ESB Asset Development UK Ltd

Millmoor Rig Wind Farm

Environmental Impact Assessment Report (Volume 1)

663320

NOVEMBER 2022

RSK GENERAL NOTES

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Project manager	Robert Beck
Date:	21/11/2022

PREFACE

ESB Asset Development UK Limited ("the applicant") is submitting an application under Section 36 of the Electricity Act 1989 for consent of Millmoor Rig Wind Farm (hereafter referred to as "the Proposed Development"), located at Wauchope Forest, south of Bonchester Bridge in the Scottish Borders. The site within which the Wind Farm would be located currently comprises commercial forestry. It is proposed that up to 13 turbines would be constructed in the turbine area (the area of the site in which the proposed turbines are located), and that each turbine would have a height of between 180 and 230 metres. The individual turbine generating capacity is anticipated to be approximately 6 Megawatts (MW), with the total installed capacity for the Proposed Development in excess of 50 MW. The application also includes approximately 20 MW of battery storage (BESS).

ESB is Ireland's premier energy company, established in 1927 and is a leading independent power generator in the UK market. ESB has a track record of over 20 years as a successful investor in the UK since commissioning one of the first independent power generation plants at Corby in Northamptonshire in 1994. ESB owns and operates wind farms across the UK and Ireland with a current generating capacity of 600 MW.

ESB has appointed RSK Environment Ltd (RSK), an experienced environmental consultancy, as lead consultant to carry out the EIA and related assessments to accompany an application to the Scottish Ministers to construct and operate the Proposed Development. This Environmental Impact Assessment (EIA) Report describes the findings of environmental assessments undertaken during the development of the Proposed Development.

Information relating to the EIA Report and supporting documentation is available in three volumes:

Volume 1 – Environmental Impact Assessment Report

Volume 2 – Figures

Volume 3 – Technical Appendices

When the Section 36 application for the Proposed Development is lodged with Scottish Government Energy Consents Unit (ECU), the applicant will advertise the application in the Edinburgh Gazette and the local press confirming by when representations on the application should be made. The ECU will also invite formal representations on the application, which will be taken into account before reaching a decision on the application.

Any representations to the application may be submitted via the ECU website at www.energyconsents.scot/Register.aspx; by email to the Scottish Government, Energy Consents Unit mailbox at representations@gov.scot; or by post to the Scottish Government, Energy Consents Unit, 4th Floor, 5 Atlantic Quay, 150 Broomielaw, Glasgow, G2 8LU, identifying the application and case reference number and specifying the grounds for representation. Further information on the Proposed Development can be found on the project website at:

https://www.esbenergy.co.uk/millmoor-rig-wind-farm

Hard copies of the EIA Report are subject to a charge of £1,000 and are available on written request from:

RSK Environment Ltd, 65 Sussex Street, Glasgow, G41 1DX.

Hard copies of the non-technical summary are available free of charge. A digital version of the EIA Report can be downloaded free from the ECU portal or from https://www.esbenergy.co.uk/millmoor-rig-wind-farm, or provided on USB stick or DVD-ROM by written request as above.

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EIA Quality Mark

This Environmental Statement, and the Environmental Impact Assessment (EIA) carried out to identify the significant environmental effects of the proposed development, was undertaken in line with the EIA Quality Mark Commitments.

The EIA Quality Mark is a voluntary scheme, operated by IEMA, through which EIA activity is independently reviewed, on an annual basis, to ensure it delivers excellence in the following areas:

- *EIA Management*
- *EIA Team Capabilities*
- *EIA Regulatory Compliance*
- *EIA Context & Influence*
- *EIA Content*
- *EIA Presentation*
- *Improving EIA practice*

To find out more about the EIA Quality Mark please visit: http://www.iema.net/eia-quality-mark/

CONTENTS

GLOSSARY

air quality standard	concentration of a pollutant, over a specified period, above which adverse effects on health and/or the environment may occur, and which should not be exceeded
alternatives	different design, layout and technological possibilities that could be considered during project development that have potential to fulfil the project objectives
ambient	of or relating to the immediate surroundings of something (e.g. ambient noise level)
ancient woodland	woodland that has existed continuously since at least AD 1600
appropriate assessment	process whereby projects, either alone or in combination, are considered to see if it can be ascertained that they will not adversely affect the integrity of a European protected site
assessment	process by which information about effects of a proposed plan, project or intervention is collected, assessed and used to inform decision making
avoidance	form of mitigation consisting in preventing the impact from happening. E.g. placement of access roads outside of rare habitats.
baseline conditions	environment as it appears (or would appear) immediately prior to the implementation of the project together with any known or foreseeable future changes that will take place before completion of the project
baseline studies	work done to determine and describe the environmental conditions against which any future changes can be measured or predicted and assessed
biodiversity	variety of life forms; different plants, animals and microorganisms; the genes they contain; and the ecosystems they form
catchment	drainage/basin area within which precipitation drains into a river system and eventually into the sea
committed development	development projects that are either under construction or have valid planning permissions/consents
compensation	measures taken to offset the unavoidable negative environmental impacts of a development by counterbalancing them with environmental gains, aiming to achieve a net neutral or beneficial outcome
competent authority	authority responsible for determining the application for consent, permission, licence or other authorisation to proceed with a development
construction phase	period during which the building or assembling of a proposed development and its infrastructure is undertaken
consultation	process by which those organisations or individuals with an interest in the area associated with the Proposed Development are identified and engaged as part of the EIA process
consultation bodies	organisations that the competent authority is required to consult by virtue of the EIA Regulations

Controlled Activities Regulations	Controlled Activities Regulations (CAR), also known as the Water Environment (Controlled Activities) (Scotland) Regulations 2011, apply regulatory controls over activities which may affect Scotland's water environment. SEPA risk assesses the proposed activities before granting an authorisation if it is appropriate. The type of authorisation depends on the environmental risk, and could be General Binding Rules, registration, or a licence.
controlled waters	surface waters, ground waters and coastal waters to which UK pollution legislation applies
culvert	pipe or box-type conduit through which water is carried under a structure
cumulative impact	impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. cumulative impact may arise as the result of (a) the combined impact of a number of different environmental topic-specific impacts from a single environmental impact assessment project on a single receptor/ resource or (b) the combined impact of a number of different projects within the vicinity (in combination with the environmental impact assessment project) on a single receptor/resource.
decommissioning	period during which a development and its associated infrastructure are removed from active operation
design event	event such as a rainstorm or flood of given magnitude and probability (usually derived from previous records)
do-nothing scenario	the conditions that would persist in the absence of the implementation of a development
effect	term used to express the consequence of an impact (expressed as the 'significance of effect'), which is determined by correlating the magnitude of the impact with the importance (or sensitivity) of the receptor or resource in accordance with defined significance criteria. For example, land clearing during construction results in habitat loss (impact), the effect of which is the significance of the habitat loss on the ecological resource.
EIA Regulations	collective term for the various statutory instruments through which the previous Directives on Environmental Assessment have been implemented in the UK
emission standard	maximum amount or concentration of a pollutant allowed to be emitted from a particular source
emissions inventory	collection of data relating to the characteristics of processes or activities that release pollutants into the atmosphere
Energy Consents Unit	part of the Scottish Government's Energy Division, the unit processes and administers energy infrastructure applications for Scottish Ministers under the 1989 Electricity Act; the unit is made up of two teams, the Section 36 team and the Section 37 team,
enhancement	measure that seek to improve an environmental condition and is over and above what is required to mitigate the adverse effects of a project
environmental assessment	method and a process by which information about environmental effects is collected, assessed and used to inform decision-making. Assessment processes include strategic environmental assessment, assessment of implications on European sites, and environmental impact assessment.

environmental impact assessment	statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. Involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Regulations, including the publication of an EIA Report.
Environmental Impact Assessment Report	otherwise known as an EIA Report. Document produced in accordance with the EIA Regulations that reports the outcomes of the EIA process
environmental information	information that must be taken into account by the decision maker (the competent authority) before granting any kind of authorisation in any case where the EIA process applies. It includes the Environmental Impact Assessment Report, including any further information, any representations made by any body required by the Regulations to be invited to make representations, and any representations duly made by any other person about the environmental effects of the development
environmental management plan	structured plan that outlines the mitigation, monitoring and management requirements arising from an environmental impact assessment
estuary	downstream part of a river where it widens to enter the sea
European protected species	all the plant and animal species included in the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) Schedule 2 and Schedule 4
European site	sites that make up the European ecological network (also known as Natura 2000 sites). These include sites of community importance (SCIs), special protection areas (SPAs) and potential SPAs (pSPAs), special areas of conservation (SACs) and candidate or possible SACs (cSACs or pSACs), and Ramsar sites.
evaluation	determination of the significance of effects. Evaluation involves making judgements as to the value of the receptor/resource that is being affected and the consequences of the effect on the receptor/resource based on the magnitude of the impact.
existing environment	see 'baseline conditions'
Gate check	Procedure adopted by the Energy Consents Unit to review work undertaken by the applicant for a Section 36 or Section 37 development prior to submission of their EIA Report and consent application.
Habitats Regulations	The Conservation (Natural Habitats) Regulations 1994 (most recently amended in 2012), is more commonly known as the Habitats Regulations. The Habitats Regulations cover requirements for sites that are internationally important for threatened habitats and species (e.g. Natura sites), species that require strict protection (e.g. European protected species), and other aspects of the previous Habitats Directive.
Habitats Regulations assessment	assessment of the impacts of implementing a plan or policy on a European site, the purpose being to consider the impacts of a project against conservation objectives of the site and to ascertain whether it would adversely affect the integrity of the site
hydraulics	processes and regimes of water flow (velocities, volumes, duration, frequency etc) in hydrological systems such as surface waters and groundwater
hydrodynamics	mechanical properties of fluids, such as those concerned with flow

hydrogeology	study of the distribution and movement of groundwater
impact	change that is caused by an action; for example, land clearing (action) during construction that results in habitat loss (impact)
intertidal	area of land between mean high water and mean low water
invertebrates	animals without backbones
local development	development type identified as local under the Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009
major development	development type identified as major under the Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009
mean (high/low) water	highest/lowest average level water reaches on an outgoing tide
method statement	document that sets out intended working or survey practices
mitigation	measures intended to avoid, reduce and compensate adverse environmental effects
monitoring	continuing assessment of the performance of the project, including mitigation measures. This determines if effects occur as predicted or if operations remain within acceptable limits, and if mitigation measures are as effective as predicted.
national development	development type identified as national under the Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009
non-statutory consultee	organisations and bodies that may be consulted on relevant planning applications
non-technical summary	information for the non-specialist reader to enable them to understand the main predicted environmental effects of the proposal without reference to the main EIA Report
operation	functioning of a development on completion of construction
pasture	grassland maintained primarily for and by grazing, and on which grazing stock is kept for a large part of the year
phase 1 habitat survey	Recognised methodology used for collating information on the habitat structure of a particular site.
photomontage	superimposing of an image onto a photograph to create a realistic representation of proposed or potential changes to a view
piling	installation of bored and driven piles into the ground
planning authority	local authority that is empowered by law to exercise planning functions for a particular area of the United Kingdom
pollution	any increase of matter or energy to a level that is harmful to living organisms of their environment (when it becomes a pollutant)
preferred option	chosen design option that most successfully achieves the project objectives and becomes subject to further design and assessment
programme	series of steps that have been identified by the applicant, or series of projects that are linked by dependency
project	One (or more) aspect of a programme or plan that has been identified by the applicant and usually involves a direct physical intervention
project objectives	objectives of the project, set by the applicant

Proposed Development	a plan or project that the applicant or promoter seeks to implement
Ramsar	areas designated by the UK Government under the International Ramsar Convention (the Convention on Wetlands of International Importance)
receptor	defined individual environmental feature usually associated with population, fauna, flora, water bodies, soils, landscapes and cultural heritage features with the potential to be affected by a project
residual effect	those effects that remain following the implementation of mitigation measures
resource	defined, but generally collective, environmental feature usually associated with soil, water, air, climatic factors, landscape, material assets, including the architectural and archaeological heritage that has potential to be affected by a project
roosting site (birds)	place where birds rest or sleep
roosting site (bats)	place where bats live (e.g. built structures and trees)
run-off	precipitation that flows as surface water from a site, catchment or region water bodies such as rivers and lakes and ultimately flows to the sea
Section 36 Application	in Scotland, the construction and operation of power stations of a certain capacity requires an application to be made to Scottish Ministers under section 36 of the Electricity Act 1989. Applications to the Scottish Ministers need to be accompanied by an EIA Report. The Energy Consents Unit's Section 36 team will process applications for on-shore power station applications, including wind farms over 50 MW and hydro developments over 1 MW.
Section 37 Application	in Scotland, applications for powerlines and wayleaves should be made to Scottish Ministers under section 37 of the Electricity Act 1989. Applications to the Scottish Ministers need to be accompanied by an EIA Report. The Energy Consents Unit's Section 37 team will process applications for off-shore power station applications, transmission lines, necessary wayleaves, and compulsory purchase orders for electricity lines and gas pipelines.
Schedule 1 project	plans or projects listed Schedule 1 of the EIA Regulations
Schedule 2 project	plans or projects listed in Schedule 2 of the EIA Regulations
Scoping	process of identifying the issues to be addressed by the environmental impact assessment process. It is a method of ensuring that an assessment focuses on the important issues and avoids those that are considered not significant.
Scoping opinion	opinion provided by a competent authority that indicates the issues an environmental impact assessment of a proposed development should consider
screening	formal process undertaken to determine whether it is necessary to carry out a statutory environmental impact assessment and publish an Environmental Impact Assessment Report in accordance with the EIA Regulations
sediment	organic and inorganic material that has precipitated from water to accumulate on the floor of a water body, watercourse or trap

semi-natural	habitat, ecosystem, community, vegetation type or landscape that has been modified by human activity but consists largely of native species and appears to have similar structure and functioning to a natural type
significance	see ‘significance of effect’
significance of effect	measure of the importance or gravity of the environmental effect, defined by either generic significance criteria or criteria specific to the environmental topic
significant environmental effect	environmental effect considered material to the decision-making process
sites of special scientific interest	main national conservation site protection measure in Britain designated under the Wildlife and Countryside Act 1981
special area of conservation	international designation implemented under the Habitats Regulations for the protection of habitats and (non bird) species
special protection area	sites designated under the previous EU Directive (79/409/EEC) for the conservation of wild birds
stakeholder	organisation or individual with a particular interest in the project
study area	spatial area within which environmental effects are assessed (i.e., extending a distance from the project footprint in which significant environmental effects are anticipated to occur). This may vary between the topic areas.
threshold	specified level in grading effects (e.g. the order of significance)
visual amenity	value of a particular view or area in terms of what is seen
vehicle movement	movement of project vehicles only
visualisation	computer generated wireline or photomontage illustrating change over time of the landscape where the Proposed Development will be located
wildlife corridor	linear habitats/landscape features such as hedgerows that may increase connectivity by acting as routes between habitat patches
worst case	principle applied where environmental effects may vary (e.g. owing to seasonal variations) to ensure the most severe effect is assessed

ABBREVIATIONS

AA	appropriate assessment
AIL	Abnormal Indivisible Load
ALARP	as low as reasonably practicable
AOD	above Ordnance Datum
BAP	biodiversity action plan
BAT	best available techniques
bgl	below ground level
BGS	British Geological Survey
BS	British Standard
CA	competent authority
CAR	Controlled Activities Regulations
CCoP	construction code of practice
CD	chart datum
CEMP	construction (or contract) environmental management plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Centre
COSHH	control of substances hazardous to health
CRTN	calculation of road traffic noise
dB(A)	decibel (A-weighted), a unit of noise measurement
DBA	desk-based assessment
ECU	Energy Consents Unit
EcIA	ecological impact assessment
EHO	environmental health officer
EIA	environmental impact assessment
EIAR	Environmental Impact Assessment Report or EIA Report
EPR	Environmental Permitting Regulations
EPS	European protected species
EQS	Environmental Quality Standards
EU	European Union
FBA	Freshwater Biological Association
FRA	flood risk assessment
GDL	garden and designed landscapes
GIS	geographic information system
GPS	global positioning system
GWDTE	Groundwater dependent terrestrial ecosystems

HAP	habitat action plan
HAZID	hazard identification
HDV	heavy duty vehicle
HER	Historic Environment Record
HGV	heavy goods vehicle
HIA	health impact assessment
HRA	Habitats Regulations assessment
HES	Historic Environment Scotland
HSE	Health and Safety Executive
IEMA	Institute of Environmental Management and Assessment
ILP	Institute of Lighting Professionals
IPP	Independent Power Producer
JNCC	Joint Nature Conservation Committee
km	kilometre
kV	Kilovolt
LCA	landscape character area
LCT	landscape character types
LAQM	local air quality management
LBAP	local biodiversity action plan
LDP	local development plan
LGV	light goods vehicle
LI	Landscape Institute
LiDAR	Light detection and ranging
LNR	local nature reserve
LTP	local transport plan
LVIA	landscape and visual impact assessment
MAGIC	Multi-Agency Geographic Information for the Countryside
MV	Medium Voltage
MW	Megawatts
NER	Neutral Earth Resistor
NID	National Infrastructure Directorate
NNR	national nature reserve
NO_x	oxides of nitrogen
NPF	National Planning Framework
NTS	non-technical summary
NVC	National Vegetation Classification
OS	Ordnance Survey
PA	Planning authority

PAC	pre-application consultation
PAN	proposal of application notice
PCS	power conversion systems
PM_{10}	Particulate matter (with an aerodynamic diameter below 10 µm)
RCS	river corridor survey
RHS	river habitat survey
RIGS	regionally important geological and geomorphological site
RSPB	Royal Society for the Protection of Birds
SAC	special area of conservation
SCADA	Supervisory control and data acquisition
SEPA	Scottish Environment Protection Agency
SINC	site of importance for nature conservation
SLA	special landscape area
SM	scheduled monument
SNH	Scottish Natural Heritage
SoCC	statement of community consultation
SoS	Secretary of State
SPA	special protection area
SPP	Scottish Planning Policy
SSSI	site of special scientific interest
SuDS	sustainable drainage system
SWT	Scottish Wildlife Trust
TA	transport assessment
TIA	traffic impact assessment
TMP	traffic management plan
TNO	Transmission Network Operator
TPO	tree preservation order
TRICS	Trip Rate Information Computer System
UK	United Kingdom
VAR	volt-ampere reactive
VEC	valued ecological component
VER	valued ecological receptor
WEBS	Wetland Bird Survey
WFD	Water Framework Directive
ZTV	zone of theoretical visibility

1 INTRODUCTION

1.1 Background to Proposed Development

1.1.1 ESB Asset Development UK Limited (hereafter ‘the applicant’) is proposing to construct a new wind farm development called Millmoor Rig Wind Farm (hereafter referred to as “the Proposed Development”), located at Wauchope Forest, south of Chesters in the Scottish Borders (Ordnance Survey Grid reference: NT 61212 07010).

1.1.2 The applicant is seeking to secure approval for the Proposed Development by way of a consent application under Section 36 of the Electricity Act 1989[1] and the Electricity Works (Environmental Impact Assessment) (Scotland) (EIA) Regulations 2017[2] (hereafter ‘the EIA Regulations’) to Scottish Ministers.

1.1.3 The Proposed Development is situated at the same location, but with a different site boundary, as a previous wind farm proposal, Highlee Hill Wind Farm, that was submitted by its developer RES as a planning application to Scottish Borders Council (SBC) in July 2016 and allocated the application reference 16/00810/FUL. The Highlee Hill Wind Farm planning application was formally withdrawn by RES in May 2017. Millmoor Rig Wind Farm is a wholly new project with no connection to the Highlee Hill Wind Farm proposal or to RES.

1.1.4 The Proposed Development comprises the turbine area (the area of the site in which the proposed turbines are located) and the access area (the area of the site in which the access route from the public road to the turbine area is located). The turbine area and access area form the site defined by the application red line boundary.

1.1.5 The turbine area currently comprises commercial forestry. The Proposed Development would comprise of up to 13 turbines, with a range of blade tip heights between 180 and 230 metres. Associated infrastructure would also be developed including access tracks, borrow pits, transformers, underground cables, onsite sub-station / control building, a prospective energy storage facility, telecommunications equipment and temporary construction compounds. The individual turbine generating capacity is anticipated to be approximately 6 MW, with the total generating capacity for the Proposed Development in excess of 50 MW. **Figure 1.1** shows the Proposed Development areas context and location

1.2 Environmental Impact Assessment (EIA)

1.2.1 EIA is a process for identifying the likely consequences on the existing biological, physical and human environment arising from development progression.

[1] United Kingdom Government (1989), Electricity Act 1989, published by the United Kingdom Government (1989).

[2] Scottish Government (2017), The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

1.2.2 The process is undertaken to ensure that the environmental effects of certain types of development proposal are fully investigated, understood and taken account of in the consenting and authorisation process.

Statutory Context

1.2.3 The requirement that an EIA should be prepared by the promoters of certain types of development prior to consent being granted, and the process by which an EIA should be undertaken, was originally prescribed in 1985 within a previous European Council Directive.

1.2.4 The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 set out the statutory requirements and apply where planning consent is being sought for developments under the Section 36 of the Electricity Act 1989.

1.2.5 Whilst not a statutory requirement, as part of the EIA process, the applicant sought a formal Scoping Opinion (ECU reference: ECU00003426)[3] from the Energy Consents Unit (ECU) on behalf of the Scottish Ministers under the EIA Regulations. This was submitted on 08 February 2022. In further recognition of the Proposed Development's potential effects, the applicant has decided to volunteer to undertake an EIA in support of the application.

Environmental Impact Assessment Report

1.2.6 It is a requirement of the EIA Regulations that an EIA Report be prepared to describe the likely significant effects of a proposed development on the environment.

1.2.7 This EIA Report accompanies the S36 application and reports the formal process and outcomes of the EIA undertaken for the Proposed Development. Its purpose is to present the Proposed Development and its predicted environmental effects in a concise, objective and non-promotional manner in order to provide the Scottish Ministers, Local Authority, consultation bodies, interested bodies and the general public with sufficient information to assess its likely environmental effects.

1.2.8 This EIA Report has been prepared under the supervision of, and reviewed by, persons having suitable competency in environmental impact assessment, which is also a requirement of RSK's continued registration on IEMA's 'EIA Quality Mark' scheme. Amongst other things, RSK defines 'suitable competency' as sufficient relevant qualifications and experience (e.g. a minimum of five years) in working on EIA projects and suitable professional standing as recognised by, for instance accreditation as a Chartered Environmentalist or equivalent.

1.3 Structure of Environmental Impact Assessment Report

1.3.1 The Environmental Impact Assessment (EIA) Report is presented in three volumes:

- **Volume 1**: Environmental Impact Assessment Report;
- **Volume 2**: Figures; and
- **Volume 3:** Appendices.

[3] https://www.energyconsents.scot/ApplicationSearch.aspx. Search for "Millmoor Rig", ECU reference: ECU00003426

1.3.2 A non-technical summary (NTS) of the EIA Report has been prepared as a separate document, in accordance with the requirements of the EIA Regulations.

Volume 1

1.3.3 EIA Report Volume 1 comprises 17 sections, which are structured in the following manner.

- **Chapter 1 Introduction** introduces the Proposed Development and explains the underlying objectives of the proposals, describes the statutory basis for the EIA, outlines the structure adopted in this EIA Report and identifies the team of competent experts responsible for undertaking and reporting the EIA.
- **Chapter 2 Proposed Development** identifies the location of the project and characterises the site and its surroundings; establishes the need for the Proposed Development; summarises the reasonable alternatives that have been considered in the development of a preferred design solution; provides a detailed description of the key design components and characteristics of the Proposed Development and associated land take; and outlines the planned timescales for construction and implementation.
- **Chapter 3 Consultation** summarises stakeholder consultation undertaken during the EIA and the design development of the Proposed Development.
- **Chapter 4 Environmental Assessment Process** summarises the Scoping process undertaken to establish the scope of the EIA, the adopted approach to the EIA and format of the individual technical assessments, and modifications made to the EIA scope that have arisen during the design development and assessment of the Proposed Development.
- **Chapter 5 Planning Policy Context** provides a summary of the legislative and policy framework relevant to the development including an overview on the climate emergency and the response to COVID-19.
- **Chapters 6 to 17 Technical Assessments** report the findings of the detailed environmental assessments and the residual effects on the environment predicted to occur as a result of implementation of the Proposed Development.
- **References** of documents used or considered during the EIA are provided at the end of each section, where relevant.

Volume 2

1.3.4 Volume 2 comprises a series of plans, figures and photographs (referenced in Volume 1) that illustrate the relationship between the existing environment and the Proposed Development.

Volume 3

1.3.5 Volume 3 comprises technical appendices (referred to in Volume 1) containing detailed reports of the individual environmental assessments and other relevant supporting documentation.

1.4 EIA Team

1.4.1 RSK Environment Ltd (RSK) has undertaken the EIA and preparation of this EIA Report on behalf of the applicant.

1.4.2 The relevant expertise and qualifications of the experts involved in the preparation of this EIA Report are detailed in **Table 1.1**.

Table 1.1: EIA Team Responsibilities

Name	Qualifications	Company	Role
EIA project management team			
Joe Somerville	MA(Hons), MSc MCIfA FSA Scot PIEMA	RSK	EIA Project Director
Robert Beck	BA (Hons), MEnvS, PGDip, PIEMA	RSK	EIA Project Manager
Adam Paterson	BSc (Hons), MSc, GIEMA	RSK	EIA Project Support
Spyridonas Angeli	BSc (Hons), MSc	RSK	EIA Project Support
EIA technical specialists			
Sarah Sinclair	MA (Hons), MRTPI	RSK Stephenson Halliday	Technical lead - Planning
David Gooch	MA, CMLI	Pegasus	Technical lead – Landscape and Visual Assessment
Owen Raybould	BSc (Hons), MCIfA, IHBC	RSK Headland Archaeology	Technical lead - - Cultural Heritage and Archaeology
Katie Farmer	BSc (Hons), MCIEEM	RSK Biocensus	Technical lead - Ecology
Leanne Cooke	BSc (Hons), MCIEEM	RSK Biocensus	Specialist - Ecology
Sarah Sanders	BSc (Hons)	McArthur Green	Technical lead - Ornithology
Catherine Isherwood	MA, MSci, MSc, PhD, Chartered Geologist, Fellow of the Geological Society of London, Professional Graduate of the Institute of Materials, Minerals and Mining	RSK WRc	Technical lead - Geology, Hydrogeology, Hydrology and Peat
Matthew Cand	Dipl Eng, PhD, Member of the Institute of Acoustics	Hoare Lea	Technical lead - Noise and Vibration

Name	Qualifications	Company	Role
Jon Hassel	BEng (Hons), Member of the Chartered Institution of Highways and Transportation, Member of the Transport Planning Society	RSK Traffic and Transport	Technical lead - Traffic and Transportation
Ian Fletcher	BEng	Wind Business Support	Technical lead - Aviation and Radar
Robert Beck	BA (Hons), MEnvS, PGDip, PIEMA	RSK	Technical lead - Socio-Economics, Land Use and Tourism
Spyridonas Angeli	BSc (Hons), MSc	RSK	Technical lead – Shadow Flicker
Michael Sutton	BSc	Pager Power	Technical lead - Telecommunications and Electromagnetic Interference
Libby Robinson	PhD, BSc(Hons), FGS	RSK	Technical lead - Climate Change Mitigation
Wayne Scurrah	DDF	RSK ADAS	Technical lead - Forestry

1.5 References

Scottish Government (2017), The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

UK Government (1989), Electricity Act 1989.

2 PROPOSED DEVELOPMENT

2.1 Site Description

2.1.1 The Proposed Development site is located in the Scottish Borders, within a large area of commercial forestry in the Wauchope Forest. The location of the Proposed Development site is shown in **Figure 2.1.**

2.1.2 The land use within the Proposed Development site consists entirely of commercial forestry plantation. The plantation is currently active with some sections being felled, and other areas presenting recent crop plantation as well as mature stands. Only a few areas within the site are not within forestry:

- small areas kept clear around the abandoned settlement of Westshiels;
- forestry rides;
- areas adjacent to the streams and burns; and
- a large quarry located in the western part of the site. The quarry area is recorded on OS mapping as disused, but appears to be currently active.

2.1.3 The Proposed Development site is located in the Hawick and Denholm ward of the Scottish Borders Council region. The nearest settlements are Chesters, approximately 3.3 km to the north, and Bonchester Bridge, about 5.2 km to the north-west along the A6088 (all measurements taken from the nearest turbine). The nearest group of properties is located at Southdean, approximately 2.1 km to the north. The nearest individual properties are Dykeraw and Dykeraw Cottage, about 1.7 km to the north, and Lustruther, approximately 2.1 km to the north.

2.1.4 The site is close to the Scotland–England border, which is about 2.9 km from the nearest turbine at its closest point..

2.1.5 Within 25 km of the site there are a number of other wind farm developments that are variously operational, consented or are currently in the planning system (referred to as 'cumulative developments'), comprising:

- Langhope Rig (operational);
- Windy Edge Wind Farm (consented)[4];
- Pines Burn Wind Farm (consented);
- Faw Side Wind Farm (in planning); and
- Teviot Wind Farm (in planning).

2.2 Need for the Development

2.2.1 Scotland's current policy ambitions for addressing the impact of climate change are amongst the highest in Europe. The Scottish Government declared a climate emergency in May 2019 and has recently passed the Climate Change Bill which has passed into law

[4] Windy Edge Wind Farm was consented in 2015; however, the developer has since submitted a Scoping Request for a different development on the same site. The original consented development has been used and is considered most relevant to the cumulative baseline; however, the revised Windy Edge Scoping scheme is included in **Technical Appendix 6.9 Cumulative Effects of Scoping Sites**.

the requirement for a 100% reduction in CO_2 emissions by 2045 and an interim target of 70% reduction in emissions by 2030.

2.2.2 The Scottish Energy Strategy has also set a target for 50% of total energy demand (including from heat and transport) from renewable sources by 2030, which implies a further substantial increase in delivery of renewable energy. As such, the Scottish Government has encouraged all forms of renewable and low carbon solutions for meeting these energy target.

2.2.3 The Scottish Government's Onshore Wind Policy Statement 2017[5] recognises both the continuing important role of onshore wind and the challenges it now faces in a subsidy-free environment. Further detail relating to the Energy Strategy, Onshore Wind Policy Statement and ongoing demand for renewable energy generation is provided in **Chapter 5: Planning Policy Context** and in the separate **Planning Statement** accompanying the application.

Energy Security

2.2.4 Onshore wind is the cheapest form of renewable energy and Scotland has some of the best wind resource in Europe.

2.2.5 Although renewable capacity has grown significantly, there are times when, for example, there are periods of low wind, gas generators are often required to fill demand. This comes at a cost, especially in recent times, with wholesale gas prices at a record high. The Office of National Statistics[6] states that gas is used to fuel approximately 42.6% of the UK's electricity generation, so rising gas prices have, in turn, led to rising electricity prices.

2.2.6 The design of electricity systems still has to catch up with the role of renewable energy, and this is recognised by the UK Government and Scottish Government, which have plans to make the grid 'renewable ready' to ensure more renewables can go into the grid.

2.2.7 **Chapter 5: Planning Policy Context** of the EIA Report outlines the international, UK and Scottish climate change, renewable energy and planning policies that are considered to be relevant to the Proposed Development. Legislation, planning policy and guidance specific to each technical discipline is set out in the relevant technical chapters (**Chapters 6** to **17**) of the EIA Report.

2.3 The Applicant

2.3.1 ESB Asset Development UK Limited, part of ESB, Ireland's premier energy company, established in 1927 is a leading independent power generator in the UK market. ESB has a track record of over 20 years as a successful investor in the UK since commissioning one of the first independent power generation plants at Corby in Northamptonshire in 1994. ESB owns and operates wind farms across the UK and Ireland with a current generating capacity of 600 MW.

[5] Scottish Government (2017). Onshore Wind Policy Statement.

[6] Office for National Statistics (2022) Digest of UK Energy Statistics Chapter 5. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1094628/DUKES_2022_Chapter_5.pdf [accessed November 2022].

2.4 Site Selection Rationale

2.4.1 The applicant identified potential sites for large scale onshore wind energy development throughout Scotland through a constraints-based approach, with sites being evaluated against the following criteria, in no particular order:

- avoiding 'Group 1' areas from Scottish Planning Policy (SPP);
- avoiding SPP 'Group 2' national and international designations;
- Development Plan policy;
- landscape character;
- distance from dwellings;
- cumulative impact with other wind farm developments;
- exposed sites with good wind speed;
- feasibility of grid connection;
- area topography, including gradients, exposure, watercourses and land use;
- feasibility of access for abnormal indivisible loads (AILs); and
- compatibility with aviation interests.

2.4.2 An essential element of the search for potential sites is the interest of landowners in onshore wind energy development. In that regard, and taking the criteria above into account, the Proposed Development site initially became a viable proposition for the applicant following discussions with the landowners, who were interested in exploring the possibility of harnessing such a development on their land.

2.4.3 The Proposed Development site was confirmed as a good site for development following further feasibility assessments.

2.5 Consideration of Alternatives

2.5.1 According to the EIA regulations, the EIA Report should include: *"a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment*."

2.5.2 With respect to the Proposed Development the alternatives considered were as follows:

- different turbine and infrastructure layouts/locations within the Proposed Development site;
- different turbine heights/dimensions; and
- different access routes to and from the Proposed Development site in terms of delivery of AIL.

2.5.3 The Proposed Development design and layout was adapted and altered in response to environmental constraints and consultation feedback. The Proposed Development went through a series of four design iterations. Changes to the layout included increasing the distance of the proposed turbines to residential properties in Chesters; decreasing the number of turbines; and introducing varying turbine heights to blade tip.

2.5.4 Each of these layouts is shown on **Figure 2.2** and a summary of the layout iterations is included within **Section 2.6**.

2.5.5 In considering turbine heights and dimensions, a maximum turbine tip height and approximate rotor diameter has been selected for the purposes of design and assessment of impacts. However, it should be noted that a single candidate model of the turbine has not been specified. For the purposes of assessment, therefore, where relevant for each technical assessment turbine models that adhere to the limits of stated dimensions, and provide the realistic relevant worst case impact, have been assumed.

2.6 Design Evolution and Development of Preferred Option

2.6.1 The Proposed Development has undergone four principal iterations of the layout, which have been developed at different stages in the project design process in accordance with the landscape and visual design objectives discussed at **Section 6.1** of the EIA Report:

- Layout A –15 turbine Scoping layout, each with a maximum height to blade tip of 200 m, representing a wind optimised layout.
- Layout B –13 turbine layout with a maximum height of 200 m, except for one turbine with a maximum height of 180 m, informed by early results of onsite surveys and consultant inputs.
- Layout C –13 turbine layout with five turbines with a maximum height of 180 m, two turbines with a maximum height of 200 m and six turbines with a maximum height of 210 m, responding to a detailed landscape appraisal, alongside initial design of ancillary infrastructure. Two options for site access were identified to the north-east of the site, running from the A6088 predominantly along existing forestry tracks.
- Layout D – The final site layout comprising 13 turbines, with five turbines with a maximum blade tip height of 180 m, two turbines with a maximum height of 200 m, four turbines with a maximum height of 210 m, and two turbines with a maximum height of 230 m, reflecting an enhanced energy yield compared to Layout C, with detailed ancillary infrastructure design and a preferred access route from the A6088.

2.6.2 Design iterations (A to D) are shown on **Figure 2.3**.

Layout A

2.6.3 The first design was developed prior to any detailed site-specific surveys being completed. The layout was based onsite information available at the time, including baseline environmental data recorded in Highlee Hill Wind Farm Environmental Statement and collected from desktop studies. In addition, technical constraints were considered, such as turbine separation distances of approximately 3 and 4 rotor diameters in downwind and cross wind directions respectively (based on a 163 m rotor) and the anticipated wind variation over the site with topography. The layout comprised 15 turbines of up to 200 m tip height, which represented the maximum physical capacity of the turbine area from a wind resource perspective prior to the establishment of detailed constraints. Layout A was used for Scoping consultation.

Layout B

2.6.4 Following completion of detailed site-specific surveys, which refined the environmental baseline and key constraints, a design workshop was held with technical specialists to get an improved layout of turbines (with consideration given to other infrastructure).

2.6.5 The location and sensitivity of all identified environmental receptors were mapped, and appropriate buffers around them were agreed between the technical specialists and project engineers. The following design principles and buffers were applied during this design iteration:

- a 1,630 m residential buffer was adopted (i.e., ten times the proposed 163 m rotor diameter);
- turbine separation distances of approximately 5 and 3 rotor diameters in downwind and cross wind directions respectively (based on a 163 m rotor diameter);
- 100 m buffer from the River Tweed and Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI);
- 100 m buffer from Jed Water due to it flowing into a tributary of the River Tweed SAC and SSSI;
- 50 m buffer from other watercourses;
- 220 m buffer from designated heritage assets and 10 m buffer from non-designated heritage assets;
- 500 m buffer from Tamshiel Rig Scheduled Monument(SM10605);
- 100 m buffer from a microwave link crossing the site;
- avoidance of areas of deep peat (>0.5 m depth);
- a set back from landownership boundaries to avoid blade oversailing;
- avoidance of the most sensitive habitats and protected species; and
- avoidance of slopes greater than 12 degrees.

2.6.6 Turbines were moved further away from residential properties in Southdean than in Layout A, resulting in a reduction of turbines from 15 to 13. Turbines were generally moved to lower lying areas of the site so that topography would provide natural screening. Scoping turbine T04 (which was renumbered T10 from Layout B onwards) was located on an area of higher ground and blade tip height was reduced from 200 m to 180 m to maintain a balanced composition.

2.6.7 This layout was used as the basis for detailed design of the ancillary infrastructure.

Layout C

2.6.8 A detailed infrastructure design was completed based on Layout B. The key design principles for the access track network were, as far as practicable, to utilise the existing forestry tracks and to minimise new watercourse crossings. This resulted in the micrositing of turbines T02 and T13.

2.6.9 Following this exercise, wirelines showing the evolving design from key viewpoints were used to appraise the potential visual effects. Comparisons were made with the visualisations from the Highlee Hill Wind Farm application. This resulted in numerous minor changes to improve the visual appearance of the scheme and to reduce visibility compared to Highlee Hill Wind Farm from key viewpoints, including the western approach to Chesters, Carter Bar, and residential properties to the south-west and along the A6088 to the north. Turbines T03, T07, T08 and T09 were reduced from 200 m to 180 m to blade tip height to reduce their prominence.

2.6.10 Consideration was given to increasing some turbine heights in order to maximise the energy generation onsite, whilst maintaining key LVIA design objectives. As a result, turbines T04, T05, T06, T11, T12 and T13 were increased 200 m to 210 m to blade tip height. This resulted in a more even composition and a lower maximum turbine height (527 m compared to 548 m) above ordnance datum (AOD) than Layout A.

2.6.11 In addition, two site access options were identified to the north-east of the site, running from the A6088 predominantly along existing forestry tracks. Potential locations were also identified for the substation and battery storage compound.

2.6.12 An appraisal of potential site access routes was considered before selecting the preferred options from the east at Martinlee Plantation, 1.7 km north-east of the turbine area. Site access from the west of the Proposed Development site was discounted because an abnormal load route assessment confirmed it would not have been technically feasible to deliver turbine components to this access point. Site access from Dykeraw Farm, as was proposed in the Highlee Hill Wind Farm, was discounted as that would have required routing construction traffic past residential properties at Southdean, resulting in potentially adverse effects. Site access from the east at Martinlee Plantation was preferred as it was technically feasible and avoids traffic passing through Southdean and Chesters. This site access option would utilise existing forestry tracks that would be upgraded, minimising the requirement for new tracks to be constructed, and reducing potential environmental disturbance.

2.6.13 Two eastern site access options were considered. Both leave the A6088 at Martinlee Plantation and follow the existing forestry track in a south-westerly direction. Route option one then diverts to the north-west through forestry to the turbine area at its north-eastern corner in the vicinity of turbine T03. Route option two continues south-west along the existing forestry track before turning west on a new section of track through forestry into the turbine area at its south-eastern corner in the vicinity of turbine T01. Both route options would require new watercourse crossings at the Carter Burn and the Black Burn.

2.6.14 Other ancillary infrastructure proposed in Layout C comprised two substation and battery storage compound location options, a potential mobilisation compound location in the field to the east of the proposed site access junction from the A6088, and three potential borrow pit search areas based on an initial desk-based assessment of environmental data and bedrock potential.

2.6.15 An initial aviation lighting scheme was also prepared, which proposes a cardinal lighting scheme, as discussed at **Chapter 13: Aviation and Radar**, with the outermost turbines (T01, T03, T08, T09, T11 and T12) to be lit.

2.6.16 This layout was then subject to further survey work and desk-based assessments before finalising the design.

Layout D – Final Layout

2.6.17 Layout D represents the final stage of design iteration, which included finalisation of turbine locations and siting and design of ancillary infrastructure.

2.6.18 Further survey work comprised a detailed peat depth survey, protected species survey, national vegetation classification (NVC) survey, archaeological walkover survey and forestry baseline survey. Additionally, desk-based assessments comprising a theoretical visibility mapping exercise for the proposed lit turbines to review the potential landscape and visual impacts and a review of Layout C by the construction design and management (CDM) principal designer were conducted.

2.6.19 A second design workshop was held to review Layout C and to identify locations for additional ancillary infrastructure, including the substation and battery storage compound, mobilisation compounds, and potential borrow pit locations.

2.6.20 The final layout including ancillary infrastructure is shown on **Figure 2.2**.

2.6.21 Individual technical assessment chapters in the EIA Report include design input in further detail and respond to specific matters, in particular pertaining to the scale of the proposed turbines and the landscape fit of the scheme.

Turbines

2.6.22 The additional site surveys, which included a, confirmed the existing understanding of the onsite constraints. Therefore, the turbine locations established in Layout C remained unchanged.

2.6.23 The heights of turbines T05 and T06 were increased from 210 m to 230 m to blade tip. These turbines sit low within the overall array and a landscape and visual appraisal found that increasing the tip heights would result in a limited increase to the overall landscape and visual effects. Neither of these turbines is proposed to be fitted with visible aviation lighting so their increased height does not introduce additional night-time effects the increased heights of turbines T05 and T06 allow the wind yield to be increased compared to Layout C.

2.7 Site Access

2.7.0 Further peat depth, archaeological walk over, forestry mensuration, botanical and protected species surveys were conducted along both proposed access options. Following an appraisal of environmental and technical constraints, site access option one was chosen as it avoided potential impacts on a badger sett and reduced the overall length of access track required.

Ancillary Infrastructure

2.7.1 Field surveys did not identify any sensitive environmental receptors within the proposed mobilisation compound area so this location remained. A turbine delivery layover area was also incorporated along the site access, at a location where no sensitive environmental receptors had been identified during surveys.

2.7.2 The substation option, to the east of the site, was identified as the preferred location, but the substation option to the west of the site, has been retained as an alternative. Both options will be assessed within the EIA Report. On the advice of the archaeological consultant the temporary construction compound south of the preferred substation option was moved immediately adjacent to the west of the substation so that the forestry immediately to the south would provide a level of screening of the substation from SM10605 Tamshiel Rig.

2.7.3 Following the design workshop, it was decided to retain all three proposed potential borrow pit search area locations as identified in Layout C, but with a minor amendment made, for technical reasons, to relocate borrow pit search area BP1 to the west of the existing forestry track.

2.8 Proposed Development

Key Components

2.8.1 The Proposed Development infrastructure would comprise:

- up to 13 wind turbines, of approximately 6 MW each, five with a maximum tip height of 180 m, two with a maximum tip height of 200 m, four with a maximum tip height of 210 m and two with a maximum tip height of 230 m;
- hardstanding areas at the base of each turbine, with a permanent area of approximately 2,156 m^2;
- site entrance and access track from the A6088 using the route of an existing forestry track, and access track linking the turbine locations. Total length of access tracks is 14,909.9 m, of which 3,897.7 m is new access track with associated new watercourse crossings and 11,012.2 m is existing access track and watercourse crossings which would need to be upgraded;
- an operations control building with parking and welfare facilities (part of substation compound);
- a substation compound (two location options included in the EIA);
- an energy storage facility with a capacity of *c*. 20 MW;
- telecommunications equipment;
- up to two temporary construction compounds;
- a temporary turbine lay over area;
- three borrow pit search areas, to provide suitable rock for access tracks, turbine bases and hardstandings; and
- underground cabling linking the turbines with the substation.

Wind Turbines

<u>Turbine Parameters</u>

2.8.2 The turbines would have an approximate rotor diameter of 163 m. The model and actual dimensions of the wind turbines ultimately selected would be influenced by the economic market and technological advances at the time of procurement. However, blade tip height would not exceed 230 m. Indicative elevations are shown on **Figure 2.4**. Grid references and maximum blade tip heights for the proposed turbine are identified in **Table 2.1**.

Table 2.1: Proposed Turbine Locations

Turbine	Easting	Northing	Maximum Height to Tip (m)
T01	363467	605540	200
T02	363226	606000	200
T03	363500	606716	180
T04	362806	606357	210
T05	362152	606085	230
T06	362073	605489	230
T07	362314	607067	180
T08	361771	607162	180
T09	360577	606834	180
T10	360977	606405	180
T11	360995	605828	210
T12	361395	605389	210
T13	361644	606199	210

2.8.3 The proposed turbine locations and ancillary infrastructure would be subject to a proposed maximum micrositing tolerance of 50 m in any direction. In those places where environmental features may be potentially affected by the micrositing, tolerance would be constrained to less than 50 m, and such changes would be managed in consultation with an Environmental Clerk of Works (ECoW) for the Proposed Development during its construction phase. The micrositing constraints relevant to the Proposed Development are set out within each of the technical sections of this EIA Report. Any movement of the turbines from the Proposed Development layout outwith the micrositing tolerance would be agreed with SBC and would be in accordance with the mitigation set out in this EIA Report. A summary of the proposed environmental commitments is provided in **Technical Appendix 2.1: Schedule of Environmental Commitments.**

Turbine Design

2.8.4 The turbines would be three bladed, horizontal axis turbines with solid tubular towers. The blades would be made from reinforced composite materials such as fibreglass. The turbine towers would be made of steel.

2.8.5 The wind turbines would be of the same basic appearance and colour. It is proposed that the turbines would be of a matt grey colour finish. Although off-white has been an accepted colour for turbines, more recently constructed wind turbines have been a mid-grey tone, which reduces the distance over which turbines are visible, especially in dull weather or low light conditions. The choice of material and colour for the proposed turbines is an important consideration in terms of visual impact. Finishing would be expected to be agreed by a condition placed on consent.

Turbine Foundations

2.8.6 Turbine foundations would be dependent upon site-specific ground conditions at the turbine locations and the type of turbine chosen. However, it is envisaged that installation of the turbines using a steel reinforced concrete base (gravity foundation) would be suitable.

2.8.7 The concrete gravity foundations would be located underground. Therefore, a quantity of earth would need to be removed. The amount of earth to be removed would depend upon site-specific ground investigations at each turbine location. Topsoil, peat and other material would be removed from the foundation area and stored so that it may be used later for reinstatement.

2.8.8 Turbine foundations would be set down to the depth of suitable bearing strata with an approximate diameter of 25 m and circular or octagonal shape (see **Figure 2.5 'Indicative Turbine Foundations'**). Should geotechnical investigations demonstrate that the required bearing capacities are not achievable; a piled foundation design would be adopted using the same overall design footprint.

2.8.9 An anchor ring and foundation bolts would be cast into a central column onto which the turbine tower would be fixed. Concrete for the foundations would either be delivered to the Proposed Development in a "ready mix" form or processed in a concrete batching plant located onsite within a construction compound.

2.8.10 For the purposes of this EIA Report, a maximum (worst case) scenario for turbine foundations of a 3 – 4 m depth and 25 m by 25 m circular or octagonal footprint has been assumed. The concrete bases would be allowed to cure (i.e., reach its design strength) before turbines are fitted.

Turbine Lighting

2.8.11 As discussed in more detail in **Chapter 13: Aviation and Radar**, the Air Navigation Order Article 222[7] requires turbines with a tip height of or exceeding 150 m to display aviation lighting to indicate their presence. Dispensations for reduced lighting schemes can be agreed with the Civil Aviation Authority (CAA), according to the guidance provided in CAP-764[8]. For the Proposed Development, the CAA has been consulted and a reduced lighting scheme whereby only six turbines require to be lit with visible lighting (2000 candela, reducing to 200 candela in good visibility) on the hubs, is proposed. This would include the most elevated turbine, ie the turbine having the most elevated turbine tip, T11. In addition, cardinal turbines T01, T03, T08, T09 and T12 would be lit in order to define the footprint of the Proposed Development. Additionally Infra-red (IR) lighting would be installed on all peripheral turbines to meet the requirements of the Ministry of Defence (MoD). Subject to the evolution of CAA policy, the applicant would also consider the

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[7] UK Statutory Instruments (2016), The Air Navigation Order Part 8 Chapter 2 Article 222. Accessed at: https://www.legislation.gov.uk/uksi/2016/765/article/222/made [accessed March 2022].

[8] Civil Aviation Authority (2016), CAP 764: Policy and Guidelines on Wind Turbines. Accessed at: https://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=5609 [accessed March 2022].

installation of an aircraft detection lighting system (ADLS) on the Proposed Development. This would switch on the visible lights only when an aircraft passes within specified horizontal and vertical distances from the Proposed Development.

2.8.12 Further information on aviation turbine lighting is provided in **Chapter 13: Aviation and Radar**, in particular **Section 13.7: Mitigation**. Further discussion of the way turbine lights would be perceived is provided in **Appendix 6.2: Aviation Lighting Assessment**.

Turbine Erection

2.8.13 The Turbine components would be delivered to the relevant storage area for each component, whether it be to a specific turbine hardstanding or to a storage area located at one of the construction compounds, until weather conditions are appropriate for turbine erection. The bottom turbine tower section would firstly be fixed to the anchor ring and foundation bolts imbedded into the central column of the foundations, followed by the upper turbine tower sections, all being lifted into place by two cranes (a heavy lifting capacity crane, and a smaller service crane). The cranes would then lift the nacelle into place on the top section of the turbine tower. Blades would then be fitted to the rotor hub, either on the ground before lifting altogether onto the nacelle, or otherwise individually lifted for connection to the rotor hub *in situ*.

Turbine Hardstandings

2.8.14 Level hardstanding areas are required adjacent to each turbine base for the operation of a heavy lifting capacity crane, and a smaller service crane, used for assembly of the turbine components. They would also be used as storage areas for the turbine components. The hardstandings would be to the same general specification as the turbine access tracks that they adjoin, but a slightly greater depth of construction is envisaged.

2.8.15 It is anticipated that each hardstanding would be 77 m x 28 m with a 5.5 m wide track running along the length of the hardstanding. Two blade fingers, each approximately 20 m x 4 m, may be required on the track side of the hardstanding. The cut-and-fill batters required on the hardstandings would be dictated by pre-construction detailed site investigation (SI) surveys.

2.8.16 In addition to the hardstanding for the main assembly crane, up to two additional temporary crane pads may be required for crane assembly. These crane pads are shown on the Typical Turbine Hardstanding Arrangement drawing at **Figure 2.6.**

2.8.17 The hardstandings would be constructed using suitable surplus material generated from the excavation process elsewhere within the turbine area and from borrow pits where possible. Topsoil and peat would be excavated, and stone laid and compacted to the required depth. The depth of the hardstandings would be dependent on the ground conditions at specific locations.

Transformer Houses

2.8.18 Each turbine would be expected to have an associated transformer, located either internally or externally to the turbine. External transformers would be located within weather-proof housing which would have indicative dimensions of 5.5 m by 3.0 m by

3.0 m. Transformer housing would be colour finished to blend in with the surrounding landscape.

Site Entrance and Access Tracks

2.8.19 The site access junction would be located at an existing junction from the A6088 at Martinlee Plantation, approximately 1.7 km north-east of the turbine area. This access would be upgraded to safely allow the delivery of wind turbines and construction materials.

2.8.20 The access route to turbines would be made up of a total of approximately 14.9 km of new and upgraded track.

2.8.21 The following principles have been applied as far as practicable in the design of the onsite access tracks:

- tracks make use of existing infrastructure and track/disturbed ground where possible;
- track length is kept to a minimum to reduce construction time, the requirement for stone, and land-take;
- gradients are to be kept to acceptable levels to accommodate the requirements of delivery vehicles and also to allow construction plant to move safely around the Proposed Development site;
- tracks are routed to avoid sensitive hydrological, ecological and archaeological features as far as practicable and to keep watercourse crossings to a minimum;
- tracks are routed to minimise felling requirement, such as the use of existing forestry rides;
- tracks are routed to avoid areas of deep peat;
- tracks are designed to minimize the required cut-and-fill quantities; and
- horizontal and vertical alignments of tracks are designed in such a way as to comply with Turbine Supplier requirements, for example minimum turning radius and vertical curvature on both the tracks and hardstandings.

2.8.22 The access track would generally be unpaved (stone surface) and of 5.5 m running width, with a 1 m shoulder verge to either side and 2:1 side slopes. The track could be up to 7 m wide on bends. The access tracks are shown in **Figure 2.7**.

2.8.23 Approximately 3.9 km of new access track would require construction. Turning heads of sufficient size to accommodate articulated vehicles would also be provided at several locations, as indicated on **Figure 2.3.** Some further widening would be necessary along the access track route to allow for passing places/temporary lay down areas, with the locations subject to detailed design post-consent.

2.8.24 In general terms, the construction method would see topsoil, including peat, being removed and stored adjacent to the construction area until required for reinstatement. The Peat Management Plan (**Technical Appendix 10.1**) will set out options for reuse of the excavated material and provide . guidance on management and handling of excavated peat and soils.

2.8.25 Excavations would continue to expose a suitable horizon or bedrock on which to construct the track.

2.8.26 The tracks would be constructed in layers, with a geo-textile membrane if required, overlain by a base of coarse stone, and subsequent layers of higher graded crushed stone. Each layer of stone would be compacted and shaped to provide a profile and surface finish of a quality suitable for the turbine construction vehicles. The estimated depth of stone would be 750 mm, though the final thickness used would be dependent on local ground conditions and load capacity.

2.8.27 The requirements for access track drainage would be determined at detailed design stage and onsite during construction. The access tracks would have a suitable cross-fall to drain run-off and, where gradients are present, lateral drains would intercept any flow along the road. The dimensions of the lateral drains would be matched to the estimated water flow and outlets would be suitably located with erosion protection as required.

2.8.28 Where ground conditions are of a permeable nature, swales would be utilised alongside the access tracks to allow natural filtering of surface water into the ground. Where areas are less free draining, land drains or drainage ditches would be installed as topography and ground conditions dictate. Drainage filters would be installed at suitable locations to remove silts from the run-off.

2.8.29 Post construction, the vegetated turf layer would be used for reinstatement to allow re-establishment of natural vegetation to the area. Reuse of the turf layer is the preferred option over seeding the edges of the access track, as seeding rarely gives a representative cover and has been known to encourage deer grazing on verges.

Underground Cabling

2.8.30 The Proposed Development would comprise underground electric cables which would connect the turbines and the battery storage to the substation and control building compound. The majority of the underground power cables would run parallel to access tracks in trenches. An indicative cable trench is shown in **Figure 2.7**.

Watercourse Crossings

2.8.31 As part of the access track construction and associated hardstanding works, six new watercourse crossings would be required, locations identified on **Figure 10.4.1** in **Technical Appendix 10.4**. Bridges and bottomless culverts would be used for the main watercourse crossings. Closed culverts may be used for minor drainage channels.

Borrow Pits

2.8.32 The Proposed Development would require crushed stone to construct new tracks, create hardstanding areas for the cranes and lay the turbine foundations.

2.8.33 The total estimated required quantity of stone is approximately 300,000 cubic metres, the majority of which is expected to be won from onsite borrow pits, as shown on **Figure 2.3**. However, it is anticipated that approximately 12,000 cubic metres would need to be brought in from off-site sources to build the initial section of access road leading to the first onsite borrow pit as well as the turbine foundations. However, for purposes of assessing worst case, **Chapter 12: Traffic and Transport** assessment will also consider the scenario where 100% of the stone requirement would be brought in from off-site sources.

2.8.34 Locations for up to three borrow pits have been carefully sited in areas with rock exposure. As a result, the volume of topsoil/peat that would need to be removed in order to access the stone from borrow pits is limited. Further detail on the location and extent of the borrow pits is provided in **Technical Appendix 10.3.**

2.8.35 Rock extraction from borrow pits by means of blasting operations is not anticipated. However, in the occasion that blasting would be required, operations would be undertaken in strictly controlled conditions at regular times within the working week, that is, Mondays to Fridays, between the hours of 07.00 and 19.00. Blasting on Saturday mornings should be a matter for negotiation between the contractor and the local authorities.

Substation Compound

2.8.36 The indicative layout and elevations of the substation compounds are shown on **Figure 2.8** and **Figure 2.9**. The substation compound is split into two separate compounds, an Independent Power Producer (IPP) compound (to be used by the applicant) and a Transmission Network Operator (TNO) compound (to be used by Scottish Power Energy Networks). A separate control building would be located in each compound.

2.8.37 The substation compounds would measure approximately 150 m x 100 m and would contain a storage yard/laydown area. The substation compound would be enclosed by palisade type fencing. Lighting would be kept to a minimum and would be limited to working areas only and would comply with health and safety requirements. Lighting would be down lit and linked to timers and movement sensors so that light pollution is kept to a minimum.

IPP Compound and Control Building

2.8.38 The IPP compound would contain a 132 kV (kilovolt) to MV (medium voltage) grid transformer (with over the fence connection to the TNO 132 kV AIS switchgear bay), a house transformer, a Neutral earth Resistor (NER) and possible a harmonic filter or VAR (volt-ampere reactive) support unit.

2.8.39 A single storey control building would house MV switchgear, control and protection equipment, SCADA (supervisory control and data acquisition) equipment, LV battery systems, welfare facilities (toilet, washing and basic food preparation area), telecommunications equipment, workshop and offices. The approximately 18.3 m x 11.3 m control building is shown in **Figure 2.8**. The control building welfare facilities would include a suitably sized foul waste holding tank, which would be emptied by tanker and removed from the project area on an appropriate timescale for disposal at a suitably licensed off-site facility or a composting toilet, and bottled water or a small water bowser. The details of the system to be put in place would be agreed with SBC.

2.8.40 Cable arrays from the turbine transformers would converge at the IPP compound control building.

2.8.41 The IPP control building would be constructed in keeping with the local built environment. The final designs for the building and compound would incorporate sustainable design features and would be agreed with SBC.

TNO Compound and Substation Building

2.8.42 The TNO compound would contain a 132 kV AIS switchgear bay to which the 132 kV underground grid cable would connect at one end. At the other end of the 132 kV AIS switchgear bay an over the fence connection to the IPP grid transformer would be facilitated.

2.8.43 The TNO control building would likely comprise of a single storey modular unit measuring approximately 12.5 m x 10 m as shown in **Figure 2.8**. The control building would house control and protection equipment, SCADA equipment, LV battery systems, stores and welfare facilities.

2.8.44 The TNO control building would be constructed in keeping with the local built environment. The final designs for the buildings and compound would incorporate sustainable design features and would be agreed with SBC.

Energy Storage

2.8.45 The energy storage facility is proposed to be located within the substation compound. This is anticipated to comprise a lithium-ion battery technology solution, with modular elements comprising a number of battery housings (either standard ISO containers, electrical-houses ('eHouses') or otherwise) with associated 'heating, ventilation and air-condition' ('HVAC') systems, along with paired power conversion systems ('PCS') comprising bi-directional inverters and transformers, as well as central switchgear, metering and transformer, and space for access and operations.

2.8.46 This area of technology is currently fast-evolving in terms of:

- technological advances in battery energy density and performance;
- the design and existence of various potential service markets for providing revenues; and
- opportunities for time-shifting of wind farm generation.

2.8.47 For this reason, indicative designs for the installation have been provided in **Figures 2.10** and **2.11** based upon certain parameters, which form the basis of the EIA presented in this EIA Report. These indicative parameters are considered to represent the realistic worst case scenario in EIA terms. The battery technology type for the Proposed Development would meet all the relevant safety and environmental standards. Any requirements for environmental (e.g., PPC permitting) or health and safety consents (e.g., COMAH) would be discussed, confirmed and agreed with the relevant authority prior to construction.

2.8.48 Within the space provided by the substation construction compound (75 m x 45 m), based on the assumed parameters (and as illustrated indicatively on **Figures 2.10** and **2.11**), it is considered possible to achieve an arrangement comprising 2.6 m x 16.1 m ISO containers with top-mounted HVACs, each with a single accompanying PCS, along with a single 2.6 m by 11.4 m switchgear container, assuming that other electrical elements (including metering and grid-connection transformer) could be either included within or shared with the wind farm substation compound. Based on a current industry Grid Battery Storage solution, where a 16.1 m-long container can host between 1.2 MW (power): 5.3 MWh (energy) at configuration for "maximum energy" (roughly 4.1 hours duration), and 7.2 MW:3.8 MWh at "maximum power" (roughly 0.5 hours duration), this could relate to an indicative system of anywhere between 21.6 MW:95.4 MWh to 129.6 MW:68.4 MWh. Sufficient space within the substation construction compound remains to accommodate the battery energy storage facility alongside any bunding or drainage required.

2.8.49 The final choice of battery model would ensure compliance with the above parameters. The number, dimensions, housing type, finish, arrangement, security fencing and landscaping of energy storage elements would be subject to SBC consultation and approval prior to construction.

Permanent LiDAR

2.8.50 Permanent LiDAR ("light detection and ranging") facilities are to be included within the substation compound, shown on **Figure 2.2 and Figure 2.8**. Each unit would be connected to the wind farm SCADA system. Power supply and data transfer wound be via wind farm cabling (buried in the electrical cable trenches). A backup power system, data logger and a small storage facility would be sited at each LiDAR location. The Lidar installation would require a hardstanding area of approximately 5 x 4 m or erection and ongoing maintenance.

Construction Phase

2.8.51 Construction of the Proposed Development is anticipated to take approximately 21 months from mobilisation to completion.

2.8.52 An indicative construction programme is set out in **Table 2.3** below. Many of these construction activities would be carried out concurrently, although predominantly in the order set out below. A more detailed construction plan would be prepared prior to construction.

Table 2.1: Indicative Construction Programme

Activity	Month																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Site establishment																					
Forestry felling and timber export																					
Construction of new access tracks and crane hardstandings																					
Turbine foundation construction																					
Substation, energy storage and electrical works																					
Cable trenching and installation																					
Crane delivery																					
Turbine delivery, erection and commissioning																					
Site reinstatement																					

Construction Traffic

2.8.53 It is anticipated that the largest volume of traffic would be associated with the construction phase of the project, when vehicles are likely to be travelling from major centres and ports to deliver materials to the site. The origins of materials and goods are expected to be the port of Blyth.

2.8.54 The main construction traffic access routes would be predominantly from the north via the A68, A696 and A6088. The access routes for abnormal loads associated with the wind turbine generator components would be predominantly from the south-east via the A1, A696, A68 and A6088. Further detail is provided in **Chapter 12: Traffic and Transport** of the EIA Report. The proposed Abnormal Indivisible Load (AIL) route is shown in **Figure 12.1**.

Construction Workforce

2.8.55 A detailed construction workforce schedule, i.e., employee numbers throughout the construction programme, and likely shift patterns would not be known until the contract for building the Proposed Development has been awarded, however, the maximum number of staff likely to be onsite at any one time would be 50.

Mobilisation Compounds

2.8.56 During the construction period, a temporary mobilisation compound would be required. These would facilitate the construction activities prior to the main construction compounds becoming operational. The locations of the mobilisation compound are shown on **Figure 2.2**.

2.8.57 To create the mobilisation compound, turf and topsoil would be stripped and bunded at the edge of the mobilisation compounds. A layer of geotextile membrane would be placed on the subsoil, and Type 1 aggregate stone would be imported and compacted to create temporary surfaces. Appropriate temporary drainage mitigation would be installed around the mobilisation compound. and the mobilisation compound would be decommissioned on completion of construction activities.

2.8.58 The compound would be located at the beginning of the access area at the A6088 junction and dimensions would be 70 m x 30 m.

Construction Compounds

2.8.59 During the construction period, a construction compound would be required that would include a laydown area for wind turbine components, and dimensions would be 100 m x 100 m. The location of the construction compound is shown on **Figure 2.2**.

2.8.60 The main construction site office and compound would comprise temporary cabins to be used for the site offices, the monitoring of incoming vehicles and welfare facilities for site staff including toilets; parking for construction staff visitors and construction vehicles; secure storage for tools and small parts; a receiving area for incoming vehicles; and temporary security fencing around the compound.

2.8.61 The compounds would be used as storage areas for the various components, fuels and materials required for construction. Typically, the major structural components of the turbines would be delivered directly to the turbine hardstandings. Temporary lay-down areas would be provided for parking and unloading vehicles, including AIL.

2.8.62 Any lighting would be directional in accordance with Institute of Lighting Professionals (ILP) guidance and mounted on the individual portacabins.

2.8.63 The construction compounds and lay down areas would be constructed by first stripping the topsoil, which would be stored in a mound for subsequent reinstatement at the end of the construction period, in line with industry best practice[9]. Care would be taken to maintain separate stockpiles for turf and the different soil types to prevent mixing during storage. A geotextile would then be placed on the sub-stratum, which would be overlain by a working surface of stone to approximately 750 mm thickness. Measures for ensuring compliance with industry best practice would be set out in the Construction Environmental Management Plan (CEMP).

2.8.64 Reinstatement would involve removing the stone and underlying geotextile before carefully ripping the exposed substrate and replacing the excavated soil.

Construction Hours

2.8.65 It is anticipated that the main construction hours for the Proposed Development would be between 07:00 and 19:00 hours Mondays to Fridays, and 07:00 to 14:00 hours on Saturdays, unless otherwise agreed with SBC. Certain activities, such as electrical works in the substation or turbine erection in the event of delays due to high winds, may require to be undertaken outwith these hours. Construction hours generally also apply to the delivery of materials to the Proposed Development; however, abnormal loads may be delivered out of these hours when the road network is at its quietest to reduce traffic disturbance. Delivery of the nacelles, towers and blades to the Proposed Development site would require the use of abnormal sized and slow-moving trucks. These trucks would require a police escort and the timing of these deliveries may be dictated by the police. More details can be found in **Chapter 12: Traffic and Transportation**.

Felling

2.8.66 The Proposed Development would require 81.96 ha of woodland to be felled to facilitate construction and operation of the wind turbines and ancillary infrastructure. Further details are provided in **Technical Appendix 17.1**.

Access

2.8.67 There are Rights of Way crossing the site (**Figure 14.1**). Additionally, the site is accessible via the general access rights granted under the Land Reform Act (Scotland) 2003. During construction, access to areas where construction is taking place, or where there are construction related activities, may be restricted for health and safety purposes in accordance with the Construction (Design and Management) Regulations 2015. Notices would be placed in prominent locations around the site outlining any areas of restricted access. Measures for ensuring public safety during construction would be

[9] Current best practice includes: *Good Practice during Wind Farm Construction* (2019), A joint publication by Scottish Renewables; Scottish Natural Heritage; Scottish Environment Protection Agency; Forestry Commission Scotland; Historic Environment Scotland; Marine Scotland Science; AEECoW. 4th Edition. https://www.scottishrenewables.com/assets/000/000/453/guidance_-_good_practice_during_wind_farm_construction_original.pdf?1579640559 [accessed December 2021].

agreed with the SBC Access Officer and set out in the CEMP. The CEMP would set out measures to ensure that recreational users of the site are informed of the construction work and directed into safe areas where there would be no conflict with plant and machinery. Such measures would be agreed in advance with SBC.

Operational Phase

Turbine Monitoring and Control

2.8.68 Wind turbines have a proven track record for operating safety. All turbines are controlled by a Supervisory Control and Data Acquisition (SCADA) system, which would gather data from all the turbines and provide the facility to control them from a remote location. The SCADA system would gather data from all the turbines via communications cables connecting to each turbine (the cables being buried in the electrical cable trenches).

2.8.69 In the case of any fault, including over-speed of the blades, overpower production, or loss of grid connection, the turbines shut down automatically through integrated braking mechanisms. They are also fitted with vibration sensors so that, if, in the unlikely event a blade was damaged, the turbines would again be automatically shut down.

Meteorological Effects

2.8.70 Turbines, as with any tall structure, can be susceptible to lightning strike and appropriate measures are included in the turbine design to conduct lightning strike down to earth and minimise the risk of damage to the structure. In the case of a lightning strike on a turbine or blade the turbine would be automatically shut down.

2.8.71 In cold weather, ice can build up on blade surfaces when operating. The turbines can continue to operate with a thin accumulation of snow or ice, but would be shut down automatically when there is a sufficient build up to cause aerodynamic or physical imbalance of the rotor assembly. Many models now include de-icing technology.

2.8.72 Local meteorological conditions would be monitored by a permanent LiDAR installation, which would be located within the substation compound as shown on **Figure 2.8.**

Turbine Servicing and Repair

2.8.73 Each manufacturer has specific maintenance requirements; however, it is anticipated that routine servicing of the turbines would typically be undertaken twice a year, with a full annual service and a minor service every intervening six months. In the first year, there is also likely to be an initial three month service post-commissioning. Individual turbines would be switched off when servicing is ongoing. Maintenance and servicing would include activities such as changing of gearbox oils and individual turbine components.

2.8.74 Blade inspections would be likely to be required between every two and five years. These would traditionally be undertaken using a cherry picker or similar, but may also be performed with a 50-tonne crane and a man-basket or using drones. Repairs to blades would use the same equipment. Light winds and warmer, dry conditions are required for any blade repairs hence summer (June to August) would be the most appropriate period for this work.

2.8.75 Operational waste would generally be restricted to small volumes of waste generated from machinery repair and maintenance. The maintenance contractors would dispose of any such waste off-site, in line with Scottish waste management regulations and duty of care.

Track Maintenance

2.8.76 Once the Proposed Development is operational, the volume of traffic using the access tracks would be low. Correspondingly, the need for any track maintenance works is anticipated to be low and infrequent. Any such works required would generally be undertaken during the drier conditions in the summer months.

Operational Workforce

2.8.77 A team of several staff including engineer fitters would supervise the operation of the wind turbine installation and would visit the Proposed Development to conduct routine maintenance. The frequency of these visits would depend on the turbine manufacturer.

Decommissioning Phase

2.8.78 The Proposed Development is anticipated to have an operational life of 35 years, after which it would be decommissioned, and the turbines dismantled and removed. This is the proposed course of operations which is being applied for and any alternative to this action would require separate consent from the ECU, and so is not considered within this EIA Report.

2.8.79 During decommissioning the turbines would be dismantled and removed, along with any associated above ground electrical equipment. This decommissioning work would be the responsibility of the applicant, or any subsequent owners of the Proposed Development. Underground cables would be left in place and foundations would be removed to a depth of 0.5 m below ground level to avoid environmental impacts from deeper removal. Prior to decommissioning of the site, a method statement would be prepared and agreed with SBC.

2.9 References

Civil Aviation Authority. 2016. CAP 764: Policy and Guidelines on Wind Turbines. Available at:

https://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=5609 [accessed March 2022]

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1094628/DUKES_2022_Chapter_5.pdf. [accessed march 2022].

Scottish Government (2020), Scottish Planning Policy.

Scottish Renewables, Scottish Natural Heritage, Scottish Environmental Protection Agency, Forestry Commission Scotland, Historic Environment Scotland and Marine Scotland Science. (2019), *Good Practice during Wind Farm Construction*, AEECoW, 4th Edition. Available at:

https://www.scottishrenewables.com/assets/000/000/453/guidance_-_good_practice_during_wind_farm_construction_original.pdf?1579640559 [accessed December 2021].

UK Statutory Instruments (2016), The Air Navigation Order Part 8 Chapter 2 Article 222. Accessed at: https://www.legislation.gov.uk/uksi/2016/765/article/222/made [accessed March 2022].

3 CONSULTATION

3.1 Overview

3.1.1 Consultation has been integral to the design and development of the Proposed Development, identification of existing environmental constraints and sensitivities, and identification and assessment of the likely environmental effects of the Proposed Development.

3.1.2 Consultation with statutory organisations, non-statutory organisations and the general public commenced in July 2021 and has taken a number of forms, including

- stakeholder liaison;
- public information events; and
- informal discussions.

Stakeholder Liaison

3.1.3 Consultation with statutory consultees and other organisations has been undertaken throughout the EIA process to obtain environmental information, to discuss and agree the scope of individual environmental assessments and the adopted methods of assessment, and to develop appropriate environmental mitigation measures.

3.1.4 EIA topic-specific consultation is summarised in each chapter of this EIA Report where relevant.

3.1.5 An EIA Scoping Request was submitted by the applicant in February 2022. Copies of the EIA Scoping Report and ECU's Scoping Opinion are available on the ECU website[10].

Public Consultation

3.1.6 The applicant has undertaken a multifaceted public consultation approach, including maintaining a project website and project mailbox, and attendance at community council meetings. This was supplemented by two in-person public events.

3.1.7 Public consultation was held at key stages in the development process to inform the general public and other interested parties of project alternatives and the emerging findings of the EIA, and to elicit comment and feedback on the Proposed Development.

3.1.8 The project website[11] and mailbox[12] were launched in February 2022 to coincide with publication of the Scoping Report. Letters were sent by email to community councils, councillors and local politicians to raise awareness. As well as project information, the website provided the opportunity for stakeholders to submit comments and questions.

3.1.9 In March 2022, the applicant attended Hobkirk and Southdean community council meetings in person to discuss the proposals. This coincided with the Scoping consultation

[10] https://www.energyconsents.scot/ApplicationSearch.aspx. Search for "Millmoor Rig", ECU reference: ECU00003426.

[11] https://www.esbenergy.co.uk/millmoor-rig-wind-farm

[12] millmoorrig@esb.ie

period to allow the community councils the opportunity to directly address queries to the applicant and make recommendations for the scope of the EIA.

Public information days were hosted on 16 June 2022 in Southdean and 17 June 2022 in Bonchester Bridge. The events were advertised for two weeks in the local newspapers the Southern Reporter, the Border Telegraph and the Hawick Paper. Additionally, a project postcard, including details of the events, was distributed to all properties within at least 10 km (this was extended to include the settlements of Oxnam and Denholm) of the Proposed Development. Letters were sent by email to community councils, councillors and other local politicians.

3.1.10 At the public information days, A1 banners containing project information were set up for public display, including a selection of photomontage and wireline visualisations. Attendees were given the opportunity to observe how the Proposed Development would appear from any specific point around the area, through location-specific wireline visualisations created live, by generating viewpoints through ReSoft Software. Public consultation materials were hosted on the project website for those attending virtually. These events were intended to inform the local communities, general public and other interested parties of location of the Proposed Development site, present the most up to date design proposals available at the time (Layout C), explain the EIA process, detail how the Proposed Development had evolved and responded to the emerging EIA findings, and to elicit comment and feedback on the Proposed Development.

3.1.11 Further information on the public consultation activities undertaken for the Proposed Development is provided in the Statement of Community Consultation that accompanies the application for consent.

Informal discussions

3.1.12 Discussion was undertaken with interested parties and landowners during the design development of the Proposed Development and the EIA process.

3.1.13 EIA topic-specific consultations are summarised in each chapter of this EIA Report where relevant.

3.2 References

Energy Consents Unit (2022). Scoping Opinion May 2020. Dated 18 May 2020 Available at: https://www.energyconsents.scot/ApplicationSearch.aspx. Search for “Millmoor Rig”, ECU reference: ECU00003426.

RSK Environment Ltd (2020). Millmoor Rig Wind Farm Scoping Report. Dated 30 August 2021. Available at: https://www.energyconsents.scot/ApplicationSearch.aspx. Search for “Millmoor Rig”, ECU reference: ECU00003426.

4 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

4.1 Scoping

4.1.1 An underlying principle of the EIA process is that it should concentrate on environmental issues where effects associated with a development proposal are likely to be significant.

4.1.2 Although it is not mandated by the EIA Regulations, the applicant conducted a Scoping process in order to determine issues that should be addressed in the EIA and the form topic-based assessments should take.

4.1.3 The following considerations were factored into the Scoping process:

- The nature of the receiving environment and the type of operations associated with the Proposed Development are such that environmental effects could arise during construction, operation and decommissioning stages.
- A review of the Proposed Development site revealed ecological habitats and species of potential interest.
- There is a requirement for early liaison with stakeholder and regulatory authorities (e.g. the Scottish Environment Protection Agency and Health and Safety Executive) to provide input for the EIA and design development processes.
- There is a need for early consultation and commencement of ecological and ornithological surveys, peat depth probing and noise monitoring to accommodate data collection within seasonal and programme constraints.
- Significant cumulative effects could potentially arise through the interaction of the project with other existing and approved development projects in the vicinity, and the combined effects of two or more environmental aspects associated with the project on environmental interests (e.g. combined visual, noise and air quality effects on local residents).

Scoping Process

4.1.4 The applicant initially conducted a detailed Scoping exercise from the summer 2021. The Scoping exercise involved a review of available environmental information related to the form and status of the existing environment; preliminary desk-based and site-based appraisals and surveys; and application of knowledge of the potential environmental implications of comparable schemes (based on direct past project experience and other published experience and guidance).

4.1.5 The outcomes of the Scoping exercise were collated in a Scoping Report; that accompanied a formal request for a Scoping opinion that was issued by the applicant to the ECU on 08 February 2022[13]. This report identified the environmental aspects that the applicant proposed to address within the EIA for the Proposed Development. It discussed each aspect in terms of a brief summary of the environmental baseline for each (where practical), the relevant potential impacts and an overview of the proposed method of

[13] RSK Environment Ltd (2020). Millmoor Rig Wind Farm Scoping Report. Dated 30 August 2021. Available at: https://www.energyconsents.scot/ApplicationSearch.aspx. Search for “Millmoor Rig”, ECU reference: ECU00003426.

assessment for each. Where relevant, the technical areas were assessed in the context of industry guidance, best practice, and likely design of the Proposed Development.

4.1.6 Following receipt of the Scoping Request, the ECU undertook consultation with statutory and non-statutory agencies and other environmental bodies with knowledge of the Proposed Development site. The following bodies provided responses:

- Scottish Borders Council (SBC) as Local Planning Authority;
- Scottish Environment Protection Agency (SEPA);
- NatureScot;
- Historic Environment Scotland (HES);
- Transport Scotland;
- Marine Scotland;
- Scottish Forestry;
- Southdean Community Council;
- Denholm and District Community Council;
- Hobkirk Community Council;
- Upper Liddesdale Community Council;
- Royal Society for the Protection of Birds (RSPB);
- Tweed Foundation Fisheries Trust;
- Joint Radio Company (JRC);
- Crown Estate Scotland;
- BT;
- Scottish Water;
- River Tweed Commission District Salmon Fisheries Board;
- BAA Aerodrome Safeguarding (Edinburgh);
- Scottish Rights of Way and Access Society (ScotWays);
- Defence Infrastructure Organisation;
- Fisheries Management Scotland;
- Northumberland County Council;
- Nuclear Safety Directorate (HSE);
- NATS Safeguarding;
- Historic England;
- Scottish Wild Land Group; and
- Northumberland National Park Authority.

4.1.7 The following consultees were contacted, but no response was received:

- British Horse Society Scotland;
- Civil Aviation Authority;
- Fisheries Trust Scotland;
- John Muir Trust;
- Mountaineering Scotland;
- Scottish Wildlife Trust;
- Scottish Wild Land Group;
- VisitScotland;

- Lothian and Borders Raptor Survey Group;
- Borders Online;
- Jed Valley Community Council;
- Oxnam Water Community Council;
- Environment Agency;
- Natural England; and
- Carlisle Airport.

4.1.8 The ECU issued its Scoping Opinion, available on the ECU website[14], to the applicant on 27 May 2022.

4.1.9 The consultee/consultation responses provided in the Scoping Opinion noted the following, which resulted in the applicant modifying the scope of the EIA accordingly:

- Cultural Heritage – HES and SBC requested additional visualisations and the applicant has agreed a final list of viewpoints and visualisations in consultation with HES and SBC. A list of the current agreed list of viewpoint and visualisation requirements is included in **Chapter 7: Archaeology and Cultural Heritage**. HES was also consulted regarding the scope of the assessment for the access area as the proposed access track would be adjacent to the east of three scheduled monuments (SM6599, SM6600 and SM6601) and then pass through scheduled monument SM6602. The proposed site access options would predominantly follow the existing track, however, some works would be required to accommodate the abnormal indivisible loads proposed, including an upgrade to the existing watercourse crossing over the Carter Burn. No detailed design of the Carter Burn bridge crossing will be included in this EIA report. HES agreed that, if required, a detailed assessment of impact on setting of SM6602 would be undertaken once a detailed design is available.
- Residential Visual Amenity Assessment (RVAA) – Typically, detailed consideration with regard to the visual amenity of residential properties within 2 km of a site is given in the Landscape and Visual Impact Assessment (LVIA). At the request of the local community, the applicant has extended the RVAA study area to include any residential properties up to 3 km from the Proposed Development. A separate, standalone, RVAA has been prepared as part of the LVIA.
- SBC requested that a sequential route assessment be completed for the A6088, which the applicant agreed to undertake.
- Noise – Detailed noise monitoring was previously undertaken in the area in 2014 to support the application for the eventually withdrawn Highlee Hill Wind Farm proposal. However, in consultation with the local community, the applicant has undertaken a new baseline survey to determine current background noise levels.
- Landscape and Visual Impact Assessment Viewpoints – Southdean Community Council and SBC requested further viewpoints to be added. Following an internal appraisal, additional viewpoints were agreed (details of viewpoints requested by consultees and a full list of viewpoints to be included in the EIA Report is included in **Chapter 6: Landscape and Visual Impact Assessment**).
- Cumulative Landscape and Visual Impact Assessment – SBC requested that the study area be increased to 25 km, which the applicant agreed to.

[14] Energy Consents Unit (2022). Scoping Opinion May 2022. Dated 12 May 2020 Accessible from https://www.energyconsents.scot/ApplicationSearch.aspx. Search for “Millmoor Rig”, ECU reference: ECU00003426.

- Landscape and Visual Impact Assessment Night Time Viewpoint Assessment – SBC requested further viewpoints to be added. Following an internal appraisal, further viewpoints were agreed (details of viewpoints requested by consultees and a full list of viewpoints is included in **Chapter 6: Landscape and Visual Impact Assessment**).

4.1.10 The scope of the individual assessments has been reviewed regularly throughout the EIA process to take account of new published guidance and/or assessment methodologies, stakeholder feedback, new environmental information and ongoing scheme design changes.

4.1.11 Explanations of the methods of assessment adopted and the issues identified are provided in **Chapters 6 to 16** of this EIA Report, which detail the findings in relation to the various environmental aspects considered in the EIA.

Scope of the EIA

4.1.12 Scoping concluded that the following aspects were relevant for investigation in the EIA owing to the potential for significant environmental effects to arise:

- Landscape and Visual Assessment;
- Cultural Heritage and Archaeology;
- Ecology;
- Ornithology;
- Geology, Hydrogeology, Hydrology and Peat;
- Noise and Vibration;
- Traffic and Transportation;
- Aviation and Radar;
- Socio-economics, Land Use and Tourism;
- Shadow Flicker;
- Forestry;
- Telecommunications and Electromagnetic Interference; and
- Climate Change Mitigation.

4.1.13 The following environmental aspects were reviewed and subsequently scoped out of the EIA based on the limited potential for environmental effects to arise:

- Air quality: The main source of impact on air quality would be increased traffic flows on local roads during construction and emissions from construction activities. It is considered that air emissions associated with these activities would be transient and localised, and highly unlikely to have a significant effect on local air quality. Best practice measures would be applied to construction, forming an integral part of the Environmental Management Plan. There would be no emissions to air during operation.
- Population and Human Health: Properly designed and maintained wind turbines are a safe technology. The site design and in-built buffers from sensitive receptors would minimise any risk to human health resulting from the operation of the turbines. Limited interactions with population and human health are possible, and potential effects on Telecommunications (**Chapter 15**), Aviation and Radar (**Chapter 13**), Traffic and Transportation (**Chapter 12**), Noise (**Chapter 11**), Shadow Flicker (**Chapter 15**) and Residential Amenity (**Chapter 6**) will be considered elsewhere in the EIA Report.

- Vulnerability of the Proposed Development to risks of major accidents and/or disasters (including climate change): None of the following climate trends identified in UKCP18[15] would affect the Proposed Development: increased temperature, changes in the frequency, intensity and distribution of rainfall events, increased windstorms and sea level rise. Braking mechanisms on turbines allow them only to be operated under specific wind speeds, and given the elevated location of the site flooding would not pose a significant risk. Furthermore, the Proposed Development would not contribute to flooding elsewhere.

4.1.14 The Scoping process also concluded that the relationship and compliance of the Proposed Development to local, regional and national planning policy would be best established in a separate planning statement. Accordingly, the applicant has prepared a standalone planning statement that accompanies the S36 application for the Proposed Development.

4.2 Additional Consultation

Gatecheck Report Process

4.2.1 As part of the Section 36 process, RSK prepared and submitted a Gatecheck Report for the Proposed Development to the ECU on 30 July 2022.

4.2.2 The Gatecheck Report described the design evolution of the Proposed Development since the Scoping stage including, where relevant, changes that have been made in response to consultation and community engagement. The document also set out the scope of the EIA in advance of the application for consent being made.

4.2.3 Responses to the Gatecheck Report were received from the following stakeholders:

- NatureScot;
- HES;
- SEPA; and
- THC.

4.2.4 The feedback received has been addressed and incorporated in the EIA Report where relevant.

Aviation Lighting Consultation

4.2.5 A document providing information on the Proposed Development and of the proposed aviation lighting scheme was issued in May 2022 seeking feedback from key aviation stakeholders.

Having collected the views of the stakeholders a final scheme was lodged with the CAA for their approval, Stakeholder feedback has confirmed that this is acceptable, with the final approval of the CAA outstanding at the time of submission.

In this case, six turbines are proposed to have nacelle mounted medium-intensity steady red (2000 candela) obstacle lights, operating from dusk until dawn. This would include the most elevated turbine, i.e., the turbine with the most elevated turbine tip, which in the case of the Proposed Development is T11. In addition, it is proposed that T01, T03, T08,

[15] Met Office (2019), UKCP18 Science Overview Report.

T09 and T12 would be lit in order to define the geographical footprint of the Proposed Development.

4.2.6 Full details of the proposed aviation lighting scheme is outlined in **Chapter 13: Aviation and Radar**.

4.3 EIA

Legislation

4.3.1 Regulation 4 of the EIA Regulations states that the EIA must identify, describe and assess the direct and indirect significant effects of the Proposed Development on the following factors:

- population and human health;
- biodiversity;
- land, soil, water, air and climate; and
- material assets, cultural heritage and the landscape.

4.3.2 The findings of the EIA should be included in an EIA Report prepared by the developer. Regulation 5 sets out the content of an EIA Report. The EIA Report must identify, describe and assess the potential direct and indirect significant effects of the Proposed Development and the potential interactions between those factors. The description should detail the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the Proposed Development.

4.3.3 Schedule 4 of the EIA Regulations sets out the information that must be included in the EIA Report, including:

- description of the development, including in particular:
    - a description of the location of the development;
    - a description of the physical characteristics of the whole development;
    - a description of the main characteristics of the operational phase of the development; and
    - an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.
- a description of the reasonable alternatives studied by the developer;
- a description of the relevant aspects of the current state of the environment (the 'baseline scenario') and an outline of the likely evolution thereof without implementation of the project;
- a description of the factors specified above likely to be significantly affected by the development;
- a description of the likely significant effects of the development on the environment, resulting from:
    - the construction and existence of the development, including, where relevant, demolition works;
    - the use of natural resources, in particular land, soil, water and biodiversity;

- the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances and the disposal and recovery of waste;
    - the risks to human health, cultural heritage or the environment;
    - the cumulation of effects with other existing and/or approved development;
    - the impact of the development on climate and the vulnerability of the development to climate change; and
    - the technologies and the substance used.
- A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment;
- A description of the mitigation measures envisaged to avoid, prevent, reduce and if possible offset any significant adverse effects on the environment and, where appropriate, of any monitoring arrangements;
- A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned;
- A non-technical summary of the information covered by the points above; and
- A reference list detailing the sources used for the descriptions and assessments in the EIA report.

EIA Delivery

4.3.4 Insofar as practical, a common approach has been adopted in the undertaking and reporting of individual environmental assessments.

EIA Guidance

4.3.5 The EIA has been undertaken with regard to the following published best-practice guidance:

- Planning Circular 1: The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017;[16][17]
- Planning Advice Note 1/2013: Environmental Impact Assessment;[18]
- Web Based Guidance Onshore wind turbines;[19]
- Guidelines for Environmental Impact Assessment;[20]
- A handbook on environmental impact assessment: Guidance for competent authorities, consultees and others involved in the Environmental Impact Assessment process in Scotland;[21]

[16] Note: there is no planning circular or PAN for the Electricity EIA Regulations, and the planning circular contains information which is generally applicable to all EIA developments.

[17] Scottish Government (2017), Planning Circular 1/2017: The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

[18] Scottish Government (2013), Planning Advice Note 1/2013: Environmental Impact Assessment.

[19] Scottish Government (2014), Web Based Guidance Onshore wind turbines.

[20] IEMA (2004). Guidelines for Environmental Impact Assessment.

[21] NatureScot (2018), A handbook on environmental impact assessment: Guidance for competent authorities, consultees and others involved in the Environmental Impact Assessment process in Scotland V5.

- Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice;[22]
- Methods of Environmental Impact Assessment;[23]
- The State of Environmental Impact Assessment in the UK;[24] and
- Environmental Impact Assessment Guide to Shaping Quality Development[25].

Establishment of Baseline Environment

4.3.6 The EIA of scoped-in environmental aspects commenced with the identification and review of information relating to known, or the likely presence of, environmental receptors and resources within a defined study area in order to determine their relative value, importance and/or sensitivity towards change.

4.3.7 Environmental resources were defined as those environmental aspects that support and are essential to natural or human systems. These include areas or elements of population, ecosystems, watercourses, air and climatic factors, landscape, and material assets.

4.3.8 Environmental receptors were defined as people (i.e., occupiers of dwellings and users of recreational areas, places of employment and community facilities) and elements within the environment (e.g. flora and fauna) that rely on environmental resources.

4.3.9 Desk-based data sources comprised consultation responses; published literature; databases, records and schedules relating to environmental designations; national, regional and local policy documentation; historic and current mapping; aerial photography; and data gathered from previous environmental studies

4.3.10 Site surveys were undertaken to verify and consolidate information gathered during the desk-based review, and to evaluate the relationships between specific environmental interests and their wider environmental value.

4.3.11 Study area extents vary in accordance with the environmental aspect being considered. For some topics, a study area has been defined as being relatively localised to the Proposed Development, while for others it has extended outward to capture the surrounding road network, distant communities, and environmentally sensitive areas. The definition of each study area has been informed by a review of the relationship between the proposed scheme and the receiving environment, the outcomes of Scoping, and reference to thresholds stipulated in topic-specific EIA guidance.

Impact Prediction and Assessment

4.3.12 Impacts comprise identifiable changes to the baseline environment. These can be either beneficial (e.g. introduction of planting to screen visually detracting elements) or adverse (e.g. loss of an attractive environmental component), and can take the following forms:

- direct [primary] (e.g. loss of habitat to accommodate the Proposed Development);

[22] IEMA (2017), Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice.

[23] P. Morris and R. Therivel: Routledge (2009), Methods of Environmental Impact Assessment: Third Edition.

[24] IEMA (2011), The State of Environmental Impact Assessment in the UK.

[25] IEMA (2016), Environmental Impact Assessment Guide to Shaping Quality Development.

- indirect [secondary] (e.g. pollution downstream arising from silt deposition during earthworks);
- transboundary;
- short-term/temporary (e.g. dust generated during construction);
- medium-term (e.g. cutting back of planting which is subsequently allowed to regenerate);
- long-term/permanent (e.g. improvement in air quality); and
- cumulative (e.g. incremental changes caused by other past, present or reasonably foreseeable actions together with those associated with the proposed scheme, or where a receptor or resource is subject to a combination of individual impacts such as air pollution, noise and visual impact associated with the proposed scheme in isolation).

4.3.13 Impact assessments have been both quantitative and qualitative in nature, and based on comparisons between the environmental conditions immediately prior to the assumed construction of the Proposed Development and the predicted environment conditions resulting from its implementation. Each technical chapter of the EIA Report describes the forecasting methods used in the EIA.

4.3.14 Impacts have been defined in accordance with accepted terminology and standardised methodologies to predict the magnitude of impact (or change) resulting from the Proposed Development.

4.3.15 Assessments have been undertaken for the year of construction and in the year when the Proposed Development would become operational. Some environmental aspects have required further assessment beyond the operational year to take account of factors such as predicted traffic growth or activities associated with decommissioning of the Proposed Development.

4.3.16 Where relevant, the assessments describe the expected significant effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters relevant to the proposed scheme. This includes consideration of effects resulting from future climate change and the vulnerability of the project to climate change.

Environmental Effects

4.3.17 Effects are defined as the consequence of impacts. They are formulated as a function of the receptor/resource value and sensitivity, and the predicted magnitude of impact.

4.3.18 Professional judgement, defined thresholds, established criteria and standards have been used to report the environmental effects of impacts, which can be referred to as either being prior to, or following establishment of, environmental mitigation.

Environmental Mitigation

4.3.19 Environmental mitigation measures have been developed to address potentially significant adverse environmental effects.

4.3.20 Mitigation can take the form of agreed measures incorporated into the evolving design of the Proposed Development (e.g. environmental treatments), standard measures (e.g. best practice construction management to control dust emissions) that are enforceable through planning conditions, and measures proposed in outline (e.g. off-site planting to provide visual screening to nearby residential dwellings) that may require further development and formal agreement to ensure their implementation.

4.3.21 The principles adopted in the identification and development of environmental mitigation for the Proposed Development are avoidance (wherever possible), reduction (where avoidance cannot be achieved) and compensation (where reduction is unachievable or would not achieve the required level of mitigation).

Significance of Environmental Effects

4.3.22 The significance of an environmental effect has been established by way of reference to the importance/value of affected resources; the number and sensitivity of affected receptors; impact magnitude, duration, frequency and extent of effect; and the reversibility of effect (or the extent to which the adverse effects can be effectively reduced).

4.3.23 The following generic significance criteria (Error! Reference source not found.) have been applied across the environmental aspects to ensure identified environmental effects are assessed in a comparable manner, except where such criteria are not applicable due to other prevailing topic-specific guidance (e.g. ecological impact assessment) and/or established standards and thresholds (e.g. EU limit values for air emissions):

Table 4.1: Generic Significance Criteria

Level of effect	Description
Major	Very large or large change in environmental or socio-economic conditions. These effects, both adverse and beneficial, are likely to be important considerations at a national to regional level because they contribute to achieving national / regional objectives or are likely to result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Intermediate change in environmental or socio-economic conditions. These effects are likely to be important considerations at a regional and local level.
Minor	Small change in environmental or socio-economic conditions. These effects may be raised as local issues, but are unlikely to be of importance in the decision-making process.
Negligible	No discernible change in environmental or socio-economic conditions (i.e., variation within normal bounds or below measurable levels). An effect that is likely to have a negligible or neutral influence, irrespective of other effects.

4.3.24 Only major and moderate effects, which are likely to be factors in deciding whether a development is acceptable, are significant effects. Significance assumes only embedded and standard construction mitigation measures are in place, these being the environmental mitigation measures for which delivery and implementation can be secured.

4.3.25 The residual effects (i.e., the post-mitigation effects) of the Proposed Development are considered by the Scottish Ministers in the decision-making process when determining the S36 application.

4.4 Assessment Reporting

4.4.1 Each individual assessment follows a comparable format to ensure consistency in reporting the existing environmental conditions and the potential effects on them arising from implementation of the Proposed Development.

- **Introduction** introduces the assessment topic under consideration.
- **Scope and Methodology** identifies and describes the scope of the assessment, the methods and criteria adopted, relevant guidance followed, and any assessment limitations, assumptions or difficulties encountered.
- **Consultation Undertaken** summarises the stakeholder engagement including dialogue with statutory consultees and with other stakeholders and where relevant the influence on the EIA.
- **Statutory and Planning Context** outlines statutes, guidance, policies and plans relevant to the environmental interests forming the focus of the assessment.
- **Existing Environment** describes the features and characteristics associated with the baseline environment.
- **Predicted Impacts** reports the predicted impacts on the baseline environment during the construction, operational and decommissioning phases.
- **Mitigation** details all measures that have been incorporated into the design of the project and/or agreed as deliverable, including proposed monitoring where applicable.
- **Summary of Residual Effects** summarises the nature and significance of residual environmental effects that are predicted to remain, post-implementation of mitigation measures.

4.5 Assumptions, Uncertainties and Limitations

4.5.1 The EIA was undertaken and the resulting EIA Report compiled using the environmental information made available to the EIA team by the applicant and members of their project team, together with other readily available and publicly accessible material including existing literature and studies, as well as personal communication with local experts. To the best of RSK's knowledge, the information used as a basis for the assessment is accurate and up to date. The team is not aware of any limitations of the underlying information or of any constraints that would materially affect the evaluations.

4.5.2 RSK has also have also carried out its own site visits, surveys and investigations at or in the vicinity of the site to provide more information for the assessments and to fill data gaps. This has resulted in a more complete and up to date set of baseline data to use as the basis for the impact assessment. Although the data have been collected over a period of time, RSK is of the opinion that the data is relevant and valid at the time of reporting. It should be noted that the surveys and investigations are conducted on a sampling basis and this places a limit on the certainty of the data set.

4.5.3 This EIA Report has been based on the best available information at the time of publication. However, further information may become available during the detailed design phase that would be used to inform the project if relevant.

4.5.4 Assumptions adopted in the evaluation of impacts are reported in each of the relevant sections. However, these assumptions are often implicit and rely on expert judgement. Any assumptions and known technical deficiencies have been documented.

4.5.5 The EIA has been undertaken during the initial design phase of the project and, therefore, some of the technical aspects of the construction and operation have yet to be determined. Where an alternative option could cause additional impacts, these are discussed within the relevant sections. In addition, the EIA has taken a precautionary approach to adopt conservatism in the assumptions made and any scenarios assumed, so that a reasonable 'worst case' scenario was assessed. Therefore, inherent uncertainties are accounted for and subsequent modifications to the project during the detailed design phase are less likely to fall outside of the assumed envelope of the assessment parameters.

4.6 References

Energy Consents Unit (2022), Scoping Opinion May 2022. Accessible from https://www.energyconsents.scot/ApplicationSearch.aspx. Search for "Millmoor Rig", ECU reference: ECU00003426.

IEMA (2017), Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice.

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Morris, P. and Therivel, R (2009), Methods of Environmental Impact Assessment: Third Edition. Abingdon: Routledge.

RSK Environment Ltd (2020), Millmoor Rig Wind Farm Scoping Report. Dated 30 August 2021. Available at https://www.energyconsents.scot/ApplicationSearch.aspx. Search for "Millmoor Rig", ECU reference: ECU00003426.

Scottish Government (2017), Planning Circular 1/2017: The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

Scottish Government (2013), Planning Advice Note 1/2013: Environmental Impact Assessment.

Scottish Government (2014), Web Based Guidance Onshore wind turbines.

5 PLANNING POLICY CONTEXT

5.1.1 This chapter outlines the international, UK and Scottish climate change, renewable energy and planning policies that are considered by the applicant to be relevant to the Proposed Development. Legislation, planning policy and guidance specific to each technical discipline is set out in the relevant technical chapters (**Chapters 6 to 17**) of the EIA Report.

5.1.2 The chapter sets out the framework to which the application will be considered. It includes a high-level overview of the climate change and renewable energy policy and targets which are considered to be relevant to the Proposed Development.

5.1.3 The chapter outlines the relevant planning policy to the Proposed Development which includes National Policy, the Development Plan, emerging planning policy and applicable planning guidance. This chapter was considered current to 1st November 2022. A Planning Statement will be prepared and submitted to support the application post submission. This will allow the upcoming National Planning Framework 4 and the Onshore Wind Policy Statement to be considered fully as part of the application for consent. The **Planning Statement** does not form part of the EIA Report and has been submitted with the application to the ECU as a stand-alone document.

5.2 Electricity Act 1989

5.2.1 This EIA Report has been prepared in respect of the Proposed Development for which permission will be sought under Section 36 of the Electricity Act 1989 ('the 1989 Act') and deemed planning permission under Section 57(2) of the Town and Country Planning Act 1997 (as amended). In the consideration of the application, the Scottish Ministers have a duty to fulfil the requirements of Schedule 9 (paragraph 3) of the 1989 Act. This requires the Scottish Ministers to consider the *'desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest'.* In addition, the Scottish Ministers are required to assess whether the applicant has fulfilled the requirement to '*do what he reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects.*'

5.2.2 Schedule 9 also sets out a requirement for the protection of fisheries by decision makers. Paragraph 3 (3) states that "*in exercising any relevant functions each of the following, namely, a licence holder, a person authorised by an exemption to generate or supply electricity and the Secretary of State shall avoid, so far as possible, causing injuries to fisheries or to the stock of fish in any waters*." The assessment of impacts on fish have been considered and are addressed in **Chapter 8: Ecology**.

5.2.3 In applications submitted under Section 36, the role of the Development Plan is not the same as in applications submitted under the Town and Country Planning (Scotland) Act 1997 as amended ('the 1997 Act'). The test set out in Section 25 of the 1997 Act, which requires that development must accord with the terms of the Development Plan, is not engaged in the case of a Section 36 application. The Development Plan is nonetheless a relevant consideration in the determination of a Section 36 application. An assessment against the Development Plan is provided within the Planning Statement submitted with the application (but separate from the EIA Report).

5.3 Renewable Energy

International Context

5.3.1 In order to understand the need for renewable energy generation in the UK, it is important to consider the international drive towards addressing climate change. The policy framework for renewable energy developmemt in the UK is largely motivated by international agreements on the reduction of greenhouse gas (GHG) emissions. This section sets out the background of the international context as well as an overview of the most relevant recent publications.

United Nations

5.3.2 The United Nations Framework Convention on Climate Change (UNFCCC) came into force on 21 March 1994 and sought to stabilise the atmospheric concentrations of GHGs at “safe levels”. The Convention provides an overall framework for international government efforts to address the challenge posed by climate change. Currently there are 197 parties signed up to the Convention. The Convention embodies a series of review mechanisms.

5.3.3 The 21st session of the Conference of the Parties (COP21), which was held in Paris in December 2015, resulted in a legally binding global climate change target agreed by all 197 member parties with the aim of capping global climate change well below 2°C of warming.

5.3.4 The outcome of the 26th session in Glasgow in November 2021 (COP26) was a package of decisions, resolutions and statements that formalised how the commitments made at COP21 would be enacted. COP26 covered three key themes around climate change: adaptation; finance and mitigation, with the aim to limit the rise in global average temperature to 1.5°C above pre-industrial levels.

The Inter Governmental Panel on Climate Change (IPCC) Special Report: Global Warming of 1.5 °C, 2018

5.3.5 This Report responded to the invitation, contained in the Decision of the COP21 (the ‘Paris Agreement’), for the IPCC to provide a Special Report in 2018 on the impacts of global warming of 1.5°C above pre-industrial levels. The IPCC accepted the invitation in April 2016 and published the Special Report in October 2018.

5.3.6 The IPCC Report advised that “*estimates of the global emissions outcome of current nationally stated mitigation ambitions as submitted under the Paris Agreement would lead to global greenhouse gas emissions in 2030 of 52–58 GtCO$_2$eq yr^{-1}[Global Total carbon dioxide emissions]. Pathways reflecting these ambitions would not limit global warming to 1.5°C, even if supplemented by very challenging increases in the scale and ambition of emissions reductions after 2030*”.

5.3.7 The IPCC Report concluded that reliance on future large-scale deployment of carbon dioxide removal can only be achieved if global CO_2 emissions start to decline well before

2030. It advised that "*Strengthening the capacities for climate action of national and sub-national authorities, civil society, the private sector, indigenous peoples and local communities can support the implementation of ambitious actions implied by limiting global warming to 1.5°C. International cooperation can provide an enabling environment for this to be achieved in all countries and for all people, in the context of sustainable development. International cooperation is a critical enabler for developing countries and vulnerable regions.*"

United Nations Emissions Gap Report 2022

5.3.8 The United Nations Emissions Gap Report 2022 was published on 27 October 2022 and presents the latest data on the expected gap in 2030 for the 1.5°C and 2°C temperature targets of the 2015 Paris Agreement. The document is titled 'The Closing Window – Climate crisis calls for rapid transformation of societies'.

5.3.9 The Emissions Gap Report Key Messages document states that the Emissions Gap Report:

"finds that the world is still falling short of the Paris climate goals, with no credible pathway to 1.5^o C in place. Only an urgent system-wide transformation can avoid an accelerating climate disaster. The report looks at how to deliver this transformation, through action in the electricity supply, industry, transport and building sectors, and the food and financial systems."

5.3.10 Page IV of the Executive Summary notes that:

5.3.11 *"Since the twenty-sixth United Nations Climate Change Conference of the Parties (COP 26), there has been limited progress in reducing the immense emissions gap for 2030..."*

5.3.12 *"...To get on track for limiting global warming to 1.5^{o}C, global annual GHG emissions must be reduced by 45 per cent compared with emissions projections under policies currently in place in just eight years, and they must continue to decline rapidly after 2030, to avoid exhausting the limted remaining atmospheric carbon budget."*

5.3.13 Page X of the Executive Summary states:

"The transformation towards zero GHG emissions in the sectors of electricity supply, industry, transportation and buildings is under way. However, increased and accelerated action is needed if these are to happen at the pace and scale required to limit global warming to well below 2^{o}C, preferably 1.5^{o}C."

5.3.14 Table 5.1 of the Emissions Gap Report 2022 sets out actions which accelerate or hinder the transformation of the electricity sector. The most important actions are:

"EXPAND RENEWABLES: Renewable energy needs to be expanded as fast as possible. Removing barriers is most important, as costs are no longer the issue in many geographies. This can be achieved through policies, incentives, purchases of green electricity, removal of administrative barriers, and direct investments (Falk, Gaffney et al. 2020; IEA 2021e; Clarke et al. 2022).

PLAN A JUST TRANSFORMATION: The transformation needs to be planned carefully in regions that are currently dependent on fossil fuel extraction for jobs and public revenue. Anticipating the change and planning for it seems essential (Falk, Gaffney et al. 2020; IEA 2021e).

PREPARE ELECTRICITY SYSTEM FOR HIGH SHARES OF RENEWABLES: this includes providing flexible electricity supply, short- and long-term storage, adapting the distribution grids, considering variable electricity demand, and adapting the electricity market to incentivize this (Falk, Gaffney et al. 2020; IEA 2021e; Clarke et al. 2022)."

IPCC Sixth Assessment Report

5.3.15 The Intergovernmental Panel on Climate Change (IPCC) has now published the first, second and third parts of the Sixth Assessment Report which includes:

- AR6 Climate Change 2021: The Physical Science Basis;
- AR6 Climate Change 2022: Impacts, Adaption and Vulnerability; and
- AR6 Climate Change 2022: Mitigation of Climate Change.

5.3.16 The final part, the Synthesis Report, is due to be finalised in September 2022.

5.3.17 It is clear that unless there are rapid, sustained and large-scale reductions of climate change causing GHG emissions, including CO_2, methane and others, the goal of limiting global warming to 1.5°C compared to pre-industrial levels, as enshrined in the Paris Agreement, will be beyond reach.

5.3.18 The Mitigation of Climate Change Report[26] advises that:

"Without a strengthening of policies beyond those that are implemented by the end of 2020, GHG emissions are projected to rise beyond 2025, leading to a median global warming of 3.2 [2.2 to 3.5] °C by 2100."

5.3.19 The Report also confirms that the mitigation strategies required to meet international ambitions to keep global warming within the 1.5 and 2°C targets include the immediate transition from fossil fuels to renewables as part of the mix of solutions. The Report states:

"All global modelled pathways that limit warming to 1.5°C (>50%) with no or limited overshoot, and those that limit warming to 2°C (>67%) involve rapid and deep and in most cases immediate GHG emission reductions in all sectors. Modelled mitigation strategies to achieve these reductions include transitioning from fossil fuels without CCS [carbon capture and storage] to very low- or zero-carbon energy sources, such as renewables or fossil fuels with CCS, demand side measures and improving efficiency, reducing non-CO2 emissions, and deploying carbon dioxide removal methods to counterbalance residual GHG emissions."

UK Context

5.3.20 This section sets out the summary of UK Government's approach to renewable energy generation since 2008. This provides the framework for the development of renewable energy generation across the UK and a background for the development of Scottish renewable energy generation and wind energy policy. This section focuses on the most recent and most relevant UK documents.

[26] IPCC (2022), Mitigation of Climate Change Report. Available at https://report.ipcc.ch/ar6/wg3/IPCC_AR6_WGIII_Full_Report.pdf [accessed November 2022].

Climate Change Act 2008

5.3.21 The Climate Change Act (the 2008 Act) became law on 26 November 2008. The Scottish Government is a partner in delivering the UK emissions reduction target set out in the 2008 Act.

5.3.22 Two key aims underpin the 2008 Act these are:

- to improve carbon management and help the transition towards a low carbon economy in the UK; and
- to demonstrate strong UK leadership internationally.

5.3.23 The 2008 Act introduced for the first time a legally binding framework to tackle the challenges of climate change. It sets legally binding targets for the UK to reduce carbon dioxide emissions by 2050 by at least 80% relative to 1990 levels. Energy generated from renewable sources was identified as a key component for meeting the challenge of reducing carbon emissions and the fight against climate change.

The Climate Change Act 2008 (2050 Target Amendment) Order 2019

5.3.24 The 2008 Act was amended in 2019 to include revised targets. These included the target of a 100% redcution in GHG emissions from 1990 levels by 2050.

Net Zero - the UK's Contribution to Stopping Global Warming

5.3.25 The UK's Contribution to Stopping Global Warming was published by the Climate Change Committee (CCC) in May 2019. It was prepared at the request of the UK Government and the devolved governments of Scotland and Wales, to reassess the UK's long-term emissions targets.

The Sixth Carbon Budget: The UK's Path to Net Zero

5.3.26 On 09 December 2020 the CCC released the Sixth Carbon Budget which updates intermediary targets for the UK's progress to Net Zero, which states:

"*Our recommended pathway requires a 78% reduction in UK territorial emissions between 1990 and 2035. In effect, it brings forward the UK's previous 80% target by nearly 15 years. There is no clearer indication of the increased ambition implied by the Net Zero target than this*."

5.3.27 In establishing intermediary targets towards Net Zero. As concluded in the Sixth Carbon Budget: this target is only credible if policy to reduce emissions ramps up significantly:

5.3.28 "*The implication of this path is clear: the utmost focus is required from government over the next ten years. If policy is not scaled up across every sector; if business is not encouraged to invest; if the people of the UK are not engaged in this challenge – the UK will not deliver Net Zero by 2050*."

The Energy White Paper, December 2020

5.3.29 On 13 December 2020, the UK Government published its Energy White Paper, 'Powering our Net Zero Future', this document sets out current thinking on the way in which the UK should work towards meeting its Net Zero targets by 2050. It advises that although retiring generating capacity will need to be replaced, modelling suggests, overall energy demand could double by 2050. It notes that this would require a four-fold increase in clean electricity generation with decarbonisation of electricity increasingly underpinning the delivery of the Net Zero target.

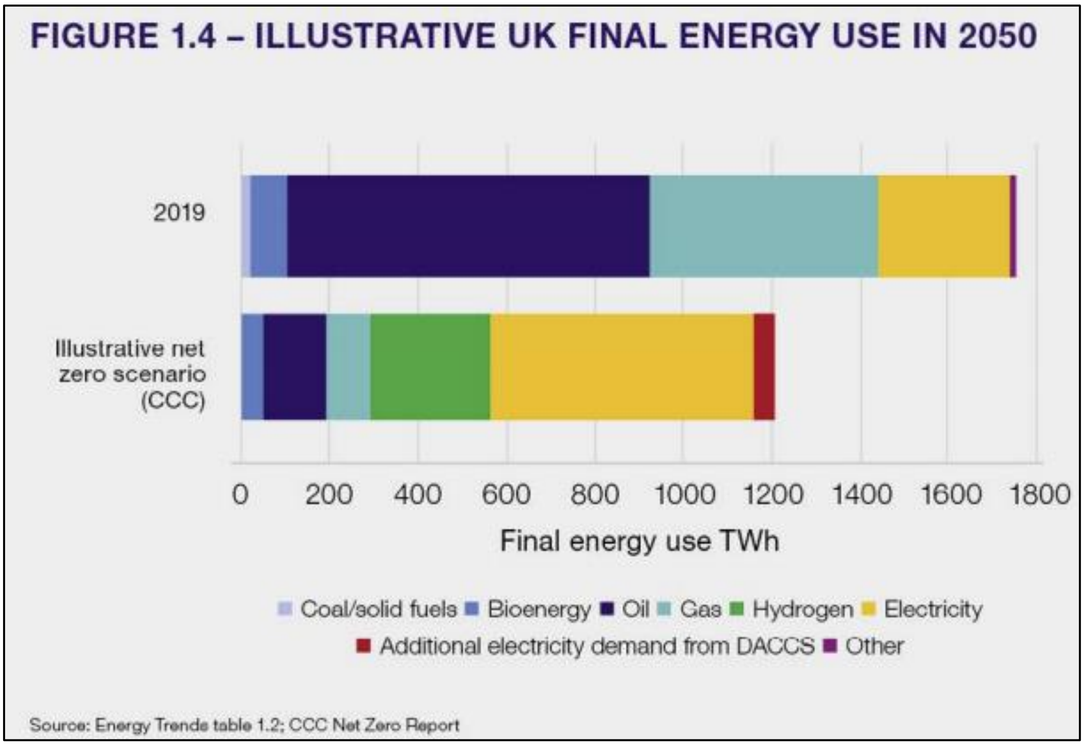
5.3.30 On Page 4, the Energy White Paper sets out three key themes:

- transforms energy;
- green recovery; and
- fair deal for consumers.

5.3.31 In terms of clean electricity production, the Report considers what needs to be achieved in order to reach Net Zero, summarised in **Figure 1.4** on Page 9, which is reproduced below in **Source:** Energy White Paper (December 2020)

5.3.32 .

Figure 5.1: UK Clean Electricity Production by 2050



Source: Energy White Paper (December 2020)

The document states that: *"Onshore wind and solar will be key building blocks of the future generation mix, along with offshore wind*".

Climate Change Committee Progress Report to Parliament June 2022

5.3.33 The CCC Progress Report to Parliament was published in June 2022. The Report has assessed *"the risks relating to the delivery of the Government's pathway and the Sixth Carbon Budget, tracking progress against the Government's stated objectives."* The Report has found there are *"either significant risks or a policy gap for 38% of the required emissions reduction to meet the Sixth Carbon Budget."*

5.3.34 The CCC's view is that the policy framework needs to be completed in the next year in order to drive forward the delivery needed within this decade. UK Government Net Zero Strategy, October 2021.

5.3.35 The UK Government published the Net Zero Strategy in October 2021. It sets out the UK Government's policies and proposals to keep them on track in relation to the carbon budgets. In relation to power, Page 19 of the Net Zero Strategy states the UK Government *"…will fully decarbonise our power system by 2035*." The key policies of relevance to the Proposed Development include:

- *"By 2035 the UK will be powered entirely by clean electricity, subject to security of supply."*
- *"40GW of offshore wind by 2030, with more onshore, solar and other renewables – with a new approach to onshore and offshore electricity networks to incorporate new low carbon generation and demand in the most efficient manner that takes account of the needs of local communities like those in East Anglia."*
- *"Deployment of new flexibility measures including storage to help smooth out future price spikes."*

5.3.36 Page 94 outlines the UK Government's key commitments to deliver a decarbonised power system by 2035. The key commitments include:

- *"Take action so that by 2035, all our electricity will come from low carbon sources, subject to security of supply, bring forward the government's commitment to a fully decarbonized power system by 15 years…*
- *…Accelerate deployment of low-cost renewable generation, such as wind and solar through the Contracts for Difference scheme by undertaking a review of the frequency of the CfD auctions…*
- *…Adopt a new approach to onshore and offshore electricity networks to incorporate a new low carbon generation and demand in the most efficient manner, taking account of the environment and local communities…*
- *…Ensure that the planning system can support the deployment of low carbon energy infrastructure…"*

5.3.37 The Net Zero Strategy brings forward by 15 years the goal of a fully decarbonised, reliable, and low-cost power system. Page 98 states "*Although the Energy White Paper envisaged achieving an overwhelmingly decarbonised power system during the 2030s, we have since increased our ambition further. By 2035, all our electricity will need to come from low carbon sources, subject to security of supply, bringing forward the government's commitment to a fully decarbonised power system by 15 years, whilst meeting a 40-50% increase in demand*."

5.3.38 Page 98 continues by recognising that:

"…*the Energy White Paper's fundamental approach remains unchanged. A low-cost, net zero consistent electricity system is most likely to be composed predominantly of wind and solar generation, whether in 2035 or 2050*."

British Energy Security Strategy, April 2022

5.3.39 The British Energy Security Strategy was published by the UK Government in April 2022. It builds upon the Ten Point Plan for a Green Industrial Revolution and the Net Zero Strategy. It sets out the progress that has been made since the publication of the Ten Point Plan. It states:

"Accelerating the transition from fossil fuels depends critically on how quickly we can roll out new renewables. Our Ten Point Plan for a Green Industrial Revolution has already put the UK at the forefront of many renewable technologies, delivering £40 billion of private investment in under two years. By the end of 2023 we are set to increase our capacity by a further 15 per cent. But now we must go further and faster, building on our global leadership in offshore wind."

5.3.40 The UK Government acknowledge that onshore wind is one of the cheapest forms of renewable energy and they are:

"…serious about delivering cheaper, cleaner, more secure power, so we need to consider all options. That is why we included onshore wind in the latest Contracts for Difference auction round and will include it in future rounds."

5.3.41 The document notes that Scotland has its own planning system and that the UK Government *"…will work with the Scottish Government to ensure communities and landscape issues are considered for future projects."*

Scottish Context

5.3.42 Tackling climate change is a devolved matter and, therefore, the Scottish Government has the responsibility to set policy. In response to the UK Climate Change Act 2008, the Scottish Government enacted the Climate Change (Scotland) Act 2009. This and subsequent legislation brought forward by the Scottish Government introduced more ambitious climate reduction targets for the Scottish Government to meet, over and above the UK-wide targets identified above.

5.3.43 The following text identifies key Scottish legislation, renewable energy targets and policy that are relevant to the Proposed Development.

Climate Change (Scotland) Act 2009

5.3.44 The Climate Change (Scotland) Act 2009 created the statutory framework for GHG emissions reductions in Scotland by setting an interim 42% reduction target for 2020, with the power for this to be varied based on expert advice, and an 80% reduction target for 2050. To help ensure the delivery of these targets, the Act also required that the Scottish Ministers set annual targets, in secondary legislation, for Scottish emissions from 2010 to 2050.

Climate Change (Emissions Reduction Targets) Scotland Act 2019

5.3.45 The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 was passed by the Scottish Parliament in 2019 and its measures were brought into force in March 2020. It amends the Climate Change (Scotland) Act 2009 and sets targets to reduce Scotland's emissions of all GHGs to net zero by 2045 at the latest, with interim targets for reductions of at least 56% by 2020, 75% by 2030, 90% by 2040.

5.3.46 The target of net zero emissions by 2045, five years ahead of the UK, is, the Scottish Government state, firmly based on what the independent CCC advise is the limit of what can currently be achieved. Progress towards the targets is measured against 1990 levels of carbon dioxide, methane and nitrous oxide and 1995 levels of hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride.

5.3.47 As well as setting the targets, the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 has set annual targets for Scotland. The Scottish Government Climate Change Website[27] advises that these are to help ensure delivery of the long-term targets. The levels of these targets (expressed as percentage reductions from the 1990/1995 baseline) are set out as follows for the years between 2021 and 2030:

- 2021 – 57.9 %;
- 2022 – 59.8 %;
- 2023 – 61.7 %;
- 2024 – 63.6 %;
- 2025 – 65.5 %;
- 2026 – 67.4 %;
- 2027 – 69.3 %;
- 2028 – 71.2 %;
- 2029 – 73.1 %; and
- 2030 – 75 %.

Scottish Energy Strategy 2017

5.3.48 The Scottish Government published the Scottish Energy Strategy in December 2017 (the SES) (Scottish Government, 2017). The SES sets out the Scottish Government's vision for the future energy system in Scotland, for the period to 2050. The Strategy is designed to provide a long-term vision to guide detailed energy policy decisions over the coming decades. It articulates the priorities for an integrated system-wide approach that considers both the use and the supply of energy for heat, power and transport. The document focuses on a range of renewable sources including onshore wind, solar and energy storage. The main document was published alongside three policy statements:

- Onshore Wind Policy Statement (OWPS);
- Local Heat & Energy Efficiency Strategies and District Heating; and
- Scotland's Energy Efficiency Programme (SEEP).

5.3.49 The SES sets out the 2050 vision for energy in Scotland is to have a "*flourishing, competitive local and national energy sector, delivering secure, affordable, clean energy for Scotland's households, communities and businesses*". The vision is centred around six priorities, including the following:

- *"innovative local energy systems which empower communities; and*
- *exploiting Scotland's huge renewable energy resources".*

5.3.50 The SES outlines that energy storage has an important role to play in the future of Scotland's energy system. It states: "*Changes in how we store energy across the system, and particularly in terms of electricity and heat, could have a profoundly important bearing on our low carbon economy*".

5.3.51 The SES advises that for Scotland to meet the domestic and international climate change targets, the Government will set a new 2030 'all-energy' target for the equivalent of 50% of Scotland's heat, transport, and electricity consumption to be supplied from renewable sources.

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[27] https://www.gov.scot/policies/climate-change/ [accessed May 2022]

5.3.52 The SES advises that onshore wind development is essential to Scotland's transformation to a fully decarbonised energy system by 2050 and brings opportunities which underpin our vision to grow a low carbon economy and build a fairer society.

Scotland's Energy Strategy Position Statement (2021)

5.3.53 The Scottish Government published Scotland's Energy Strategy Position Statement (SESPS) in March 2021 which provides an overview of the Governments key priorities for the short to medium-term in ensuring a green economic recovery, whilst remaining aligned to net zero ambitions, in the lead up to COP 26.

5.3.54 SESPS provides an overview of Government policies in relation to energy and reinforces *"the importance the Scottish Government attaches to supporting the energy sector in our journey towards net zero, thus ensuring a green, fair and resilient recovery for the Scottish economy"*.

5.3.55 The Ministerial Foreword references the challenge of COVID 19 which, it states, has created an economic crisis and notes that the Climate Emergency *"has continued unabated"*. The Foreword states that *"in this context, the need for a just transition to net zero greenhouse gas emissions by 2045, in a manner that supports sustainable economic growth and jobs in Scotland, is greater than ever"*.

5.3.56 The SESPS refers to Scotland's ambitious legislative framework for emissions reduction in the world and *"a particularly challenging interim target for 2030"*. This is the ambitious target of achieving a 75% reduction in GHG emissions by 2030 in advance of achieving net zero by 2045.

5.3.57 The summary of the SESPS is clear that the current SES remains in place until any further Energy Strategy refresh is adopted by Ministers.

5.3.58 Onshore renewables are specifically considered in Section 8 of the SESPS where it states that "*the continued growth of Scotland's renewable energy industry is fundamental to enable us to achieve our ambition of creating sustainable jobs as we transition to net zero*". It adds that:

"*the Scottish Government is committed to supporting the increase of onshore wind in the right places to help meet the target of net zero. In 2019, onshore wind investment in Scotland generated over £2 billion in turnover and directly supported approximately 2,900 full time equivalent jobs across the country*".

Onshore Wind Policy Statement 2017

5.3.59 The 2017 OWPS was prepared to reaffirm the existing Scottish Government's onshore wind policy set out in previous publications. It includes separate sections on key priority areas as follows:

- route to market;
- repowering;
- developing a strategic approach to new development;
- barriers to deployment;
- protection for residents and the environment;
- community benefits; and
- shared ownership.

5.3.60 The 2017 OWPS states that Scotland will continue to need more onshore wind developments in order to meet renewable energy targets. Also highlighted in the OWPS is an acknowledgement by the Scottish Government that wind farm design is moving in the direction of bigger turbines and that larger turbines should be supported where appropriate.

5.3.61 The 2017 OWPS outlines the Scottish Government's position that new onshore wind projects should be developed at no additional subsidy cost to consumers, adding that some limited market intervention is required to protect projects against variations in the wholesale price of power.

5.3.62 A consultative draft for an update to the OWPS was published by the Scottish Government in 2021; further information is provided below.

Onshore Wind Policy Statement Refresh: Consultation Draft (2021)

5.3.63 In October 2021 the Scottish Government published its consultation on a revised OWPS. The Scottish Government were seeking views on their ambition to secure an additional 8-12 GW of installed onshore wind capacity by 2030. Whilst not yet policy this document provides insight into the Scottish Government's position on the future of onshore wind.

5.3.64 The Ministerial Foreword acknowledges that onshore wind is a cheap and renewable source of electricity generation. It further advises that onshore wind remains vital to Scotland's future energy mix and the delivery of renewable electricity generation is essential.

5.3.65 In relation to current deployment the document acknowledges that:

"We must go further and faster than before. We expect the next decade to see a substantial increase in demand for electricity to support net zero delivery across all sectors, including heat, transport and industrial processes."

5.3.66 The document advises that the Scottish Government believes that it is "*vital to send a strong signal and set a clear expectation*" on what onshore wind can contribute to meeting Net Zero.

5.3.67 The document considers the issue of security of supply, and it states that:

"*onshore wind can play a greater part in helping to address the substantial challenge of maintaining security of supply and network resilience in a decarbonised electricity system*."

Climate Change Plan: The Third report on Proposals and Policies 2018-2032

5.3.68 The Climate Change Plan (CCP) (Scottish Government, 2018) is the third report on proposals and policies for meeting Scotland's annual GHG emissions targets that the Scottish Ministers must lay before the Scottish Parliament as required by the 2009 Act.

5.3.69 An update to the CCP 2018, Update to the Climate Change Plan 2018-2032 Securing a Green Recovery on a Path to Net Zero, was published by the Scottish Government in December 2020 and includes the targets in the amendments to the Climate Change Act *"to reduce emissions by 75% by 2030 (compared with 1990) and to net zero by 2045."* The update notes that to achieve the climate change targets a coordinated approach is needed: *"A coordinated approach is fundamental to delivering a just transition, given that the transition will transform all part of our society and economy."*

A Fairer, Greener Scotland – The Government's Programme for 2021-22

5.3.70 The Scottish Government's A Fairer, Greener Scotland (AFGS) was published in September 2021. This document reaffirms the Scottish Government's commitment to ensuring a green recovery by: "*securing an economic recovery which is green and fair – for everyone and in every part of Scotland – and delivers our ambition to become a net zero nation*."

5.3.71 Chapter 3 of the AFGS which is titled A Net Zero Nation: Ending Scotland's contribution to climate change, in a just and fair way, advises on Page 63 that by 2030 the Government's aim is to generate 50% of Scotland's overall energy consumption from renewable sources and by 2050 to have decarbonised the energy system almost completely.

5.3.72 Page 64 notes that the development of renewable energy "*presents an immense opportunity for Scotland to lead by example showing how a clean energy future is possible at home, and as a net exporter of renewable energy, attracting further investment and ensuring our progress to net zero is environmentally and economically beneficial*."

5.3.73 The AFGS also commits to ensuring that National Planning Framework 4 (NPF4) would actively enable renewable energy and would be supportive of existing wind farms and expansion of the grid. All renewable energy projects over 50 MW would be designated as national development and the document reaffirms its commitment to ensuring that a balance is struck between development and the protection of biodiversity and the natural environment.

5.3.74 A Fairer Greener Scotland also outlines on Page 64 that, subject to consultation, the Scottish Government is committed to securing between 8 and 12GW of installed onshore wind by 2030. This has now been consulted on as part of the OWPS Refresh.

12 immediate actions for the new Scottish Government in the year of COP26

5.3.75 In September 2021, the Climate Emergency Response Group (CERG) published 12 immediate actions that the Scottish Government should prioritise. The Executive Summary states that these priorities are "*practical and fit well with a green recovery and a just transition in the year of the UN Climate Conference taking place in Glasgow, COP26*".

5.3.76 The Executive Summary also states that this is a "*decade for action*" building on the evidence from the IPCC Sixth Assessment Report requiring immediate and large-scale reductions in GHG emissions.

5.3.77 Page 30, which is titled: 'Make the climate emergency a guiding principle in all planning decisions', states:

"Planning and consent policy is critical to supporting the transition to net zero – for example through encouraging developments for walking, cycling and use of public transport, ensuring readiness for installation of electric vehicle charging points, and a favourable planning regime for low-cost renewables, particularly onshore wind."

5.3.78 Page 32 also notes the need for taller turbines to be translated into local planning policy.

Reducing Emissions in Scotland Progress Report to Parliament

5.3.79 The CCC published the Progress in reducing emissions in Scotland 2021 Report to Parliament on 07 December 2021. The report outlines that Scottish emissions fell 2% in 2019 which is the latest year that data are available. Page 9 states:

"*In 2020, emissions will have fallen substantially due to the lockdowns in response to the COVID-19 pandemic, but much of this effect is transient. The latest available data do not reflect these developments, so in this report we focus primarily on future delivery of emissions reductions. The 2020s is the critical decade in changing course for Net Zero*."

5.3.80 Page 9 of the report continues by stating*:*

"Most of the key policy levers are now in the hands of the Scottish Government, but promises have not yet turned into action. In this new Parliament, consultations and strategies must turn decisively to implementation."

5.3.81 The CCC's key messages include:

- *"The Scottish Government has set out laudable ambitions.*
- *Delivery of rapid emissions reductions cannot wait. It has taken 30 years to halve Scottish territorial emissions; they must halve again in a decade to meet the legislated 2030 target…*
- *Greater transparency is needed…*
- *The annual targets during the 2020s will be very difficult to meet, even with the strongest climate policies. Emissions in 2019 were above the annual target...*
- *Meeting the 2030 target. Climate policy in Scotland must focus on the transition to Net Zero and the need for rapid progress by 2030…"*

Assessment of Scotland's progress towards CERG priorities

5.3.82 In January 2022 CERG published the Assessment of Scotland's progress towards CERG priorities. Its aim is to track the progress of the Scottish Government response to 12 immediate actions that CERG outlined in September 2021 (which is detailed above). In summary:

"Overall, progress has been made against all but three of our asks. However, none have been met in full."

5.3.83 In relation to the CERG Proposal – Climate emergency a guiding principle in all planning decisions, CERG comments in terms of speed (timelines, targets, delivery) *"No actions to encourage immediate action or build capacity to deliver urgently."* CERG also notes that:

"Draft NPF 4 does have net zero at its core which is positive change. However, more clarity is needed to give planning system and developers certainty – 'must' vs 'should', removing inconsistencies in other strategies, aligning infrastructure investment plans."

5.4 Climate Emergency

5.4.1 In May 2019, both the Scottish and UK Governments declared a climate emergency. In a speech to the Scottish Parliament the Climate Change Secretary stated:

"The Climate Change Committee has been stark in saying that the proposed new targets will require "a fundamental change from the current piecemeal approach that focuses on

specific actions in some sectors to an explicitly economy wide approach". To deliver the transformational change that is required, we need structural changes across the board: to our planning, procurement, and financial policies, processes and assessments. And as I've already said, that is exactly what we will do."

5.4.2 The Climate Change Secretary went onto say that: "*subject to the passage of the Planning Bill at stage 3, the next National Planning Framework and review of the Scottish Planning Policy will include considerable focus on how the planning system can support our climate change goals*."

5.4.3 The speech to parliament highlighted the advice received by the Scottish Government from the UK CCC, emphasising this advice was being taken forward via amendments to the Climate Change Bill.

Scottish Borders Council Climate Emergency

5.4.4 Scottish Borders Council (SBC) declared a climate emergency in September 2020 and in June 2021 they published the Climate Change Route Map (CCRM). The CCRM provides: *"a pathway to climate change resilience and to Net Zero emissions for the Scottish Borders, over a 25-year flexible time horizon."*

5.4.5 It is based on five themes which are:

1. Resilience;
2. Transport Use;
3. Nature Based Solutions;
4. Energy; and
5. Waste Management.

5.4.6 Section 5 sets out SBC's 25 CCRM theme milestones and core actions for each milestone. There are a number of milestones relating to reducing GHG emissions, including *"EC4 Adopt emerging low energy technologies as they become available and viable"* and relating core actions which state:

- *"Support development of the whole renewables industry through its planning and economic policies: wind, wave, and tidal energy, solar, hydro, biomass including potential for circular economy such as farm waste to create biofuel.*
- *Support the development of grid balancing services including battery storage and an interconnected smart grid to balance generation and consumption.*
- *Work with SGN, SOSE (around business opportunities) and other partners to support phasing out of natural gas and movement to the incorporation of biogas and hydrogen.*
- *Pursue development of the region as a 'demonstrator' of new and innovative technologies and systems, with the Borderlands Energy Masterplan offering a UK Government and Scottish Government supported initiative to maximise the low*

carbon and economic potential of the region's significant and expanding net energy contribution."

5.5 The Response to Covid-19

5.5.1 The Scottish Government has outlined that Scotland's recovery following the outbreak of the COVID-19 pandemic needs to be, amongst other things, a green recovery. The following text sets out some of the ways in which that can be achieved.

Climate Change Committee advice to the Scottish Government on the Recovery from the COVID-19 pandemic

5.5.2 In its letter to Roseanna Cunningham MSP and Cabinet Secretary for Environment, Climate Change and Land Reform, dated May 2020, the CCC are clear that "*reducing greenhouse gas emissions and adapting to climate change should be integral to any recovery package*". The letter sets out six principles for a resilient recovery, these are as follows:

1. *"Use climate investments to support the economic recovery and jobs;*
2. *Lead a shift towards positive long-term behaviours;*
3. *Tackle the wider 'resilience deficit' on climate change;*
4. *Embed fairness as a core principle;*
5. *Ensure the recovery does not 'lock in' greenhouse gas emissions or increased climate risk; and*
6. *Strengthen incentives to reduce emissions when considering fiscal changes".*

Chief Planner and Minister for Local Government, Housing and Planning Letter May 2020

5.5.3 In their letter of 29 May 2020, the Chief Planner and Minister for Local Government, Housing and Planning advised that:

"*The need for a well-functioning planning system is as important now as ever. Decisions and actions being taken now, across government and wider society, are vital to the nation's health, wellbeing and economic recovery. What we do in planning is vital to all of those objectives in the short and the long-term.*

We are in no doubt that Scotland's planning services are essential in supporting recovery, ensuring appropriate development proposals can be consented in good time to facilitate delivery on the ground."

5.5.4 This reference, although in the context of the planning system, is relevant to Section 36 applications for energy developments.

Scottish Renewables Written Evidence to the House of Commons Scottish Affairs Committee Inquiry into Coronavirus and Scotland

5.5.5 In June 2020, Scottish Renewables submitted evidence to the House of Commons Scottish Affairs Committee inquiry into COVID-19 and Scotland. The submission makes the case for placing Scotland's renewable energy industry at the heart of a green economic recovery, sets out the opportunities that the renewable energy industry in

Scotland offers to quickly stimulate the economy and how the UK Government can unlock long-term opportunities for renewable energy in Scotland.

5.5.6 The submission advises that economic analysis has established that for every gigawatt (GW) of renewable energy installed in Scotland it creates 1,500 jobs and adds £133 million of gross value added (GVA) to the Scottish economy.

Towards a robust, resilient wellbeing economy for Scotland, Advisory Group on Economic Recovery June 2020

5.5.7 In June 2020, a report from the Advisory Group on Economic Recovery was published. The Foreword advises that:

"*in the world before Covid-19, Scotland had the ambition to become a robust, wellbeing economy. That is one that generates strong economic growth with the concomitant creation of quality jobs, and that does so with an unequivocal focus on climate change, fair work, diversity and equality. Diversity – in all its aspects- is not simply a moral issue; there is conclusive evidence that diversity of thinking leads to better outcomes*."

Eight Policy Packages for Scotland's Green Recovery July 2020

5.5.8 The CERG published Eight Policy Packages for Scotland's green recovery in July 2020. The Executive Summary states:

"The COVID-19 pandemic has created a public health and economic crisis, which has shifted the parameters of this response. A green recovery is a necessity, not an option".

5.5.9 Under the heading of 'Unlocking private investment now with greater policy certainty' the document calls for an update to existing planning guidance to enable new and existing onshore wind planning consents and enhance the competitiveness of Scottish projects.

5.5.10 The conclusion of the document states that:

"Scotland's response to COVID-19 is a massive opportunity to catapult and prioritise a just transition to a net zero economy. The Scottish Government is already committed to a fair and green recovery from this public health crisis. This report has identified specific policy proposals which can help make that a reality - directly addressing the economic concerns resulting from the public health crisis while stepping up our response to the climate crisis – an existential emergency that has not gone away. The packages have also been designed to make the most of the wider social, health and well-being benefits."

5.6 Progress Towards Targets

5.6.1 This section of the chapter sets out the key renewable energy and climate change targets which are relevant to the Proposed Development.

The Targets

5.6.2 It is considered the key targets for Scotland are as follows:

- 2030 to reach a 75% reduction in GHG emissions;
- 2045 to reach net zero GHG emissions; and
- 2030 to generate 50% of Scotland's overall energy consumption from renewable sources.

5.6.3 **Table 5.1** presents the key energy targets relevant to the Proposed Development.

Table 5.1: Energy Targets

Target	Timescale	Source	Current Position
50% of energy use from renewable sources	2030	Scottish Energy Strategy	26.7%[1] in 2020
Reduction of GHG emissions by 75 % against 1990 levels	2030	The Climate Change (Scotland) Act 2009 (as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019	GHG emissions in Scotland have fallen by 58.7 % since 1990[2]
Annual and Domestic Effort Targets 54% reduction from 1990 baseline 55 % reduction from 1990 baseline 56% reduction from 1990 baseline	Annual 2018 2019 2020	The Climate Change (Scotland) Act 2009 (as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019	Missed by 4 %[3] Missed by 3.5 %[4] Target met[5]
Net zero GHG emissions against 1990 levels	2045	The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019	GHG emissions in Scotland have fallen by 58.7 % since 1990[2]

[1] Scottish Government (2022), Energy Statistics for Scotland Q2 2022 Figures.

[2] Scottish Government (2022), An Official Statistics publication for Scotland, Scottish Greenhouse Gas Emissions 2020.

[3] Scottish Government (2021), An Official Statistics publication for Scotland, Scottish Greenhouse Gas Emissions 2019.

[4] Scottish Government (2020), An Official Statistics publication for Scotland, Scottish Greenhouse Gas Emissions 2018.

[5] The figures for 2020 are recognised to have been affected by the Covid-19 pandemic.

Progress Towards Scottish Targets

5.6.4 **Table 5.1** outlines that the interim GHG reduction target for 2020 detailed in the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 has been met. The Official Statistics publication for Scotland, Scottish Greenhouse Gas Statistics 2020 which was published in June 2022 sets out that:

"The main contributors to this decrease between 2019 and 2020 were reductions in emissions in the Domestic Transport (-2.5 MtCO_2e), International Aviation and Shipping

(-1.1 $MtCO_2e$) and Energy Supply (-0.8 $MTCO_2e$) sectors. All other sectors demonstrated modest reductions over this period, with the exception of the Residential sector which increased by 0.1 $MtCO_2e$. The Business and Public sectors showed essentially no change in emissions in the latest year."

5.6.5 The reductions in Domestic Transport and International Aviation and Shipping are understood to be associated with the Covid-19 lockdown. Page 18 of the publication states:

"Domestic transport emissions have decreased by 2.5 $MtCO_2e$ (20.9 per cent reduction) between 2019 and 2020. As shown in a new table (Table B4), emissions from all forms of domestic transport reduced in the latest year with cars (-26.6 per cent) and domestic aviation (-61.5 per cent) showing the largest emissions reductions, due to the COVID-19 restrictions."

5.6.6 **Table 5.1** demonstrates that in 2020, 26.7% of total Scottish energy consumption came from renewable sources (19.2% in 2017, 21.1% in 2018 and 23.8% in 2019).

5.6.7 Figures released by the Scottish Government in the Energy Statistics for Scotland (September 2022) show that as of June 2022, 13.3GW of renewable electricity capacity was operational in Scotland. While there is an 16.7GW of capacity either under construction, consented, or in planning, the target relates to installed capacity.

5.6.8 The Scottish Government also had a target to deliver the equivalent of 100% of Scottish electricity consumption from renewables by 2020. This target was missed with 98.6%[28] of gross electricity consumption coming from renewables in 2020.

5.7 National Planning Policy and Advice

5.7.1 National planning policy and advice documents relevant to the Proposed Development include the following documents:

- The National Planning Framework 3 (June 2014) (NPF3);
- Scottish Planning Policy (June 2014) (SPP);
- Historic Environment Policy for Scotland (HEPS);
- Onshore Wind Turbines Specific Advice Sheet (updated May 2014);
- Good Practice Principles for Community Benefits from Onshore Renewable Energy Developments (Scottish Government, 2019);
- Online Planning Advice on Flood Risk (2015);
- PAN 1/2011 Planning and Noise (March 2011);
- PAN 2/2011 Planning and Archaeology (July 2011);
- PAN 3/2010 Community Engagement;
- PAN 1/2013 Environmental Impact Assessment (August 2013);
- PAN 51 Planning, Environmental Protection and Regulation (October 2006);
- PAN 60 Planning for Natural Heritage (January 2008);

[28] Scottish Government (2021), Annual Energy Statement & Quarterly Statistics Bulletin, December 2021. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2018/10/quarterly-energy-statistics-bulletins/documents/energy-statistics-summary---december-2021/energy-statistics-summary---december-2021/govscot%3Adocument/Scotland%2BEnergy%2BStats%2BQ3%2B2021.pdf [accessed May 2022].

- PAN 61 (2001) Sustainable Urban Drainage Systems;
- PAN 69 Planning and Building Standards Advice on Flooding (August 2004);
- PAN 71 Conservation Area Management;
- PAN 75 Planning for Transport (August 2005); and
- PAN 79 Water and Drainage (September 2006).

National Planning Framework for Scotland (NPF3)

5.7.2 NPF3 was published by the Scottish Government in June 2014. it provides the Scottish Government's long term strategy for Scotland and provides a framework for the spatial development of Scotland as a whole. There is high level support for the promotion of renewable energy developments throughout many parts of NPF3. Chapter 3 of NPF3, 'A low carbon place' identifies that planning will play a key role in delivering the Scottish Government commitments set out in 'Low Carbon Scotland: the Scottish Government's report on proposals and policies'. The priorities which are set out in this strategy set a clear approach which is consistent with Scottish climate change legislation.

5.7.3 Overall, NPF3 emphasises the Scottish Government's commitment to increasing sustainable economic growth across all areas of Scotland and is supportive of renewable energy developments which are located in the right places.

5.7.4 NPF3 sets out a national spatial strategy structured around four key themes, which also includes 'A low carbon Place'. These are set below:

- A successful, sustainable place: this theme is underpinned by the objective of achieving "*a growing low carbon economy*" alongside creating "*high quality, vibrant and sustainable places*…". The Framework calls for a renewed focus on exploiting Scotland's energy resources, and in paragraph 2.7 the NPF3 identifies a need for development which "*facilitates adaptation to climate change, reduces resource consumption and lowers greenhouse gas emissions*".
- A low carbon place: this theme relates to the legally binding target of reducing Scotland's GHG emissions by 80% by 2050 compared with 1990 levels, as set out in the Climate Change (Scotland) Act 2009. It states that "*Our built environment is more energy efficient and produces less waste and we have largely decarbonised our travel*".
- A natural, resilient place: this theme is concerned with environmental protection, and it is noted that Scotland's principal asset is the land, which must be managed sustainably as both an economic and dynamic resource and an environmental asset. It is noted in paragraph 4.22 of the SPP that "*rural areas have a particular role to play in building Scotland's long-term resilience to climate change and reducing our national greenhouse gas emissions*".
- A connected place: this theme is orientated around maximising physical and digital connectivity around Scotland and between Scotland and the rest of the world.

5.7.5 It should be noted that the targets with respect to 'A low carbon place' have now been superseded by The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

5.7.6 Paragraph 3.9 of NPF3 makes it clear that the Scottish Government wants to continue to capitalise on the wind resource of Scotland.

5.7.7 NPF3 advises that, whilst Scotland is making good progress in diversifying the energy generation capacity and lowering carbon emissions, more action is required by way of continuing to capitalise on the wind resource to ensure security of supply. Paragraph 3.22

makes it clear that onshore wind development will continue to make a significant contribution to the diversification of energy supplies.

Scottish Planning Policy (SPP) 2014

5.7.8 SPP creates a presumption in favour of development that contributes to sustainable development. Sustainable development is focussed on throughout the SPP. Under the heading of Policy Principles, it states: "*This SPP introduces a presumption in favour of development that contributes to sustainable development*"; and Paragraph 28 advises that: *"The planning system should support economically, environmentally and socially sustainable places by enabling development that balances the costs and benefits of a proposal over the longer term. The aim is to achieve the right development in the right place; it is not to allow development at any cost."*

5.7.9 Paragraph 29 of SPP advises that planning policies and decisions should support sustainable development. To assess whether a policy or proposal supports sustainable development the following principles should be considered:

- giving due weight to net economic benefit;
- responding to economic issues, challenges and opportunities, as outlined in local economic strategies;
- supporting good design and the six qualities of successful places;
- making efficient use of existing capacities of land, buildings and infrastructure including supporting town centre and regeneration priorities;
- supporting delivery of infrastructure, for example transport, education, energy, digital and water;
- supporting climate change mitigation and adaption including taking account of flood risk;
- improving health and well-being by offering opportunities for social interaction and physical activity, including sport and recreation;
- having regard to the principles for sustainable land use set out in the Land Use Strategy;
- protecting, enhancing and promoting access to cultural heritage, including the historic environment;
- protecting, enhancing and promoting access to natural heritage, including green infrastructure, landscape and the wider environment;
- reducing waste, facilitating its management and promoting resource recovery; and
- avoiding over-development, protecting the amenity of new and existing development and considering the implications of development for water, air and soil quality.

5.7.10 Onshore wind is specifically considered in SPP starting at Paragraph 161. SPP advises that Planning Authorities should set out a spatial framework in Local Development Plans identifying areas likely to be most appropriate for onshore wind farms where there is the greatest potential for onshore wind development. Table 1 of SPP is as presented in **Table 5.2.**

Table 5.2: Table 1 of SPP Spatial Framework

<table>
<tr><th colspan="3">Group 1: Areas where wind farms will not be acceptable</th></tr>
<tr><td colspan="3">National Parks and National Scenic Areas</td></tr>
<tr><th colspan="3">Group 2: Areas of significant protection</th></tr>
<tr><td colspan="3">Recognising the need for significant protection, in these areas wind farms may be appropriate in some circumstances. Further consideration will be required to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation.</td></tr>
<tr><td>National and international designations:
• World Heritage Sites;
• Natura 2000 and Ramsar sites;
• Sites of Special Scientific Interest;
• National Nature Reserves;
• Sites identified in the Inventory of Gardens and Designed Landscapes;
• Sites identified in the Inventory of Historic Battlefields.</td><td>Other nationally important mapped environmental interests:
• areas of wild land as shown on the 2014 SNH map of wild land areas;
• carbon rich soils, deep peat and priority peatland habitat.</td><td>Community separation for consideration of visual impact:
• an area not exceeding 2 km around cities, towns and
• villages identified on the local development plan with an identified settlement envelope or edge. The extent of the area will be determined by the planning authority based on landform and other features which restrict views out from the settlement.</td></tr>
<tr><th colspan="3">Group 3: Areas with potential for wind farm development</th></tr>
<tr><td colspan="3">Beyond groups 1 and 2, wind farms are likely to be acceptable, subject to detailed consideration against identified policy criteria</td></tr>
</table>

5.7.11 Paragraph 169 of SPP, provides guidance for development management and the determination of development proposals. It sets out that proposals for energy infrastructure developments should take account of spatial frameworks for wind farms where these are relevant and sets out key considerations for proposals. These include net economic effect; the scale of contribution to renewable energy generation targets; effect on GHG emissions; cumulative effects; effects on communities and individual dwellings; and landscape and visual effects.

Draft Fourth National Planning Framework (draft NPF4)

5.7.12 The Draft Fourth National Planning Framework (draft NPF4) sets out how the Scottish Government's approach to planning and development will help to achieve a net zero, sustainable Scotland by 2045. It was laid in Parliament on 10 November 2021. The Scottish Parliament considered the draft NPF4 for period of up to 120 days which ran alongside the public consultation process which ended on 31 March 2022. The Scottish Government are considering responses to the draft NPF4 before presenting a final draft to the Scottish Parliament which is expected during 2022.

5.7.13 As set out in the 'Fairer, Greener Scotland – The Government's Programme for 2021-22' the draft NPF4 is proposing that renewable energy infrastructure exceeding 50 MW would be a national development.

5.7.14 The draft NPF4 incorporates Scottish Planning Policy, containing detailed national policy on a number of planning topics. Draft policies which are considered by the applicant to be most relevant to the Proposed Development are summarised in **Table 5.3**.

Table 5.3: Draft NPF4 policies most relevant to the Proposed Development

Policy Reference	Title	Relevant Policy Summary
Policy 2	Climate Emergency	When considering all development proposals significant weight should be given to the Global Climate Emergency. All development should be designed to minimise emissions over its lifecycle Development proposals for national, major or EIA development should be accompanied by a whole-life assessment of GHG emissions from the development. Development proposals for new, infrastructure should be designed to be adaptable to the future impacts of climate change.
Policy 3	Nature Crisis	Development proposals should contribute to the enhancement of biodiversity, including restoring degraded habitats and building and strengthening nature networks and the connections between them. Potential adverse impacts of development proposals on biodiversity, nature networks and the natural environment should be minimised through careful planning and design. Design should take into account the need to reverse biodiversity loss, safeguard the services that the natural environment provides and build the resilience of nature by enhancing nature networks and maximising the potential for restoration. Development proposals for national, major and of EIA development or development for which an Appropriate Assessment is required should only be supported where it can be demonstrated that the proposal will conserve and enhance biodiversity, including nature networks within and adjacent to the site, so that they are in a demonstrably better state than without intervention, including through future management.
Policy 19	Green Energy	Development proposals for all forms of renewable energy and low-carbon fuels, together with enabling works such as transmission and distribution infrastructure, and energy storage such as battery storage, should be supported in principle. Development proposals for wind farms in National Parks and National Scenic Areas should not be supported. Outwith National Parks and National Scenic Areas and recognising the sensitivity of any other national or international designations, development proposals for new wind farms should be supported unless the impacts identified (including cumulative effects), are unacceptable. To inform this, site specific assessments including where applicable

Policy Reference	Title	Relevant Policy Summary
		Environmental Impact Assessments (EIA) and Landscape and Visual Impact Assessments (LVIA) are required. Areas identified for wind farms should be suitable for use in perpetuity. Consents may be time-limited, but wind farms should nevertheless be sited and designed to ensure impacts are minimised and to protect an acceptable level of amenity for adjacent communities. Specific considerations will vary relative to the scale of the proposal and area characteristics, but development proposals for renewable energy developments must take into account: • net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities; • the scale of contribution to renewable energy generation targets; • effect on GHG emissions reduction targets; • cumulative impacts – taking into account the cumulative impact of existing and consented energy development; • impacts on communities and individual dwellings, including visual impact, residential amenity, noise and shadow flicker; • landscape and visual impacts, including effects on wild land; • effects on the natural heritage, including birds; • impacts on carbon rich soils; • public access, including impact on long distance walking and cycling routes and scenic routes; • impacts on historic environment assets, including scheduled monuments, listed buildings and their settings; • impacts on tourism and recreation; • impacts on aviation and defence interests including seismological recording; • impacts on telecommunications and broadcasting installations, particularly ensuring that transmission links are not compromised; • impacts on road traffic and on adjacent trunk roads; • effects on hydrology, the water environment and flood risk; • the need for conditions relating to the decommissioning of developments, including ancillary infrastructure; • site restoration, opportunities for energy storage; and • the need for a robust planning obligation to ensure that operators achieve site restoration.

Policy Reference	Title	Relevant Policy Summary
Policy 28	Historic Assets and Places	Development proposals for the demolition of listed buildings or other works that adversely affect the special interest of a building or its setting should not be supported. Development proposals should preserve or enhance the character and appearance of conservation areas and their settings. Development proposals which affect scheduled monuments should only be supported where they avoid direct impacts on scheduled monuments and any adverse impacts upon their setting. Development proposals should avoid adverse impacts on non-designated historic environment assets, areas and their setting.
Policy 32	Natural Places	Development proposals that would have an unacceptable impact on the natural environment including biodiversity objectives should not be supported. Development proposals likely to have a significant effect on an existing or proposed European site which is not directly connected with or necessary to their conservation management must be subject to an 'appropriate assessment' of the implications for the conservation objectives. Development proposals that will affect a National Park, National Scenic Area, Site of Special Scientific Interest or a National Nature Reserve should only be supported where the objectives of designation and the overall integrity of the area will not be compromised; or any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance. Development proposals that would be likely to have an adverse effect on a protected species should not be supported unless it meets the relevant statutory tests. If there is evidence to suggest that a protected species is present onsite or may be affected by a proposed development, steps must be taken to establish their presence. The level of protection afforded by legislation must be factored into the planning and design of the development and any impacts must be fully considered prior to the determination of the application. Planning authorities should apply the precautionary principle where the impacts of a proposed development on nationally or internationally significant landscape or natural heritage assets are uncertain, but there is sound evidence indicating that damage could occur. Development proposals for development in areas identified as wild land (per Nature Scot Wild Land Areas map 2014) should only be supported where:

Policy Reference	Title	Relevant Policy Summary
		• the Proposed Development cannot be reasonably located outside of the wild land area; or, • it is for small scale development directly linked to a rural business, croft or required to support a fragile population in a rural area; and, • a site based assessment of any significant effects on the qualities of the areas is undertaken, and use of siting, design or other mitigation minimises adverse impacts.
Policy 33	Soils	Development proposals should only be supported if they are designed in a way that minimises the amount of disturbance to soils on undeveloped land and protects them from damage including erosion or compaction. Development on peatland, carbon rich soils and priority peatland habitat should not be supported unless essential for: • essential infrastructure, where there is a location need and no other site is suitable; or • the generation of energy from a renewable source, where the proposal supports a zero carbon electricity system and will maximise the function of the peatland during its operational life and in decommissioning; or • small scale development directly linked to a rural business, farm or croft; or • supporting a fragile population in a rural or island area; or • restoration of peatland.
Policy 34	Trees, Woodland and Forestry	Development proposals should not be supported where they would result in: • any loss of ancient woodlands, ancient and veteran trees, or adverse impact on their ecological condition; • adverse impacts on native woodlands, hedgerows and individual trees of high biodiversity value or identified for protection in the Forestry and Woodland Strategy; • fragmenting or severing woodland habitats, unless mitigation measures are identified and implemented; • conflict with Restocking Direction, Remedial Notice or Registered Notice to Comply issued by the Scottish Government Forestry Regulator, Scottish Forestry. Development proposals involving woodland removal should only be permitted where it would achieve significant and clearly defined additional public benefits. Where woodland is removed in association with development, developers will generally be expected to provide compensatory planting.

5.8 Development Plan Policy

5.8.1 The Development Plan for the Proposed Development comprises the SESplan Strategic Development Plan (SDP) 2013 which was approved in June 2013 and the Scottish Borders LDP which was adopted in May 2016.

5.8.2 Both the SESplan SDP and Scottish Borders LDP are more than five years old. Paragraph 33 of the SPP sets out that where a development plan is more than five years old it is considered to be out of date and the presumption in favour of development that contributes to sustainable development will be a significant material consideration.

SESplan Strategic Development Plan 2013

5.8.3 The SESplan SDP is now dated, however, it does recognise the need for renewable energy. Policy 10 Sustainable Energy Technologies states:

"The Strategic Development Plan seeks to promote sustainable energy sources. Local Development Plans will…set a framework for the encouragement of renewable energy proposals that aim to contribute towards achieving national targets for electricity and heat, taking into account relevant economic, social, environmental and transport considerations…"

5.8.4 A second Proposed Strategic Development Plan was published and submitted to Scottish Ministers for examination in June 2017. However, in May 2019 Scottish Ministers rejected the second Proposed Strategic Development Plan as they were not satisfied that it had been informed by an adequate and timely Transport Appraisal.

Scottish Borders Local Development Plan

5.8.5 It is considered by the applicant and SBC that the key policy for the Proposed Development is Policy ED9 Renewable Energy Development. The policy states:

"The council will support proposals for both large scale and community scale renewable energy development including commercial wind farms, single or limited scale wind turbines, biomass, hydropower, biofuel technology and solar power where they can be accommodated without unacceptable significant adverse impacts or effects, giving due regard to relevant environmental, community and cumulative impact considerations.

The assessment of applications for renewable energy developments will be based on the principles set out in Scottish Planning Policy [2014], in particular, for onshore wind developments, the terms of Table 1: Spatial Frameworks. Renewable energy developments, including wind energy proposals, will be approved provided that there no relevant unacceptable significant adverse impacts or effects that cannot be satisfactorily mitigated. If there are judged to be relevant significant adverse impacts or effects that cannot be satisfactorily mitigated, the development will only be approved if the council is satisfied that the wider economic, environmental and other benefits of the proposal outweigh the potential damage arising from it."

5.8.6 Policy ED9 sets out the criteria which will be considered in the assessment of wind energy developments which are:

- *"the onshore spatial framework which identifies those areas that are likely to be most appropriate for onshore wind turbines;*
- *Landscape and visual impacts, to include effects on wild land, and taking into account the report of Landscape Capacity and Cumulative Impact (July 2013) as an initial reference point, the landscape and visual impact assessment for a proposal (which should demonstrate that it can be satisfactorily accommodated in the landscape, visual and cumulative impact guidance, for example that produced by Scottish Natural Heritage;*
- *all cumulative impacts, including cumulative landscape and visual impact, recognising that in some areas the cumulative impact of existing and consented development may limit the capacity for further development;*
- *impacts on communities and individual dwellings (including visual impact, residential amenity, noise and shadow flicker);*
- *impacts on carbon rich soils (using the carbon calculator), public access, the historic environment (including scheduled monuments and listed buildings, and their settings), tourism and recreation, aviation and defence interests and seismological recording, telecommunications and broadcasting installations, and adjacent trunk roads and road traffic;*
- *effects on the natural heritage (including birds), and hydrology, the water environment and flood risk;*
- *opportunities for energy storage;*
- *net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities;*
- *the scale of contribution to renewable energy generation targets, and the effect on greenhouse emissions;*
- *the need for conditions relating to the decommissioning of developments, including ancillary infrastructure, and site restoration; and*
- *the need for a robust planning obligation to ensure that operators achieve site restoration."*

5.8.7 Other policies of the Scottish Borders LDP which are considered relevant to the applicant and SBC are summarised in **Table 5.4**.

Table 5.4: Relevant Policies of the Scottish Borders Local Development Plan

Policy Reference	Policy Summary
Policy PMD1: Sustainability	Sets out a number of sustainability principles which should be incorporated within proposed developments.
Policy PMD2: Quality Standards	Includes a number of quality standards on sustainability, placemaking and design, accessibility and green space, open space and biodiversity which will apply to all development.
Policy ED10: Protection of Prime Quality Agricultural Land and Carbon Rich Soils	Outlines that proposals for renewable energy development will be permitted if they are in accordance with the requirements of Policy ED9.

Policy Reference	Policy Summary
Policy HD3 Protection of Residential Amenity	Includes criteria which proposed developments will be assessed against in order to protect residential amenity.
Policy EP1 International Nature Conservation Sites and Protected Species	Seeks to protect international designated sites and European protected species from potentially adverse development.
Policy EP2 National Nature Conservation Sites and Protected Species	Seeks to protect nationally important designated sites and protected species from potentially adverse development.
Policy EP3 Local Biodiversity	Seeks to safeguard and enhance local biodiversity.
Policy EP4 National Scenic Areas	Sets out criteria where development that may affect National Scenic Areas will be permitted.
Policy EP5 Special Landscape Areas	Seeks to safeguard landscape quality.
Policy EP7 Listed Buildings	The Council will support development proposals that conserve, protect and enhance the character, integrity and setting of Listed Buildings. New Development which adversely affects the setting of a Listed Building will not be permitted.
Policy EP8 Archaeology	Sets out the protection required for archaeology assets including Scheduled Monuments, battlefields and regional or local archaeological assets.
Policy EP9 Conservation Areas	Sets out the requirements in relation for developments in or adjacent to conservation areas.
Policy EP10 Gardens and Designed Landscapes	Seeks to protect Garden and Designed Landscapes and the Council will support development that safeguards and enhances the landscape features, character and settings of Gardens and Designed Landscapes.
Policy EP13 Trees, Woodlands and Hedgerows	The Council will not support development that would cause the loss of or serious damage to trees, woodlands and hedgerows unless the public benefits of the Proposed Development outweigh the loss.
Policy EP15 Development Affecting the Water Environment	Seeks to ensure that development does not adversely affect the water environment.
Policy EP16 Air Quality	Requires that developments which could affect air quality are accompanied with information that demonstrates that any such impacts can be minimised to an acceptable degree.

Policy Reference	Policy Summary
Policy IS5 Protection of Access Routes	Development which would have an adverse impact on public access routes will not be supported unless a suitable diversion or appropriate alternative route can be agreed with the Council and delivered by the applicant.
Policy IS8 Flooding	Development will not be permitted if it would be at a significant risk of flooding, or it would increase flooding elsewhere.

Renewable Energy Supplementary Guidance

5.8.8 The Renewable Energy Supplementary Guidance was adopted in 2018 and forms part of the Development Plan. It provides additional detail and guidance to Policy ED9 of the Scottish Borders LDP. It contains the onshore spatial framework, as required by SPP identifying areas where wind farms will not be acceptable (Group 1), areas of significant protection (Group 2) and areas with potential for wind farm development (Group 3).

5.8.9 The Proposed Development site is within a Group 3 area which is an area with potential for wind farm development (see **Table 5.2**). SPP 1 of SPP describes Group 3 as areas beyond groups 1 and 2 where wind farms are likely to be acceptable, subject to detailed consideration against identified policy criteria.

5.8.10 The updated Ironside Farrar Landscape Capacity and Cumulative Impact Study (2016) informed the Renewable Energy Supplementary Guidance and is a material consideration in the determination of Section 36 application.

5.9 Emerging Planning Policy

5.9.1 This section of the chapter includes an overview of the emerging Scottish Borders Local Development Plan 2 (LDP 2) and the Indicative Regional Spatial Strategy (IRSS).

Scottish Borders Council Proposed Local Development Plan 2

5.9.2 The Proposed LDP2 (PLDP2) was submitted by SBC to the Scottish Government for Examination on 14 July 2022.

5.9.3 It is considered the key draft policy is Policy ED9: Renewable Energy Development which is the same as Policy ED9 of the adopted LDP with the only difference being that it refers to the Renewable Energy Supplementary Guidance which was adopted in 2018. The other draft polices which are considered to be relevant by the applicant to the Proposed Development are listed in **Table 5.5**.

Table 5.5: Relevant Policies of the PLDP2

Policy Reference
Policy PMD1: Sustainability
Policy PMD2: Quality Standards
Policy ED10: Protection of Prime Quality Agricultural Land and Carbon Rich Soils
Policy HD3 Protection of Residential Amenity

Policy Reference
Policy EP1 International Nature Conservation Sites and Protected Species
Policy EP2 National Nature Conservation Sites and Protected Species
Policy EP3 Local Biodiversity and Geodiversity
Policy EP4 National Scenic Areas
Policy EP5 Special Landscape Areas
Policy EP7 Listed Buildings
Policy EP8 Historic Environment Assets and Scheduled Monuments
Policy EP9 Conservation Areas
Policy EP10 Gardens and Designed Landscapes
Policy EP13 Trees, Woodlands and Hedgerows
Policy EP15 Development Affecting the Water Environment
Policy EP16 Air Quality
Policy IS5 Protection of Access Routes
Policy IS8 Flooding

Indicative Regional Spatial Strategy

5.9.4 The Planning (Scotland) Act 2019 establishes a requirement for a planning authority or a group of planning authorities to prepare and adopt a Regional Spatial Strategy (RSS). While this duty has not yet been enacted the Scottish Government asked planning authorities to prepare Indicative Regional Spatial Strategies (IRSS) to help with the preparation of the NPF4.

5.9.5 SBC is part of both the South East of Scotland region and the South of Scotland region which have each prepared IRSS. Each IRSS recognises the benefits of renewable energy. The South of Scotland IRSS states *"The South of Scotland is a significant generator of renewable energy. Increased renewable energy generation storage and transmission would benefit the region and Scotland and could be a significant catalyst for wider investment and supply chain growth."*

5.9.6 RSS will not form part of the statutory Development Plan, however, planning authorities will need to have regard to them when preparing LDPs.

References

Scottish Government (2021), Annual Energy Statement & Quarterly Statistics Bulletin, December 2021. Available at:

https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2018/10/quarterly-energy-statistics-bulletins/documents/energy-statistics-summary---december-2021/energy-statistics-summary---december-2021/govscot%3Adocument/Scotland%2BEnergy%2BStats%2BQ3%2B2021.pdf [accessed May 2022].

6 LANDSCAPE AND VISUAL ASSESSMENT

6.1 Introduction

6.1.1 This chapter has been prepared by Pegasus Group. The Lead Author is David Gooch, who is a Chartered Member of the Landscape Institute (CMLI).

6.1.2 This chapter presents a Landscape and Visual Impact Assessment (LVIA) of the Proposed Development. The purpose of an LVIA when undertaken in the context of an Environmental Impact Assessment (EIA) is to identify any likely significant landscape and visual effects arising as a result of the Proposed Development. An LVIA must consider both:

- effects on the landscape as a resource in its own right (the landscape effects); and
- effects on specific views and visual amenity more generally (the visual effects).

6.1.3 Therefore, this LVIA considers the potential effects of the Proposed Development upon:

- individual landscape features and elements;
- landscape character;
- specific views; and
- people who view the landscape.

6.1.4 In this chapter, landscape and visual effects are assessed separately although the procedure for assessing each of these is closely linked and follows The Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3) (Landscape Institute and the Institute for Environmental Management and Assessment, 2013)[29].

6.1.5 The main objectives of the landscape assessment can be summarised as follows:

- to identify, evaluate and describe the baseline landscape character of the site and its surroundings and also any notable individual landscape features within the site;
- to determine the nature of the landscape receptor (i.e., the sensitivity of the landscape) through a consideration of its susceptibility to the type of development proposed and any values associated with it;
- to identify and describe any impacts of the Proposed Development in so far as they affect the landscape resource;
- to evaluate the nature of the landscape effects (i.e., the magnitude, duration and reversibility of the effect);
- to identify and describe mitigation measures that have been adopted to avoid, reduce and compensate for landscape effects;
- to evaluate the relative significance of residual landscape effects; and
- to determine which landscapes effects, if any, are significant.

6.1.6 The main objectives of the visual assessment are similar and can be summarised as follows:

[29] Landscape Institute and the Institute for Environmental Management and Assessment (2013). The Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3). Routledge.

- to identify, evaluate and describe the baseline visual context of the site and its surroundings with a focus on both specific views and the more general visual amenity experienced by people who have views of the site;
- to determine the nature of the visual receptor (i.e., the sensitivity of the viewpoint or person whose visual amenity is affected) through a consideration of the susceptibility of the viewpoint/person to the type of development proposed and any values associated with either the viewpoint or visual amenity experienced;
- to identify and describe any impacts of the development in so far as they affect a viewpoint or views experienced;
- to evaluate the nature of the visual effects (i.e., the magnitude, duration and reversibility of the effect);
- to identify and describe mitigation measures that have been adopted to avoid, reduce and compensate for visual effects;
- to evaluate the relative significance of residual visual effects; and
- to determine which visual effects, if any, are significant.

6.1.7 The LVIA also considers any cumulative landscape and visual effects which may arise as a result of the Proposed Development in conjunction with other wind farm developments.

6.1.8 The main LVIA presented in this chapter is supported by figures and visualisations in **Volume 2** and technical appendices in **Volume 3**.

6.1.9 The location of the Proposed Development and the overall 35 km study area for the LVIA is illustrated on **Figure 6.1** (measured from the outermost turbine). For reference, other operational, consented and proposed wind farms referred to throughout this chapter are illustrated on **Figure 6.34** to 35 km within the overall 35 km LVIA study area and to 25 km on **Figure 6.35** within the 25 km detailed cumulative study area, agreed at Scoping stage. Refer to paragraph 6.8.1 for further explanation on the study area for the cumulative landscape and visual assessment.

6.1.10 This chapter is structured as follows:

- Scope and Methodology;
- Consultation Undertaken;
- Statutory and Planning Context;
- Existing Landscape and Visual Context;
- Predicted Impacts;
- Mitigation;
- Summary of Effects; and
- References.

6.2 Scope and Methodology

Types of Impacts Considered in the LVIA

6.2.1 The primary source of best practice for LVIA in the UK is "The Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3) (Landscape Institute and the Institute for Environmental Management and Assessment, 2013)."[30]

6.2.2 The LVIA presented in this chapter has been undertaken in accordance with the principles established in GLVIA3. It must, however, be acknowledged that GLVIA3 establishes guidelines not a specific methodology. The preface to GLVIA3 recognises that:

"This edition concentrates on principles and processes. It does not provide a detailed or formulaic 'recipe' that can be followed in every situation – it remains the responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand."

6.2.3 The methodology for this assessment has, therefore, been developed specifically for this LVIA to ensure that it is appropriate and fit for purpose.

6.2.4 Consideration has also been given to the following documents:

- Landscape Sensitivity Assessment Guidance (Methodology), (2022), NatureScot[31];
- Guidelines for Landscape Character Assessment, (2002) Countryside Agency and Scottish Natural Heritage (SNH)[32];
- Assessing the Cumulative Impact of Onshore Wind Energy Developments, (2021) NatureScot[33];
- Siting and Design of Wind farms in the Landscape, Version 3 (February 2017) SNH[34];
- Visual Representation of Wind farms – Version 2.2 (February 2017), SNH[35];
- General pre-application and Scoping advice for onshore wind farms. Guidance. (September 2020) NatureScot[36];
- LI Technical Guidance Note 2/19. Residential Visual Amenity Assessment (RVAA) (March 2019) Landscape Institute[37];

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[30] Landscape Institute and the Institute for Environmental Management and Assessment (2013). The Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3). Routledge.

[31] NatureScot (2022). Landscape Sensitivity Assessment Guidance (Methodology). Available at: https://www.nature.scot/doc/landscape-sensitivity-assessment-guidance-methodology - Introduction [acccesed November 2022].

[32] The Countryside Agency & NatureScot (NatureScot)(2002). Guidelines for Landscape Character Assessment.

[33] NatureScot (March 2021). Assessing the Cumulative Impact of Onshore Wind Energy Developments. Available at: https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments [accessed November 2022].

[34]NatureScot (2017). Siting and Design of Wind farms in the Landscape, Version 3a. Available at: https://www.nature.scot/doc/siting-and-designing-wind-farms-landscape-version-3a [accessed November 2022].

[35] NatureScot (February 2017). Visual Representation of Wind farms – Version 2.2. Available at: https://www.nature.scot/doc/visual-representation-wind-farms-guidance [accessed November 2022].

[36] NatureScot (September 2020). General pre-application advice and Scoping advice for onshore wind farms. Available at: https://www.nature.scot/doc/general-pre-application-and-Scoping-advice-onshore-wind-farms [accessed November 2022].

[37] Landscape Institute (2019). Technical Guidance Note 2/19. Residential Visual Amenity Assessment (RVAA). Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/03/tgn-02-2019-rvaa.pdf [accessed November 2022].

- LI Advice Note 02/17 Visual representation of development proposals (March 2017) Landscape Institute[38]; and
- LI Technical Guidance Note 02/21 Assessing landscape value outside of national designations[39].

Scope of the Assessment

6.2.5 The LVIA assesses both the long-term effects relating to the operational lifetime of the Proposed Development and the short-term temporary effects associated with the construction of the Proposed Development.

6.2.6 Where appropriate, the LVIA also considers any residual effects once the proposed wind turbines have been decommissioned and removed (assumed to be 35 years from the date of completed construction).

6.2.7 The LVIA considers both direct and indirect landscape and visual effects. It not only assesses the impacts associated with the turbines, but also any related impacts resulting from the construction compound, borrow pits, underground cabling, site tracks, substation, energy storage facility, and access roads.

6.2.8 Consideration has been given to seasonal variations when assessing the visibility of the Proposed Development.

6.2.9 The LVIA also considers any cumulative effects arising in conjunction with other wind farm schemes in the study area, as defined below. Best practice guidelines identify two principal types of cumulative visual impact:

- combined visibility – where the observer is able to see two or more developments from one viewpoint; and
- sequential visibility – where two or more sites are not visible at one location, but would be seen as the observer moves along a linear route, for example, a road or public right of way.

6.2.10 The guidelines state that 'combined visibility' may either be 'in combination' (where two or more sites are visible from a fixed viewpoint in the same arc of view) or 'in succession' (where two or more sites are visible from a fixed viewpoint, but the observer is required to turn to see the different sites). Both types are discussed in this LVIA. The published GLVIA3 also indicates a difference in emphasis between sequential effects that are frequent and those which are occasional. The LVIA also includes a further consideration of the overall totality of the effect, when the Proposed Development is considered alongside the other operational or proposed schemes across the study area.

6.2.11 In relation to both the effects of the Proposed Development alone and the cumulative effects with other wind farm schemes in the study area, both beneficial (positive) and adverse (negative) effects are considered. Wind farms give rise to a wide spectrum of opinions, ranging from strongly negative to strongly positive, with a wide range of opinions lying somewhere between these two positions. Some people view wind turbines as incongruous or industrial structures whilst others view them as aesthetically pleasing,

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[38] Landscape Institute (2019). Technical Guidance Note 06/19 Visual Representation of Development Proposals. Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf [accessed November 2022].

[39] Landscape Institute (2021). Technical Guidance Note 02-21: Assessing landscape value outside national designations. Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2021/05/tgn-02-21-assessing-landscape-value-outside-national-designations.pdf [accessed November 2022].

elegant structures and a positive response to climate change. This spectrum of opinion has come to be referred to in relation to wind farms as the concept of valency. For the avoidance of doubt, in considering the effects of the Proposed Development, a precautionary approach to the assessment has been adopted and it is assumed that, unless specifically stated otherwise, the effects of the proposal will be adverse in nature, even though it is acknowledged that, for some people, the impacts could be considered to be beneficial.

Study Area

6.2.12 The initial study area for the landscape and visual impact assessment is 35 km radius from the turbines in all directions. The extent of this study area is illustrated in Figure 6.1. Initial site work informed by analysis of preliminary ZTVs indicated that any significant landscape and visual effects are likely to occur within a much narrower radius from the site; therefore, the level of assessment work in this LVIA incrementally decreases with distance from the site, with the greatest focus of assessment being within broadly 20 km of the site. The intention is that the detail of the LVIA remains proportional to the likely significance of effects, as advocated in GLVIA3.

6.2.13 In terms of cumulative effects, the intention has again been that assessment work is proportional to the likelihood of significant effects arising. The approach adopted in the cumulative LVIA has been to focus on other wind farms which are either operational, under construction, consented or the subject of a full planning application and which have the potential to give rise to significant cumulative effects when considered in combination with the Proposed Development. Rather than simply considering every other wind farm within a set distance of the Proposed Development, the approach has been to focus the assessment on those sites which have the potential to given rise to significant cumulative effects, and in particular those wind farms within 25 km of the Proposed Development. Further details of this approach are set out in the cumulative impact assessment (**Section 6.8**).

Landscape Assessment Methodology

6.2.14 A baseline landscape assessment was carried out to determine the current features and character of the landscape within and surrounding the site.

6.2.15 The baseline landscape assessment involved firstly a review of desk material including:

- Ordnance Survey maps at 1:250,000; 1:50,000; 1:25,000 and 1:10,000 scales;
- Aerial photographs of the site and surrounding area;
- Topography;
- Current & historical land use;
- Geology and soil maps;
- Historic Parks and Designated Landscapes;
- Relevant planning policy;
- Relevant landscape sensitivity/capacity studies;
- Relevant landscape character assessments; and
- Relevant Historic Landscape Character Assessments.

6.2.16 Field visits have been conducted in a variety of weather conditions and at different times of the year during the pre-application stage.

6.2.17 The baseline assessment identified the existing landscape features on the site, and in the immediate vicinity, and how these elements combine to give the area a sense of landscape character. Plans and construction details of the Proposed Development were used to determine the impacts of the scheme on landscape features and character.

6.2.18 The LVIA firstly assesses how the Proposed Development would impact directly on any existing landscape features or elements (e.g. removal of trees etc.).

6.2.19 The LVIA then considers impacts on landscape character with reference to landscape character areas/types identified in published landscape character documents. Further details of the assessment criteria that underpins this LVIA are set out in **Technical Appendix 6.1**.

Visual Assessment Methodology

6.2.20 Potential visual receptors of the Proposed Development were identified by interpretation of digitally generated ZTVs (see **Table 6.1** for an explanation of ZTVs and how they were produced).

Table 6.1: Production of ZTVs

Production of Zone of Theoretical Visibility (ZTV) Maps
A Zone of Theoretical Visibility (ZTV) illustrates the extents from which a feature would theoretically be visible within a defined study area.
ZTVs are generated assuming a 'bare ground' terrain model. This means that the ZTVs presented within this LVIA have been generated from topographical data only and they do not take any account of vegetation or the built environment which may screen views of the development. It is, as such, a 'worst case' zone of visual influence and considerably over-emphasises the actual visibility of the proposed scheme. In reality trees, hedges and buildings may restrict views of the development from many of the areas rendered as within the ZTV.
A further assumption of the ZTV is that climatic visibility is 100 % (i.e., visibility is not impeded by moisture or pollution in the air). In reality, such atmospheric conditions are relatively rare in this part of the country. Mist, fog, rain and snow are all common weather occurrences, which would regularly restrict visibility of the development from some of the areas within the ZTV; this being an incrementally more significant factor with distance from the site. Atmospheric pollution is not as significant as it is in other parts of the country, but is still present and would also restrict actual visibility on some occasions, again more so with distance from the site.
The ZTVs were generated using GIS. The programme used topographical height data (OS Terrain 5) to build a terrain model. The programme then renders the model using a square grid to illustrate whether the turbines would be visible in each 50 m x 50 m square on the grid for a specified distance in every direction from the site.
Digital ZTVs have been prepared to illustrate the theoretical visibility of the turbine for a radius of 35 km around the site. Three sets of ZTVs have been produced, the first shows visibility of the turbines to blade tip when the blade is at its highest possible position, the second, the visibility of the turbines at hub height and the final set shows the visibility of the turbines proposed to be lit with visible aviation lights. Enlargements of the ZTVs have also been produced.
Cumulative ZTVs have been produced to show locations where the ZTVs of two or more operational, consented or proposed wind turbine sites overlap (in certain cases a number of wind farms which are at the same stage in development have been grouped together). In the cumulative ZTVs one colour has been used to illustrate the theoretical visibility of the Proposed Development and a second colour to illustrate the visibility of a second site.

Production of Zone of Theoretical Visibility (ZTV) Maps
Where the ZTVs of the two sites overlap a third colour has been used to illustrate this potential cumulative visual influence. It should be noted that there are several limitations to the use of ZTVs. For a discussion of these limitations please refer to Visual Representation of Wind farms – Version 2.2 (NatureScot). In particular, it should be noted that the ZTV plans simply illustrate theoretical visibility and do not imply or assign any level of significance to those areas identified as being within the ZTV. The ZTVs are a tool to assist the Landscape Architect to identify where the site would potentially be visible from. The assessment of landscape and visual effects in this chapter does not rely solely on the accuracy of the ZTVs. The ZTVs have been ground proofed and professional judgement has been used to evaluate the significance of effects.

6.2.21 A selection of viewpoints was identified and agreed with statutory consultees to represent a range of views and viewer types as discussed in Visual Representation of Wind farms – Version 2.2 (NatureScot)[40] and in paragraphs 6.16-6.20 of GLVIA3.

6.2.22 The viewpoints cover a variety of different character areas, are in different directions from the site and are at varying elevations. Some of the viewpoints are intended to be representative of the visual experience in a general location whereas other viewpoints illustrate the view from a specific or important vantage point. The viewpoints are located at a range of distances from the Proposed Development to illustrate the varying magnitude of visual impacts.

6.2.23 Visualisations were produced for each of the viewpoints; these are presented in **Volume 2** of this EIA Report. An explanation of how they were produced and information to be read in conjunction with the visualisations is provided in **Technical Appendix 6.2**.

6.2.24 Each of the representative viewpoints was visited to gain an understanding of the sensitivity of the viewpoint receptors and to make professional judgements on the likely visual effects arising from the Proposed Development.

6.2.25 The viewpoints were used as the starting point for considering the effects on visual receptors within the entire study area. The visual assessment does not rely solely on the viewpoint assessments to determine the significance of effects on different visual receptor groups throughout the study area. It should be recognised that the viewpoints illustrated in the LVIA simply represent a series of snapshots from a small selection of the locations within the study area from where the Proposed Development would be visible. Following the viewpoint assessment, the LVIA considers the effect on visual amenity throughout the study area with reference to different visual receptor groups at varying distances from the site.

Assessment Criteria

6.2.26 The purpose of an LVIA when produced in the context of an EIA is to identify any significant landscape and visual effects within the study area to assist the determining authority in deciding the acceptability of the scheme under consideration.

6.2.27 The detailed assessment criteria used to determine landscape and visual sensitivity, magnitude of change and significance of effect are set out in **Technical Appendix 6.1**. The approach and methodology to the assessment of the effects of visible aviation

[40] NatureScot (February 2017). Visual Representation of Wind farms – Version 2.2. Available at: https://www.nature.scot/doc/visual-representation-wind-farms-guidance [accessed November 2022].

lighting on landscape character and visual amenity is set out in **Technical Appendix 6.10**.

6.2.28 Professional judgement is then employed to determine whether the effect is significant or not. Those effects described as **Major, Moderate Major** and in some cases **Moderate** may be regarded as significant.

Residual Effects

6.2.29 Best practice for EIA in general terms requires that the significance of potential effects be assessed, mitigation proposals identified (if a significant effect is identified) and the residual effect (with mitigation in place) then re-assessed to demonstrate the effectiveness of the mitigation proposed.

6.2.30 In the case of LVIA for wind farms this presents two interrelated problems:

- potential effects cannot be meaningfully assessed in the absence of an assumed layout; and
- landscape and visual mitigation principally focuses on refinement of the site layout ('mitigation by design').

6.2.31 The approach taken in this study has, therefore, been to build landscape and visual mitigation into the final layout (refer to **Chapter 2**). Mitigation has been considered as part of the iterative design process, but as this mitigation is integral to the final layout, there is no difference between the assessed effects reported in the main body of this chapter and the residual effects.

Limitations to the Assessment

6.2.32 The assessment of effects within this LVIA has been derived through the use of publicly available information only. Within such a large study area it is unfeasible to visit every single location from which the Proposed Development might be visible as illustrated on the ZTVs. The authors of the LVIA have, however, spent a considerable length of time 'in the field' and visited all important viewpoints and locations within the study area.

6.2.33 Limitations to the use of ZTVs are set out in **Table 6.1** above and the limitations in relation to photography, wireframes and photomontages are also set out in **Technical Appendix 6.2**.

6.3 Consultation Undertaken

6.3.1 Throughout the Scoping exercise, and subsequently during the ongoing EIA, relevant organisations were contacted with regards to the Proposed Development. **Table 6.2** below outlines the consultation responses received in relation to landscape and visual matters.

Table 6.2: Consultee Responses

Consultee	Comments Received/Issues Raised	Response
Energy Consents Unit (ECU)	The Proposed Development For each generating component the following will be required to be assessed and fully detailed: components; the scale of the development; and export capacity. Landscape, visual and night-time assessment The LVIA, must include a robust Night-Time Assessment with agreed viewpoints to consider the effects of aviation lighting and how the chosen lighting mitigates the effects. The study area and the final list of viewpoints and visualisations should be agreed following discussion between the Company, Scottish Borders Council, NatureScot, Northumberland County Council and Northumberland National Park Authority.	In line with current NatureScot guidance, "General pre-application advice for onshore wind farms" (September 2020)Error! Bookmark not defined., Annex 2, the assessment of the effects of night-time lighting on landscape character and visual amenity has been considered throughout the main LVIA chapter. The study area and final list of viewpoints have been reviewed following Scoping responses and amended as appropriate. The final list of LVIA and night-time viewpoints was confirmed in writing to Scottish Borders Council.
	Cumulative Landscape impact assessment Developments to be included in cumulative landscape impact assessments should be discussed and agreed by the Company and Scottish Borders Council. Photography and visualisations submitted in the EIA report should reflect the most up-to-date cumulative position and the most up-to-date ecological and vegetation position.	The Cumulative Landscape Impact Assessment and visuals reflect the current cumulative position as far as reasonably practicable.

Consultee	Comments Received/Issues Raised	Response
Scottish Borders Council (SBC)	<u>Landscape Character and Visual Assessment</u> The following areas need further consideration or amendment: with the significantly taller turbines now being proposed for the majority of applications it would be reasonable to extend the cumulative study area from 20km to at least a 25 km radius from the outermost proposed turbines. Windfarms at Scoping should also be included in the cumulative assessment. The very significant increase in height of turbines in recent years suggests the RVAA should be extended from 2 km to a 3 km radius from the nearest turbine. Consideration should be given to including up to three night-time additional viewpoints. VP6, VP11 and VP13 are recommended, representing different receptors and distances. Additional viewpoints are recommended on the A68 either at the first hairpin north from Carter Bar or when the road straightens out to the north after the hairpins. Also, a viewpoint from the higher fringes of Jedburgh to the east of the town, such as Rowan Road off Oxnam Road. Given the projected impacts from the A6088 and the number of viewpoints on this road, a sequential route assessment for the A6088 would also be recommended.	The RVAA study area has been increased to 3 km. Viewpoints 6 and 11 have been included as additional night-time viewpoints. In relation to Viewpoint 13, given there is intermittent theoretical visibility over a short section of the road at a distance of approximately 7.9 km it is not included as an additional night-time viewpoint. Theoretical visibility is predicted to the north of the hairpins. However, plantation woodland along the western edge of the road would restrict actual visibility of the Proposed Development. There is very limited visibility of blade tips only from the higher fringes to the east of Jedburgh. These two locations have been included as wirelines only and used to inform the assessment of effects on receptors. An assessment of sequential effects from the A6088 has been included as part of the LVIA.
NatureScot	<u>Concerns</u> landscape and visual impacts arising from the wind farm, including cumulative impacts with other wind farms in	

Consultee	Comments Received/Issues Raised	Response
	the wider area, and impacts from the visible aviation lighting that will be required due to turbine height. Advice Reference should be made to all information available regarding the original planning application. In particular, responses from statutory consultees will be relevant as a source of information about key issues to be addressed by the EIA Report for this proposal. Landscape and visual impacts of the Proposed Development are a key concern. It may be prudent to consider Teviot Wind Farm in the cumulative studies given that an application for this project is likely to be submitted imminently.	Since the Scoping exercise took place an application for the Teviot Wind Farm has been submitted and as such the scheme has been included in the CLVIA.
Denholm & District Community Council	Visual impact The turbines would have a significant adverse effect on the visual amenity of the area. The proposed turbines exceed the recommended capacity for turbines in the Scottish Borders Landscape Capacity Study. Aviation warning lights	The LVIA has assessed the effects of the Proposed Development on visual receptors and identified any significant effects. The site of the Proposed Development is located within Landscape Character Type (LCT) 5ii - Southern Uplands Forested Covered and specifically within the Wauchope/Newcastleton Landscape Character Area (LCA), as identified in the Scottish Borders Council Update of Wind Energy Landscape Capacity and Cumulative Impact Study, 2016[41]. The assessment of landscape capacity presented at Table 6i(iv) of the study notes that this area has been identified as having "Low Capacity" for turbines over 120 m.

[41] Scottish Borders Council (Ironside Farrar. 2016). Update of Wind Energy Landscape Capacity and Cumulative Impact Study. https://www.scotborders.gov.uk/directory_record/47226/landscape_capacity_and_cumulative_impact/category/28/approved_planning_guidance [accessed November 2022].

Consultee	Comments Received/Issues Raised	Response
	It is of great concern that the proposed windfarm only lies approximately 3 kms from Kielder Forest, an area widely acclaimed as a “Best Dark Sky” area in Britain. Whatever lights are deemed necessary, they will have a significant detrimental effect on that character, and consequent negative impact on the tourist activity of the wider area on both sides of the border.	Effects on the Northumberland Dark Sky Park have been considered as part of the LVIA. Initial lit turbine theoretical visibility mapping indicates very limited visibility with none predicted from Kielder Observatory.
Hobkirk Community Council	Support the climate change targets. Do not agree with the developer’s proposal to assess the impacts only for developments that have submitted a full application or have been approved. The applicant needs to demonstrate satisfactorily how it intends to mitigate the likely adverse effects on settlements and individual residences. There needs to be a full consultation with stakeholders to discuss the likely effects on Kielder dark skies area and whether adequate mitigation is feasible.	Cumulative effects arising from Scoping stage schemes have been considered within an appendix to the cumulative landscape and visual impact assessment (CLVIA). Effects on the Northumberland Dark Sky Park have been considered as part of the LVIA. Initial lit turbine theoretical visibility mapping indicates very limited visibility with none predicted from Kielder Observatory.
Northumberland County Council	No Objection	
Northumberland National Park Authority	Confirm that given the ZTV plan and wireline visualisations provided we are content and welcome the inclusion of the two viewpoints set within the National Park for the LVIA assessment. With regards any potential cumulative effect with other wind farms, we are not up to date on how far some of the other proposed wind farms in the area have	Noted.

Consultee	Comments Received/Issues Raised	Response
	progressed and so cumulative visual impact would need to be included within the Scoping.	
ScotWays	Rights of way BR143, BR145 and BR144 as recorded in the National Catalogue of Rights of Way (CROW) cross or are close to the application site. The Heritage Paths project promotes a route, The Wheel Causeway [HP16] for its historic interest. This old route crosses or is close to the application site. ScotWays considers the Welsh Assembly Government's Technical Advice Note on Renewable Energy (TAN 8) sets out a reasonable principle for a recommended minimum separation distance. ScotWays is likely to object to any proposal where the above principle is not followed. It is proposed to site at least two turbines in close proximity to the recorded rights of way noted above: we would anticipate that the applicant clarifies turbine separation distances. We anticipate that the applicant will take into account both recreational amenity and landscape impacts in developing their proposals for this site. We are particularly concerned that the cumulative impact wind turbines proposed in this general area is taken into account. The applicant may wish to approach the relevant authority's access team for their input when drawing up their Access Management Plan for their proposed development.	Effects on receptors using these routes have been considered as part of the LVIA.
Southdean Community Council	<u>Landscape and Visual</u> Requested the residential visual amenity study area is extended from 2 km to 3 km.	The RVAA study area has been increased to 3 km.

Consultee	Comments Received/Issues Raised	Response
	Requested wireframes and also full imagery at arms length from additional viewpoint at Southdean Lodge Bothy.	Wirelines have been provided from each property assessed in detail in the RVAA at **Technical Appendix 6.6**.
	Also request the following additional viewpoints: CC Top of the Hill north of Chesters /Bairnkine turn off - 623118 Carlins Tooth - a popular walking destination 630025 Wheel Causeway intersection by the Meg and the Bairns - importance for walkers --613019 Carterhouse — highly visible across the site 671074. Peel Fell mast — popular with walkers 682058	An additional LVIA viewpoint has been included for Wheel Causeway. The other requested viewpoints are located at similar distances and orientations to LVIA Viewpoints 6, 7 and 11. Wirelines have been produced from these locations and included in an appendix and used to inform the assessment of landscape and visual effects.
	Requested that turbines 1, 12 and 15 are removed.	Since Scoping, the number of turbines has been reduced and the design evolution process has sought to create a balanced layout while considering onsite constraints.
	Requested a 25 km cumulative study area to include the Faw Side application.	The detailed cumulative study area has been extended to 25 km to allow consideration of Faw Side.
	Visualisations should be prepared in the same manner as the previous Highlee Hill WF proposal.	Visualisations have been prepared following NatureScot best practice guidance.
	The Proposed development would completely transform the setting of Chesters with a majority of the properties	

Consultee	Comments Received/Issues Raised	Response
	facing directly onto the proposed Wind Farm and is inappropriately sited. The unsuitability of the location was reflected in the Scottish Borders Updated Wind Energy Capacity Study from 2016. <u>Visual Receptors</u> Request RVAA for all the properties facing the development on Chesters Brae. Request wireframe and arms length montages from each location. Consider the potential impacts on residential amenity to be overbearing and dominant. <u>Turbine lighting</u> Concerned about potential impact on dark skies area. Request additional viewpoints for night-time assessment at Southdean Lodge Bothy, VP4 and VP11.	Noted. Visual effects from settlements beyond the extended 3 km RVAA study area have been considered within the receptor group assessment within the main LVIA chapter. The RVAA has been supported by a photo record of principal views from each property visited and wire frames from each property within the 3 km RVAA study area. Noted. Effects on the Northumberland Dark Sky Park have been considered as part of the LVIA. Initial lit turbine theoretical visibility mapping indicates very limited visibility with none predicted from Kielder Observatory. The request for a viewpoint from Southdean Lodge Bothy is noted. Viewpoints are selected from publicly accessible locations where more people are likely to experience effects during the hours of darkness.

Consultee	Comments Received/Issues Raised	Response
	<u>Cumulative impact</u> Southdean CC firmly believes that Scoped applications should also be included so the Community can properly assess all the developments on merit. The applications that should be considered for detailed assessment are as follows:- Consented - Pines Burn , Windy Edge (also worth noting that there is a new Scoping request) Applications - Faw Side, Teviot Wind farm (due very shortly -which the new Windy Edge adjoins) Scoping - Cliffhope , Wauchope East , Wauchope West, and possibly Newcastleton	Viewpoint 4 is located at a similar elevation and has a comparable orientation to that of Viewpoint 1 that is a night-time viewpoint. Viewpoint 11 presents a more elevated view from Chesters Brae and has been included as an additional night-time viewpoint. The approach to the CLVIA follows the 2021 NatureScot guidance**Error! Bookmark not defined.**. Teviot Wind Farm is now at the application stage and as such has been considered in the assessment. The consented Windy Edge scheme has been included in the CLVIA, and the revised Windy Edge scheme which is at Scoping has been included at **Technical Appendix 6.9**. Regarding the other Scoping schemes of Cliffhope and Wauchope, these were submitted for Scoping in 2017 and 2016 respectively. Given the considerable time that has passed neither of these schemes has been included within the assessment. Should these schemes come forward during the application, they will be considered at that time.
Upper Liddesdale & Hermitage Community Council	The negative visual aspect and residential amenity of this proposal will need to be justified.	Any significant effects identified in the LVIA and its technical appendices will be weighed in the overall planning balance by the decision maker.

Consultee	Comments Received/Issues Raised	Response
	The cumulative impact has increased since the Highlee Hill proposal with a number of wind farms to the East which have been consented (Windy Edge, Pines Burn); applied for (Faw side and shortly, Teviot); and in Scoping (the new Windy Edge, Cliffhope, Wauchope East, and Wauchope West).	The approach to the CLVIA follows the 2021 NatureScot guidance[Error! Bookmark not defined.]. Teviot Wind Farm is now at the application stage and as such has been considered in the assessment. The consented Windy Edge scheme has been included in the CLVIA, and the revised Windy Edge scheme which is at Scoping has been included at **Technical Appendix 6.9**. Regarding the other Scoping schemes of Cliffhope and Wauchope, these were submitted for Scoping in 2017 and 2016 respectively. Given the considerable time that has passed neither of these schemes has been included within the assessment. Should these schemes come forward during the application, they will be considered at that time.

6.4 Statutory and planning context

European Landscape Convention, Adopted 2000

6.4.1 The European Landscape Convention (ELC) is the first international convention to focus specifically on the landscape as a resource in its own right. The convention promotes landscape protection, management and planning, as well as European co-operation on landscape issues. Signed by the UK Government in February 2006, the ELC became binding from March 2007. It applies to all landscapes, towns and villages, as well as open countryside; the coast and inland areas; and ordinary or even degraded landscapes, as well as those that are afforded protection.

6.4.2 The UK Government has stated that it considers the UK to be compliant with the ELC's requirements and in effect the principal requirements of the ELC are already enshrined in the existing suite of national policies and guidance on the assessment of landscape and visual effects.

6.4.3 The ELC defines landscape as:

'An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.' (Council of Europe 2000)'

6.4.4 It is important to recognise that the ELC does not require the preservation of all landscapes although landscape protection is one of the core themes of the convention. Equally important though is the requirement to manage and plan future landscape change.

6.4.5 The ELC highlights the importance of developing landscape policies dedicated to the protection, management and planning of landscapes. In this regard, NatureScot and Scottish Borders Council have a suite of landscape character assessment and landscape capacity studies which enables decisions to be made with due regard to landscape character as promoted by the ELC.

Planning Policy

6.4.6 A full and detailed consideration of national and local planning policy is contained in **Chapter 5: Planning Policy Context** of this EIA Report and in the accompanying Planning Statement.

Guidance

Scottish Borders Council Supplementary Guidance. Renewable Energy. July 2018[42]

6.4.7 Adopted in 2018, this supplementary guidance forms part of the Development Plan and provides further guidance referred to in Policy ED9 of the LDP. Chapter 7 Wind Energy confirms the onshore wind energy spatial framework set out in Table 1 of SPP and provides an explanation of 'Community Separation for consideration of Visual Impact'.

[42] Scottish Borders Council (2018). Scottish Borders Council Supplementary Guidance. Renewable Energy. Available at: https://www.scotborders.gov.uk/info/20051/plans_and_guidance/766/renewable_energy_supplementary_guidance [accessed November 2022].

The SPG identifies a 2 km zone around each settlement identified in the LDP and notes that this as the *“more sensitive area for wind turbines and the consideration of turbines within these areas should be judged in terms of considering any potential adverse impacts on residents within the 2 km distance. Applicants are required to demonstrate the acceptability of such proposals with any mitigation measures required.”*

6.4.8 Chapter 8 Development Management Considerations provides further guidance on the “Considerations for Wind Energy Proposals” set out in Policy ED9. The considerations relevant to this LVIA are:

B) Landscape and Visual Impacts and Effects on Wild Land

6.4.9 The SPG states that *“The Council will support proposals if: they are capable of being accommodated in the landscape in a manner which respects its main features and character as identified in the Scottish Borders “Landscape Capacity and Cumulative Impact Study” (2016) and which minimises effects on the landscape and the wider area through a careful choice of site, layout and overall design.”*

6.4.10 In terms of Visual Impact, the SPG states that *“The Council will support proposals if: They do not have an unacceptable visual impact, taking into account views experienced from surrounding residential properties and settlements, public roads and paths, significant public viewpoints and important recreational assets and tourist attractions.”*

6.4.11 The SPG at page 36 highlights that the perception of wind turbines is influenced by the scale of the receiving landscape and that larger scale, more open landscapes often in upland areas are potentially better able to accommodate large scale turbines than more complex scale landscapes.

6.4.12 It emphasises that assessments should be supported with appropriate visual material including zone of theoretical visibility (ZTV) maps, wirelines and photomontages from representative viewpoint locations agreed with the Council.

C) Cumulative Impacts

6.4.13 The SPG states that “The Council will support proposals if: their cumulative impact in combination with operational and approved wind energy developments and applications pending determination, have no unacceptable impacts.” The SPG also references cumulative guidance contained within the Scottish Borders Council Assessment of Landscape Capacity and Cumulative Change Study (2016) prepared by Ironside Farrar, referring to Figure 13 of that study that identifies areas where cumulative impact is an issue to be addressed.

6.4.14 The SPG also notes that cumulative impact assessment will be required to consider *“existing wind farms, those which have permission and those that are subject to valid, yet undetermined applications.”*

D) Impacts on Communities and Individual Dwellings (In Terms of Visual Impact, Residential Amenity, Noise and Shadow Flicker)

6.4.15 The SPG notes the proposals will be supported where *“They do not have an unacceptable impact on the amenity of nearby residents, including from noise and shadow flicker.”*

6.4.16 In relation to visual impact, the SPG notes that *“the most significant visual impacts occur when commercial turbines are sited within approximately 2 km of residences”,* but notes that particular local landscape features may reduce these effects. The SPG states that applications for commercial-sized turbines will require consideration of residential amenity impacts, particularly where those impacts occur at 2 km or less.

6.4.17 The SPG also highlights the Landscape Capacity Study as a material development management consideration, which is considered separately below.

6.4.18 Appendix D of the SPG lists iconic viewpoints that proposals should consider where relevant.

Scottish Borders Council. Update of Wind Energy Landscape Capacity and Cumulative Impact Study (Ironside Farrar. 2016)[43]

6.4.19 The Update of Wind Energy Landscape Capacity and Cumulative Impact Study (hereinafter referred to as the Landscape Capacity Assessment) resolves landscape capacity with cumulative development and comprises three stages:

1) Firstly, identifying the underlying capacity of the Scottish Borders landscape to accommodate wind turbine development;

2) Secondly, assessing the degree of cumulative change resulting from operating and consented wind turbines in the study area and in specific areas of Scottish Borders;

3) Thirdly, assessing the level of further development that could acceptably be accommodated within areas of Scottish Borders thereby identifying remaining capacity.

6.4.20 It is important to the note that NatureScot advise that such studies should not be referred to as 'capacity studies' as no local or regional targets are available on which to determine the 'capacity' for development. They advise that these studies *"should reflect their purpose, which is to provide a strategic assessment of relative landscape and visual sensitivity to certain defined forms of development"*[44].

6.4.21 With reference to **Figures 6.13 and 6.14**, the Proposed Development sits within Landscape Character Type (LCT) 5(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton, within the Capacity Assessment. This correlates with LCT 96 Southern Uplands with Forest, as defined in the SNH 2019 National Landscape Character Types.

6.4.22 Its character and sensitivity, along that of other relevant landscape character areas, is considered further in **Section 6.6** below.

Scottish Borders Council. Local Landscape Designations Review. 2012[45]

6.4.23 The Local Landscape Designation Review (LLDR) provided the justification for the creation and redefinition of Areas of Great Landscape Value (AGLV) to form Special

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[43] Scottish Borders Council (Ironside Farrar. 2016). Update of Wind Energy Landscape Capacity and Cumulative Impact Study. https://www.scotborders.gov.uk/directory_record/47226/landscape_capacity_and_cumulative_impact/category/28/approved_planning_guidance [accessed November 2022].

[44] NatureScot Website. Landscape sensitivity studies. Available at: https://www.nature.scot/professional-advice/landscape/landscape-tools-and-techniques/landscape-sensitivity-studies [accessed November 2022].

[45] Scottish Borders Council (2012). Scottish Borders Council Supplementary Guidance. Local Landscape Designations. Available at: https://www.scotborders.gov.uk/directory_record/20043/local_landscape_designations/category/28/approved_planning_guidance [accessed November 2022].

Landscape Areas (SLA). The study predates the current LDP, and informed previous planning policy. However, of particular relevance are the Statements of Importance for each SLA in Chapter 4 which describe the location of each SLA, the reasons for its designation, forces for change and management recommendations.

6.5 Existing Landscape and Visual Context

6.5.1 For the avoidance of doubt, all distances are approximate and have been measure from the asset to the nearest proposed turbine, unless otherwise stated.

Site Location

6.5.2 The Proposed Development is located in the Scottish Borders Council area, close to the Scotland England border. The Proposed Development site is centred at approximately Ordnance Survey (OS) Grid Reference 362449, 606748. The closest settlements (identified in Scottish Borders LDP Volume 2 Settlement Profiles[46]) are Chesters, situated approximately 3.3 km to the north and Bonchester Bridge, situated approximately 5.2 km to the north-west.

6.5.3 The nearest main highways are the A68 between Darlington in England and Edinburgh, situated approximately 5.8 km to the east, the A6088 between Carter Bar and Hawick that passes approximately 2.3 km to the north-east and the B6357 between Jedburgh and Newcastleton that passes approximately 1.1 km to the west.

6.5.4 The location of the Proposed Development is illustrated at **Figure 6.1**, and the final layout including ancillary infrastructure is shown on **Figure 2.2**.

6.5.5 The Proposed Development is situated at the same location, but with a different site boundary, as a previous wind farm proposal, the Highlee Hill Wind Farm, that was submitted by its developer RES as a planning application to Scottish Borders Council (SBC) in July 2016 and allocated the application reference 16/00810/FUL[47]. The Highlee Hill Wind Farm planning application was formally withdrawn by RES in May 2017.

Landscape Designations

6.5.6 A review of all landscape designations within the 35 km study area has been undertaken. Landscape designations are illustrated on **Figures 6.9 and 6.10**. **Figure 6.11** illustrates landscape designations to 20 km overlaid with the blade tip ZTV and **Figure 6.12** shows landscape designations to 20 km overlaid with the lit turbine ZTV.

International/National Landscape Designations

6.5.7 There are no international landscape designations covering the site or located within the 35 km study area.

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[46] Scottish Borders Local Development Plan 2016. Volume 2 Settlement Profiles. Available at:https://www.scotborders.gov.uk/info/20051/plans_and_guidance/121/local_development_plan [accessed November 2022].

[47]16/00810/FUL - Erection of wind farm comprising of 11 turbines 176m high to tip, 2 turbines 150m high to tip and associated works, infrastructure, compounds, buildings, masts and forestry felling, Land Southwest Of Lustruther Farmhouse (Highlee Hill) Hawick Scottish Borders.

6.5.8 There are no national landscape designations covering the site. However, the Northumberland National Park (NNP) is situated approximately 6.3 km to the east of the nearest turbine.

National Parks

6.5.9 The National Parks and Access to Countryside Act (1949) allowed the designation of England's National Parks. Their purpose is to:

- conserve and enhance their natural beauty, wildlife and cultural heritage and
- promote public understanding and enjoyment of their special qualities.

6.5.10 Where these aims conflict the relevant National Park Authority must prioritise the first of these aims, known as the 'Sandford Principle'.

6.5.11 The Northumberland National Park Local Plan[48] (NNPLP) sets out at paragraph 3.4 that national planning policy places great weight to the protection of the 'Special Qualities' of the Park. Its Special Qualities are set out in the Northumberland National Park Management Plan[49] and are defined as:

- Distinctive Landscape Character;
- Rich Cultural Heritage;
- Landscape Rich in Biodiversity and Geology; and
- True Sense of Tranquillity.

6.5.12 The five strategic aims identified in the Management Plan are:

- Aim 1 – A Welcoming Park: To put people and their connections with the landscape at the heart of the National Park;
- Aim 2 – A Distinctive Place: To manage, conserve and enhance the distinctive natural and cultural qualities of the National Park;
- Aim 3 – A Living Working Landscape for Now and the Future: To adapt to change by applying new approaches, together with traditional techniques;
- Aim 4 – Thriving Communities: To ensure the thriving and vibrant communities have a strong sense of place and an economy grounded in the natural and cultural qualities of the National Park; and
- Aim 5 – A Valued Asset: To ensure the National Park is valued as a local, regional and national asset, with influence beyond its boundaries that is worth looking after now and for generations to come.

6.5.13 These strategic aims have been distilled into five strategic priorities for the Local Plan as follows:

- Strategic Priority 1: To support sustainable development and land management that conserves and enhances the National Park's distinctive natural and cultural qualities and protects its assets;
- Strategic Priority 2: To support sustainable use of ecosystem products and services thereby enhancing natural capital across the landscape of the National Park, contributing positively to health and wellbeing;

[48] Northumberland National Park. Local Plan. Adopted July 2020. Available at: https://www.northumberlandnationalpark.org.uk/planning/planning-policy/local-plan/ [accessed November 2022].

[49] Northumberland National Park. Management Plan 2016-2021. Distinctive Places, Open Spaces. Available at: https://www.northumberlandnationalpark.org.uk/about-us/committees-and-plans/management-plan/ [accessed November 2022].

- Strategic Priority 3: To support and encourage sustainable economic growth to allow our local communities to thrive;
- Strategic Priority 4: To support the provision of a range of housing that encourages more working age people and families to live in the National Park or one of its gateway settlements; and
- Strategic Priority 5: To support the retention and enhancement of community facilities, infrastructure and rural services in order to sustain our thriving communities.

6.5.14 With reference to **Figure 6.11** showing landscape designations overlaid with the blade tip ZTV, despite the proximity of the Proposed Development to the Park theoretical visibility is very limited. No theoretical visibility is predicted at the parts of the Park closest to the Proposed Development at Carter Bar.

6.5.15 Where visibility is predicted, it occurs at distances in excess of 10 km to the north-east of the Proposed Development, intermittently and in the most elevated locations along the north-western fringes of the Park in the Cheviot Hills.

6.5.16 Given the very limited theoretical visibility from the Park, effects on this designation are not considered further within the LVIA. However, effects are considered from two viewpoints within the Park (Viewpoint 9 - Carter Bar Vantage Point and Viewpoint 15 – Pennine Way, Black Halls) and as part of the receptor group assessment.

National Scenic Areas

6.5.17 The Eildon and Leaderfoot National Scenic Area (NSA) is situated within the northern part of the study area, over 23 km from the Proposed Development. With reference to the blade tip ZTV at Figure 6.3, although theoretical visibility is predicted across parts of the designation, given the distance from the Proposed Development, any effects would be very limited and would not be considered significant. As such, effects on this designation are not considered further in this assessment.

Local Landscape Designations

Special Landscape Areas

6.5.18 SBC has identified nine Special Landscape Areas (SLAs) and published citations for each SLA within the Local Landscape Designations SPG15. Referring to **Figure 6.9** accompanying this chapter, the following SLAs are located within 35 km of the Proposed Development:

- SLA 3: Tweed, Ettrick and Yarrow Confluences;
- SLA 4: Tweed Lowlands;
- SLA 5: Teviot Valleys; and
- SLA 8: Cheviot Foothills.

6.5.19 The Tweed, Ettrick and Yarrow Confluences and Tweed Lowlands SLAs are situated over 20 km from the Proposed Development. With reference to the blade tip ZTV at **Figure 6.3** and **Figure 6.9** showing landscape designations to 35 km, theoretical visibility from both these areas is intermittent and is likely to be further screened by intervening buildings and vegetation. Any effects would be very limited and would not be considered significant. As such effects on these two SLAs are not considered further within the LVIA.

6.5.20 The Teviot Valleys and the Cheviot Hills SLAs cross through parts of the 20 km detailed study area.

Teviot Valleys SLA

6.5.21 The Teviot Valleys SLA is situated approximately 3.5 km to the north of the Proposed Development at its closest point, extending north from Chesters. With reference to its designation statement, its 'key characteristics' are:

- Covers sections of the Teviot, Jed and Rule valleys as they converge to the north-east of Hawick. It is located between Hawick and Jedburgh, with boundaries formed by ridges which contain the valleys, and by the A6088 to the south.
- Covers a series of distinctive Borders valleys and hills, and has been defined to draw together a number of landmark features with their pastoral and woodland settings.
- Visually prominent hills include Minto Crags, Peniel Heugh, Dunion Hill, Minto Hills and Rubers Law, each of which has a strong relationship with the adjacent valleys and the wider landscape. The three valleys each have their own distinctive character and scale.
- Minto Crags are a dramatic feature contrasting strongly with the gentle farmed valley Teviot below. Long views along the Teviot valley are terminated by the monument on Peniel Heugh. The romantic setting of Fatlips Castle is a reminder of a historic past, when the landscape was dominated by wealthy landowning and military classes, and extensive designed landscapes make a positive contribution. The smooth, rounded grassy Minto Hills contrast with the rugged, wooded Minto Crags.
- Rubers Law has a distinctive craggy summit, dissected and rocky. Bonchester Hill is almost a reduced version of the same, while Dunion Hill is a landmark above Jedburgh.
- The Jed valley is important as a key gateway into the Borders along the A68, including the sense of sudden arrival at Jedburgh after the scenic drive through the wooded valley. Rocky cliff features of red sandstone along the Jed are particularly attractive against spring green of trees.
- The Rule Water is smaller in scale than the Jed Valley and is densely wooded with beech trees along the road. It is an intimate, picturesque valley with traditional stone buildings and bridges, and intriguing gateways into estates. There is evidence of management which suggests a well-established and well-loved landscape.

6.5.22 The 'forces for change' relevant to this application are:

- potential for visual impact of development on hills outside the proposed SLA; and
- development of wind farms and wind turbines, and associated works.

6.5.23 The management recommendations relevant to this application are:

- consider the effects of development on hilltops, such as masts or wind farms, which may be visible within the valleys.

6.5.24 Given the proximity of this SLA to the Proposed Development, effects on it are considered further within this chapter.

Cheviot Foothills SLA

6.5.25 The Cheviot Foothills SLA is situated approximately 3.6 km to the north-east of the Proposed Development at its closest point and covers the south-eastern corner of the Borders, adjoining the Scotland England border and the Northumberland National Park.

6.5.26 With reference to its designation statement, its 'key characteristics' are:

- the Cheviot uplands are distinct from typical Borders hills, being of different form with more frequent rocky outcrops;
- the area has a very remote feel, with wildness value at the summits. The rocky outcrops enliven the green grass moorland expanse of some hills. Layers of hills give visual depth to views into and within the area. It can be an exciting, dramatic landscape which draws you in with the promise of fine views from higher ground;
- the surrounding valleys have a quieter, unintimidating drama. Flat valley floors without tree cover allow open views to the hills;
- Carter Bar is a key access point into the Borders, and indeed into Scotland. The border car park offers panoramic views across wide areas of the Southern Uplands;
- the Cheviots are a well-used recreational resource, contiguous with the Northumberland National Park, and including sections of the Pennine Way and St Cuthbert's Way;
- Yetholm is an important settlement for recreation as it lies at the end of the Pennine Way; and
- the Kale valley has prominent cultivation terraces on its east slope, presenting a clear sign of past habitation.

6.5.27 The 'forces for change' relevant to this application are:

- development of wind farms and wind turbines, and associated tracks.

6.5.28 Given the proximity of this SLA to the Proposed Development, effects on it are considered further within this chapter.

Wild Land

6.5.29 There are no defined areas of Wild Land falling within the 35 km LVIA study area. As such effects on Wild Land are not considered further within this chapter.

Gardens and Designed Landscapes

6.5.30 There are 13 GDLs situated within the 35 km study area, with only one located within 20 km. Monteviot GDL is situated to the north-west of Jedburgh, approximately 15.5 km to the north of the Proposed Development.

6.5.31 With reference to **Figure 6.10** showing landscape designations within 20 km overlaid with the blade tip ZTV, the majority of the GDL does not experience theoretical visibility of the Proposed Development, with visibility limited to the more elevated parts towards its northern boundary at over 18.5 km. Actual visibility is further restricted by the extensive parklands and given the distance from the Proposed Development, any effects would not be considered significant. As such effects on GDLs are not considered further within the assessment.

Published Landscape Character Descriptions

6.5.32 A review was undertaken of the following published sources of information regarding regional and local landscape character, landscape value and landscape capacity:

- NatureScot National Landscape Character Assessment, 2019[50];
- Scottish Borders Council. Update of Wind Energy Landscape Capacity and Cumulative Impact Study (Ironside Farrar. 2016)[51]; and
- The Borders Landscape Assessment. SNH Review No. 112 (ASH Consulting Group)[52].

6.5.33 At this point, for clarity, it is necessary to distinguish between two terms that are frequently used in published guidance and this chapter. They originate from the 'Guidelines for Landscape Character Assessment' (Countryside Agency and NatureScot, 2002):-

- Landscape Character Types (LCTs) are defined as tracts of landscape, which have a generic unity of character due to the particular combinations of landform, land cover, pattern and elements. The same landscape character type can occur at several different locations throughout a study area; and
- Landscape Character Areas (LCAs) are defined as discrete geographical areas of a particular landscape character type and can only occur at a single location.

6.5.34 At a national level the whole of Scotland has now been characterised by the NatureScot National Landscape Character Assessment (2019) which has been published as an online resource. In introducing the updated information, NatureScot set out that where there are *'topic specific landscape capacity or sensitivity studies, they would take precedence for informing that development type'.*

6.5.35 At the local level, the Proposed Development lies within the area covered by the Scottish Borders Council Update of Wind Energy Landscape Capacity and Cumulative Impact Study (Ironside Farrar. 2016). This study takes the six regional character areas within Scottish Borders (defined in the Borders Landscape Character Assessment, ASH Consulting Group 1998) and divides them into five regional landscape character types, with further subdivisions into 30 local landscape character types (LCTs).

6.5.36 Therefore, it is considered appropriate to focus the assessment of effects on the landscape character types in this study and not the national level assessment. However, it is worth noting that their boundaries are consistent in most cases.

Character Types/Areas Covering the Proposed Development

6.5.37 The Proposed Development, including the full extent of the access route lies within LCT 5(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton.

<u>LCT 5(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton</u>

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[50] NatureScot (2019). National Landscape Character Types. Available at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions [accessed November 2022].

[51] Scottish Borders Council (Ironside Farrar. 2016). Update of Wind Energy Landscape Capacity and Cumulative Impact Study.
https://www.scotborders.gov.uk/directory_record/47226/landscape_capacity_and_cumulative_impact/category/28/approved_planning_guidance [accessed November 2022].

[52] SNH (1998). The Border landscape assessment. ASH Consulting Group. Available at: https://www.nature.scot/sites/default/files/2018-01/Publication 1998 - SNH Review 112 -The Borders landscape character assessment.pdf [accessed November 2022].

6.5.38 The Borders Landscape Assessment (1998) records the key characteristics, features and qualities of the Southern Uplands Forest Covered LCT as:

- large scale rolling landform;
- dominant coniferous forest cover characterised by Sitka spruce plantation with occasional areas of pine and larch; and
- simple, uniform character.

6.5.39 The character description notes that elevations range between 200 to 500 m, with the Wauchope Forest straddling the Tweed watershed to the north and the Solway to the south. Land cover is dominated by plantation woodlands. Where higher peaks protrude above the woodland or where there are open areas, land cover comprises coarse grassland and heather, with rushes occurring in poorly drained areas.

6.5.40 It goes on to note that the area is predominantly used as commercial forest plantation, with pockets of grazing in grassland areas. There is a dispersed settlement pattern with widely spaced farmsteads and forestry buildings, with few settlements and roads, but noting the B6357 passing through the Wauchope and Newcastleton forest areas, north to south, via the headwater of the Liddel and Rule waters.

6.5.41 The description notes that visual horizons are mainly confined by trees. It notes the colours of greens, blues and browns, with textural variety resulting from the series of felling coupes and replanting. It also notes the prominence of the forest plantation when viewed from adjacent landscape types, and the contrast between the uniformity of the forest block edges and the curves of the hill landform. These forest blocks result in the area having simple land cover, and a regularity of form and colour.

6.5.42 In relation to the Wauchope/Newcastleton Forest Landscape Character Area it highlights:

- strong direct links with the character of the Kielder Forest immediately to the south of the Cheviots ridge;
- distinctive geology of Carboniferous sedimentaries gives a generally more subdued landform; and
- higher summits (up to 600 m).

Other Landscape Character Types considered in this LVIA

6.5.43 In order to consider the indirect effects of the Proposed Development on landscape character, LCTs within 35 km of the Proposed Development have been illustrated at **Figure 6.13**, and those located within the 20 km detailed study area are illustrated at **Figure 6.14**. The LCTs within 20 km have also been overlaid with the blade tip ZTV at **Figure 6.15**, and with the lit turbine ZTV at **Figure 6.16**.

6.5.44 All LCTs located between 20 km and 35 km have been scoped out of any further assessment, as it is considered that there would be no potential for significant effects to arise at this distance.

6.5.45 An initial review has been undertaken to determine which LCTs would have the potential for significant effects to arise and would, therefore, require detailed consideration in this chapter. The intention has been to ensure that the level of attention given to each character type is proportionate to the likelihood of significant effects arising. The discussion below summarises the process followed in deciding which character types have the potential to experience significant effects and hence to scope out various character types from further consideration.

6.5.46 As set out in **Technical Appendix 6.3** all LCTs present within the 20 km detailed LVIA study area have been subject to this initial review. The findings of this exercise are presented at **Table 1** of **Technical Appendix 6.3**.

6.5.47 The LCTs considered in detail in this chapter are:

- LCT 4 (iii) – Southern Uplands with Scattered Forest – Cauldcleuch Head Group - Scottish Borders;
- LCT 5(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton;
- LCT 7 – Cheviot Foothills – Falla Group;
- LCT 11(i) – Grassland with Hills – Bonchester/Dunion;
- LCT 11(ii) – Grassland with Hills – Rubers Law; and
- LCT 28(iv) - Wooded Upland Fringe Valley - Rule Water.

Local Landscape Description and Character Appraisal

6.5.48 A plan illustrating the landscape features/elements within the site and its immediate context (5 km radius of the turbines) is provided in **Figure 6.18**. The following discussion provides an overview of the physical and perceptual characteristics of the site and immediately surrounding landscape without particular reference to published landscape character types.

Topography

6.5.49 Topography within 35 km of the Proposed Development is illustrated in **Figure 6.17**.

6.5.50 The Proposed Development is situated on a gently sloping plateau that is bound by a ridge of high ground to the south. The plateau slopes in a broadly north-easterly direction from an elevation of approximately 302 m Above Ordnance Datum (AOD) in its south-western corner and 359 m AOD in its south-eastern corner, to approximately 223 m AOD at its northern corner and 197 m at its north-eastern corner.

6.5.51 The site is bordered along its western edge by a series of low hills comprising Wolfelee Hill (393 m AOD, Wolfehopelee Hill (340 m AOD), Black Hill (359 m AOD), Wardmoor Hill (365 m AOD) and Brockie's Law (366 m AOD). To the south, the site is bound by the low hills of Hardlee Knowe (323 m AOD), Dun Knowe and Green Law (320 m AOD) and along its eastern boundary by Tamshiel Rig and Blackburn Rig.

6.5.52 Further south beyond the low hills, the Cheviot Hills form a chain of hills that extend through the southern part of the 20 km detailed LVIA study area. They form a prominent series of hills that sweep around in a broad arc, eventually meeting the high plateau landscape to the north of Eskdalemuir Forest. The hills include Peel Fell (602 m AOD), approximately 5.8 km to the south of the Proposed Development, Fanna Hill (515 m AOD), Wyndburgh Hill, Greatmoor Hill (599 m AOD) and The Pike (462 m AOD).

6.5.53 This ridge of hills passing through the southern part of the detailed 20 km LVIA study area is incised by Teviot Dale in the north-western part of the study area and Liddes Dale in the south-western part of the study area, leading to lowland areas to the north-east and south-west respectively.

6.5.54 Overall, the topography of the site and its immediate environs is characterised as a gently sloping plateau framed by higher ground to the west, south and east.

Watercourses and Drainage

6.5.55 The site of the Proposed Development is crossed by the upstream sections of the Jed Water, which flows from the hills to the south of the site, via Raven Burn and forming the Jed Water near to the southern edge of the site boundary. The Jed Water then flows in a broadly south to north direction through the central part of the site, with Battling Sike passing through the western part of the site and joining it, as it continues northwards through the site.

6.5.56 To the immediate east of the site boundary is Carter Burn while Black Burn flows along the eastern edge of the site. Both of these watercourses meet Jed Water at the northern tip of the site and Jed Water continues in a broadly north-westerly direction towards Chesters and then continues in a broadly north-easterly direction towards Jedburgh, where it meets the Teviot.

6.5.57 The River Teviot is the other main watercourse passing through the northern part of the study area, flowing in a north-easterly direction towards Kelso where it meets the River Tweed.

6.5.58 The chain of hills to the south of the site marks the watershed between the lowlands to the north-east and those to the south-west towards the Solway.

Vegetation

6.5.59 The site of the Proposed Development occupies an area of approximately 847 hectares (ha) within the north-eastern part of Wauchope Forest, comprised entirely of short rotation forestry plantation (SRF). The forest is actively managed, with areas of maturing trees, some new planted areas and areas currently being felled. In addition to the forestry, there are areas of rough grassland adjacent to watercourses, and along the edges of forest rides.

6.5.60 Wauchope Forest occupies a large proportion of the south-west part of the wider 20 km study area. Kielder Forest extends through the southern part of the study area and Reddesdale and Leithope Forest, through the eastern part.

6.5.61 To the north, the wider 20 km study area comprises pasture fields at lower elevations, that give way to areas of moorland and rough grassland at higher elevations.

Built Infrastructure

6.5.62 The site is crossed by an extensive network of man-made tracks that provide access for forestry vehicles to the different forest coupes from the A6088 to the north and the B6357 to the west of the site. There is a cluster of derelict farm buildings at Westshiels towards the central part of the southern edge of the site boundary and a quarry within the western part of the site.

6.5.63 Within the wider landscape, there are numerous individual farmsteads, small groups of properties, villages and occasional towns, situated mainly within the more settled valley landscapes.

6.5.64 The primary routes crossing through the 20 km detailed LVIA study area comprise the A68 situated approximately 5.8 km to the east, the A6088 between Carter Bar and Hawick that passes approximately 2.3 km to the north-east, the A7 approximately 13 km to the north-west and the A698 approximately 12 km to the north. There are also several B roads passing through the study area including the B6357 between Jedburgh and Newcastleton approximately 1.1 km to the west, the B6399 approximately 7.7 km to the west and the B6359 and B6405 over 12.2 km to the north-west.

6.5.65 Within the wider landscape there are several consented and operational wind farms as shown on **Figures 6.34 and 6.35**. The nearest operational wind farm is Langhope Rig Wind Farm comprising 10 turbines with a blade tip height of 121.2 m, situated approximately 23.3 km to the north-west. There are also a number of consented wind farms within the vicinity of the Proposed Development. These are Pines Burn Wind Farm approximately 5.8 km to the west, consisting of 11 turbines, with four turbines with a blade tip height of 149.9 m, three turbines within blade tip height of 145 m and four turbines with a blade tip height of 130 m and Windy Edge approximately 14 km to the south-west with 9 turbines with a maximum blade tip height of 125 m.

6.5.66 There are also several wind farms submitted in planning, comprising Teviot Wind Farm approximately 11.9 km to the west, consisting of 62 turbines up to 240 m to blade tip and Faw Side Community Wind Farm, approximately 24 km to the south-west comprising 45 turbines with a maximum blade tip height of up to 200 m.

6.5.67 The consented Windy Edge Wind Farm is subject to a revised proposal which is currently at the Scoping stage, consisting of 12 turbines with a maximum blade tip height of 200 m.

Sensory and Perceptual Characteristics

6.5.68 The site of the Proposed Development site is a commercial coniferous plantation, with areas within it at different stages within the forest cycle. The forestry provides a strong sense of enclosure, restricting visibility to adjacent landscapes. Views within the site are restricted by the irregular-shaped forest blocks, funnelling views along the tracks that are then truncated by adjacent blocks.

6.5.69 From the forest edge, from felled areas and from higher ground there is much greater intervisibility with surrounding landscapes. The adjacent low hills to the south provide the backdrop and frame the site, and the lower-lying valley landscape to the north. Together the landscape has a simple, smooth form with a stronger horizontal emphasis that results in the site and the immediate surroundings having a relatively large scale.

Forces for Future Change in the Landscape

6.5.70 The main foreseeable forces for change in the landscape surrounding the site relate to changes to the forest plantations with areas of felling and replanting in line with forest management plans. Further changes may also occur due to changes in agricultural land use and changes to traditional forms of moorland management, which may over time change such as by introducing longer rotations between burning, or changes to vegetation resulting from re-wetting or rewilding which encourage greater habitat diversity.

6.5.71 As noted above, within the wider landscape, there are several commercial wind energy developments, consented, in planning or being considered at Scoping which, if consented, would influence the existing character of the wider landscape surrounding the Proposed Development.

6.5.72 In addition to the consented or proposed developments within the vicinity of the site, it is widely recognised that climate change will have an impact on the future character of the Scottish landscape through changes to weather conditions that will in turn result in changes to vegetation that will affect the intrinsic character of the landscape.

Visual Receptors

6.5.73 As illustrated by the blade tip ZTV at **Figure 6.3**, despite the height of the proposed turbines, the Cheviot ridge that runs to the south of the site restricts theoretical visibility of the Proposed Development to a principal area extending up to approximately 5 km to the south-east and south, 7 km to the west and north-west and 11 km to the north. Beyond these distances visibility is much patchier and intermittent. There is practically no visibility from areas to the south-east and south, with patchy theoretical visibility from limited areas to the west, and from higher ground to the north-west of Hawick and to the north and north-east.

6.5.74 It was determined that there was no potential for the Proposed Development to result in any significant visual effects at distances over 20 km from the Proposed Development closest turbine, and furthermore, that with distance from the site, the likelihood of significant visual effects occurring incrementally decreases. Therefore, whilst the primary study area for this LVIA extends out to 35 km and the various figures which accompany this report illustrate a 35 km study area, sensitive visual receptors are identified with a decreasing level of detail with distance from the site.

6.5.75 Interpretation of the various ZTVs accompanying this report assisted in identifying potentially sensitive visual receptors. Principal visual receptors within the surrounding landscape are illustrated at **Figures 6.19 and 6.20** are identified below.

Residential Receptors and Settlements

6.5.76 Residential visual receptors have been identified in bands of distance from the nearest turbine with a greater level of detail provided in relation to those properties nearest to the Proposed Development, although it is recognised that there may be views from individual properties and clusters of properties throughout the wider study area.

6.5.77 With reference to the blade tip ZTVs at **Figures 6.3 - 6.8** and **Figures 6.22 - 6.33** with and the Scottish Borders Settlement Profiles and Maps[53], only those properties or settlements with theoretical visibility of the Proposed Development have been identified below, Settlements with no theoretical visibility have not been considered further within this chapter.

Residential Properties within 3 km

[53] Scottish Borders Council. Local Development Plan. Adopted 2016. Volume 2. Settlement Profiles. Available at:- https://www.scotborders.gov.uk/info/20051/plans_and_guidance/121/local_development_plan [accessed November 2022].

6.5.78 There are 29 residential properties located within or just beyond 3 km of the Proposed Development. Of these, seven have no theoretical visibility and two are either derelict or unoccupied, therefore, are not considered further within this chapter. The remaining 20 have some degree of theoretical visibility and effects on these properties are considered further in the Residential Visual Amenity Assessment at **Technical Appendix 6.6**. The location of these properties is illustrated on **Figure 6.6.1, Technical Appendix 6.6**.

Settlements within 3 to 5 km

6.5.79 Beyond 3 km of the Proposed Development, the nearest residential properties are located at:

- Chesters, situated approximately 3.3 km to the north.

Settlements within 5 to 10 km

6.5.80 Beyond 5 km of the Proposed Development, the nearest settlement is Bonchester Bridge, situated approximately 5.1 km to the north-west.

Settlements within 10 to 15 km

6.5.81 Beyond 10 km of the Proposed Development, the nearest settlements are:

- Hawick, situated approximately 12.3 km to the north-west; and
- Jedburgh, situated approximately 13.1 km to the north north-east.

6.5.82 There is no predicted visibility from Denholm, situated approximately 11.8 km to the north north-west.

Settlements within 15 to 20 km

6.5.83 There is no predicted visibility from Ancrum, situated approximately 17 km to the north.

Scotland's Great Trails

6.5.84 The following great trails are located within 35 km of the Proposed Development:

- Borders Abbeys Way is a circular route commencing and finishing at Kelso. The route is approximately 10.6 km to the north of the Proposed Development at its closet point;
- Romans and Reivers Route commences at Ae Forest in Dumfries and Galloway and ends at Hawick. The route is approximately 14.8 km to the north-west of the Proposed Development at its closest point near Hawick;
- St Cuthbert's Way commences in Melrose and culminates at Holy Island off the Northumberland Coast. The route is approximately 15.8 km to the north-east of the Proposed Development at its closest point near Jedburgh; and
- The Southern Upland Way passes through Galashiels and Melrose in the northern part of the study area, approximately 28 km to the north of the Proposed Development.

6.5.85 An initial review has been undertaken to determine which of these trails have the potential for significant effects to arise and would, therefore, require detailed consideration in this chapter. The intention has been to ensure that the level of attention given to each route is proportionate to the likelihood of significant effects arising. The findings of the initial review are presented at **Table 2** of **Technical Appendix 6.4**.

6.5.86 This review identified that the section of the Borders Abbeys Way near Jedburgh has the potential to be significantly affected by the Proposed Development.

Core Paths and Routes

6.5.87 Within the initial 35 km LVIA study area there is an extensive network of core paths. These are illustrated at **Figure 6.19** overlaid with the blade tip ZTV. Beyond approximately 10 km of the Proposed Development, theoretical visibility of the Proposed Development is very patchy and intermittent. Where theoretical visibility is predicted, it is only over short sections of the route. Therefore, any effects experienced would be seen at considerable distance and would not be considered significant. As such effects on core paths and routes beyond 10 km of the Proposed Development are not considered further within this chapter.

Core Paths within 5 km of the Proposed Development

6.5.88 There are no core paths within 5 km of the Proposed Development.

Core Paths within 5 to 10 km of the Proposed Development

6.5.89 Core paths within 5 to 10 km of the Proposed Development comprise:

- Core path No. 116 – near Bonchester Bridge, located approximately 6 km to the north-west of the Proposed Development;
- Core path No. 203 – near Kirkton and White Hill, located approximately 9.8 km to the north-west;
- Core path 126 – near Slitrig Water, located approximately 8.2 km to the west; and
- Aspirational Core Path - near Slitrig Water, located approximately 8 km to the west.

6.5.90 An initial review has been undertaken to determine which core paths have the potential for significant effects to arise and would, therefore, require detailed consideration in this chapter. The intention has been to ensure that the level of attention given to each core path is proportionate to the likelihood of significant effects arising. The findings of the initial review are presented at **Table 3** of **Technical Appendix 6.4**.

6.5.91 This review identified that the following routes have the potential to be significantly affected by the Proposed Development:

- Core path No. 116 – near Bonchester Bridge; and
- Core path No. 203 – near Kirkton and White Hill.

Other Routes and Paths

6.5.92 Within 5km of the Proposed Development there are no Core Paths, but there are a number of other routes comprising rights of way, a promoted path and a permissive/customary path. These are:

- Dykeraw Plantation Right of Way, heads south from Southdean and crosses through Dykeraw Plantation and the site of the Proposed Development;

- Wheel Causeway, heads south-east from Cleuch Head and passes through the western fringes of the Proposed Development area;
- Bonchester Bridge & Hill Promoted Path, a circular route commencing at Bonchester Bridge and continuing south via Hobkirk and looping back around Bonchester Hill, situated approximately 3.8 km to the north-west of the Proposed Development;
- Rights of Way leading south-east from Southdean via Charlie's Knowe and south from the A6088 and converging at Burns Plantation to the immediate east of the site. The route continues south via Blackburn Rig, south to Knox Knowe, where it crosses into Northumberland and continues as Bridleway 529/001;
- Right of way leading to Carter Fell from the A6088, situated approximately 2.8 km to the east of the Proposed Development; and
- Permissive/customary path to the west of the B6357 through Wauchope Forest, situated approximately 1.6 km to the west of the Proposed Development.

6.5.93 With reference to **Figure 6.20**, given the proximity of the above routes to the Proposed Development, and the extensive theoretical visibility predicted, all of the above routes are considered further within the assessment.

Cycling Routes

6.5.94 The following recreational routes are located within 10 km of the Proposed Development:

- Borders Loop Cycle Route – passes along the A6088 and through Chesters, approximately 3.4 km to the north.

Roads

6.5.95 Within the initial 35 km LVIA study area there is an extensive network of A roads, B roads and minor roads. These are illustrated at **Figure 6.19** overlaid with the blade tip ZTV. Beyond approximately 10 km of the Proposed Development, theoretical visibility of the Proposed Development is very patchy and intermittent. Where theoretical visibility is predicted, it is only over short sections of the route. Therefore, any effects experienced would be seen at considerable distance, and intermittently as receptors travel along the route and effects would not be considered significant. As such effects on roads beyond 10 km of the Proposed Development are not considered further within this chapter.

Roads within 10 km of the Proposed Development

6.5.96 The following roads are located within 10 km of the Proposed Development:

- A68 passing approximately 5.8 km to the east. The road is one of the main routes between Scotland and England and the Carter Bar vantage point is located to either side of the road, providing a stopping point for people to experience views across the Borders;
- A6088 passing 2.3 km to the north-east of the Proposed Development, connecting Hawick and Carter Bar;
- B6399 passing 7.8 km to the west of the Proposed Development linking Hawick in the north and Newcastleton in the south; and
- B6357 passing 1.5 km to the west, between Jedburgh and Newcastleton.

6.5.97 An initial review has been undertaken to determine which roads have the potential for significant effects to arise and would, therefore, require detailed consideration in this chapter. The intention has been to ensure that the level of attention given to each core path is proportionate to the likelihood of significant effects arising. The findings of the initial review are presented at **Table 3** of **Technical Appendix 6.4**.

6.5.98 This review identified that the following routes have the potential to be significantly affected by the Proposed Development:

- A68;
- A6088; and
- B6357.

Recreation and Tourism

6.5.99 Within the initial 35 km LVIA study area the Northumberland National Park is one of the main tourism destinations attracting thousands of visitors, who visit to appreciate its dramatic scenery, participate in a range of activities, and appreciate its dark sky qualities at the Northumberland Dark Sky Park.

6.5.100 The Dark Sky Park encompasses the whole of the National Park and extends south-west from it, covering Redesdale and Kielder Forests. With reference to the lit turbine hub height ZTV at **Figure 6.12** overlaid on the landscape designations, there is very limited theoretical visibility of the lit turbine hubs from the Dark Sky Park with no visibility predicted from Kielder Observatory. Although there is a small area of predicted visibility to the east of Knox Knowe, there are no walking routes crossing through this part of the park and it is not a promoted location from which to visit to appreciate the dark sky. Given the very limited extent of predicted visibility of lit turbines from within the Dark Sky Park, it is considered that effects on it would be very limited in nature and would not be considered significant. As such it is not considered further within the assessment.

6.5.101 Other main destinations for tourism include the historic town of Jedburgh, with its heritage attractions comprising its Abbey, museum and Mary Queen of Scots' Visitor Centre, and the Carter Bar Viewpoint.

6.5.102 With reference to the blade tip ZTVs at **Figures 6.3 and 6.4**, there is no theoretical visibility from the centre of Jedburgh. As such effects on the visual amenity of people visiting these assets are not considered further within the assessment.

6.5.103 In relation to the Carter Bar viewpoint, there is theoretical visibility of between one and three turbines (although in reality the view is screened by plantation forestry). Effects on views experienced from it are considered as part of the assessment of Viewpoint 9, which is located in the southbound layby and hence further from the topography to the immediate west of vantage point on the northbound side of the road.

Assessment Viewpoints

6.5.104 **Table 6.3** sets out the viewpoints considered as part of this assessment. These viewpoints have been derived through desk-based, onsite analysis, interpretation of ZTVs and through consideration of the viewpoints used in the withdrawn Highlee Wind Farm application. The assessment viewpoints have also been consulted on with Scottish Borders Council, Southdean Community Council and based on feedback from the public consultation events.

6.5.105 Following this feedback, three additional LVIA viewpoints and two additional night-time views have been included. A separate appendix (**Technical Appendix 6.8**) has also been included of wirelines requested by Southdean Community Council. Further information on the changes made can be found below in **Section 6.3**.

6.5.106 The viewpoints are representative of the range of views towards the Proposed Development. They are not intended to cover every single view, but are representative of a range of distances from the site and receptor types (e.g. residents, walkers, road users) and have been used to inform the assessment of effects on landscape character, the visual assessment, the cumulative assessment, the assessment of effects and from routes.

6.5.107 **Table 6.3** identifies the 21 assessment viewpoints. The locations of these viewpoints are illustrated on **Figures 6.2 and 6.3**.

Table 6.3: Assessment Viewpoints

No.	Location	OS Grid Reference	Approx. Distance to the Nearest Turbine	Receptor Type
1	A6088, Chesters	362395, 610476	3.3 km	Residential Road users
2	A6088, Southdean	363250, 609112	2.2 km	Residential Road users
3	Fort north-east of Southdean	363496, 609388	2.6 km	Visitors
4	A6088, Western approach to Chesters	361634, 610634	3.4 km	Residential Road users
5	Bonchester Hill	359471, 611790	5.0 km	Walkers
6	B6357 Vantage Point	359170, 603557	2.8 km	Visitors
7	Footpath at Knox Knowe	365468, 602816	3.3 km	Walkers
8	A6088, north-west of Carter Bar	367569, 607371	4.1 km	Walkers
9	Carter Bar (eastern vantage point)	369798, 606857	6.2 km	Visitors Road users
10	Pike Fell	353489, 606367	7.1 km	Walkers
11	Footpath and Minor Local Road, Chesters Brae	363279, 610785	3.8 km	Residential
12	Rubers Law	358048, 615547	9 km	Walkers
13	A6088 Approach to Bonchester Bridge	355994, 612670	7.4 km	Road users

No.	Location	OS Grid Reference	Approx. Distance to the Nearest Turbine	Receptor Type
14	Wolfelee Hill	359717, 608474	1.8 km	Walkers
15	Pennine Way, Black Halls	378828, 610659	15.8 km	Walkers
16	Five Stanes	375263, 616863	15.5 km	Walkers
17	A7 Approach to Hawick	351069, 616778	13.7 km	Road users
18	Borders Abbey Way, Black Law	361964, 618201	11 km	Walkers
19	Wheel Causeway	361280, 601935	3.4 km	Walkers
20	A68, north of hairpin past Carter Bar	368973, 608692	5.8 km	Road users
21	Rowan Road, Jedburgh	366084, 620422	13.8 km	Receptors in Jedburgh

6.5.108 An initial review has been undertaken to determine which viewpoints would have the potential for significant effects to arise and would, therefore, require detailed consideration in this chapter.

6.5.109 The intention has been to ensure that the level of attention given to each viewpoint is proportionate to the likelihood of significant effects arising. The findings of the initial review are presented at **Table 1** of **Technical Appendix 6.4**.

6.5.110 This review identified that the following viewpoints have the potential to be significantly affected by the Proposed Development:

- Viewpoint 1 - A6088, Chesters;
- Viewpoint 2 - A6088, Southdean;
- Viewpoint 3 - Fort north-east of Southdean;
- Viewpoint 4 - A6088, Western approach to Chesters;
- Viewpoint 5 - Bonchester Hill;
- Viewpoint 6 - B6357 Vantage Point;
- Viewpoint 7 - Footpath at Knox Knowe;
- Viewpoint 8 - A6088, north-west of Carter Bar;
- Viewpoint 9 - Carter Bar (eastern vantage point);
- Viewpoint 10 - Pike Fell;
- Viewpoint 11 - Footpath and Minor Local Road, Chesters Brae;
- Viewpoint 12 - Rubers Law;
- Viewpoint 13 - A6088 Approach to Bonchester Bridge;
- Viewpoint 14 - Wolfelee Hill;
- Viewpoint 18 - Borders Abbey Way, Black Law;
- Viewpoint 19 - Wheel Causeway; and
- Viewpoint 20 - A68, north of hairpin past Carter Bar.

6.5.111 **Technical Appendix 6.5** provides a baseline description of the view from each assessment viewpoint identified in the initial review process as having the potential to experience significant effects, followed by a detailed analysis and assessment of the effects.

6.6 Predicted Impacts

6.6.1 Following a brief summary of the Proposed Development, this section of the LVIA considers the effects of the Proposed Development on the physical features of the site (landscape fabric), landscape character, and visual amenity. It considers the effects at three different stages in the lifetime of the Proposed Development:

- during construction of the Proposed Development;
- during the operational lifetime of the Proposed Development; and
- during decommissioning of the Proposed Development after 35 years of operation.

6.6.2 Effects during the first and third of these phases are considered to be temporary and would have a short duration. Effects associated with the operational phase of the Proposed Development are considered to be long-term, reversible effects.

Project Description

6.6.3 A detailed description of the Proposed Development is set out in **Chapter 2** of the EIA Report. The Proposed Development description below summarises those details of the Proposed Development that have particular relevance to this LVIA.

6.6.4 The Proposed Development would principally comprise the following visible features which may have an impact on landscape character or visual amenity:

- 13 wind turbines of approximately 6 MW each, five with a maximum tip height of 180 m, two with a maximum tip height of 200 m, four with a maximum tip height of 210 m and two with a maximum tip height of 230 m;
- hardstanding areas at the base of each turbine, with a permanent area of approximately 2,156 m2;
- one permanent wind monitoring LiDAR device to be located within the substation compound;
- site entrance and access track from the A6088 using the route of an existing forestry track, and access track linking the turbine locations. Total length of access tracks is 17,165 m, of which 10,890 m is new access track and 6,275 m is existing access track which would need to be upgraded;
- an operations control building with parking and welfare facilities;
- a substation compound;
- a battery energy storage;
- telecommunications equipment;
- temporary construction compounds comprising one main construction compound, three turbine laydown areas and one mobilisation compound located at the entrance to the site from the A6088;
- three no. borrow pit search areas, to provide suitable rock for access tracks, turbine bases and hardstandings; and
- underground cabling linking the turbines with the substation.

Turbine Design

6.6.5 The turbines would be three bladed, horizontal axis turbines with solid tubular towers. The blades would be made from reinforced composite materials such as fibreglass. The turbine towers would be made of steel.

6.6.6 The wind turbines would be of the same basic appearance and colour. It is proposed that the turbines would be of a matt grey colour finish. Although off-white has been an accepted colour for turbines, more recently constructed wind turbines have been a mid-grey tone, which reduces the distance over which turbines are visible, especially in dull weather or low light conditions. The choice of material and colour for the proposed turbines is an important consideration in terms of visual impact. Finishing would be expected to be agreed by a condition placed on consent.

Turbine lighting

6.6.7 Air Navigation Order Article 2222 requires turbines exceeding a tip height of 150 m to display aviation lighting to indicate their presence. Dispensations for reduced lighting schemes can be agreed with the Civil Aviation Authority (CAA), according to the guidance provided in CAP-764. For the Proposed Development, the CAA has agreed to a reduced lighting scheme whereby only six cardinal turbines require to be lit with visible lighting (2,000 candela, reducing to 200 candela in good visibility) on the hubs.

6.6.8 Visibility sensors would be installed on the six cardinal turbines to measure the prevailing atmospheric conditions and visibility range. Should atmospheric conditions mean that visibility from the turbines within the site is greater than 5 km from the Proposed Development, CAA policy permits lights to operate in a lower intensity mode, being a minimum of 10% of their capable illumination. Therefore, the 2,000 candela steady state lights would operate at 200 candela. However, if visibility is restricted to 5 km or less, the lights would operate at 2,000 candela.

6.6.9 By ensuring the lights installed comply with the ICAO recommendations, it is possible to attenuate the vertical downwards light to a level that reduces the visual impact from receptors at ground levels below the lights. Implementing the ICAO recommendations, at -1 degrees the aviation lights should only be 1,125 candela and at -10 degrees should only be 75 candela, when visibility is greater 5 km.

6.6.10 Additionally Infra-red (IR) lighting would be installed on peripheral turbines to meet the requirements of the Ministry of Defence (MOD). Subject to the evolution of CAA policy, the applicant would also consider the installation of an aircraft detection lighting system (ADLS) on the Proposed Development. This would switch on the visible lights only when an aircraft passes within specified horizontal and vertical distances from the wind farm.

6.6.11 Further information on visible aviation lighting is provided in **Chapter 13: Aviation and Radar.**

6.6.12 The LVIA has also been mindful of the dynamic nature of the proposed turbines and the manner in which they would introduce movement into the landscape. Whilst the visualisations presented in the LVIA show static turbines, such is the nature of a single printed image, at all times the judgements have been mindful that the turbines would be turning and have the ability to rotate such that they might face any direction depending on the angle of the prevailing wind. It is also acknowledged that the proposed turbines may rotate at a different speed to that of other turbines in the landscape and this has been factored into the judgements at all times, when considering locations where more than one set of turbines would be visible. Thus, while these factors may not be explicitly addressed so as to manage the length of the assessment, they have at all times been considered.

6.6.13 Furthermore, it is also acknowledged that during dark sky hours, the turbine blades passing in front of the turbine lighting leads to a temporary dimming and brightening of the lights. This is something which only occurs when the turbines are viewed with the blades in front of the nacelle and, therefore, is dependent on the prevailing wind direction on any given day.

6.6.14 The dimming and brightening effect serves to increase the noticeability of the turbines within the view and, therefore, increases their visual effect. This effect would be more likely occur at locations to the south-west of the turbines where there are likely to be fewer visual receptors during the low light level period.

6.6.15 The approach and methodology to the assessment of the effects of visible aviation lighting on landscape character and visual amenity is set out in **Technical Appendix 6.10**.

Effects during Construction on Existing Landscape Features

6.6.16 As identified in the baseline section, the existing landscape features present on the site are:

- short rotation forestry (SRF) plantation;
- existing tracks and access from the A6088;
- rough grassland;
- abandoned settlement at Westshiels;
- minor watercourses and crossings.

6.6.17 The construction phase would result in the keyhole felling of trees around turbine positions and the subsequent removal of timber, felling of trees along the route of new access tracks and existing tracks requiring widening. Ground-level vegetation would also be removed to facilitate the excavation of the three borrow pits, the construction of access tracks, turbine foundations, foundations for crane pads, the substation compound, operations control building, energy storage facility, temporary construction compounds and watercourse crossings. All of these elements would be located in LCT 5(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton.

6.6.18 The borrow pit areas would be worked in strips to ensure only enough aggregate for the Proposed Development is removed and to limit the impacts of the borrow pits to as confined an area as possible. Topsoil would be stripped and stored in mounds not exceeding 2 m to minimise compaction and to promote shedding of water. Removed topsoil, plus rock material unsuitable for use as aggregate or fill would be used in the final restoration of the borrow pits.

6.6.19 On completion of working, the borrow pits excavation edges would be softened. Any unusable material from the excavation would be used in restoration of the borrow pit. Restored faces would have a maximum slope of 27° and stored topsoil would be replaced over the restored faces to facilitate re-vegetation and the final restoration of the borrow pit. For restoration the borrow pit floor would be ripped or routed to break up the surface; soils and turf material would then be replaced over the area. The soils would contain a natural seedbank and it is anticipated that natural vegetation would re-establish over time. However, it is accepted that some regrading of the land profile would be expected in the immediate vicinity of the borrow pits.

6.6.20 Further information and supporting drawings of the borrow pits can be found at **Technical Appendix 10.2**.

6.6.21 Although it is noted as a characteristic element in the description of the Southern Uplands Forest Covered – Wauchope/Newcastleton LCT, the forest plantation is an element that has been introduced to the landscape in order to provide a timber crop and hence its value is considered to be low. Its susceptibility is also considered to be low as it is subject to ongoing change as areas are felled, cleared and replanted. The overall sensitivity of the plantation is judged to be low.

6.6.22 The forestry plantation would experience a low magnitude of change resulting from the construction of access tracks, laydown areas, crane pads and turbine foundations, affecting a small part of the overall plantation, with large areas to the east, south and west of the site remaining. Combining the separate judgements about the sensitivity of the plantation and the magnitude of change introduced by the Proposed Development, the overall level of effect is considered to be **Minor**, which is considered to be **not significant**.

6.6.23 The existing access track off the A6088 and the existing tracks leading through the plantation are man-made elements to allow vehicular access to the forest for management operations. As such they are judged to have low value and susceptibility and an overall low sensitivity.

6.6.24 The existing access from the A6088 would require upgrading to allow for wind farm construction and delivery vehicles and as set out in **Chapter 2**, approximately 11 km of existing tracks would require upgrading, resulting in a medium magnitude of change and a **Minor Moderate effect** that is considered **not significant**.

6.6.25 Rough grassland adjacent to existing tracks and watercourses occurs abundantly throughout the forest and is assessed as having low value. Such areas are frequently subject to change through ongoing forest management, resulting in low susceptibility. The overall sensitivity of this landscape element is judged as low.

6.6.26 Where required, grassy areas would be cleared and soils stored and replaced following construction, allowing areas to naturally regenerate. The overall magnitude of change this element would experience is assessed as low, resulting in a **Minor effect** that would be **not significant**.

6.6.27 The abandoned settlement at Westshiels, is not a designated asset, but does provide a link to the site's previous agricultural uses, prior to the commencement of forestry operations, as such it is considered to have medium value and to be moderately susceptible. Its sensitivity is assessed as medium. It would experience a low magnitude of change as all proposed turbines and access tracks have avoided the feature. The overall effect on Westshiels is considered to be **Minor Moderate**, which is considered to be **not significant**.

6.6.28 Watercourses are judged to have a medium sensitivity as they are susceptible to changes which affect their course or their water quality. The proposed turbines have been located away from watercourse channels. Therefore, it is only where new internal access tracks cross these landscape features where there is potential for construction effects to occur. At present a total of five crossings are proposed. Effects on the watercourses crossing the site would be limited and controlled through best-practice construction and environmental practices, such that there would be no greater than a low magnitude change and a **Minor Moderate level of effect** which would be **not significant.**

Summary of Effects on Existing Landscape Features

6.6.29 The Proposed Development would result in no greater than a **Minor Moderate level of effect** to existing landscape features on the site, with the effects considered to be **not significant**.

Assessment of Effects on Landscape Character

6.6.30 The LCTs covering the initial 35 km LVIA study area are shown on **Figure 6.13** and within the 20 km detailed study area on **Figure 6.14**. LCTs within 20 km are also overlaid with the blade tip ZTV at **Figure 6.15** and with the lit turbine ZTV at **Figure 6.16**.

6.6.31 As explained in the baseline at paragraph 6.5.45, an initial review has been carried out of the LCTs within 20 km which have the potential to experience significant effects. This found that in addition to the Southern Uplands Forest Covered – Wauchope/Newcastleton landscape character type (LCT 5(ii)), a further five LCTs have the potential to be significantly affected by the Proposed Development as detailed in **Table 6.4**.

Table 6.4 - Landscape Character Types assessed in detail

Landscape Character Type	Location relative to the Proposed Development
LCT 5(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton	The Proposed Development is located in the northern part of this LCT.
LCT 4 (iii) – Southern Uplands with Scattered Forest – Cauldcleuch Head Group - Scottish Borders	Situated approximately 2.7 km to the west and extending south-westwards to over 29 km from the Proposed Development
LCT 7 – Cheviot Foothills – Falla Group	Situated 2.2 km to the north-east and extending to over 18 km from the Proposed Development
LCT 11(i) – Grassland with Hills – Bonchester/Dunion	Situated 2.3 km to the north and extending to over 15 km to the north of the Proposed Development
LCT 11(ii) – Grassland with Hills – Rubers Law	Situated 2.6 km to the north-west and extending to over 10 km from the Proposed Development
LCT 28(iv) - Wooded Upland Fringe Valley - Rule Water	Situated over 2.2 km to the north-west of the Proposed Development and extending to over 10 km to the north of the Proposed Development

Sensitivity of Landscape Character to Wind Energy Development

6.6.32 The first stage in assessing the effects of the Proposed Development on landscape character is to evaluate the sensitivity of the landscape to the type of change proposed at the site. As indicated within GLVIA3, sensitivity of landscape character should be determined through a consideration of both its susceptibility to change and any values associated with the landscape.

6.6.33 The overall sensitivity of landscape character is essentially an expression of a landscape's ability to accommodate a particular type of change, either directly within that landscape, or indirectly in a separate part of the wider landscape with which there is some degree of intervisibility. It varies depending on the physical and perceptual attributes of the landscape including, but not necessarily limited to: scale; degree of openness; landform; existing land cover; landscape pattern and complexity; the extent of human influence in the landscape; the degree of remoteness/wildness; perception of change in the landscape; the importance of landmarks or skylines in the landscape; intervisibility with and influence on surrounding areas; condition; rarity and scenic quality of the landscape, and any values placed on the landscape, including any designations that may apply. For the wider landscape, where only indirect effects on landscape character would have the potential to occur, the key element which defines the susceptibility of that landscape to the Proposed Development is the degree of intervisibility with the landscape in which the development is proposed. In some cases, the importance of intervisibility with surrounding landscapes would be specifically listed as a characteristic of published landscape character areas. However, even where this is not explicitly stated, there will always be some degree of visual relationship between a landscape and its wider surroundings, and this matter is, therefore, considered in the field during the site work which is undertaken to help inform the judgements of susceptibility for each part of the landscape. However, it is recognised that where views of the surrounding landscape are not listed as a key characteristic of a landscape, it would not be expected that a proposed development in that separate adjoining landscape would be able to impact on the key characteristics of that first area.

6.6.34 The discussion below analyses the susceptibility and value of each of the LCTs taken forward into detailed assessment, and then combines these separate judgements to provide an overall judgement of the sensitivity of the LCT. This analysis takes account of the Scottish Borders Council Update of Wind Energy Landscape Capacity and Cumulative Impact Study 2016, as discussed further below, and was also informed by further desk and field study.

Scottish Borders Council Update of Wind Energy Landscape Capacity and Cumulative Impact Study (2016)[54]

6.6.35 The Landscape Capacity Study considers the sensitivity of the Scottish Borders landscape to onshore wind energy development and is based on an assessment of landscape sensitivity and value of the different landscape character types and areas in Scottish Borders.

6.6.36 The Landscape Capacity Study considers characteristics such as scale, landform, pattern, development, landscape quality, landscape elements and features, and context complexity, land cover, in order to inform a judgement of landscape character sensitivity.

[54] Scottish Borders Council (Ironside Farrar. 2016). Update of Wind Energy Landscape Capacity and Cumulative Impact Study. https://www.scotborders.gov.uk/directory_record/47226/landscape_capacity_and_cumulative_impact/category/28/approved_planning_guidance [accessed November 2022].

6.6.37 It is also important to note that the judgements concerning how sensitive each character type is to wind energy development being deployed within that specific unit. As noted previously, this is not necessarily the same as being of a particular sensitivity to wind farm development in an adjacent or distant character unit, which may only result in indirect effects on landscape character. The sensitivity of the character unit to wind energy development in an adjoining or distant character unit would typically be lower. This is because at any given location in a landscape, whilst features of the wider landscape do help to characterise that area, the physical features and perceptual characteristics of the landscape in the immediate vicinity have a far greater influence on character and one's sense of landscape character than distant features, no matter how tall they may be.

6.6.38 Therefore, whilst the Landscape Capacity Study was a useful tool to help inform the consideration of the susceptibility and value of the LCTs set out below, it should be noted that its findings have not been adopted verbatim in this LVIA. Rather, the approach taken has been to seek to provide a sensitivity rating for each area in line with the approach advocated in GLVIA3, whilst taking the Landscape Capacity Study into consideration.

LCT 5(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton

6.6.39 As outlined above, the Proposed Development is located within this LCT. It covers a large area and extends to the east of the A68 via a relatively narrow limb for approximately 6.6 km into part of the Cheviot Foothills. South of the A6088, the LCT extends in a south-westerly direction for over 29 km from the Proposed Development, through Wauchope Forest, across the Larriston Fells and either side of Liddell Water to Newcastleton.

6.6.40 The north-eastern part of the LCT, east of A68, overlaps with the locally designated Cheviot Hills SLA, elevating the value of this part of the LCT. However, the majority of the LCT is not designated for its scenic qualities. It forms part of a broad area of commercially managed forest planation that is frequently encountered within the surrounding landscape. With reference to **Figure 6.18**, the area is crossed by several rights of way that cross through the forest plantation and the extensive network of man-made forest tracks provide opportunities for walking, cycling and horse riding, with several Forest Land Scotland promoted routes, Jonny's Trail and Cauldron Trail[55]. The presence of these activities, along with forest management operations moderates the area's perception of remoteness and tranquillity. Overall, the value of the LCT is assessed as medium.

6.6.41 The susceptibility of the LCT, as a result of the direct effects resulting from the Proposed Development, is assessed as medium. The Proposed Development would be located directly within the larger part of this LCT and would have the potential to result in the loss of some landscape elements. However, large areas of commercial forest would remain. It would alter the visual characteristics of the LCT, where views along forest tracks and between coupes open up, However, the area's susceptibility is moderated by the presence of forestry operations, access tracks and associated infrastructure which influence its baseline character thereby reducing the area's susceptibility to the Proposed Development.

[55] Forest Land Scotland. Wauchope Route Card. Available at: https://forestryandland.gov.scot/visit/wauchope [accessed November 2022].

6.6.42 The value of the LCT combined with its susceptibility to the Proposed Development results in the LCT having an overall **medium sensitivity**.

LCT 4 (iii) – Southern Uplands with Scattered Forest – Cauldcleuch Head Group - Scottish Borders

6.6.43 The northern edge of this LCT is situated approximately 2.7 km to the west of the Proposed Development and extends south-west towards the River Teviot and south across the upland area to the west of Liddes Dale. It is characterised by the contrast between the smooth form of the upland, rolling landform, with its dome-shaped hills and the smaller scale, more intimate narrow valleys below. The area is predominantly grassland, with occasional scattered forest blocks, with strong intervisibility with the adjoining Southern Uplands Forest Covered LCT 5(ii) to the east.

6.6.44 The value of the LCT is assessed as medium. It is a large-scale landscape, with a varied landform, with its characteristic dome-shaped and conical landform. Although not designated for its scenic qualities, it does offer a perception of remoteness and seclusion within the more intimate valley landscapes and openness and exposure on the hills, where panoramic views are available towards adjoining landscapes.

6.6.45 The susceptibility of the LCT, as a result of its intervisibility with the Proposed Development, is assessed as medium. The LCT is considered to be moderately susceptible to indirect effects that could affect its perceptual qualities.

6.6.46 The value of the LCT combined with its susceptibility to the Proposed Development results in the LCT having an overall **Medium sensitivity**.

LCT 7 – Cheviot Foothills – Falla Group

6.6.47 The LCT occurs in the north-eastern part of the 20 km detailed LVIA study area and extends north-eastwards from the A6088 for approximately 16 km towards Hownam. The area is large-scale landscape, characterised by its undulating and rolling landform of grass-covered, domed hills and large forestry blocks. The area is sparsely settled, with scattered villages in the valleys and has relatively few roads crossing through it, although the A68 from Carter Bar crosses through the south-western part of the area.

6.6.48 The value of the LCT is assessed as medium high. The western and eastern fringes of the LCT cross into the Teviot Valleys and Cheviot Foothills SLAs, respectively. The area is crossed by a number of walking and promoted cycling routes that provide opportunities for recreation, while its north-eastern fringes also feature a number historically significant Roman assets including Dere Street.

6.6.49 The susceptibility of the LCT, as a result of its intervisibility with the Proposed Development, is assessed as medium high. While the lower-lying valleys and forested areas are considered to have a lower susceptibility on account of the enclosure and reduced intervisibility with adjacent LCTs, the more open hilltops are considered to be more highly susceptible to indirect effects due to the available views to adjacent LCTs.

6.6.50 The value of the LCT combined with its susceptibility to the Proposed Development results in the LCT having an overall **medium high sensitivity**.

LCT 11(i) – Grassland with Hills – Bonchester/Dunion

6.6.51 The LCT is situated in the northern part of the 20 km detailed LVIA study area and extends northwards from the A6088 at Chesters. The area is a medium-scale landscape, with a varied topography comprising long ridges and occasional domed hills such as Bonchester Hill in the western part of the LCT. The area is mainly pasture, dotted with shelter belts, small plantations and scattered trees.

6.6.52 The value of the LCT is judged to be medium high. The majority of the LCT lies within the Teviot Valleys SLA, with its characteristic series of Borders valleys and hills an intervening pastoral and woodland landscapes. The Borders Abbeys Way long distance walking route passes through the northern part of the LCT on its approach towards Jedburgh and the area is also crossed by a Core Path and a number of other promoted paths, rights of way and permissive/customary paths.

6.6.53 The susceptibility of the LCT, as a result of its intervisibility with the Proposed Development, is assessed as medium to high. While the lower-lying areas are considered to have a lower susceptibility on account of their increased enclosure and reduced intervisibility with the Proposed Development, the open, notable hilltops such as Bonchester Hill are considered to be more highly susceptible to indirect effects due to the available views to adjacent LCTs.

6.6.54 The value of the LCT combined with its susceptibility to the Proposed Development results in the LCT having an overall **medium high sensitivity**.

LCT 11(ii) – Grassland with Hills – Rubers Law

6.6.55 The LCT is also situated in the northern part of the 20 km detailed LVIA study area and covers an undulating plateau landscape to the north of Bonchester Bridge, as well as the landmark hill of Rubers Law (Viewpoint 12) with its distinctive conical form, its lower slopes and its immediate setting. The area is mainly pasture, dotted with occasional conifer plantations and scattered trees, which gives way to open, semi-improved pasture at higher elevations, interspersed with poorly drained soils on the plateau to the north-east of Bonchester Bridge.

6.6.56 The value of the LCT is judged to be high. Most of the LCT lies within the Teviot Valleys SLA north of the A6088 of the LCT lies within the Teviot Valleys SLA. Apart from the Borders Abbeys Way long distance walking route that passes through the northern part of the LCT, there are relatively few marked walking routes. The promoted Scottish Borders Loop cycle route crosses through the southern part of the LCT.

6.6.57 The susceptibility of the LCT, as a result of its intervisibility with the Proposed Development, is assessed as high. The highly prominent conical landform of Rubers Law with its craggy top is considered to be highly susceptible to indirect visual effects that could undermine its visual prominence within the landscape.

6.6.58 The value of the LCT combined with its susceptibility to the Proposed Development results in the LCT having an overall **high sensitivity**.

LCT 28(iv) - Wooded Upland Fringe Valley - Rule Water

6.6.59 The LCT is situated to the north of the Proposed Development within the northern part of the detailed 20 km LVIA study area, between LCT 11(ii) – Grassland with Hills – Rubers Law to the west and LCT 11(i) – Grassland with Hills – Bonchester/Dunion to the east. The LCT follows the meandering course of Rule Water and is generally smaller in scale and more visually contained by the slopes to its west and east. The LCT is also overlooked by the adjacent Bonchester Hill and Rubers Law in the adjoining character types.

6.6.60 The value of the LCT is judged to be medium high. The northern half of the LCT lies within the Teviot Valleys SLA, with its characteristic series of Borders valleys and hills and intervening pastoral and woodland landscapes. The Borders Abbeys Way long distance walking route crosses through the northern tip of the LCT, while the promoted path at Bonchester Bridge is situated within the southern part of the LCT, as is the Scottish Borders Loop cycle route that follows the A6088 from Bonchester Bridge.

6.6.61 The susceptibility of the LCT, as a result of its intervisibility with the Proposed Development, is assessed as medium. The lower-lying areas within the valley bottom are considered to have a lower susceptibility on account of the increased enclosure and reduced intervisibility with the Proposed Development, while the higher slopes are considered to be more susceptible to indirect effects due to the available views to adjacent LCTs.

6.6.62 The value of the LCT combined with its susceptibility to the Proposed Development results in the LCT having an overall **medium high sensitivity**.

Summary of Landscape Character Sensitivity

Table 6.5: Landscape Character Sensitivity

Landscape Character Type	Value	Susceptibility	Sensitivity
LCT 5i(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton	Medium	Medium	Medium
LCT 4 (iii) – Southern Uplands with Scattered Forest – Cauldcleuch Head Group - Scottish Borders	Medium	Medium	Medium
LCT 7 – Cheviot Foothills – Falla Group	Medium high	Medium high	Medium high
LCT 11(i) – Grassland with Hills – Bonchester/Dunion	Medium high	Medium high	Medium high
LCT 11(ii) – Grassland with Hills – Rubers Law	High	High	High
LCT 28(iv) - Wooded Upland Fringe Valley - Rule Water	Medium high	Medium	Medium high

The shaded row indicates the Proposed Development is located within the character type

Effects on Landscape Character during Construction

6.6.63 The 13 proposed turbines, crane pads, construction compounds, substation, control room and energy storage facility and borrow pits are all located in the Southern Uplands Forest

Covered – Wauchope/Newcastleton LCT (LCT 5i(ii)). This would result in direct effects on landscape character during construction on only this LCT.

6.6.64 As noted above and with reference to **Figure 2.2** access to the Proposed Development would be via the existing forest access track that leads from the A6088 at Martinlee Plantation. The track crosses Carter Burn and then passes through Burns Plantation, and around the northern foot of Tamshiel Rig, before following both new and existing tracks to each turbine location. In total approximately 3.9 km of new access tracks would be constructed and approximately 11 km of existing tracks would be upgraded. Therefore, some additional direct effects on the character of this part of the LCT would occur.

6.6.65 During the construction phase, there would be the temporary presence of cranes on the site and the movement of other construction traffic, consistent with the creation of access tracks, hardstandings and turbine bases. However, effects resulting from construction activities would be highly localised to the Southern Uplands Forest Covered – Wauchope/Newcastleton LCT, due to the visual containment provided by the extensive areas of remaining forest plantation.

6.6.66 Effects during construction on landscape character would increase incrementally through the construction phase as more turbines, foundations, hardstandings and ancillary elements are constructed. Construction activities would move from turbine location to turbine location and, as activities increased in one location, they would be decreasing at locations where construction had finished.

6.6.67 Cranes would be involved in the erection of the turbines, but these would be onsite for a relatively short period during the overall construction phase. The cranes would form noticeable vertical features in the landscape for a short period of time, but would be a relatively diminutive visual component compared with the turbines being erected.

6.6.68 As previously discussed, there would be no significant effects on any existing landscape features. Overall, it is considered that whilst there would be localised areas of high magnitude of change directly, there would be an overall low medium magnitude of change upon the part of the Southern Uplands Forest Covered – Wauchope/Newcastleton LCT (LCT 5i(ii)) within which the Proposed Development is sited in, as its character is already influenced by ongoing forestry operations. Construction activities would occur in a relatively small part of the plantation, which would result in no greater than a **Minor Moderat**e temporary additional effect on the LCT, above that set out for the operational phase, which would be **not significant.**

6.6.69 In terms of indirect effects on the other landscape character types brought forward into detailed assessment, there will be no greater than a very low magnitude of change. The only visible construction elements would be cranes which would be seen in the context of the turbines being erected. This would result in no greater than a Minor temporary effect which would be **not significant**.

6.6.70 Construction effects would be temporary, short term and non-permanent.

Effects on Landscape Character during the Operational Phase

6.6.71 The effects on landscape character are discussed below in relation to each landscape character type brought forward from the initial review (see **Technical Appendix 6.3**) and as identified in **Table 6.4**. The magnitude of change on landscape character as a result of the Proposed Development has been determined using professional judgement based on the following factors:

- the percentage of the character type from where the site would theoretically and actually be visible;
- the distance between the character type and the site;
- the likely prominence of the turbines from the character type taking account of existing locally dominant characteristics in the character type; and
- the degree to which the physical and perceptual characteristics of the landscape would change as a result of the Proposed Development.

6.6.72 To aid the consideration of effects on landscape character, the ZTV has been overlaid on the character types within 20 km of the site, which is shown at **Figure 6.15**.

6.6.73 With the exception of the mobilisation compound adjacent to the A6088, the ground-level components of the Proposed Development would not be discernible due to the screening provided by the remaining forestry plantation. Therefore, impacts on landscape character, as experienced in the wider landscape, arise largely in relation to the introduction of the 13 proposed turbines into the landscape and the resultant impact on the perceptual experience of landscape character.

6.6.74 It is noted that in general, the magnitude of change in landscape character will incrementally decrease with distance from the turbines as they become gradually less prominent.

6.6.75 It is recognised that during the hours of darkness, it may be possible for turbine lighting to result in a significant effect on the character of the surrounding landscape. For example, if the proposed wind energy development is located within or in proximity to a designated dark sky area, or is remote from existing sources of visible lighting, such as residential areas, commercial or industrial sites, or major roads.

6.6.76 A summary of the effects on landscape character is presented in **Table 6.6**. Note, that for all character types stated within this table, the duration of the Proposed Development is considered to be long-term (35 years) and reversible.

LCT 5i(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton

6.6.77 The 13 proposed turbines and all associated infrastructure of the Proposed Development are located within the northern part of this LCT.

6.6.78 It is important to note that the Landscape Capacity Study identifies this area as having 'low capacity' to turbines over 120 m. In relation to the Cheviot Hills it goes on to state that:

"The largest upland area, Wauchope/ Newcastleton LCA, has much the greatest capacity for larger scale wind energy development due to its large scale, gently rolling landform with extensive areas of uniform forest cover and lack of settlement. The central area has capacity for all sizes of turbine and well separated windfarms of up to 15 turbines in some locations. Capacity is restricted by some sensitivities including the Carter Bar border crossing and viewpoint in the north-east, the setting of the Scotland-England border and the Liddel Water valley and Hermitage Castle in the south-west."

6.6.79 With reference to the landscape character types within 20 km overlaid with the blade tip ZTV at **Figure 6.15**, theoretical visibility of the Proposed Development from the LCT is largely contained within a 5 km radius.

6.6.80 To the west of the Proposed Development, the nearby chain of high ground comprising Wolfelee Hill (Viewpoint 14), Wolfehopelee Hill, Black Hill and Brockie Law restricts visibility from the narrow valley to the west of the site through which the Catlee, Wigg, Wauchope burns and the B6357 pass, before theoretical visibility is once again available from higher ground on the western valley side.

6.6.81 To the south-west, theoretical visibility is also contained by the ridge of high ground comprising Wauchope Rig, Wigg Knowe, Dog Knowe, Dog Bank Hill, East Hill, Needs Law that sweeps around to Hartshorn Pike and Carlin Tooth, situated approximately 4 and 3 km to the south of the Proposed Development respectively. This ridgeline continues in a north-easterly direction towards Carter Bar and restricts visibility from the majority of areas to the south-east within Northumberland.

6.6.82 Beyond 5 km theoretical visibility becomes patchier and more intermittent. To the north-east of the A68, visibility is predicted from the wooded slopes to the north-east of Lamblair Edge, extending north-west as far as Hophills Nob and from the north-eastern fringes of the LCT near Philip Law. Although visibility is predicted from this area, actual visibility is reduced on account of the extensive forestry that screens views towards the Proposed Development.

6.6.83 Beyond 5 km to the south and south-west of the Proposed Development, theoretical visibility is limited, with a few intermittent patches of predicted visibility, however, there are large swathes to the south-west part of the LCT where no visibility is predicted, before visibility is predicted from the Larriston Fells, at over 10 km from the proposed turbines.

6.6.84 Viewpoints 2, 3, 6, 8, 14 and 19 all provide useful context for appreciating the scale of the northern part of the LCT, the simplicity of its landform and the uniformity of its landscape cover.

6.6.85 The proposed turbines would introduce direct effects on the LCT in the immediate vicinity of where they are located and indirect effects on the remaining parts of the LCT. The Proposed Development is located within a large-scale landscape that has simple form whose character has been influenced by human activity associated with the forest plantations. Nonetheless, the proposed turbines would introduce tall vertical structures that extend above the adjacent forest canopy.

6.6.86 During daylight hours, the proposed turbines would introduce a large and highly prominent change within a part of the landscape where there are no other turbines at present. This would strongly influence the character of the LCT out to a distance of up to 5 km to the west, south and east, resulting in the LCT becoming a ‘landscape with wind turbines’, but due to the large-scale and extensive forestry, the turbines would not become the defining characteristic element nor would the development result in the landscape becoming a ‘wind farm landscape’. Nonetheless, the change would result in a high magnitude of change and a **Moderate Major effect** that is considered to be **significant**.

6.6.87 Between approximately 5 to 10 km to the east, visibility quickly reduces as views become screened by topography and further restricted by the extensive forest plantation, with views only available from areas of higher ground. Where views are available, the

Proposed Development would still form a noticeable new element, but would be less prominent and occupy a smaller proportion of the view, resulting in a low medium magnitude of change and a **Minor Moderate effect** that is considered **not significant**.

6.6.88 Beyond 10 km to the east, visibility is greatly reduced with the majority of areas having no theoretical visibility, resulting in no greater than a very low magnitude of change and **Minor effects** that would be considered **not significant**.

6.6.89 On higher ground to the west of the B6357, visibility would be largely restricted by the extensive forest cover that blankets the valley slopes. Where views are available, the Proposed Development would appear backclothed against landform to the east, with actual visibility likely to be reduced by the extensive, intervening forest plantation to the immediate west of the site. This would result in a medium magnitude and a **Moderate effect** that is considered to be **not significant**. Such effects would occur between 5 and 7 km to the west, south-west and south.

6.6.90 Beyond 7km, the majority of the LCT to the south-west would experience no effects to its visual characteristics, with limited areas in the vicinity of the Larriston Fells at over 13 km to the south south-west. From this more distant location the influence on the visual characteristics would be greatly reduced and although visible, would result in a low magnitude of change and **Minor Moderate effect** on this part of the LCT that would be considered **not significant**.

6.6.91 During the hours of darkness effects would be reduced as only six of the 13 proposed turbines (Turbines T01, T03, T08, T09, T11, T12) would have nacelle mounted, visible aviation lighting. With reference to the lit turbine ZTV overlaid with the LCTs at Figure 6.16, theoretical visibility of the lit turbines is reduced, with areas to the immediate west and east of the site having limited visibility of the turbine lighting, and areas to the south-west also experiencing reduced visibility of lit turbines. Where lit turbines can be seen, the lights would appear as small red dots in the dark sky.

6.6.92 However, it is important to acknowledge that for the majority of the time they would operate at 10% of their maximum brightness (200 Candela (candela)) when visibility is greater than 5 km and would only operate at maximum intensity (2,000 candela) when visibility was less than 5 km. In certain situations, there would also be a further reduction in their perceived brightness resulting from the attenuation of light due to the elevation of the viewer relative to the light source. Further information on visible aviation lighting is provided in **Chapter 13: Aviation and Radar**.

6.6.93 Given the relative remoteness of the area, which is largely dark apart from the lights of the few isolated properties located within the LCT, the lights of occasional vehicles travelling on the A68 through the eastern part of the LCT and the A6088 that crosses through the northern part of the LCT, the lit turbines would influence the character of this part of the LCT during the hours of darkness. This would result in a medium high magnitude of change, resulting in a **Moderate effect** that is considered **significant** within 5 km to the west, south and east.

6.6.94 Between 5 and 10 km to the east, theoretical visibility of the lit turbines is limited to a few areas of higher ground in the vicinity of Hophills Nob, Lamblair Edge, Ephope Law and Philip Law. Given the limited theoretical visibility and the increased distance the lights would appear as small red dots in the dark sky, resulting in the magnitude of change during the hours of darkness reducing to low, resulting in a **Minor Moderate effect** that is considered **not significant**.

6.6.95 At distances beyond 10 km to the east, the magnitude of change would reduce to very low, with effects considered to be **Minor** and **not significant**.

6.6.96 At distances between 5 and 7 km to the west, south-west and south during dark sky hours, the magnitude of change would be no greater than medium, resulting in **Moderate effects** that are considered **not significant**.

6.6.97 Beyond 7 km to the south-west, in the limited areas where visibility of lit turbines is predicted the magnitude of change would be low to very low, resulting in no greater than a Minor effect that is considered not significant.

LCT 4 (iii) – Southern Uplands with Scattered Forest – Cauldcleuch Head Group - Scottish Borders

6.6.98 This LCT brought forward into detailed assessment is situated approximately 2.7 km to the west of the Proposed Development at its closest point and extends to over 29 km from it. It is situated away from the site and no infrastructure would be located in this area. Therefore, any effects discussed below relate to indirect effects on the visual characteristics of the LCT.

6.6.99 The Landscape Capacity Study notes the area is an extensive open hill upland landscape, with a rolling form and steep sided valleys. It goes on to note the relatively little forestry within this area, but does note the extensive areas being visible in neighbouring areas. It also notes that there are no landscape designations, no core paths and little settlement and a low intervisibility with adjacent landscapes.

6.6.100 With reference to the landscape character types within 20 km overlaid with the blade tip ZTV at **Figure 6.15**, the main area of predicted visibility occurs in the north-eastern part of the LCT and predominantly to the east of the B6399, in the vicinity of Pike Fell (Viewpoint 10), extending up to 8 km from the Proposed Development. It is relevant to note at this point, this is the part of the landscape where the consented Pines Burn Wind Farm is located and where the proposed Teviot Wind Farm is also located. The cumulative effects on landscape character resulting from the Proposed Development and these schemes is considered separately within the cumulative effects section at **Section 6.8.**

6.6.101 To the west of the B6399 and beyond 8 km, theoretical visibility is very intermittent and largely restricted to the highest points such as The Pike, approximately 11.8 km to the west, and the line of hills comprising Skelfhill Pen, Cauldcheuch Head and Greatmoor Hill over 13 km to the south-west.

6.6.102 During daylight hours, within approximately 5 km to the west of the Proposed Development there is theoretical visibility of a limited number of proposed turbines within relative proximity to the Proposed Development. They would have a strong influence on this part of the landscape, resulting in a medium high magnitude of change and a **Moderate effect** that is considered to the **significant**.

6.6.103 Between 5 and 8 km to the west, the proposed turbines would introduce a moderate change to available easterly views that would be experienced across a small to moderate proportion of the view. With reference to Viewpoint 10, intervening forestry would screen parts of the turbines, with views limited to the upper parts of towers, hubs and blade tips. This would result in a medium magnitude of change and a **Moderate effect** that is considered to be **not significant**.

6.6.104 Beyond 8 km, where theoretical visibility is available from the higher elevations the Proposed Development would occupy a small proportion of the view, with the intervening forestry plantation partially screening the development. With the increased distance, the Proposed Development would appear more recessive within available views, resulting in no greater than a low magnitude of change and a **Minor Moderate effect** that is considered to be **not significant**.

6.6.105 During the hours of darkness the scale of the effects would be reduced as only six of the 13 proposed turbines (Turbines T01, T03, T08, T09, T11, T12) would have nacelle mounted, visible aviation lighting. With reference to the lit turbine ZTV overlaid with the LCTs at **Figure 6.16**, theoretical visibility of the lit turbines is reduced. Within the north-eastern corner of the LCT, only three or four of the lit turbines would be visible, whilst at slightly higher elevations further west, up to all six of the lit turbines would be visible.

6.6.106 The turbine lights would appear as small red dots in an area with few other light sources comprising widely separated isolated properties, farm buildings and very occasional transient light sources of vehicles passing along the local road network that crosses through this part of the LCT. Within 5 km to the west, this would result in no greater than a medium magnitude of change and **Moderate effect**, that is considered to be **significant**.

6.6.107 Between 5 and 8 km to the west, given the level of intervening screening the magnitude of change to the visual characteristics of this part of the LCT is judged to be no greater than low medium, resulting in a **Minor Moderate effect** that is considered **not significant**.

6.6.108 Beyond 8 km, there is very limited theoretical visibility of the lit turbines, with visibility limited to the highest peaks, with visibility of between five and six turbines only available in the vicinity of The Pike. Given the increased distance and the very limited visibility of lit turbines from this part of the LCT, there would be no greater than a low to very low magnitude of change and Minor to no effect, which would be not significant. However, beyond approximately 8 km the majority of the LCT would experience no effect.

LCT 7 – Cheviot Foothills – Falla Group

6.6.109 The southern edge of this part of the LCT borders the A6088 and is approximately 2.3 km to the north-east of the Proposed Development at it closest point and extends to over 18 km from the Proposed Development. It is situated away from the site and no infrastructure would be located in this area. Therefore, any effects discussed below relate indirect effects on the visual characteristics of the LCT.

6.6.110 The Landscape Capacity Study notes that the area is a large scale rolling and undulating upland landscape with occasional dome-shaped hill and rocky outcrops. It goes on to note that land cover is mainly grassland with a mixture of rough grassland with improved pasture within the valleys, with some large forestry blocks. There is a scattered pattern of settlement along minor roads, with the A68 to Carter Bar passing through the area. The description also notes that the LCT overlaps the Cheviot Foothills SLA in the south-east and the Teviot Valleys SLA in the western part. The description also notes the panoramic views available from Carter Bar and the high internal and external visibility from this open landscape.

6.6.111 With reference to the landscape character types within 20 km overlaid with the blade tip ZTV at **Figure 6.15**, the main area of predicted visibility is limited to the southern fringes of the LCT along the A6088 road corridor, before visibility is restricted by topography to the north-east. Beyond this visibility is limited to higher ground and south-west facing slopes to the north-east of Chesters, to areas north of the Jed Water and isolated points to the west and east of the A68, with longer range theoretical visibility predicted from the north-eastern part of the LCT at a distance of between approximately 13 and 17 km.

6.6.112 West of the A68, the Proposed Development introduces a new element into available southerly views, that would be available along the southern edge of the LCT and from a more open pocket of landscape to the north-east of Chesters. From other parts of the LCT west of the A68, extensive forestry plantation restricts visibility, limiting the influence of the Proposed Development on the visual characteristics of this part of the LCT.

6.6.113 During daylight hours, due to the proximity of the southern part of the LCT, extending to approximately 5 km to the north and east, the proposed turbines would introduce a large and prominent change that would influence the character of available southerly views from the southern part of the LCT. This would result in a high magnitude of change and a **Major effect** that is considered to be **significant**.

6.6.114 Between approximately 5 and 7 km, theoretical visibility is much patchier and largely restricted to pockets of higher ground along the A68 corridor. Due to the increased distance, the proposed turbines would have a reduced influence on the character of this part of the LCT, which is further tempered by the extensive forestry plantation that extends along the western side of the road that partially screens the Proposed Development, particularly from the road corridor itself, although it is noted that views are available from more elevated and open areas to the east of the A68. Over time as parts of the plantation are felled, visibility would increase, but would then progressively reduce as newly planted trees mature. Taking these factors into consideration, the Proposed Development would introduce a low medium magnitude of change and a **Moderate effect** that is considered **not significant** on this part of the LCT, although these effects would only be experienced at limited points and where views are available.

6.6.115 Between 7 and 15 km, theoretical visibility is intermittent and patchy with a larger band of theoretical visibility to the east and north-east of Oxnam Water. This area is also partly forested, meaning actual visibility would be restricted from parts of this area. At distances of over 13.5 km, the Proposed Development would form an increasingly minor element within available views and would have much less influence on its character, which is much more strongly influenced by nearby features. It is considered that the magnitude of change would be low, which combined with its sensitivity would result in **Minor Moderate effects** that would be considered **not significant**.

6.6.116 With reference to Viewpoint 16, beyond 15 km the Proposed Development is much more recessive in the view and is a small-scale component of the broad scale panoramic view, resulting in a low to very low magnitude of change and no greater than a **Minor effect** that would be considered **not significant**.

6.6.117 During the hours of darkness the scale of the effects would be reduced as only six of the 13 proposed turbines (Turbines T01, T03, T08, T09, T11, T12) would have nacelle mounted, visible aviation lighting. With reference to the lit turbine ZTV overlaid with the LCTs at **Figure 6.16**, theoretical visibility of the lit turbines is reduced, but as visibility of the Proposed Development is mainly limited to areas of higher ground, with the full extent of the array visible, the reduction is only slight.

6.6.118 Lit turbines would appear as small, red dots in an area with few other light sources comprising widely separated isolated properties, farm buildings and very occasional transient light sources of vehicles passing along the local road network that crosses through this part of the LCT.

6.6.119 At distances up to 5 km to the north and east, the introduction of the turbine lighting into the dark sky would introduce a medium high magnitude of change and would result in a **Moderate Major effect** that is **significant**.

6.6.120 With increased distance, the visible aviation lights would be less apparent and would be located within a small overall proportion of the view, compared with the closest parts of the LCT to the Proposed Development. At distances between 5 and 7 km this would result in the magnitude of change reducing to low medium, resulting in **Minor Moderate effects** that would be considered n**ot significant**.

6.6.121 At distances between 7 and 15 km, the increasing distance would result in the some of the lit turbines not being visible. Where views of lit turbines are available, they would appear as small red dots that would be discernible, but they would have less influence on the dark sky qualities of this more distant part of the LCT. This would introduce a magnitude of change that would be no greater than low, with effects considered to be **Minor** and **not significant**.

6.6.122 Beyond 15 km the magnitude of change would reduce and would be no greater than very low, resulting in **Minor effects** that are considered **not significant**.

LCT 11(i) – Grassland with Hills – Bonchester/Dunion

6.6.123 The southern part of the LCT covers the settlement of Chesters and extends south from the A6088 towards Southdean, while to the north, it extends to approximately 15.3 km from the Proposed Development. The LCT is situated to the north of the Proposed Development and no infrastructure would be located in this area. Therefore, any effects discussed below relate indirect effects on the visual characteristics of the LCT.

6.6.124 As noted above, the area is a medium-scale landscape, with a varied topography comprising long ridges and occasional domed hills such as Bonchester Hill in the western part of the LCT. The area is mainly pasture, dotted with shelter belts, small plantations and scattered trees. The Landscape Capacity Study also notes the high visibility to, and across this area.

6.6.125 With reference to the landscape character types within 20 km overlaid with the blade tip ZTV at **Figure 6.15**, the main area of predicted visibility at the southern end of the LCT occurs south of Chesters and the A6088 and extends northwards for approximately 5 km.

6.6.126 Theoretical visibility is extensive, with most areas predicted to experience visibility of up to all 13 turbines. However, visibility reduces towards the south-western corner of the LCT as the terrain falls into the Carter Burn valley and through the valley to the east of Abbotrule, with visibility on the north side of the valley.

6.6.127 A further area of visibility is predicted between 5 and 7 km near Abbotrule, with a further area of predicted visibility near Bedrule, that extends between Watch Knowe in the south, Black Law (Viewpoint 18) and Dunion Hill in the north near to the B6358. Visibility is predicted along the ridge and from its south-east facing slopes before visibility is prevented from the lower-lying valley to its east. To the north of the B6358, the small area of visibility between 13 and 14.5 km includes the partially wooded, eastern slopes of Lanton Hill.

6.6.128 During daylight hours, due to the proximity of the southern part of the LCT to the Proposed Development, extending to approximately 5 km to the north, the proposed turbines would introduce a large and prominent change that would strongly influence the character of available southerly views from the southern part of the LCT, as illustrated by viewpoints 1, 4 and 11. This would result in a high magnitude of change and a **Major effect** that is considered to be **significant**.

6.6.129 Between 5 and 7 km, due to the greater distance from the Proposed Development, the turbines' influence on the character of available views reduces, introducing a medium magnitude of change and a **Moderate effect** that is considered **not significant**. This is because the character of available views is more strongly influenced by the nature of available views across the intervening rural landscape, which the proposed turbines are set beyond.

6.6.130 Beyond 7 km, the influence of the Proposed Development would be reduced further, resulting in no greater than a low magnitude of change and a **Minor Moderate effect** that is considered to be **not significant**.

6.6.131 During the hours of darkness the scale of the effects would be reduced as only six of the 13 proposed turbines (Turbines T01, T03, T08, T09, T11, T12) would have nacelle mounted, visible aviation lighting. With reference to the lit turbine ZTV overlaid with the LCTs at Figure 6.16, theoretical visibility of the lit turbines is reduced, but as visibility of the Proposed Development is mainly limited to areas of higher ground, with the full extent of the array visible, the reduction is only slight.

6.6.132 Lit turbines would appear as small, red dots in an area with few other light sources comprising widely separated isolated properties, farm buildings and very occasional transient light sources of vehicles passing along the local road network that crosses through this part of the LCT, expect in the northern part of the LCT near to Jedburgh which is influenced to a greater degree by artificial lights during the hours of darkness.

6.6.133 Within 5 km of the Proposed Development, most areas are predicted to experience visibility of up to all six lit turbines. Where views are available, the aviation lighting would introduce new light sources, that would be introduced into a part of the landscape where there are no other visible lights, apart from around settlements and properties. This would introduce a medium high magnitude of change and a **Moderate Major effect** that is **significant**.

6.6.134 With increased distance, between 5 and 7 kms and beyond, the turbine lights would be less apparent and would have a reduced influence on the visual characteristics of the LCT during dark sky hours. This would result in a low medium magnitude of change and Moderate effect that is considered not significant between 5 and 7 kms and a low to very low magnitude of change and **Minor to no effects** that is considered **not significant** beyond 7km.

LCT 11(ii) – Grassland with Hills – Rubers Law

6.6.135 As noted above, the LCT comprises an undulating plateau landscape to the north of Bonchester Bridge and includes the regionally prominent hill, Rubers Law (Viewpoint 12) with its distinctive conical form. The area is mainly pasture, dotted with occasional conifer plantations and scattered trees, which give way to open, semi-improved pasture at higher elevations, interspersed with poorly drained soils on the plateau to the north-east of Bonchester Bridge. The Landscape Capacity Study also notes the high visibility across and towards this area and in particular to Rubers Law.

6.6.136 The LCT is situated to the north-west of the Proposed Development and no infrastructure would be located in this area. Therefore, any effects discussed below relate indirect effects on the visual characteristics of the LCT.

6.6.137 As noted above, the area is a medium-scale landscape, with a varied topography comprising long ridges and the prominent Rubers Law with its craggy top located in the western part of the LCT. The area is mainly pasture, dotted with shelter belts, small plantations and scattered trees.

6.6.138 Viewpoint 13 provides a useful reference point for appreciating the characteristics of the LCT to the south and north of the A6088. It illustrates the simple landform, its openness and the prominence of the conical form of Rubers Law. Viewpoint 12 also provides useful context for understanding the high degree of intervisibility with adjacent landscape character types.

6.6.139 With reference to the landscape character types within 20 km overlaid with the blade tip ZTV at **Figure 6.15**, theoretical visibility is predicted from the eastern half of the LCT, extending from its southern edge, north along the eastern flank of Rubers Law. However, to the south of the A6088, theoretical visibility is restricted as the topography falls towards the south-eastern edge of the LCT towards Hobkirk. Theoretical visibility is very limited from the western half of the LCT and restricted to two small discrete areas, in the south-western corner of the LCT and to the immediate north of the A6088.

6.6.140 A high degree of topographical screening is evident in views from the south-eastern corner of the LCT, due to the position of the intervening Wolfelee Hill, relative to this part of the LCT. This limits the influence of the proposed turbines on this part of the LCT. Between approximately 4.5 and 10 km, this would result in a low magnitude of change. Combined with its sensitivity, this would lead to a **Minor Moderate effect** that would be considered **not significant** during daylight hours.

6.6.141 During the hours of darkness the scale of the effects would be reduced as only six of the 13 proposed turbines (Turbines T01, T03, T08, T09, T11, T12) would have nacelle mounted, visible aviation lighting. With reference to the lit turbine ZTV overlaid with the LCTs at **Figure 6.16**, theoretical visibility of the lit turbines is much reduced due to the intervening screening landform that restricts views of the lit turbines. Few areas within the eastern part of the LCT would experience views of all lit turbines, with most areas experiencing theoretical visibility of up to 4 of the lit turbines.

6.6.142 Lit turbines would appear as small red dots in an area with very few other light sources, generally limited to very occasional transient light sources of vehicles passing along the A6088 that crosses through the southern part of the LCT.

6.6.143 Given the distance from the LCT and the limited theoretical visibility of lit turbines, the magnitude of change introduced to all parts of the LCT would be very low. Combined with the sensitivity of the LCT, this would introduce no greater than a **Minor effect** that is considered to be **not significant**. These effects would be experienced from all parts of the LCT where visibility is predicted.

LCT 28(iv) - Wooded Upland Fringe Valley - Rule Water

6.6.144 The LCT is situated to the north of the Proposed Development between LCT 11(ii) – Grassland with Hills – Rubers Law to the west and LCT 11(i) – Grassland with Hills – Bonchester/Dunion to the east. The LCT follows the meandering course of Rule Water and is generally smaller in scale, visually contained by the slopes to its west and east and as a result has a more intimate, pastoral valley character. The LCT is also overlooked by the adjacent Bonchester Hill and Rubers Law in the adjoining character types.

6.6.145 With reference to the landscape character types within 20 km overlaid with the blade tip ZTV at **Figure 6.15**, theoretical visibility is quite limited from the central and southern parts of the LCT and is mainly restricted to the higher upper valley slopes along the western and eastern edges of the LCT, which predominantly experience theoretical visibility of a limited number of turbines.

6.6.146 Further north within the central part of the LCT, there is predicted visibility to the west from high ground to the west of Bonchester Bridge as the A6088 descends the valley into the village. Within the northern part of the LCT to the east of Rubers Law, there is predicted visibility from the majority of this area as the LCT extends north towards Bedrule.

6.6.147 Within the southern and central parts of the LCT, extending to approximately 7.5 km from the Proposed Development, due to the limited theoretical visibility, the Proposed Development would introduce a low magnitude, which combined with its sensitivity would result in a **Minor Moderate effect** that is considered to be **not significant**.

6.6.148 From the northern part of the LCT to the east of Rubers Law at distances greater than 7.5 km, although greater theoretical visibility is predicted, due to the increased distance from the Proposed Development, the turbines would appear smaller and more recessive and as such would have less influence of the visual character of this part of the LCT. However, due to the greater visibility, the magnitude of change would remain as low, with effects remaining as **Minor Moderate** and **not significant**.

6.6.149 During the hours of darkness the scale of the effects would be reduced as only six of the 13 proposed turbines (Turbines T01, T03, T08, T09, T11, T12) would have nacelle mounted, visible aviation lighting. With reference to the lit turbine ZTV overlaid with the LCTs at **Figure 6.16**, theoretical visibility of the lit turbines is much reduced due to the intervening screening landform that restricts views of the lit turbines. Few areas within the central and southern parts of the LCT would experience views of any of the lit turbines, with theoretical visibility of a reduced number of lit turbines only available from the south-western corner of the LCT.

6.6.150 Lit turbines would appear as small, red dots in an area with very few other light sources, generally limited to very occasional transient light sources of vehicles passing through the valley. Given the very limited theoretical visibility of lit turbines from the central and southern parts of the LCT, their influence on the visual characteristics during the hours of darkness would be negligible and would result in no greater than very low magnitude of change, which combined with the sensitivity of the LCT would result in a **Minor effect** that is **not significant**.

6.6.151 From the northern part of the LCT, at distances in excess of 7.5 km the lights would appear as small, distant red dots and would be less apparent and as such would have less influence of this part of the LCT, despite the greater number of lit turbines visible in theory from this part of the LCT. This would result in a very low magnitude of change and no greater than **Minor effects** that would be considered not **significant**.

6.6.152 A summary table of the effects on landscape character is provided within **Table 6.6**.

Table 6.6: Summary of Landscape Effects during Operation

		Daylight Hours			Hours of Darkness		
Landscape Character Type	**Sensitivity**	**Magnitude of Change**	**Level of Effect**	**Significant**	**Magnitude of Change**	**Level of Effect**	**Significant**
LCT 5i(ii) Southern Uplands Forest Covered Wauchope/Newcastleton							
Up to 5 km to the west, south and 5 km to the east	Medium	High	Moderate major	**Yes**	Medium high	Moderate	**Yes**
Between 5 and 10 km to the east	Medium	Low medium	Minor moderate	No	Low	Minor moderate	No
Beyond 10 km to the east	Medium	Very low	Minor	No	Very low	Minor	No
Between 5 and 7 km to the west, south-west and south	Medium	Medium	Moderate	No	Medium	Moderate	No
Beyond 7 km to the south-west	Medium	Low	Minor moderate	No	Low to very low	Minor	No
LCT 4 (iii) – Southern Uplands with Scattered Forest – Cauldcleuch Head Group							
Up to 5 km to the west	Medium	Medium high	Moderate	**Yes**	Medium	Moderate	**Yes**
Between 5 and 8 km to the west	Medium	Medium	Moderate	No	Low medium	Minor moderate	No
Beyond 8 km	Medium	Low	Minor moderate	No	Low to very low	Minor to no effect	No
LCT 7 – Cheviot Foothills – Falla Group							
Up to 5 km to the north and east	Medium high	High	Major	**Yes**	Medium high	Moderate major	**Yes**
Between 5 and 7 km to the north-east	Medium high	Low medium	Moderate	No	Low medium	Minor moderate	No
Between 7 and 15 km	Medium high	Low	Minor moderate	No	Low	Minor	No
Beyond 15 km	Medium high	Low to very low	Minor	No	Very low	Minor	No

LCT 11(i) – Grassland with Hills – Bonchester/Dunion							
Within 5 km	Medium high	High	Major	**Yes**	Medium high	Moderate major	**Yes**
Between 5 and 7 km	Medium high	Medium	Moderate	No	Low medium	Moderate	No
Beyond 7 km	Medium high	Low	Minor moderate	No	Low to very low	Minor to no effect	No
LCT 11(ii) – Grassland with Hills – Rubers Law							
Between 4.5 and 10 km	High	Low	Minor moderate	No	Very low	Minor	No
LCT 28(iv) - Wooded Upland Fringe Valley - Rule Water							
Central and southern parts to 7.5 km	Medium high	Low	Minor moderate	No	Very low	Minor	No
Northern part beyond 7.5 km	Medium high	Low	Minor moderate	No	Very low	Minor	No

Bold text indicates a significant effect

Effects on Landscape Character during Decommissioning

6.6.153 It is acknowledged that there would be some additional temporary effects during decommissioning of the Proposed Development after 35 years, over and above those assessed under the heading of operational effects above. The effects resulting from decommissioning activities would be localised and relatively incidental when viewed in the context of the wind farm being removed.

6.6.154 The effects on landscape character would, therefore, decrease incrementally as decommissioning progresses and as more turbines and associated foundations and hardstanding are removed.

6.6.155 The effects would be similar to those during the construction phase, but in reverse.

6.6.156 Overall, it is considered that there would be a low medium magnitude of change upon the part of the Southern Uplands Forest Covered – Wauchope/Newcastleton LCT (LCT 5i(ii)) in which the Proposed Development is sited and a temporary additional **Minor Moderate effect.**

6.6.157 In terms of indirect effects on other landscape character types assessed in detail, there would be a very low magnitude of change and no greater than a **Minor effect**.

6.6.158 The decommissioning effects of the Proposed Development on landscape character are deemed to be not significant. Once decommissioning is complete, there would be no further effects upon landscape character.

6.6.159 Construction effects on landscape character would be temporary, short term, non-permanent and **not significant.**

Assessment of Visual Effects

6.6.160 Effects on visual amenity arise from changes to views resulting from the introduction of the Proposed Development. It comprises:

- an assessment of visual effects from the representative viewpoints brought forward into detailed assessment; and
- an assessment of visual effects on receptor groups such as settlements, roads and core paths brought forward into detailed assessment.

6.6.161 The assessment has been carried out through a combination of site visits and desk study using the ZTVs, wirelines and photomontages.

Construction Effects

6.6.162 Due to the extensive forestry plantations that surround the site and its immediate surroundings, together with the relative visual containment of the surrounding landform to the south means that ground-level activity associated with the turbine construction would be screened from the view from the majority of the study area, with the exception of views from the closest viewpoints and recreational routes that cross the site, for example viewpoints 3 and 14. Due to the proximity of these locations to the Proposed Development and their elevation relative to the site, some ground-level activity such as movement of construction vehicles may be visible resulting in a low magnitude of additional change and no greater than a **Minor, temporary effect** which would be **not significant**.

6.6.163 From all the remaining assessment viewpoints, the only additional visual effects, over and above those addressed under the heading of Operational Effects, would arise in relation to views of the cranes erecting the turbines.

6.6.164 The cranes would be visible for a relatively short period and would be incidental when considered in the context of the turbines being erected. However, it is assessed that any views of these works would result in a low magnitude of additional change and no greater than a **Minor, temporary effect** which would be **not significant**.

Operational Effects

6.6.165 A detailed viewpoint assessment of the operational effects is presented at **Technical Appendix 6.5** and this considers the long-term visual effects during the operational phase of the Proposed Development for each of the 16 viewpoints brought forward into detailed assessment.

6.6.166 For each of the assessment viewpoints, a short description is given of the baseline view, and a judgement is provided regarding the sensitivity of the key receptors likely to experience the view.

6.6.167 This is followed by a description of the features of the Proposed Development that would be visible from that viewpoint. This includes a description of how many turbine hubs and blades would be visible and, where relevant, whether any ground-level components of the Proposed Development would be visible. For each viewpoint, there is a comment on how vegetation or topography would affect the actual visibility of the turbines.

6.6.168 A judgement is then provided of the magnitude of change that would be experienced at each viewpoint, the level of the effect on the view and a statement provided to clarify whether the additional effect resulting from the Proposed Development is significant or not.

6.6.169 A summary of the sensitivity of the view, the magnitude of change in the view, the level of effect and its significance is given in **Table 6.7**. Where a viewpoint is representative of more than one type of visual receptor, the assessment carried forward to the table represents the most sensitive receptor group represented by the viewpoint.

6.6.170 With reference to the Viewpoint Assessment at **Technical Appendix 6.5**, when considered against the existing baseline it has been assessed that there would be a significant visual effect at 11 of the 16 representative viewpoints during daylight hours. These are as follows:

- Viewpoint 1 - A6088, Chesters;
- Viewpoint 2 - A6088, Southdean;
- Viewpoint 3 - Fort north-east of Southdean;
- Viewpoint 4 - A6088, Western approach to Chesters;
- Viewpoint 5 - Bonchester Hill;
- Viewpoint 6 - B6357 Vantage Point;
- Viewpoint 7 - Footpath at Knox Knowe;
- Viewpoint 8 - A6088, north-west of Carter Bar;
- Viewpoint 11 - Footpath and Minor Local Road, Chesters Brae;
- Viewpoint 14 - Wolfelee Hill; and
- Viewpoint 19 - Wheel Causeway.

6.6.171 It was further assessed that during the hours of darkness there would be a significant visual effect at 10 of the 16 representative viewpoints. These are as follows:

- Viewpoint 1 - A6088, Chesters;
- Viewpoint 3 - Fort north-east of Southdean;
- Viewpoint 4 - A6088, Western approach to Chesters;
- Viewpoint 5 - Bonchester Hill;
- Viewpoint 6 - B6357 Vantage Point;
- Viewpoint 7 - Footpath at Knox Knowe;
- Viewpoint 8 - A6088, north-west of Carter Bar;
- Viewpoint 11 - Footpath and Minor Local Road, Chesters Brae;
- Viewpoint 14 - Wolfelee Hill; and
- Viewpoint 19 - Wheel Causeway.

Table 6.7: Summary of Visual Effects during Operation

		Daylight Hours			Hours of Darkness		
Viewpoint	**Sensitivity**	**Magnitude of Change**	**Level of Effect**	**Significant**	**Magnitude of Change**	**Level of Effect**	**Significant**
1 - A6088, Chesters	High	High	Major	**Yes**	Medium high	Moderate major	**Yes**
2 - A6088, Southdean	High	Medium high	Moderate major	**Yes**	Low medium	Moderate	No
3 - Fort north-east of Southdean	Medium high	High	Major	**Yes**	Medium high	Moderate major	**Yes**
4 - A6088, Western approach to Chesters	High	High	Major	**Yes**	Medium high	Moderate major	**Yes**
5 - Bonchester Hill	High	Medium high	Moderate major	**Yes**	Medium	Moderate	**Yes**
6 - B6357 Vantage Point	High	High	Major	**Yes**	High	Major	**Yes**
7 - Footpath at Knox Knowe	High	High	Major	**Yes**	Medium high	Moderate major	**Yes**
8 - A6088, north-west of Carter Bar	Medium	Medium high	Moderate	**Yes**	Medium	Moderate	**Yes**
9 - Carter Bar (eastern vantage point)	Very high	Very low	No effect	No	Very low	No effect	No
10 - Pike Fell	High	Low	Minor moderate	No	Low to very low	Minor	No
11 - Footpath and Minor Local Road, Chesters Brae	High	High	Major	**Yes**	Medium high	Moderate major	**Yes**
12 - Rubers Law	High	Medium	Moderate	No	Low to very low	Minor	No
13 - A6088 Approach to Bonchester Bridge	Medium	Low	Minor moderate to minor	No	Low to very low	Minor	No
14 - Wolfelee Hill	Medium high	High	Major	**Yes**	Medium high	Moderate major	**Yes**
18 - Borders Abbey Way, Black Law	High	Low	Minor moderate	No	Very low	Minor	No
19 - Wheel Causeway	Medium	High	Moderate	**Yes**	Medium high	Moderate	**Yes**

Assessment of Effects on Visual Receptor Groups

6.6.172 This section considers the effects of the Proposed Development on the visual receptor groups brought forward into detailed assessment.

Construction Effects on Visual Receptor Groups

6.6.173 It is recognised that there would be some additional temporary visual effects during the construction of the Proposed Development over and above those assessed under the operational phase.

6.6.174 The vast majority of effects, of note, when considering the construction phase wi be experienced within the local environs of the site, with views contained by the topography to the west, south and south-east of the site.

6.6.175 The construction works would be visible from a number of properties within the local landscape. However, views of the construction phase would be restricted to views of cranes appearing above intervening landform and vegetation with all ground-level components screened from view. These views would only be experienced for a relatively short duration during the construction and they would be experienced within the context of the turbines being constructed.

6.6.176 Overall, it is assessed that there would be a low magnitude of additional effect during construction over and above the operational phase effects assessed below. This would result in a temporary moderate additional effect, which would not be significant, and these effects need to be considered in conjunction with the operational effects identified below.

Operational Effects on Visual Receptor Groups

6.6.177 Views of the ground level components of the Proposed Development would be limited to a relatively short radius around the site, largely in an easterly direction. Except where indicated, the discussion below, therefore, relates primarily to views of the proposed turbines of the Proposed Development.

Residential Receptors within 3 km

6.6.178 All properties located within 3 km of a proposed turbine have been assessed in detail within the Residential Visual Amenity Assessment at **Technical Appendix 6.6**.

6.6.179 Having undertaken an appraisal of the relationship between the proposed turbines and the residential properties within the 3 km RVAA study area, it is assessed that residents at eight of the 15 properties (or groups of properties) would experience a significant visual effect on the view from a part of their house, garden, or principal access route, during daylight hours and five of the 15 properties would experience a significant visual effect during the hours of darkness.

However, in all cases, the properties would all continue to have other views available that are not affected by the proposed turbines. Although it is acknowledged that a number of the properties within the 3 km RVAA study area would experience significant visual effects, it is not the case that any of the effects would be of such a scale so as to become dominant or overbearing

Settlements within 3 to 5 km

6.6.180 Chesters is situated approximately 3.3 km to the north of the Proposed Development. It is a linear settlement with properties clustered around the junction between the A6088 that continues west towards Hawick and the minor roads heading north and east towards Ruletownhead and Jedburgh respectively.

6.6.181 Approaching from the south, properties along the eastern side of the A6088 comprise traditional, stone-built cottages that face west towards the road, with small garden areas to the front and gardens to their rear in the opposite direction to the Proposed Development. These properties would experience oblique views towards the development. Viewpoint 1 is representative of views that would be experienced from the southern part of the settlement.

6.6.182 There are fewer properties along the western side of the A6088, with a cluster of three bungalows situated to the south as the road bends to the west. A block of mature vegetation extends along the southern boundary of the group and along part of the western boundary, partially screening views. However, where available there would be oblique views towards the proposed turbines.

6.6.183 To the west of the war memorial, there are a number of traditional cottages extending along the north edge of the A6088 that also front directly onto the road. Due to the orientation of these properties, they would experience direct views towards the Proposed Development that would be partially filtered by the cluster of bungalows to the south of the road.

6.6.184 As the A6088 heads west from Chesters there are a number of individual properties that are situated to the north of the road, set back from it and positioned at a slightly higher elevation. Due to the orientation of these properties, they would experience direct views towards the Proposed Development. Viewpoint 4 is representative of views experienced from this area.

6.6.185 Properties along the eastern edge of the minor road heading north from Chesters are generally orientated west to east with views screened by existing vegetation and by properties along the northern edge of the A6088.

6.6.186 Properties along the minor road heading east from the A6088, Chesters Brae, comprise a mix of older and more recent houses and bungalows. As the road climbs in elevation there are a number of individual properties located to the north of the road, setback from it and positioned above the level of the road. The elevated location of these properties allows panoramic views over the tops of roadside vegetation, across the rural, valley landscape towards the ridge of high ground that extends from Carter Fell, providing the backdrop to views from the settlement. Views from Chesters Brae are represented by Viewpoint 11.

6.6.187 During daylight hours the Proposed Development would introduce a large size and scale of change that would occupy a large proportion of the view. While some receptors would experience oblique or no views, where intervening properties or vegetation screen views, many would experience direct views towards the Proposed Development from their principal façades. Overall, the Proposed Development would introduce a high magnitude of change. Combined with the high sensitivity of residential receptors, this would result in a **Major effect** that is considered **significant**.

6.6.188 During the hours of darkness, with reference to the lit turbine ZTV at **Figure 6.8**, up to all six of the proposed lit turbines would be visible from the settlement. The lights would appear as small red dots, introduced in a part of the view where no other lights are currently present. However, there are a few light sources present within the village comprising streetlights, lighting at properties within the village and the occasional lights of vehicles travelling along the A6088. This would result in a medium high magnitude of change and a **Moderate Major effect** during the hours of darkness that is also considered **significant**.

Settlements within 5 to 10 km

6.6.189 Bonchester Bridge is situated approximately 5.1 km to the north-west of the Proposed Development. It is a nucleated settlement, situated to the west and east of Rule Water, with the A6088 passing through the village. The village is set within the Rule Valley and is surrounded by high ground to its west and east, incorporating Bonchester Hill, with the valley sides being extensively vegetated. It consists of a mix of house ages and types as well as several commercial properties and a village pub.

6.6.190 With reference to the blade tip ZTV at **Figure 6.4**, theoretical visibility of up to three turbines is predicted from the settlement. This area of predicted visibility is mainly restricted to the part of the settlement lying to the west of the Rule Water, with very limited theoretical visibility from the eastern part of the settlement.

6.6.191 Although theoretical visibility is predicted from these parts of the settlement, it is considered that there would be no actual visibility. This is due to the amount of existing mature trees and vegetation that surrounds the lower valley sides, restricting visibility. It is acknowledged that views may be available from the western and eastern approaches to the settlement, which are considered separately as the part of the assessment of roads and routes.

6.6.192 During daylight hours, any available views would be limited to the very upper blade tips and only available at discrete locations. Taking the extent of existing vegetation around the settlement it is considered that there would be no greater than a very low magnitude of change and combined the high sensitivity of residential receptors, no greater than a **Minor effect** that is considered to be **not significant**.

6.6.193 With reference to the lit turbine ZTV at **Figure 6.8**, there is no theoretical visibility predicted of the lit turbines from the settlement. As such there would be no effects experienced during dark sky hours.

Settlements within 10 to 20 km

<u>Hawick</u>

6.6.194 Hawick is situated approximately 12.3 km to the north-west of the Proposed Development situated along the A7 Carlisle to Edinburgh road. It is one of the main settlements within the Borders providing a range of retail and commercial services for both its residents and the surrounding rural area.

6.6.195 With reference to the blade tip ZTV at **Figure 6.4**, there is no theoretical visibility from the majority of the town which sits within the Teviot Valley and is surrounded by higher ground to its south-east, screening views towards the Proposed Development. However, some visibility is predicted from the northern fringes of the settlement, where up to all 13 turbines would be visible in theory.

6.6.196 During daylight hours, with reference to Viewpoint 17, any available views would be limited to the very upper blade tips and would only be experienced at very few points in the northern part of the town. It is considered that there would be no greater than a very low magnitude of change, which combined with the high sensitivity of residential receptors, results in no greater than a **Minor effect** that is considered to be **not significant**.

6.6.197 With reference to the lit turbine ZTV at **Figure 6.8**, there is no theoretical visibility predicted of the lit turbines from the majority of the settlement, with only visibility of up to 2 lit turbines predicted from a small part of the northern edge of the town. Given the built form of the nearby properties in this area, together with both the distance from the Proposed Development and existing vegetation to the south-east of the settlement there would be no greater than a very low magnitude of change, with effects considered to be **Minor to no effect** that would be considered **not significant**.

Jedburgh

6.6.198 Jedburgh is situated approximately 13.1 km to the north north-east of the Proposed Development, along the Jed Water. It too is a main settlement within the Borders providing a range of services to both its residents and surrounding rural areas.

6.6.199 With reference to the blade tip ZTV at **Figure 6.4**, theoretical visibility is predicated from the more elevated eastern part of the town to the east of Jed Water, with no theoretical visibility predicted from the historic centre of the town. However, actual visibility from these residential areas to the south of Oxnam Road is likely to be restricted by existing trees and vegetation around the southern periphery of these areas and by the built form of the residential area itself.

6.6.200 During daylight hours, with reference to Viewpoint 21, any available views would be limited to the very upper blade tips and would only be experienced at very few points in the northern part of the town. It is considered that there would be no greater than a very low magnitude of change, which combined with the high sensitivity of residential receptors, results in no greater than a **Minor effect** that is considered to be **not significant**.

6.6.201 With reference to the lit turbine ZTV at **Figure 6.8**, there is no theoretical visibility predicted of the lit turbines from the settlement. As such there would be no effects experienced during dark sky hours.

Table 6.8: Summary Operational Effects on Residential Properties and Settlements

		Daylight Hours			Hours of Darkness		
Receptor	**Sensitivity**	**Magnitude of Change**	**Level of Effect**	**Significant**	**Magnitude of Change**	**Level of Effect**	**Significant**
Settlements							
Chesters	High	High	Major	**Yes**	Medium high	Moderate major	**Yes**
Bonchester Bridge	High	Very low	Minor	No	Very low	No effect	No
Hawick	High	Very low	Minor	No	Very low	Minor to no effect	No
Jedburgh	High	Very low	Minor	No	Very low	No effect	No

Recreational Routes

Scotland's Great Trails

6.6.202 As identified in the baseline, a section the Borders Abbeys Way occurring approximately 10.6 km to the north of the Proposed Development near Jedburgh has been brought forward into detailed assessment.

6.6.203 With reference to the principal visual receptors within 20 km overlaid with the blade tip ZTV at **Figure 6.20**, theoretical visibility from this section of the route commences to the south-west of Bedrule and continues eastwards for a distance of approximately 1.2 km. Over this section views are screened by surrounding vegetation close to the route, resulting in no effects.

6.6.204 As the route continues eastwards, views are screened by topography before becoming available as the route nears the summit of Black Law. As the route crosses over the crest of the hill, sweeping panoramic views are available in a southerly direction over a 544 m long section of the route. Views south are broadly perpendicular to the route, but are considered to be in the direction of one of the principal foci within the available views as views are drawn towards the distant ridgeline that frames views.

6.6.205 As the route continues eastwards it passes along the northern edge of a shelterbelt for approximately 880 m, screening views south towards the proposed turbines as the route descends the eastern slopes of Blacklaw. The route then turns northwards for approximately 850 m, over which theoretical visibility of up to six turbines is predicted. The route then passes through a wooded area, beyond which there is very patchy, theoretical visibility of up to three turbines for approximately a further 1.1 km.

6.6.206 During daylight hours, with reference to Viewpoint 18, the Proposed Development would introduce small scale elements to the view that would be experienced at distance. The development would occupy a small lateral extent of the broad vista, with most turbines backclothed against the background terrain. The turbines are also situated beyond the immediate foreground setting of Black Law. This would result in no greater than a low magnitude of change and a **Minor Moderate effect** that is considered to be **not significant**.

6.6.207 During the hours of darkness, up to all six lit turbines would be visible in theory, seen as very small red dots back-clothed against the landform to the south of the site. This change would occur in a part of the landscape with very few existing light sources. However, this change would be experienced distance and would result in no greater than a very low magnitude of change and a **Minor effect** that is considered **not significant**.

6.6.208 These effects would be experienced in the vicinity of Black Law as the route crosses the high ground. The other sections of the route described above would experience fewer effects.

Core Paths

Core path No. 116 near Bonchester Bridge

6.6.209 Core path No. 116 is located to the north of the war memorial in Bonchester Bridge and climbs westwards from the B6357 for a distance of approximately 725 m where it meets the minor road leading from the A6088, north-east towards Town-ó-rule. Referring to the principal visual receptors within 20 km overlaid with the blade tip ZTV at **Figure 6.20**, theoretical visibility is predicted over the whole route. Fewer turbines are predicted to be visible towards its eastern end, which is lower in elevation. As the route climbs in elevation to the west progressively more turbines are predicted to be visible, with visibility of up to all 13 turbines for approximately 145 m at its western end.

6.6.210 During daylight hours, the Proposed Development would introduce small scale elements to the view, where no other turbines are currently present that would be experienced at a distance of approximately 6.4 km. The development would occupy a small lateral extent of the broad vista, with the hubs of turbines backclothed against the background terrain and partly screened by the rounded intervening landform. This would result in no greater than a low magnitude of change and a **Minor Moderate effect** that is considered to be **not significant**.

6.6.211 During the hours of darkness, up to four lit turbines would be visible in theory, seen as very small red dots back-clothed against the landform to the south of the site. This change would occur in a part of the landscape with very few existing light sources and would only be experienced over a distance of approximately 330 m at the western end of the route. However, this change would be experienced at distance and would result in no greater than a very low magnitude of change and a **Minor effect** that is considered **not significant.**

6.6.212 These effects would be experienced towards the western end of the route as the route crosses higher ground. Other sections of the route described above would experience fewer effects. Furthermore, effects would be mainly experienced by people walking in an easterly direction towards Bonchester, where views would be experienced at a slightly oblique angle to the path. People walking in a westerly direction would experience much fewer effects as the development would be situated behind them.

Core path No. 203 – near Kirkton and White Hill

6.6.213 Core path No. 203 is located approximately 9 km to the north-west of the Proposed Development. From its western end, the path head east from the B6399, passing around White Hill and continuing in a broadly north north-easterly direction to near Kirkton where it meets the A6088.

6.6.214 Referring to the principal visual receptors within 20 km overlaid with the blade tip ZTV at **Figure 6.20**, theoretical visibility is predicted over a very small proportion of the route. From its western end no theoretical visibility is predicted for approximately 2.6 km, with visibility commencing as the path passes around the southern foot of White Hill and continuing for approximately 1.2 km as the route continues towards the A6088. However, over this section, theoretical visibility of only up to six turbines is predicted, with actual visibility further restricted by a small woodland block towards the north end of the area of predicted visibility and by further vegetation to the south of the route.

6.6.215 During daylight hours, views towards the Proposed Development would be partly screened and the proposed turbines would introduce no greater than a very low magnitude of change and a **Minor effect** that is considered to be **not significant**.

6.6.216 During the hours of darkness, up to four lit turbines would be visible in theory, with most parts of this section of the route only potentially having views of up to two lit turbines.

Where views are available, the turbine lighting would be seen as very small red dots back-clothed against the landform to the south of the site. However, this change would be experienced distance and would result in no greater than a very low magnitude of change and a **Minor to no effect** that is considered **not significant**.

Routes and Paths within 5 km

Rights of way crossing through the forestry plantation south of the A6088

6.6.217 As identified in the baseline section, there are a number of rights of way crossing through the extensive forestry plantations that extend southwards from the A6088 and westwards from Carter Fell, where the Proposed Development is located. These routes comprise:

- Dykeraw Plantation Right of Way, heads south from Southdean and crosses through Dykeraw Plantation and the site of the Proposed Development;
- Wheel Causeway, heads south-east from Cleuch Head and passes through the western fringes of the Proposed Development area;
- Rights of Way leading south-east from Southdean via Charlie's Knowe and south from the A6088 and converging at Burns Plantation to the immediate east of the site. The route continues south via Blackburn Rig, south to Knox Knowe, where it crosses into Northumberland and continues as Bridleway 529/001; and
- Right of way leading to Carter Fell from the A6088, situated approximately 2.8 km to the east of the Proposed Development.

6.6.218 Views experienced by people using these different routes would be similar in nature as the routes cross through the extensive commercial forestry plantation. The routes follow existing forestry tracks, breaks between forest coupes, or in the case of Wheel Causeway follow the route of historic trackways.

6.6.219 Referring to the principal visual receptors within 20 km overlaid with the blade tip ZTV at **Figure 6.20**, theoretical visibility of up to all proposed turbines is predicted where routes are within 2 km of the Proposed Development, although there are some notable points where topography alone would screen views, such as to the south of Blackburn Rig and to the south of the site at Raven Sike.

6.6.220 Beyond 2 km, theoretical visibility from the routes extends to approximately 4 km to the south-west and south. To the east, there is predicted visibility from the northern and southern parts of the right of way leading south from the A6088 to Carter Fell, although visibility is restricted as it passes through the Carter Burn valley.

6.6.221 However, actual visibility would be much less than predicted as the routes are contained within dense forest plantation that foreshortens views and limits opportunities for longer range views, except where routes pass through areas of juvenile or felled plantation and where they rise in elevation and emerge from the plantation and cross the more open moorland ridge to the south-east of the site, as illustrated by Viewpoint 7.

6.6.222 Although it is acknowledged that the forests provide opportunities for recreation and a sense remoteness, the ongoing forest operations reduces the susceptibility of people using the routes, resulting in the sensitivity of receptors using these routes being assessed as medium.

6.6.223 During daylight hours, the proposed turbines would generally be experienced in glimpsed views between forest coupes or over relatively short sections of the routes as people pass through more open areas where trees have been felled or recently planted. Where views are available, the Proposed Development would introduce large scale elements that would be experienced in close proximity. Views of the associated infrastructure would also potentially be available at certain points, but these would be much more diminutive visual components when viewed within the context of the turbines themselves. Overall, it is considered that the Proposed Development would result in a high magnitude of change and a **Moderate Major effect** that is considered **significant.** Such effects would not be experienced over the entirety of the routes and for large sections of the route, where the enclosure of the forest plantation screens views, receptors would experience no effects.

6.6.224 During the hours of darkness, where views are available up to all six lit turbines would be visible in theory, seen as small red dots back-clothed against the dark sky. This change would occur in a part of the landscape with no other existing light sources and would be experienced in close proximity. This would introduce a medium magnitude of change, resulting in a **Moderate effect** that is considered **significant**.

Other Routes and Paths

Bonchester Bridge & Hill Promoted Path

6.6.225 This circular promoted route is situated approximately 3.8 km to the north-west of the Proposed Development and commences at Bonchester Bridge and passes via Hobkirk and loops back around Bonchester Hill.

6.6.226 With reference to the principal visual receptors within 20 km overlaid with the blade tip ZTV at **Figure 6.20**, theoretical visibility from the route is limited to a short section of the route to the south-west of Hobkirk and to its north-east as the route passes over Bonchester Hill.

6.6.227 In the south-west section of the route, there is limited theoretical visibility of up to six turbines over a 1.4 km section of the route as the route passes around the head of Blackhall Burn. Existing mature trees and a shelterbelt plantation would provide some further screening of the Proposed Development.

6.6.228 This would result in no greater than a low magnitude of change and a **Minor Moderate effect** that is considered to be not significant.

6.6.229 During the hours of darkness, up to two lit turbines would be visible in theory, over a very short section of this part of the route it passes around the head of Blackhall Burn. Where views are available, the turbine lighting would be seen as small red dots and would be experienced against the dark sky, resulting in a low to very low magnitude of change and a **Minor effect** that is considered **not significant.**

6.6.230 In the north-east part of the route, there is progressively greater visibility of more turbines over a distance of approximately 865m as the route approaches the summit of Bonchester Hill. Views towards the Proposed Development would be experienced at an oblique angle when approaching the summit from the west and then direct views would be available from the summit and when descending southwards from the summit. Approaching from the south, the Proposed Development would be situated behind people walking towards the summit, but direct views would be available from the summit, with very oblique views as walkers descend in a westerly direction.

6.6.231 During daylight hours, the Proposed Development would occupy a moderate lateral extent of the view, with turbines largely backclothed against the background topography. Overall, it is assessed that this would introduce a medium high magnitude of change and a **Moderate Major effect** that is considered to be **significant**. This level of effect would be experienced over a limited part of the route extending to approximately 610 m from the high ground of Bonchester Hill. The level of effects would quickly reduce as walkers descend from the high ground.

6.6.232 During the hours of darkness, visible aviation lighting would extend across the full lateral extent of the array, with lights appearing as small, red dots backclothed against the against the background landform, resulting in a medium magnitude of change and a Moderate effect that is considered to be significant.

Permissive/customary path to the west of the B6357

6.6.233 This route is situated approximately 1.6 km to the west of the Proposed Development and follows forest tracks passing through part of Wauchope Forest.

6.6.234 With reference to the principal visual receptors within 20 km overlaid with the blade tip ZTV at **Figure 6.20**, theoretical visibility is predicted from most of the route, with the exception of a section of path as it passes through Wigg Burn valley and to the south of Kiln Knowe. However, actual visibility is greatly reduced from that indicated by the ZTV due to the extensive forest plantation that the route passes through.

6.6.235 Views towards the Proposed Development would be available from more elevated and open sections of the route near Wyndburgh Hill where felling has opened up views east in the direction of the Proposed Development. Receptors using these routes are also considered to have medium sensitivity due to the commercial forestry operations that occur within the vicinity of the route, reducing the susceptibility of receptors.

6.6.236 From such locations during daylight hours, the Proposed Development would introduce a low medium magnitude of change and a **Minor Moderate effect** that would be considered **not significant**. During the hours of darkness, there would be visibility of a reduced number of lit turbines, with further screening provided by the forested slopes on the eastern side of the B6357, resulting in a low magnitude of change and a **Minor effect** that is considered to be **not significant**.

6.6.237 From the northern part of the route, to the south-west of the parking area at Hell's Hole, there is a further open section of the route where views east in the direction of the Proposed Development are available. From this location during day light hours, the proposed turbines would appear above the rising landform and forested slopes along the eastern edge of the B6357 and would be seen in views perpendicular to the route. A reduced number of turbines would be visible with views mainly limited to the blades with the hubs of turbines nearest to the route being visible above the treeline. This would introduce no greater than a medium magnitude of change and a **Moderate effect** that is considered to be **not significant**.

6.6.238 During the hours of darkness, there would be visibility of a reduced number of lit turbines. Due to the lower elevation of this section of the route the lights would be seen in closer proximity and would appear as small red lights seen against the dark sky, resulting in a low medium magnitude of change and a **Minor Moderate effect** that is considered to be **not significant**.

Cycling Routes

6.6.239 The Borders Loop Cycle Route passes through the 20 km detailed study area, following the B711 west of Hawick, the B6399 south of Hawick and then minor roads to Bonchester Bridge where it meets the A6088 and follows it to Chesters where it continues east up Chesters Brae and follows the minor road to the A68.

6.6.240 Theoretical visibility from the route commences to the south-west of the A6088 as the route crosses the high ground west of Hobkirk. Views would be experienced broadly perpendicular to the route, appearing in the middle distance, with up to 8 turbines visible and 6 hubs visible in theory. However, intervening forest plantation would provide some screening.

6.6.241 During daylight hours the Proposed Development would introduce a low size and scale of change that would occupy a very small proportion of the view, that would only be experienced in south-easterly views, perpendicular to the route. This would result in a low magnitude of change and a **Minor Moderate effect** that is considered to be **not significant.**

6.6.242 During the hours of darkness, the nacelles of up to four of the lit turbines would be visible in theory, seen as small red dots partly backclothed against the background landform. This change would occur in a part of the landscape with no other existing light sources, resulting in a low to very low magnitude of change and a **Minor effect** that is considered to be **not significant**.

6.6.243 These visual effects continue for a distance of approximately 1.9 km until the route turns right and follows the A6088. As the route continues eastwards, roadside vegetation screens views from sections of the road as it descends towards Bonchester Bridge.

6.6.244 During daylight hours, where views are available, the turbines would introduce a low size and scale of change that would occupy a very small proportion of the view that would only be experienced in south-easterly views, perpendicular to the route. This would result in a low magnitude of change and a **Minor Moderate effect** that is considered to be **not significant**.

6.6.245 During the hours of darkness, the nacelles of up to two of the lit turbines would be visible in theory, seen as small red dots partly backclothed against the background landform. This change would occur in a part of the landscape with no other existing light sources, resulting in a low to very low magnitude of change and a **Minor effect** that is considered to be **not significant**.

6.6.246 Cyclists would not experience any effects as the route enters and continues through Bonchester Bridge due to the level of vegetative screening. Theoretical visibility from the route commences again to the south of Bonchester Hill. However, actual visibility would be prevented by existing vegetation along the southern edge of the road.

6.6.247 To the east of Doorpool, views of all of the proposed turbines would become available. With reference to Viewpoint 4, during daylight hours, they would introduce a large size and scale of change that would occupy a moderate proportion of the view that would be experienced in southerly views, perpendicular to the route. This would result in a high magnitude of change and a **Major effect** that is considered **significant**.

6.6.248 During the hours of darkness, the nacelles of up to all six lit turbines would be visible in theory, seen as small, red dots partly backclothed against the background landform. This change would occur in a part of the landscape with no other existing light sources, resulting in a medium high magnitude of change and a **Moderate Major effect** that is considered to be **significant**.

6.6.249 These effects would continue to be experienced for approximately 5.1 km as the route continues into Chesters and climbs Chesters Brae and continues eastwards before the route turns to the north-east and continues towards the A68.

Table 6.9: Summary Operational Effects on Recreational Routes

		Daylight Hours			Hours of Darkness		
Receptor	**Sensitivity**	**Magnitude of Change**	**Level of Effect**	**Significant**	**Magnitude of Change**	**Level of Effect**	**Significant**
Scotland's Great Trails							
Borders Abbey Way – Black Law (850 m section)	High	Low	Minor moderate	No	Very low	Minor	No
Core Paths							
Core Path No.116 – near Bonchester Bridge	High	Low	Minor moderate	No	Very low	Minor	No
Core Path No. 203 – near Kirkton and White Hill	High	Very low	Minor	No	Very low	Minor to no effect	No
Other Routes and Paths							
Other paths and routes within 5 km	Medium	High	Moderate major	**Yes**	Medium	Moderate	**Yes**
Bonchester Bridge & Hill Promoted Path – south-west of Hobkirk	High	Low	Minor moderate	No	Low to very low	Minor	No
Bonchester Bridge & Hill Promoted Path – north-east at Bonchester Hill	High	Medium high	Moderate major	**Yes**	Medium	Moderate	**Yes**
Permissive/customary path to the west of the B6357 – upper sections	Medium	Low medium	Minor moderate	No	Low	Minor	No
Permissive/customary path to the west of the B6357 – lower sections	Medium	Medium	Moderate	No	Low medium	Minor moderate	No
Cycle Routes							

Borders Loop – west of Hobkirk to A6088 junction	High	Low	Minor moderate	No	Low to very low	Minor	No
Borders Loop –A6088 to Bonchester Bridge	High	Low	Minor moderate	No	Low to very low	Minor	No
Borders Loop – Doorpool to east of Chesters – approximately	High	High	Major	**Yes**	Medium high	Moderate major	**Yes**

Bold text indicates a significant effect

Roads

6.6.250 As set out in **Technical Appendix 6.1** the visual sensitivity of trunk road and major roads is typically low. However, given the nature of the landscape and the likelihood that a greater number of tourists are likely to be passing through the landscape, who are more likely to appreciate its scenic qualities, users of the A68 and the A6088 are considered to have a medium sensitivity to the change proposed. Users of B roads brought forward into detailed assessment are considered to have medium sensitivity, as set out in **Technical Appendix 6.1**.

A68

6.6.251 The A68 passes through the eastern part of the Study Area, approximately 5.8 km to the east of the Proposed Development at its closest point. The road is one of the main routes between Scotland and England and is a popular route for tourists, with Carter Bar vantage point providing a stopping point for people to experience views across the Borders and the Cheviot Hills.

6.6.252 With reference to the blade tip ZTV to 20 km at **Figure 6.4**, theoretical visibility from the road is very limited with only very patchy and intermittent visibility at a few isolated points along the road, with no theoretical visibility predicted south of the Scotland England border.

6.6.253 Travelling northwards, there is a small section of the road to the north of Carter Bar where visibility is predicted over a distance of approximately 270 m as the road bends to the west and descends Carter Fell. During daylight hours the Proposed Development this would introduce a low size and scale of change that would occupy a small proportion of the view, that would appear directly ahead of road users. Views would be limited to the upper parts of blades, with intervening forestry plantation, to the west of Carter Fell providing further screening. This would result in no greater than a low magnitude of change and **Minor Moderate effect** that is considered to be **not significant**.

6.6.254 During hours of darkness, there is no predicted visibility of the lit turbines and as such there would no effects.

6.6.255 There is no predicted visibility from the road as it continues north past the junction with the A6088, for a distance of approximately 1.5 km. Predicted visibility occurs again at the hair pin bends north of Carter Bar and continues for approximately 875 m. Over this section of the route extensive mature coniferous woodland along the western edge of the road means that people would not experience views of the development. It is acknowledged that if parts of this woodland were felled views would become available. The proposed turbines would be seen at over 5.8 km and would be partly screened by intervening topography. They would appear as small-scale elements and be experienced as fleeting, glimpsed, oblique views over a short section of the route.

6.6.256 During daylight hours, this would introduce a low medium magnitude of change and would result in no greater than a **Moderate effect** that is considered to be **not significant**. With reference to the lit turbine ZTV at **Figure 6.8**, only up to two lit turbines would be visible in theory. This would introduce in no greater than a low to very low magnitude of change and a **Minor effect** that would be considered **not significant**.

6.6.257 Further north as the road continues towards Hass, there are two short sections where visibility is predicted that extend for approximately 305 m and 170 m, with a further section of theoretical visibility to the north of Hass.

6.6.258 Over these sections extensive mature coniferous woodland along the western edge of the road means that people would not experience views of the development, but views may become available if these areas were felled. The proposed turbines would be seen at over 5.9 km and would be partly screened by intervening topography. They would appear as small-scale elements and be experienced as fleeting, glimpsed, oblique views over a short section of the route.

6.6.259 During daylight hours, this would introduce a low medium magnitude of change and would result in no greater than a **Moderate effect** that is considered to be **not significant**. With reference to the lit turbine ZTV at **Figure 6.8**, up to all lit turbines would be visible in theory. However, this would extend over an approximate 150 m stretch of the road south of Hass where views are screened by roadside tree plantings. As such this would introduce in no greater than a low to very low magnitude of change and a **Minor effect** that would be considered **not significant**.

6.6.260 There is no further visibility predicted from the route.

A6088

6.6.261 The A6088, connecting Hawick and Carter Bar, passes approximately 2.3 km to the north-east of the Proposed Development. **Figures 6.4 and 6.20** illustrate theoretical blade tip visibility from the road within 20 km, **Figure 6.6** shows where turbine hubs would be visible in theory within 20 km and **Figure 6.8** where theoretical visibility of lit turbines occurs with 20 km.

6.6.262 Theoretical visibility from the road commences approximately 630 m west of the junction between the A6088 and the A68 and continues for approximately 9 km as the road continues north-eastwards, through Southdean and Chesters, ending at Doorpool. Theoretical visibility commences approximately 720 m to the west and continues as the road passes around the southern foot of Bonchester Hill and continues for approximately 2 km.

6.6.263 Theoretical visibility is also predicted as the route enters Bonchester Bridge and continues through the village and continues for approximately 3.4 km as the road climbs from Bonchester Bridge and continues north-west. There is no further precited visibility as the road passes south-west of Rubers Law and continues towards Hawick.

6.6.264 However, actual visibility from the road is much less than predicted. The character of available views from the road is influenced by subtle changes in its alignment, changes in the elevation of the road as it passes through the Southern Uplands Forest – Wauchope/Newcastleton landscape character type (LCT 5i(ii)), the extensive commercial forest plantations that extend to the north and south of the road and intermittent roadside vegetation.

A6088 Westbound

6.6.265 Travelling westbound, actual visibility commences approximately 720 m west of the junction with the A68 near the layby (see **Technical Appendix 6.7** – Wireline 1). As the road continues west, road users experience, oblique, glimpsed views along occasional forest tracks and oblique views over juvenile roadside and forest plantation.

6.6.266 During daylight hours this would result in a low magnitude of change and a Minor **Moderate effect** that is considered **not significant** and a low to very low magnitude of change and **Minor, not significant effect** during the hours of darkness. These effects continue for approximately 1 km.

6.6.267 As the road continues west towards Carterhouse, road users would experience oblique views extending across open areas of rough grassland between blocks of forest plantation near to the road and the more distant forested plateau (see Appendix 6.7 – Wireline 2 and Viewpoint 8). During daylight hours this would result in a medium high magnitude of change and a **Moderate, significant effect** and a medium magnitude of change and **Moderate effect** that is considered **not significant** during the hours of darkness. These effects occur over approximately 750 m.

6.6.268 West of Carterhouse, a large forest plantation block, fringed with deciduous trees to the south of the road screens views towards the Proposed Development for approximately 400 m, over which no views would be available. Heading north-west towards Charlie's Hill and Southdean Lodge Bothy perpendicular views are intermittently available between two large forest blocks setback from the road that partially screen views towards the Proposed Development (see **Technical Appendix 6.7 – Wireline 3 and 4**). During daylight hours this would result in a medium high magnitude of change and a Moderate, significant effect and a medium magnitude of change and **Moderate effect** that is considered not significant during the hours of darkness. These effects occur over approximately 1.7 km.

6.6.269 West of Charlie's Hill, the road is more elevated and allows open, perpendicular views across the lower ground and forest plantation to the south for approximately 1.9 km until the road descends towards Southdean and approaches Merryoaks Farm (see **Technical Appendix 6.7 – Wireline 5**). During daylight hours this would result in a high magnitude of change and a **Moderate Major, significant effect** and a medium high magnitude of change and **Moderate significant effect** during the hours of darkness.

6.6.270 At Merryoaks Farm at Southdean, intermittent roadside hedgerows and trees filter the perpendicular views that would be experienced as glimpsed views, largely screened by the rolling landform to the south-west (see Viewpoint 2). During daylight hours this would result in a medium high magnitude of change and a **Moderate, significant effect** and a low medium magnitude of change and **Minor Moderate, not significant effect** during the hours of darkness. These effects would occur over approximately 1 km north-west through Southdean to Whiteburn.

6.6.271 Beyond Southdean, effects would quickly reduce as the Proposed Development is situated behind the direction of travel as the road continues north to Chesters. At Chesters the road bends to the west and continues to head in a broadly north-westerly direction as it continues towards Hawick (see Viewpoint 4). Very oblique to perpendicular views would be available for approximately 1.3 km as the road continues north-west towards Doorpool. With reference to Viewpoint 4, views of the proposed turbines would be available set beyond intervening landform and plantation woodland. However, given the view direction relative to the road during daylight hours this would result in a medium high magnitude of change and a **Moderate, significant effect** and a medium magnitude of change and **Moderate effect** that is considered **not significant** during the hours of darkness.

6.6.272 Beyond Doorpool road users travelling westbound would not experience any further effects as the Proposed Development would appear to their rear. During daylight hours this would result in a medium high magnitude of change and a **Moderate, significant effect** and a low medium magnitude of change and **Minor Moderate** and **not significant effect** during the hours of darkness. These effects would occur over approximately 1 km north-west through Southdean to Whiteburn.

A6088 Eastbound

6.6.273 Travelling eastbound actual visibility commences to the north-west of Bonchester Bridge as the road crosses the elevated grassland plateau. The orientation of the road relative to the Proposed Development means that people travelling in an easterly direction would experience nearly direct views towards the Proposed Development. With reference to Viewpoint 13, the proposed turbines are partly screened by intervening topography.

6.6.274 During daylight hours this would result in a low magnitude of change and a **Minor Moderate effect** that is considered **not significant** and a low to very low magnitude of change and **Minor, not significant effect** during the hours of darkness. These effects continue for approximately 2.9 km towards Bonchester Bridge. As the road descends into the village its orientation changes with road users having oblique views that are filtered by intermittent roadside hedgerows and trees.

6.6.275 No views are available as the road continues through the village and over the Rule Water. As the road climbs in elevation to the east of the village views are heavily screened by intervening vegetation. Although, the Wireline 6 at **Technical Appendix 6.7** suggests very limited slightly oblique views of blade tips would be available, intervening vegetation would mean that road users would not experience any views over this stretch of the road.

6.6.276 As the road continues eastwards, passing its junction with the B6357, extensive managed hedgerows and trees to either side of the road restricts views at Crowntailrigg. To the east of Crowntailrigg, intermittent oblique views become available over the rounded landform to the south-east of the road as illustrated by Wireline 7 at **Technical Appendix 6.7**. During daylight hours this would result in a very low magnitude of change and a **Minor, not significant effect** and a very low magnitude of change and **Minor to no effect** that would be considered **not significant** during the hours of darkness as none of the turbine lights would be visible. These effects would occur over an approximate 460 m section of the road east of Crowntailrigg.

6.6.277 No views of the proposed turbines would be available until Doorpool, where views would progressively become available as the road passes around the northern edge of localised landform to the south of the road. Road users would experience oblique views towards the proposed turbines which would be seen above the gently sloping landform in the middle distance, backclothed against the more distant high ground to the south, illustrated at Wireline 8 at Appendix 6.7 and at Viewpoint 4.

6.6.278 During daylight hours this would result in a high magnitude of change and a Moderate Major, significant effect and a medium high magnitude of change and Moderate, significant effect during the hours of darkness. These effects would occur over approximately 2.1 km as the road continues east to Chesters, with views becoming increasingly perpendicular approaching the village. As the road enters the village some very limited screening is provided by properties situated to the south as the road turns south.

6.6.279 As the road exits Chesters and continues south, it falls in elevation, with effects reducing as views become increasingly screened by intervening vegetation that appears directly ahead. As the road passes Whiteburn, direct views become available, with the proposed turbines appearing above the gently sloping intervening landform seen directly ahead.

6.6.280 During daylight hours this would result in a high magnitude of change and a **Moderate Major, significant effect** and a medium high magnitude of change and **Moderate, significant effect** during the hours of darkness. These effects would occur over approximately 1.1 km as the road continues towards Southdean.

6.6.281 Effects reduce as the road enters Southdean, where intermittent roadside hedgerows and trees filters the oblique to perpendicular views experienced as glimpsed views, largely screened by the rolling landform to the south-west (see Viewpoint 2). During daylight hours this would result in a medium high magnitude of change and a **Moderate, significant effect** and a low medium magnitude of change and **Minor Moderate, not significant effect** during the hours of darkness. These effects would occur over approximately 650 m as the road passes through Southdean and starts to climb in elevation past Merryoaks Farm.

6.6.282 To the east, the road climbs and then follows higher ground as it continues south-eastwards towards Charlies Hill. Perpendicular views are available across the lower ground and forest plantation to the south for approximately 1.9 km, as illustrate by Wireline 5 at **Technical Appendix 6.7**. During daylight hours this would result in a high magnitude of change and a **Moderate Major, significant effect** and a medium high magnitude of change and **Moderate, significant effect** during the hours of darkness.

6.6.283 Beyond Charlie's Hill effects quickly diminish as the Proposed Development passes to the rear of road users travelling north-eastwards towards Carter Bar.

6.6.284 Overall, it is considered that people travelling along the A6088 would experience significant sequential visual effects over relatively short, intermittent sections of the route, with westbound travellers experiencing significant effects over a slightly greater proportion of the route during daylight hours. In comparison, eastbound travellers would experience significant sequential effects over a slightly greater proportion of the route during the hours of darkness.

6.6.285 In all cases, sequential effects would be experienced intermittently and largely at an oblique to perpendicular angle compared to the direction of travel.

B6357

6.6.286 The B6357 passes approximately 1.5 km to the west of the Proposed Development. With reference to the blade tip ZTV to 20 km at **Figure 6.20**, there is theoretical visibility predicted for approximately 500 m from its junction with the A6088 at Cleuch Head. However, there is extensive trees and hedgerows along the eastern side of the road that screens views towards the Proposed Development. As such people passing along this section of the road would experience no effects during daylight or dark sky hours.

6.6.287 As the road continues southwards, it descends with the steep valley sides to the eastern side of the road screening the Proposed Development for approximately 4.5 km. Theoretical visibility commences near Hyndlee and continues for approximately 4 km as the road climbs towards Rushy Rig.

6.6.288 To the south of Hyndlee, views towards the Proposed Development become available due to the greater setback between the road and the landform. Views extend across grass fields towards the gently, rounded landform and forest plantation. The turbines would appear set beyond the valley landscape, with views up to six turbines would be visible above Brockie Law to the east of the road with views mainly limited to the tips of blades and views of up to three hubs. The turbines would appear as medium scale elements at a perpendicular angle to the road.

6.6.289 During daylight hours, this would introduce a low magnitude of change and would result in no greater than a **Minor Moderate effect** that is considered to be **not significant.** With reference to the lit turbine ZTV at **Figure 6.8**, up to two lit turbines would be visible in theory over this section. The visible aviation lights would appear above the dark sky horizon, in a part of the landscape where there are no other light sources. This would result in a low to very low magnitude of change and a **Minor effect** that would be **not significant.**

6.6.290 As the road continues to climb into Wauchope Forest, up to all 13 turbines would be visible in theory over a 2.3 km section of the road. Actual visibility is reduced by the extensive tree cover alongside the road that screens views of the Proposed Development. Where views are available the turbines would appear as medium to large scale elements with views of towers, hubs and blades extending above the surrounding forest canopy.

6.6.291 During daylight hours, this would introduce a medium high magnitude of change and would result in a **Moderate Major effect** that is considered to be **significant**. With reference to the lit turbine ZTV at **Figure 6.8**, up to all lit turbines would be visible in theory over this section. The visible aviation lights would appear above the dark sky horizon, in a part of the landscape where there are no other light sources, resulting in a medium magnitude of change and a **Moderate effect** that is considered to be **significan**t.

Table 6.10: Summary Operational Effects on Roads

		Daylight Hours			Hours of Darkness		
Receptor	**Sensitivity**	**Magnitude of Change**	**Level of Effect**	**Significant**	**Magnitude of Change**	**Level of Effect**	**Significant**
A6088 – Westbound from Carter Bar							
A6088 – 1 km section at eastern end	Medium	Low	Minor moderate	No	Low to very low	Minor	No
A6088 – 750m section at Carterhouse	Medium	Medium high	Moderate	**Yes**	Medium	Moderate	No
A6088 – 1.7 km section from Carterhouse to Charlie's Hill	Medium	Medium high	Moderate	**Yes**	Medium	Moderate	No
A6088 – 1.9 km section from Charlie's Hill to Merryoaks, Southdean	Medium	High	Moderate major	**Yes**	Medium high	Moderate	**Yes**
A6088 – 1 km section Southdean	Medium	Medium high	Moderate	**Yes**	Low medium	Minor moderate	No
A6088 – 1.3 km section from Chesters to Doorpool	Medium	Medium high	Moderate	**Yes**	Medium	Moderate	No
A6088 – Eastbound from north-west of Bonchester Bridge							
A6088 – 1 km section north-west of Bonchester Bridge	Medium	Low	Minor moderate	No	Low to very low	Minor	No
A6088 – 460 m section east of Crowntailrigg	Medium	Very low	Minor	No	Very low	Minor to no effect	No
A6088 – 1.2 km section Doorpool to Chesters	Medium	High	Moderate major	**Yes**	Medium high	Moderate	**Yes**
A6088 – 1.1 km section Whiteburn to Southdean	Medium	High	Moderate major	**Yes**	Medium high	Moderate	**Yes**

A6088 – 650 m section Southdean	Medium	Medium high	Moderate	**Yes**	Low medium	Minor moderate	No
A6088 – 1.9 km section from Merryoaks, Southdean to Charlie's Hill	Medium	High	Moderate major	**Yes**	Medium high	Moderate	**Yes**
Other Roads							
A68 – north of Carter Bar	Medium	Low	Minor moderate	No	Very Low	No effect	No
A68 – hair pin beds north of Carter Bar	Medium	Low medium	Moderate	No	Low to very low	Minor	No
A68 – south of Hass	Medium	Low medium	Moderate	No	Low to very low	Minor	No
B6357 –500 m section south of Cleuch Head	Medium	No change	No effect	No	No change	No effect	No
B6357 – 1.4 km south of Hyndlee	Medium	Low	Minor moderate	No	Low to very low	Minor	No
B6357 – 2.3 km section near Wauchope	Medium	Medium high	Moderate major	**Yes**	Medium	Moderate	**Yes**

Effects on the Teviot Valleys Special Landscape Area

6.6.292 The Teviot Valleys SLA is situated approximately 3.5 km to the north of the Proposed Development at its closest point. Its southern boundary follows the A6088 between Hawick and Chesters and the SLA extends north-eastwards towards Jedburgh and the A68. The 'key characteristics' of the SLA are set out at paragraph 6.5.21.

6.6.293 In order to consider the effects upon the Teviot Valleys SLA it is appropriate to consider the various assessments for the relevant identified landscape character types which occur within the SLA.

6.6.294 Based on the findings of the landscape character effects on LCT 11(i) Grassland with Hills – Bonchester/Dunion, there would be indirect and significant effects on the character of the southern part of the SLA extending approximately 1.5 km north from its southern boundary during both daylight hours and the hours of darkness. Beyond this distance, effects would be less due to a combination of the increased distance from the Proposed Development and the level of topographical screening.

6.6.295 In terms of the visual qualities of the SLA, significant visual effects would occur across a small part of the southern edge of the SLA during both daylight hours and the hours of darkness. With reference to Viewpoint 5, significant effects would occur close to its boundary (up to an approximate distance of 1.5 km into the SLA), but they would only be experienced for a very limited extent because of the high ground to the north of the A6088 that serves to limit the influence of the Proposed Development on this part of the SLA.

6.6.296 Beyond approximately 1.5 km, the availability of views of the Proposed Development is reduced, with views predicted from areas of higher ground and south-facing slopes, with views from intervening valleys restricted by adjacent landform.

6.6.297 Although some views of the Proposed Development are available from parts of the SLA, its location relative to the SLA means that it appears set within an adjoining landscape, beyond that of the SLA and distinct from it, limiting its influence on the visual character of the SLA.

6.6.298 While it is acknowledged that there would be some significant effects on landscape character and visual amenity within very limited southerly parts of the SLA as a result of the Proposed Development, the effects would not be of such a scale so as to prevent an understanding or appreciation of the key characteristics or the underlying landscape qualities of the SLA.

Effects on the Cheviot Foothills Special Landscape Area

6.6.299 The Cheviot Foothills SLA is situated approximately 3.6 km to the north-east of the Proposed Development at its closest point and covers the south-eastern corner of the Borders, adjoining the Scotland England border and the Northumberland National Park.

6.6.300 In order to consider the effects upon the Cheviot Foothills SLA it is appropriate to consider the various assessments for the relevant identified landscape character types which occur within the SLA. The assessment has identified significant effects to approximately 5 km to the north and east of the Proposed Development on the LCT 5i(ii) Southern Uplands Forest Covered Wauchope/Newcastleton and on LCT 7 Cheviot Foothills – Falla Group.

6.6.301 Based on these findings, there would be indirect and significant effects during both daylight hours and the hours of darkness on the character of a very small part of the south-west corner of the SLA, with such effects extending no more than approximately 1 km into the SLA. Beyond 1 km, effects would be very limited due to a combination of the increased distance from the Proposed Development, the level of topographical screening and the extensive forest cover, with minimal effects on the character of the SLA.

6.6.302 In terms of the visual qualities of the SLA, significant visual effects would occur during both daylight hours and the hours of darkness across a very small part of the western edge of the SLA. With reference to Viewpoint 8, significant effects would occur where the SLA borders the A6088, but they would only be experienced for a very limited extent because of the high ground to the north of the A6088 and west of the A68 that serves to limit the influence of this part of the SLA.

6.6.303 Beyond approximately 1 km into the SLA from its south-western corner, the availability of views of the Proposed Development is very sporadic, with predicted views from hill tops, many of which area forested, further limiting the influence of the Proposed Development on the visual characteristic of the SLA.

6.6.304 While it is acknowledged that there would be some significant effects on landscape character and visual amenity within very limited westerly parts of the SLA, as a result of the Proposed Development the effects would not be of such a scale so as to prevent an understanding or appreciation of the key characteristics or the underlying landscape qualities of the SLA.

Visual Effects during Decommissioning

6.6.305 It is recognised that there would be some additional temporary effects during decommissioning of the turbines over and above those assessed under the heading of 'Operational Effects' above. The additional effects resulting from decommissioning activities would be localised and relatively incidental when viewed in the context of the turbines being removed.

6.6.306 The effects on visual amenity would, therefore, decrease incrementally as decommissioning progresses and as more turbines and associated foundations and hardstanding are removed. Residents in nearby properties and people travelling along the A6088 to the north of the site would experience the greatest effects during decommissioning. Receptors would have partial views of the decommissioning activities associated with the wind turbine elements of the Proposed Development, while ground-level activities would be largely screened by surrounding forest plantation.

6.6.307 The effects would be similar to those during the construction phase, but in reverse.

6.6.308 Overall, it is considered that there would be a low magnitude of additional change (over that during the operation phase) for the reasons outlined above. This would result in no greater than a minor temporary effect on the visual amenity. The decommissioning effects would be temporary in nature and are unlikely to all occur at the same time during this phase.

6.6.309 The decommissioning effects of the Proposed Development on visual amenity are deemed to be **not significant**.

6.7 Mitigation

6.7.1 As discussed in best practice guidance for EIA, mitigation measures may include:

- avoidance of effects;
- reduction in magnitude of effects; and
- compensation for effects (which may include enhancements to offset any adverse effects).

6.7.2 The primary mitigation adopted in relation to the Proposed Development is embedded within the design of the Proposed Development and relates to the consideration that was given to avoiding and minimising landscape and visual effects during the evolution of the Proposed Development layout. This is sometimes referred to as 'mitigation by design'. A detailed discussion of the design evolution and the iterative process underpinning it is provided in **Chapter 2** of this EIA Report. Design evolution is summarised below, in so far as landscape and visual matters have influenced the Proposed Development.

6.7.3 Based on general good practice design principles (as set out in SNH/NatureScot guidelines) and an analysis of site-specific opportunities and constraints, the wind farm layout has evolved to take into consideration a number of landscape and visual constraints whilst maintaining an optimal development.

6.7.4 A design rationale has been adopted to avoid inconsistent turbine spacing, outliers or excessive overlapping turbines to minimise visual confusion and ensure a balanced / compact array from key views in the local landscape. The proposed turbines have been positioned within a bowl within the wider landscape, avoiding areas of higher ground ensuring that the Proposed Development is perceived as being set down in the landscape as far as possible.

6.7.5 Appropriate offsets from all properties and settlements, have been maintained to ensure that no property would experience an overbearing visual impact such that it became an unattractive place to live.

6.7.6 The above principles have been applied as a number of iterations to the design were made. Taking all other engineering and environmental constraints into account, the final layout of the turbines onsite was specifically designed to achieve a balanced array of turbines when viewed from the surrounding landscape.

6.7.7 In considering the layout of other structures and ancillary features of the Proposed Development, the design has sought to utilise existing forestry tracks and clearings where possible.

6.7.8 The turbines themselves would be painted an off-white colour with a low reflectivity semi-matt finish (or similar as agreed with the SBC). Such a finish is widely regarded to be the least intrusive in the landscape when seen against the sky in a host of weather conditions typically experienced within the UK.

6.7.9 Mitigation of visible turbine lighting has been designed into the scheme by adopting a cardinal lighting scheme where only the outermost turbines are lit (Turbines T01, T03, T08, T09, T11 and T12). Further mitigation has been incorporated to reduce the intensity of lighting in certain atmospheric conditions by reducing the intensity and attenuating the amount of vertical downwards lighting in order to reduce the visual impact experienced by receptors below the lights.

6.7.10 Visibility sensors would be installed on relevant turbines to measure the prevailing atmospheric conditions and visibility range. Should atmospheric conditions mean that visibility from the turbines within the site is greater than 5 km from the Proposed Development, CAA policy permits lights to operate in a lower intensity mode, being a minimum of 10% of their capable illumination. Therefore, the 2,000 candela steady state lights would operate at 200 candela. However, if visibility is restricted to 5 km or less, the lights would operate at 2,000 candela.

6.7.11 Additionally, the inherent directional intensity of 2,000 candela lights can be used to reduce vertical downwards lighting impacts at elevations less than -1° degree vertical angle from the horizontal plane from the aviation light. By ensuring the lights installed comply with the ICAO recommendations, it is possible to attenuate the vertical downwards light to a level that reduces the visual impact from receptors at ground levels below the lights. Implementing the ICAO recommendations, at -1 degrees the aviation lights should only be 1,125 candela and at -10 degrees should only be 75 candela, when visibility is greater 5 km.

6.7.12 The CAA, together with the UK Wind Sector, is exploring the future use of Aircraft Detection Lighting Systems (ADLS). This can reduce the time that obstacle lights are on. The lights are triggered by the presence of any aircraft within a defined area around the development, otherwise remaining off. Such systems are unable to be used within the current regulatory environment, with anticipated changes offering the potential alongside UK airspace modernisation. Whilst the Proposed Development is unable to specify ADLS, the timescale to implementation may allow for the use of ADLS and its use would be reviewed at the time of implementation.

6.7.13 These measures are proposed as embedded mitigation. They are likely to reduce the magnitude of landscape and visual effects particularly for distant receptors, however, this feature would not remove visibility of aviation lighting completely for any nearby receptors.

6.7.14 In the long term, when the Proposed Development is decommissioned, the turbines would be removed from site, and the hard-standing would be restored in accordance with a restoration plan to be approved by the local planning authority.

6.8 Cumulative Effects

6.8.1 For the cumulative assessment, consideration was initially given to a 60 km radius from the site, as recommended by NatureScot best practice guidance. Following this, all other wind energy developments that are operational, under construction, consented or subject to a valid full planning application within 35 km of the Proposed Development were identified and reviewed as part of the cumulative baseline. It is acknowledged that this list is constantly evolving and, therefore, 31 August 2022 was used as an effective 'cut-off' date after which no further research was undertaken on the evolving status of wind energy development in the study area, and the CLVIA reflects the status of each wind farm at the time of this date.

6.8.2 In order that the assessment remains focused on those other schemes which have the greatest potential to give rise to significant cumulative effects, it was deemed appropriate to scope out any turbines under 50 m, or any turbines between 50 m and 80 m which lie over 10 km from the nearest proposed turbine. Schemes that are at Scoping or at the pre-planning stage have not been considered due to the uncertainty that these schemes will come forward and the lack of adequate information about project details. This is in accordance with the approach advocated in GLVIA3.

6.8.3 The cumulative sites within 35 km are shown in **Table 6.11** and illustrated in **Figure 6.34** and cumulative sites within the agreed 25 km detailed study area are shown on Figure 6.35.

6.8.4 At the time of preparing this LVIA, there were six other wind farms within the detailed 25 km cumulative study area which were either operational, under construction, in planning or at Scoping (**Table 6.11**). As a breakdown of these by status: one is operational, two were consented or under construction and two were subject of a valid planning application (including those at appeal).

Table 6.11: Other Wind Farms within 25 km of the Proposed Development

Site	Blade Tip Height	Number of Turbines	Distance and Direction
Operational			
Langhope Rig	121.2 m	10	23.3 km north-west
Consented or Under Construction			
Pines Burn	4 x 130 m 3 x 145 m 4 x 149.9 m	11	5.8 km west
Windy Edge	3 x 125 m 6 x 125 m	9	14.1 km south-west
In Planning			
Teviot	7 x 180 m 5 x 200 m 39 x 220 m 11 x 240 m	62	12.1 km west south-west
Faw Side	5 x 179.5 m 40 x 200 m	45	24 km south-west
Scoping			
Windy Edge Scoping	200 m	12	13.3 km south-west

6.8.5 Since the cumulative 'cut-off' date of 31 August 2022 set out at paragraph 6.8.1, it is acknowledged that an application has been submitted on 13 October 2022 to vary the tip height of some of the consented Pines Burn turbines, with the overall maximum blade tip height remaining 149.9 m.

6.8.6 For the avoidance of doubt and to reiterate the methodology adopted in **Technical Appendix 6.1**, the baseline against which the solus effects of the Proposed Development has been assessed includes all operational wind farms. An assessment of the Proposed Development with consideration of other operational wind farms has already, therefore, been presented in the main section of this LVIA.

6.8.7 The primary purpose of the cumulative impact assessment is, therefore, to consider the additional effects that might arise as a result of the Proposed Development, if the other consented and in planning (awaiting determination) schemes were also operational. In addition, this cumulative assessment also includes a further consideration of the overall totality of the effect, when the Proposed Development is considered alongside the other operational or proposed schemes across the study area.

6.8.8 The baseline in the cumulative impact assessment is, therefore, extended to consider other schemes that are not yet present in the landscape, but are at various stages in the planning process. Two scenarios are considered which reflect the different degrees of certainty that these schemes will be constructed:

- Scenario 1 assumes that other consented (but as yet unbuilt) wind farms are operational; and
- Scenario 2 extends this further to assume that all schemes in planning are also operational. In reality, it is possible that all other schemes that are in planning may not be approved and constructed, but this scenario assumes all planning schemes are operational as this presents the 'worst case'.

6.8.9 In addition to these two scenarios, a third scenario has also been considered in **Technical Appendix 6.9**. Scenario 3 extends this further to assume that all schemes currently in Scoping are also operational. In reality, it is possible that all other schemes that currently at Scoping may not be approved and constructed, but this scenario assumes all schemes are operational as this presents the 'worst case'.

6.8.10 It is also acknowledged that there are a number of other schemes that were scoped over five years ago. As none of these have come forward to application they are not considered at **Technical Appendix 6.9**. Should any of these schemes come forward during the course of this application, they will be considered at that time.

Cumulative ZTVs and Wireframes

6.8.11 Cumulative ZTVs (CZTVs) have been produced to illustrate the theoretical visibility of various other wind farms and combinations of wind farms with the Proposed Development.

6.8.12 It should be reiterated that ZTVs imply a much greater geographical extent of influence on the landscape and views of it than would actually be the case. Therefore, it follows that the cumulative ZTVs also exaggerate the actual impacts of the turbines on landscape character and visual amenity as they do not take account of vegetation or buildings in the landscape, which may restrict the nature and extent of views.

6.8.13 Cumulative ZTVs have been produced for the following combinations of existing, consented and other wind farm sites in planning:

Operational

- Langhope Rig (**Figure 6.36**)

Consented or Under Construction

- Pines Burn and Windy Edge (**Figure 6.37**)

In Planning

- Teviot and Faw Side (**Figure 6.38**)

Scoping

- Windy Edge (**Figure 6.39**)

6.8.14 **Table 6.12** provides a summary of cumulative visibility at each of the 21 viewpoints.

Table 6.12: Summary of Combined Cumulative Visual Effects by Viewpoint Location

Viewpoint Location	Operational Langhope Rig	Consented Pines Burn or Windy Edge	In Planning Teviot or Faw Side	Scoping Windy Edge
1 - A6088, Chesters	-	-	-	-
2 - A6088, Southdean	-	-	-	-
3 - Fort north-east of Southdean	O	O	X	
4 - A6088, Western approach to Chesters	-	-	-	-
5 - Bonchester Hill	O	O	O	O
6 - B6357 Vantage Point	-	-	-	-
7 - Footpath at Knox Knowe	X	-	-	-
8 - A6088, north-west of Carter Bar	X	X	X	-
9 - Carter Bar (eastern vantage point)	X	X	-	-
10 - Pike Fell	O	X	O	O
11 - Footpath and Minor Local Road, Chesters Brae	-	O	O	-
12 - Rubers Law	-	O	O	O
13 - A6088 Approach to Bonchester Bridge	O	O	O	O
14 - Wolfelee Hill	O	O	O	O
15 - Pennine Way, Black Halls	X	X	X	X
16 - Five Stanes	X	X	X	X
17 - A7 Approach to Hawick	-	O	O	O
18 - Borders Abbey Way, Black Law	O	O	O	O
19 - Wheel Causeway	O	-	O	O
20 - A68, north of hairpin past Carter Bar	-	X	X	X
21 - Rowan Road, Jedburgh	-	X	O	X

(Key: X = Simultaneously, O = In Succession and '-' = No Combined Visibility)

Cumulative Effects on Landscape Character

6.8.15 It is acknowledged that wherever more than one wind farm is visible at any given location in the landscape, there would be a greater overall or cumulative effect on landscape character than if just one wind farm was visible in the landscape.

6.8.16 However, it is also noted that in any given landscape where turbines are already present, the additional effect on landscape character of introducing further turbines may not be as significant as the initial introduction of turbines. Furthermore, in general, the greater the number of turbines in the baseline landscape the less significant the addition of further turbines may be in landscape character terms as the landscape would be more heavily characterised by turbines in the baseline situation.

6.8.17 It has been assessed in the assessment of the solus effects of the Proposed Development set out earlier in this chapter that there would be some limited significant effects on landscape character as a result of the Proposed Development. The purpose of this section of the cumulative assessment is, therefore, to identify whether there would be any change to the assessments of significance previously set out in relation to the Proposed Development, once the other wind turbines which are not already operational are considered to form part of the baseline landscape.

6.8.18 Generally speaking, such additional cumulative effects would arise when the addition of the Proposed Development to the baseline results in an increase in effects, when viewed in combination with the other wind turbines forming part of the baseline landscape.

6.8.19 The assessment is considered in two parts, firstly in relation to the scenario where the additional consented developments are also considered to be operational and then secondly the scenario where the consented and in-planning schemes are also considered to be operational.

Cumulative Scenario 1 – Other consented schemes are also considered to be operational

6.8.20 In the first cumulative scenario considered (where other consented wind farms are also considered to be operational), there would be two additional wind farms, Pines Burn situated approximately 5.8 km to the west and Windy Edge situated approximately 14.1 km to the south-west.

6.8.21 Both of these wind farms are located within LCT 4(iii) Southern Uplands with Scattered Forest – Cauldcleuch Head Group, close to the LCTs eastern edge and boundary with LCT 5i(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton. The assessment of the solus effects of the Proposed Development identified a significant effect on the Southern Uplands with Scattered Forest – Cauldcleuch Head Group LCT extending to approximately 5 km to the west from the Proposed Development overlapping the north-east corner of this LCT by approximately 2.5 km. Effects beyond this were considered to be **not significant**.

6.8.22 However, if both Pines Burn and Windy Edge were already present in the baseline landscape, the extent of this significant effect would reduce to approximately 3 km, reducing the extent of significant effects on LCT 4(iii) resulting from the Proposed Development. Beyond this point, the existing influence of Pines Burn (and to a much lesser degree Windy Edge on account of its increased distance from the Proposed Development) on the character of the landscape would be such that the additional effect of the Proposed Development would be not significant beyond this distance.

Cumulative Scenario 2 – Other consented and in-planning schemes are considered to also be operational

6.8.23 In the second cumulative scenario considered (where other schemes in planning are also considered to be consented and operational) the two additional schemes would comprise

Teviot, situated approximately 12.1 km to the west south-west and Faw Side, situated approximately 24 km to the south-west.

6.8.24 Teviot is also mostly situated in LCT 4(iii) Southern Uplands with Scattered Forest – Cauldcleuch Head Group, with a number of turbines also being situated within LCT 5i(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton, in which the Proposed Development is located.

6.8.25 Faw Side overlaps the Southern Uplands with Scattered Forest – Cauldcleuch Head Group LCT, but is mostly situated within the Southern Uplands landscape character type defined in the Dumfries and Galloway Landscape Character Assessment.

6.8.26 Given the location of these two schemes in a broadly similar direction from the Proposed Development and their increased distance, it is considered that the effects on landscape character would be the same as those identified for Scenario 1, in that there would be a reduction in the extent of significant landscape character effects introduced by the Proposed Development from approximately 5 km to 3 km.

6.8.27 For all other assessments of landscape character effects there would be no change to the significant effects already identified in the main assessment.

Totality of the Combined Effect of All Schemes

6.8.28 Consideration has also been given to the overall totality of the effect, when the Proposed Development is considered alongside the other operational, consented and proposed schemes. Of most relevance to this, is a consideration of the overall impact on the three LCTs where a significant effect was identified in the main assessment, and which cover the majority of the 5 km area around the Proposed Development: LCT 5i(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton; LCT 4(iii) Southern Uplands with Scattered Forest – Cauldcleuch Head Group and LCT 7 Cheviot Foothills – Falla Group.

6.8.29 The Proposed Development is located in LCT 5i(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton. No other wind farms are currently located within the LCT. However, the consented Pines Burn and Windy Edge schemes are situated close to the south-western edge of the LCT and as such would introduce indirect effects on a part of the LCT close to their location. Furthermore, the ‘in-planning’ Teviot scheme overlaps the south-western edge of the LCT, with a number of turbines sited within the LCT. The introduction of the Teviot turbines within part of the LCT would introduce direct significant effects on a localised part of the LCT and indirect significant effects that would extend across a further part of the LCT beyond the immediate vicinity of the turbines.

6.8.30 It is acknowledged that the combined overall effect on the character of the Southern Uplands Forest Covered – Wauchope/Newcastleton LCT, were the Proposed Development and the other schemes consented, would be notable, such that collectively the character area would become one in which the presence of occasional wind farms was a recognised characteristic feature. There would remain a considerable spacing between the Proposed Development and the other schemes, a point recognised in the 2016 Update of Wind Energy Landscape Capacity and Cumulative Impact Study, which states: “Much of this LCA has the potential to accommodate occasional well-separated windfarms …”

6.8.31 However, it would not be the case that wind energy would become the single dominant characteristic of the LCT so as to prevent an understanding and appreciation of the character of the LCT.

6.8.32 LCT 4(iii) Southern Uplands with Scattered Forest – Cauldcleuch Head Group is situated to the west of the Proposed Development and it does not currently have any existing wind farms located within it. Indirect significant effects were identified on a part of this LCT as a result of the Proposed Development.

6.8.33 The consented Pines Burn and Windy Edge schemes are located within the northern half of the LCT, along with the majority of the Teviot turbines. Considered collectively, the direct effects on the character of the LCT introduced by these other schemes would have a characterising effect on the LCT, effectively creating a new landscape character subtype, one 'with wind turbines' in the northern half of the LCT. This effect would be brought about by these other schemes in any case, without the Proposed Development, which would only reinforce this existing effect.

6.8.34 LCT 7 Cheviot Foothills – Falla Group is situated to the north and east of the Proposed Development, in the opposite direction to the other consented and in-planning schemes which are situated to the south-west of the Proposed Development. When the combined effect of these other schemes is considered, there would be no additional effects over and above those identified for the Proposed Development. Wind energy development beyond the boundary of the LCT would not become the single dominant characteristic of the LCT to prevent an understanding and appreciation of its wider underlying characteristics.

Cumulative Effects on Views and Visual Amenity

6.8.35 As with cumulative landscape character effects, it is acknowledged that the addition of the Proposed Development to the baseline has the potential to result in an increase in effects, when viewed in combination with other wind turbines forming part of the visual baseline.

6.8.36 However, it is also noted that in any given view where turbines are already present, the additional effect on visual amenity of introducing further turbines may not have as greater effect as the initial introduction of turbines. Furthermore, in general the greater the number of turbines in the baseline view, the less significant the addition of further turbines may be. It is also recognised, however, that a slight additional effect on top of an existing effect, which at present is not quite significant, could in theory tip the balance such that the overall effect is deemed to be significant. Again, generally speaking, such additional cumulative effects would arise where a visual receptor would now lie between a cumulative wind farm in one direction and the Proposed Development in a different direction, such that the visibility of turbines as a result of the addition of the Proposed Development would become notable in multiple, usually directly opposite, directions.

Cumulative 'in combination' Visual Effects

6.8.37 An 'in combination' cumulative visual effect is the term used to refer to the situation where a viewer is able to see one or more further wind farms, in addition to the Proposed Development, whilst standing in the one location. These effects are either 'simultaneous', where the viewer can see the additional turbines in the same angle of view, or ‘successive’, where the view can see the additional turbines in a different angle of view by turning their head.

6.8.38 As set out in the main assessment there are relatively few locations where the Langhope Rig wind farm is seen. Views of this existing scheme are largely restricted to views from higher points in the landscape that allow longer distance views over the surrounding landscape.

Cumulative Scenario 1 – Other Consented Schemes are Also Considered to be Operational

6.8.39 In the first cumulative scenario considered (where other consented wind farms are also considered to be operational), there would be two additional wind farms, Pines Burn situated approximately 5.8 km to the west and Windy Edge situated approximately 14.1 km to the south-west, both broadly located in the same direction from the site. The addition of these schemes would serve to establish wind energy as a visual component in this part of the landscape.

6.8.40 There would be a few locations to the west, such as Viewpoint 10, where the Proposed Development would be seen simultaneously with Pines Burn and successively with Windy Edge. There would also be some locations to the east, such as Viewpoint 8 where the Proposed Development would be seen simultaneously with Pines Burn and longer-range simultaneous views from viewpoints 15 and 16. There would also be some locations to the north, such as viewpoints 3, 5, 13, 14 where successive views would be available.

6.8.41 If these schemes formed part of the visual baseline against which the Proposed Development were to be constructed, there would be no change to the previous assessment of effects on visual amenity which the Proposed Development would bring about.

Cumulative Scenario 2 – Other Consented and In-Planning Schemes are also Considered to be Operational

6.8.42 In the second cumulative scenario considered (where other schemes in planning are also considered to be consented and operational) the two additional schemes would comprise Teviot, situated approximately 12.1 km to the west south-west and Faw Side, situated approximately 24 km to the south-west. Teviot would be seen in the same part of the landscape and at a similar distance to Windy Edge, while Faw Side, although seen in the same part of the landscape would be at a considerably greater distance.

6.8.43 The location of these schemes in a broadly similar part of the landscape would mean there would be some simultaneous views, such as from viewpoints 3, 8, 15, 16 and 20 and successive views from other elevated locations such viewpoints 4, 10 to 14, 17 to 19 and 21.

6.8.44 If these schemes formed part of the visual baseline against which the Proposed Development were to be constructed, there would be no change to the previous assessment of effects (see **Table 6.7** and **Table 6.8**) on visual amenity which the Proposed Development would bring about.

Cumulative 'Sequential' Effects

6.8.45 A 'sequential' cumulative visual effect is the term used to refer to the situation where a viewer is able to see one or more further wind farms in addition to the Proposed Development, whilst travelling along a linear route. This could be either on foot, whilst walking on a footpath, or by bicycle or car along the public highway. The main assessment focussed on the following routes which it was identified had the potential to experience significant effects as a result of the proposed scheme and these are also used as the basis for the cumulative assessment:

- A68;
- A6088;
- B6357;
- Borders Loop; and
- Borders Abbey Way.

6.8.46 It is acknowledged that the main assessment also considered effects on several core paths and routes within 5 km. However, given their location in close to the Proposed Development and the extensive intervening forest plantation to the south-west between the Proposed Development and the other cumulative schemes, it is considered that there is very limited potential for users of these routes to experience cumulative sequential effects. As such they are not considered further.

6.8.47 In the first cumulative scenario considered (where other consented wind farms are also considered to be operational), this would include Pines Burn situated approximately 5.8 km to the west and Windy Edge situated approximately 14.1 km to the south-west.

6.8.48 With reference to the cumulative ZTV at **Figure 6.37**, views of these additional schemes may be experienced from very limited parts of these routes. However, given the distance from these routes it is assessed that the addition of these schemes would not introduce any significant effects or materially change the findings of the main assessment (see **Table 6.9** and **Table 6.10**).

6.8.49 Similarly, in the second cumulative scenario which would see the addition of the Teviot and Faw Side schemes, while it is acknowledged there are some very limited sections of these routes where views of these schemes would be available, given the notable distance from the routes, the addition of the in-planning schemes would not introduce any significant effects or materially change the findings of the main assessment (see Table 6.9 and Table 6.10).

Totality of the Combined Effects of All Schemes

6.8.50 Consideration has also been given to the overall totality of the cumulative visual effect, when the Proposed Development is considered alongside the other operational, consented and proposed schemes.

6.8.51 It has already been identified in the main assessment that the Proposed Development introduces significant effects on a number of visual receptors located approximately within 5 km of the proposed turbines during daylight hours and in some instances during the hours of darkness (see **Table 6.7**, **Table 6.8**, **Table 6.9** and **Table 6.10**).

6.8.52 When the combined effects of the other operational, consented and proposed schemes are considered, the addition of the Proposed Development would not result in the overall cumulative impact of turbines being dominant or oppressive in views. This is due to the separation distances between the schemes. Where seen simultaneously such as at Viewpoint 8 and at longer-range at viewpoint 15 and 16, the additional schemes would be seen at considerable distance.

Summary of Cumulative Effects

6.8.53 It is acknowledged that wherever more than one wind farm is visible at any given location in the landscape, there would be a greater overall or cumulative effect on landscape character than if just one wind farm was visible in the landscape. Likewise, it is acknowledged that the more wind turbines that are constructed in any given landscape, the greater the magnitude of overall (or combined) change to the landscape character.

6.8.54 When the other consented wind farms (Pines Burn and Windy Edge) are considered to already form part of the baseline, it is assessed that there would be a reduction in the extent of significant landscape character effects on LCT 4(iii) Southern Uplands with Scattered Forest – Cauldcleuch Head Group which the Proposed Development would introduce.

6.8.55 When in-planning schemes are added into the baseline, given the location of Teviot and Faw Side in relation to the consented schemes and the Proposed Development, it has been assessed that the effects on landscape character would be the same as those identified for the consented schemes, in that there would be a reduction in the extent of significant landscape character effects introduced by the Proposed Development from approximately 3 km to 5 km to the west.

6.8.56 In terms of the totality of effect on landscape character, it is recognised that the combined overall effect on the character of Southern Uplands Forest Covered – Wauchope/Newcastleton LCT would be notable and that collectively the character area would become one in which the presence of occasional wind farms was a recognised characteristic feature. There would remain a considerable spacing between the Proposed Development and the other schemes. However, wind turbines would not become the single dominant characteristic feature of the LCT.

6.8.57 In relation to LCT 4(iii) Southern Uplands with Scattered Forest – Cauldcleuch Head Group, the characterising effect on the northern part of the LCT, essentially creating a new landscape character sub-type ‘with wind turbines’ would occur in any case without the Proposed Development, which would only reinforce this existing effect.

6.8.58 LCT 7 Cheviot Foothills – Falla Group is situated in the opposite direction to the other consented and in-planning schemes such that there would be no additional effects over and above those identified for the Proposed Development and wind energy beyond the boundary of the LCT would not become the dominant characteristic feature so as to prevent an appreciation of its character.

6.8.59 As with cumulative landscape character effects, it is acknowledged that wherever more than one wind farm is visible in any given view, there would be a greater overall or cumulative effect on the view or visual amenity than if just one wind farm was visible in the landscape and that the more wind turbines that are constructed, the greater the magnitude of overall (or combined) change to the view or visual amenity that prevailed prior to the introduction of the first turbines.

6.8.60 When each of the other consented wind farms are added into the assessment such that they are considered to already form part of the baseline it is considered that there would be no change to the previous assessment of the effects on visual amenity which the Proposed Development would bring about. Similarly, if the other in-planning schemes also formed part of the baseline, there would be no change to the level of visual effects which the Proposed Development would introduce. Nor would they introduce any additional significant sequential effects on the routes.

6.8.61 In terms of the totality of effect on visual amenity, it is not considered that the addition of the Proposed Development would be such as to result in the overall cumulative impact of turbines being dominant or oppressive in views experienced at various points within the area.

6.9 Summary of Effects

6.9.1 This chapter presents the findings of the Landscape and Visual Impact Assessment (LVIA) and identifies the likely significant effects arising from the Proposed Development on landscape character and visual amenity. It has been informed by field visits carried out on three separate occasions at different times of the year and by consultation undertaken with statutory consultees.

6.9.2 The existing landscape and visual baselines have been documented and presented at **Section 6.5** and the assessment has been supported by figures and visualisations (presented in **Volume 2** of the EIA Report) produced to NatureScot Visualisation Standards that show representative views from locations consulted on at Scoping that illustrate views existing and proposed views during daylight hours and views during dark sky hours from a select number of viewpoint locations.

6.9.3 The Proposed Development is located in the Scottish Borders Council area, close to the Scotland England border. The site is centred at approximately Ordnance Survey (OS) Grid Reference 362449, 606748. The nearest settlements are Chesters, situated approximately 3.3 km to the north and Bonchester Bridge, situated approximately 5.1 km to the north-west. The nearest roads are the A68, situated approximately 5.8 km to the east, the A6088 that passes approximately 2.3 km to the north-east and the B6357 located approximately 1.1 km to the west.

6.9.4 There are no national landscape designations covering the Proposed Development site. However, the Northumberland National Park (NNP) is situated approximately 6.3 km to the east of the nearest turbine. The Teviot Valleys Special Landscape Area (SLA) is situated approximately 3.5 km to the north of the Proposed Development and the Cheviot Foothills SLA is situated approximately 3.6 km to the north-east of the Proposed Development.

6.9.5 The site is located on a gently sloping, forested plateau that slopes in a broadly north-easterly direction. This plateau is bounded by a ridge of high ground to the south. The Proposed Development is located in LCT 5i(ii) Southern Uplands Forest Covered – Wauchope/Newcastleton.

6.9.6 The design of the Proposed Development is the result of a considered iterative process which has sought to minimise landscape and visual effects whilst achieving the technical and commercial requirements to ensure project viability without public subsidy.

6.9.7 Appropriate offsets from all properties and settlements have been maintained to ensure that no property would experience an overbearing visual impact. Mitigation has been designed into the proposed aviation lighting to reduce the intensity of the 2000 candela steady state lights in certain atmospheric conditions by reducing their intensity and attenuating the amount of vertical downwards lighting in order to reduce the visual impact experienced by receptors below the lights.

6.9.8 As with almost any onshore wind farm development it is recognised that the Proposed Development would give rise to some localised significant effects on landscape character and visual amenity.

6.9.9 The Proposed Development would result in direct and significant effects on the part of the landscape character type within which the Proposed Development is located, within the northern part of the Southern Uplands Forest Covered – Wauchope/Newcastleton (LCT 5i(ii)). The assessment has found that indirect significant effects would extend to 5 km to the west, south and east).

6.9.10 Indirect significant effects would also extend to approximately 5 km across the northern part of LCT 4(iii) Southern Uplands with Scattered Forest – Cauldcleuch Head Group and to approximately 5 km to the north and east of the Proposed Development across the southern edge of LCT 7 – Cheviot Hills – Falla Group.

6.9.11 In relation to visual effects, it is accepted that the Proposed Development would be visible from various nearby properties, settlements as well as the surrounding road network and footpath network.

6.9.12 It has been assessed that there would be significant visual effects experienced at 11 of the 21 representative viewpoints, as summarised above in **Table 6.7** during daylight hours and at 10 viewpoints during the hours of darkness.

6.9.13 All properties located within 3 km of a proposed turbine have been assessed in detail within the Residential Visual Amenity Assessment at **Technical Appendix 6.6**. The assessment found that residents at eight of the 15 properties (or groups of properties) would experience a significant visual effect on the view from a part of their house, garden, or principal access route, during daylight hours and five of the 15 properties would experience a significant visual effect during the hours of darkness.

6.9.14 Although it is acknowledged that a number of the properties within the 3 km RVAA study area would experience significant visual effects, it is not the case that any of the effects would be of such a scale so as to become dominant or overbearing. In relation to settlements, the assessment found that residents of Chesters would experience significant visual effects during daylight and dark sky hours.

6.9.15 The assessment of routes found that receptors would experience not significant visual effects from the Borders Abbey Way Great Trail, any of the identified Core Paths, but significant effects would be experienced from limited parts of the Bonchester Bridge & Hill Promoted Path and from parts of the various routes and rights of way that pass within 5 km, crossing through the forest where of the Proposed Development is sited.

6.9.16 The assessment of roads found that receptors travelling along the A68 would not experience significant visuals effects, but receptors would experience significant visual effects for an approximate 2.3 km section of the B6357 as the road climbs through Wauchope Forest. Road users would also experience intermittent sequential significant effects from sections of the A6088, with westbound travellers experiencing these effects for a slightly greater proportion of the route during daylight hours compared to eastbound travellers while eastbound travellers would experience significant sequential effects over a slightly greater proportion of the route during the hours of darkness.

6.9.17 In relation to cumulative effects on landscape character, there would be a slight reduction in the extent of significant effects on LCT 4(iii) Southern Uplands with Scattered Forest – Cauldcleuch Head Group which the Proposed Development would introduce, if the other consented and in-planning schemes formed part of the baseline against which the effects of the Proposed Development were assessed.

6.9.18 In terms of the totality of effect on landscape character, there would be a notable overall effect on the character of Southern Uplands Forest Covered – Wauchope/Newcastleton LCT and that collectively the character area would become one in which the presence of occasional wind farms was a recognised characteristic feature. However, wind turbines would not become the single dominant characteristic feature of the LCT.

6.9.19 In relation to LCT 4(iii) Southern Uplands with Scattered Forest – Cauldcleuch Head Group, the number of turbines would have a characterising effect on the northern part of the LCT. However, this would occur in any case even without the Proposed Development, which would only reinforce this existing effect.

6.9.20 There would be no additional cumulative effects over and above those identified for the Proposed Development on LCT 7 Cheviot Foothills – Falla Group, due to its location relative to the other consented and in-planning schemes.

6.9.21 In relation to cumulative visual effects, when each of the other consented and in-planning wind farms are added into the assessment there would be no change to the identified visual effects resulting from the Proposed Development.

6.9.22 In terms of the totality of effect on visual amenity, it is considered that the addition of the Proposed Development would not result in the overall cumulative impact of turbines being dominant or oppressive in views experienced at various points within the area.

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7 CULTURAL HERITAGE AND ARCHAEOLOGY

7.1 Introduction

7.1.1 This chapter of the EIA Report evaluates the effects of the Proposed Development on the Historic Environment (Archaeology and Cultural Heritage). The assessment was undertaken by Headland Archaeology (UK) Ltd.

7.1.2 The Proposed Development, described in detail in **Chapter 2: Proposed Development**, would include up to 13 wind turbines, five with a maximum tip height of 180 m, two with a maximum tip height of 200 m, four with a maximum tip height of 210 m and two with a maximum tip height of 230m, located in the parish of Southdean in the Scottish Borders Council region. The site layout is shown on **Figure 2.2**.

7.1.3 The land use within the Proposed Development site consists entirely of short rotation forestry (SRF) plantation. Topography varies from its high points on the western boundary Wardmoor Hill (365m above Ordnance datum (AOD)) and Black Hill (359m AOD), dropping down to 200m AOD along the Jed Water and rising again towards the south-east corner of the site at Green Law (370m AOD).

7.1.4 Access is proposed from the east, leaving the A6088 at Martinlee Plantation, 1.7 km north-east of the application boundary and follows an existing forestry track in a south-westerly direction as far as the Black Burn where the access would divert north-west on a new track through forestry into the Proposed Development site at its eastern corner.

7.1.5 A heritage asset (or historic asset) is any element of the historic environment which has cultural significance. Both discrete features, and extensive landscapes defined by a specific historic event, process or theme, can be defined as heritage assets; and assets may overlap, or be nested within one another. Designated assets include Scheduled Monuments, Listed Buildings, World Heritage Sites, Conservation Areas, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and Historic Marine Protected Areas. Other assets may also be locally designated.

7.1.6 The majority of heritage assets are not designated. Some undesignated assets are recorded in Historic Environment Records or Sites and Monuments Records (HERs/SMRs) maintained by local authorities and other agencies. Many heritage assets are currently unrecorded, and the information contained in HERs and SMRs is not definitive, since they may include features which, for instance, have been entirely removed, or are of uncertain location, dubious identification, or negligible importance. The identification of undesignated heritage assets is, therefore, to some extent a matter of professional judgement.

7.1.7 Some heritage assets may coincide with visual receptors or landscape character areas, which are assessed in **Chapter 6: Landscape and Visual Impact Assessment** and in such cases, it is important to recognise the difference in approach between these two topics. Cultural heritage assessment addresses effects on the cultural heritage significance of heritage assets, which may result from, but are not equivalent to, visual impacts. Similarly, an effect on a landscape character area does not equate to an effect on the cultural heritage significance of heritage assets within it.

Objectives

7.1.8 The objectives of this assessment are to:

- describe the location, nature and extent of any known heritage assets or areas of archaeological potential which may be affected by the Proposed Development;
- provide an assessment of the importance of these assets;
- assess the likely scale of any effects on the historic environment posed by the Proposed Development;
- outline suitable mitigation measures to avoid, reduce or offset significant adverse effects; and
- provide an assessment of any residual effects remaining after mitigation.

7.2 Scope and Methodology

7.2.1 The cultural heritage assessment has been carried out in the following stages:

- desk-based study leading to the identification of heritage assets potentially affected by the Proposed Development;
- definition of baseline conditions, based on results of the desk-based study and visits to heritage assets;
- assessment of the importance of heritage assets potentially affected by the Proposed Development;
- identification of potential impacts on heritage assets, informed by baseline information, site visits, Zone of Theoretical Visibility (ZTV) mapping, wireframes and photomontages;
- proposal of mitigation measures, to eliminate, reduce or offset adverse effects;
- assessment of the magnitude of residual effects;
- assessment of the significance of residual effects, broadly a product of the asset's importance and the magnitude of the impact; and
- assessment of cumulative effects.

Study Areas

7.2.2 The Inner Study Area (ISA) is the land within the application boundary and comprises 'the turbine area', the area of the site in which the proposed turbines are located, and 'the access area', the area of the site in which the access route from the public road to the turbine area is located (**Figure 7.1**).

7.2.3 The Outer Study Areas (OSAs) are based on a Zone of Theoretical Visibility (ZTV) of proposed turbines. Within the OSAs, assets have been included in the assessment based on the level of importance assigned to the asset (see **Table 7.2**), to ensure that all potential significant effects are recognised:

- up to 2 km from the turbine area: Category C Listed Buildings and non-designated heritage assets;
- up to 5 km from the turbine area: Conservation Areas and Category B Listed Buildings;
- up to 10 km from the turbine area: Scheduled Monuments and Inventory Historic Battlefields;

- up to 20 km from the turbine area: World Heritage Sites, Category A Listed Buildings and Inventory Gardens and Designed Landscapes, and Grade I Listed Buildings and Registered Parks and Gardens in England.

7.2.4 Beyond the defined OSAs, the screening assessment methodology considers all heritage assets in the ZTV to identify any assets of particular importance, and/or sensitivity to visual change. This is based on the approach set out in Managing Change in the Historic Environment: Setting , and is a screening exercise supplemented through Scoping and further consultation with statutory consultees. Only those monuments identified beyond the OSA requiring detailed assessment are included in the gazetteer (**Technical Appendix 7.1.1** of Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting Assessment, **EIA Report Volume 3, Appendix 7.1**). In the case of the Proposed Development, one Scheduled Monument was identified through this process: SM2296 Penchrise Pen fort is located 11.4 km west of the proposed turbines.

7.2.5 Criteria for the identification of assets of particular sensitivity or importance were based on the approach set out in Managing Change in the Historic Environment: Setting that sets out a range of factors which might form part of the setting of a heritage asset as follows:

- *"current landscape or townscape context;*
- *views to, from and across or beyond the historic asset or place;*
- *key vistas: for instance, a 'frame' of trees, buildings or natural features that give the historic asset or place a context, whether intentional or not);*
- *the prominence of the historic asset or place in views throughout the surrounding area, bearing in mind that sites need not be visually prominent to have a setting;*
- *aesthetic qualities;*
- *character of the surrounding landscape;*
- *general and specific views including foregrounds and backdrops;*
- *views from within an asset outwards over key elements in the surrounding landscape, such as the view from the principal room of a house, or from a roof terrace;*
- *relationships with other features, both built and natural;*
- *non-visual factors such as historical, artistic, literary, place name, or scenic associations, intellectual relationships (e.g., to a theory, plan, or design), or sensory factors; and*
- *a 'sense of place': the overall experience of an asset which may combine some of the above factors."*

Data Sources

7.2.6 The baseline for the assessment has been informed by a comprehensive Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting Assessment (**Technical Appendix 7.1**), based on all readily available documentary sources, following the Chartered Institute for Archaeologists' (CIfA) 'Standard and guidance for historic environment desk-based assessment (2020)'. The following sources of information were referred to:

- designation data downloaded from the HES website in January 2022;
- the National Record of the Historic Environment (NRHE), including the Canmore database and associated photographs, prints/drawings and manuscripts held by HES;

- Historic Environment Record (HER) data, digital extract received from Moray HER and Aberdeenshire HER provided by ACAS, January 2022;
- historic Landscape Assessment data, viewed through the HLAMap website;
- the National Collection of Aerial Photography (NCAP);
- geological data available online from the British Geological Survey;
- previous survey reports;
- historic maps held by the National Library of Scotland;
- unpublished maps and plans held by the National Records of Scotland;
- relevant internet resources, including Google Maps, Google Earth, Bing satellite imagery and PastMap; and
- readily available published sources and unpublished archaeological reports.

7.2.7 A site visit was undertaken on 31 May and 01 June 2022 in mixed weather conditions. Notes were made regarding site characteristics, visible archaeology and geographical/geological features with potential bearing on previous land use and archaeological survival, as well as those which may constrain subsequent archaeological investigation.

7.2.8 Records were made regarding extant archaeological features, such as earthworks or structural remains, any negative features, local topography and aspect, exposed geology, soils, watercourses, health and safety considerations, surface finds, and any other relevant information.

7.2.9 The OSA was visited to carry out assessment of heritage assets that may be affected by the operation of the Proposed Development i.e., through effects on their settings and the contribution made by setting to their cultural significance.

Definition of Baseline Conditions

7.2.10 Designated heritage assets are labelled with the reference number assigned to them by HES (prefixed SM for Scheduled Monuments, and LB for Listed Buildings); non-designated assets are labelled with the reference number in the HER or the NRHE. Previously unrecorded heritage assets within the ISA have been assigned a number (prefixed HA for Heritage Asset). A single asset number can refer to a group of related features, which may be recorded separately in the HER and other data sources. Assets within the ISA are shown in **Figure 7.1**, with detailed descriptions compiled in a Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting Assessment (**Technical Appendix 7.1**). All heritage assets within the OSA are shown in **Figure 7.2**.

Potential for Unknown Heritage Assets within the ISA

7.2.11 The likelihood that undiscovered heritage assets may be present within the ISA is referred to as archaeological potential. Overall levels of potential can be assigned to different landscape zones, following the criteria in **Table 7.1**, recognising the archaeological potential of any zone would relate to particular historical periods and types of evidence. The following factors are considered in assessing archaeological potential:

- the distribution and character of known archaeological remains in the vicinity, based principally on an appraisal of data in the HER;

- the history of archaeological fieldwork and research in the surrounding area, which may give an indication of the reliability and completeness of existing records;
- environmental factors such as geology, topography and soil quality, which would have influenced land-use in the past and can, therefore, be used to predict the distribution of archaeological remains;
- land-use factors affecting the survival of archaeological remains, such as ploughing or commercial forestry planting; and
- factors affecting the visibility of archaeological remains, which may relate to both environment and land-use, such as soils and geology (which may be more, or less, conducive to formation of cropmarks), arable cultivation (which has potential to show cropmarks and create surface artefact scatters), vegetation, which can conceal upstanding features, and superficial deposits such as peat and alluvium which can mask archaeological features.

Table 7.1: Archaeological Potential

Potential	Definition
High	Undiscovered heritage assets of high or medium importance are likely to be present.
Medium	Undiscovered heritage assets of low importance are likely to be present; and it is possible, though unlikely, that assets of high or medium importance may also be present.
Low	The study area may contain undiscovered heritage assets, but these are unlikely to be numerous and are highly unlikely to include assets of high or medium importance.
Negligible	The study area is highly unlikely to contain undiscovered heritage assets of any level of importance.
Nil	There is no possibility of undiscovered heritage assets existing within the study area.

Identification of Potential Effects

7.2.12 Effects on the historic environment can arise through direct physical impacts, impacts on setting or indirect impacts:

- direct physical impacts describe those development activities that directly cause damage to the fabric of a heritage asset. Typically, these activities are related to construction works and would only occur within the ISA.
- an impact on the setting of a heritage asset occurs when the presence of a development changes the surroundings of a heritage asset such that it affects (beneficially or adversely) the cultural significance of that asset. Visual impacts are most commonly encountered, but other environmental factors such as noise, light or air quality can be relevant in some cases. Impacts may be encountered at all stages in the life cycle of a development from construction to decommissioning, but they are only likely to lead to significant effects during the prolonged operational stage of the development.
- indirect impacts describe secondary processes, triggered by the development, that lead to the degradation or preservation of heritage assets. For example, changes to hydrology may affect archaeological preservation; or changes to the setting of a building may affect the viability of its current use and thus lead to dereliction.

7.2.13 Likely significant direct or indirect effects on known and unknown heritage assets are discussed in terms of the risk that a significant effect could occur. The level of risk depends on the level of archaeological potential combined with the nature and scale of disturbance associated with construction and pre-construction activities may vary between high and negligible for different elements or activities associated with a development, or for the development as a whole.

7.2.14 Likely significant effects on the settings of heritage assets are identified from an initial desk-based appraisal of data from HES and the HER, and consideration of current maps and aerial images. Photomontage, and wireline visualisations illustrate changes to key views, and aid assessment where potential setting effects have been identified (Volume 2). The visualisations have been produced by the Landscape and Visual team and the methodology for preparing these is described in **Chapter 6: LVIA**.

7.2.15 For any identified effect the preferred mitigation option is always to avoid or reduce effects through design, or through precautionary measures such as fencing off heritage assets during construction works to avoid accidental direct effects. Effects which cannot be eliminated in these ways would lead to residual effects.

7.2.16 Adverse direct or indirect physical effects may be mitigated by an appropriate level of survey, excavation, recording, analysis and publication of the results, in accordance with a written scheme of investigation[56].

Impact Assessment Criteria

Heritage Importance and Cultural Significance

7.2.17 Cultural heritage impact assessment is concerned with effects on cultural significance, which is a quality that applies to all heritage assets, and as defined by Historic Environment Scotland[57], relates to the ways in which a heritage asset is valued both by specialists and the public. The cultural significance of a heritage asset derives from factors including the asset's fabric, setting, context and associations. This use of the word 'significance', referring to the range of values attached to an asset. It should not be confused with the unrelated usage in EIA, where the significance of an effect reflects the weight that should be attached to it in a planning decision.

7.2.18 The importance of a heritage asset is the overall value assigned to it, based on its cultural significance, reflecting its statutory designation or, in the case of non-designated assets, the professional judgement of the assessor (**Table 7.2**). Heritage assets of national importance and international importance are assigned a high and very high level respectively. Scheduled Monuments, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and Historic Marine Protected Areas are, by definition, of national importance.

7.2.19 The criterion for Listing is that a building is of 'special architectural or historic interest'; following Designation Policy and Selection Guidance (DPSG)[58], Category A refers to 'outstanding examples of a particular period, style or building type', Category B to 'major

[56] Per Scottish Planning Policy (SPP) paragraph 150 and PAN2/2011, sections 25-27.

[57] Environmental Impact Assessment Handbook, NatureScot & HES 2018, v5 Appendix 1 page 175.

[58] DPSG (2016), Annex 2.19.

examples of a particular period, style or building type', and Category C to 'representative examples of a particular period, style or building type'.

7.2.20 Any feature which does not merit consideration in planning decisions due to its cultural significance may be said to have negligible heritage importance; in general, such features are not considered as heritage assets and are excluded from the assessment (see accompanying Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting Assessment (**Technical Appendix 7.1**).

Table 7.2: Criteria for Assessing the Importance of Heritage Assets

Importance	Criteria
Very High (International)	World Heritage Sites and other assets of equal international importance, that contribute to international research objectives
High (National)	Inventory Gardens and Designed Landscapes, Scheduled Monuments, Protected Wreck Sites, Inventory Historic Battlefields, Category A and B Listed Buildings, Historic Marine Protected Areas, and non-designated heritage assets of equivalent importance that contribute to national research objectives
Medium (Regional)	Conservation Areas, Category C Listed Buildings, undesignated assets of regional importance except where their particular characteristics merit a higher level of importance, heritage assets on local lists and non-designated assets that contribute to regional research objectives
Low (Local)	Locally listed heritage assets, except where their particular characteristics merit a higher level of importance, undesignated heritage assets of Local importance, including assets that may already be partially damaged
Negligible	Identified historic remains of no importance in planning considerations, or heritage assets and findspots that have already been removed or destroyed (i.e. 'site of')
Unknown	Heritage assets for which a level of importance cannot be defined based on current information

7.2.21 Cultural significance is assessed in relation to the criteria in DPSG[59], which inform decisions regarding heritage designations but may also be applied generally in identifying the 'special characteristics' of a heritage asset, which contribute to its significance and should be protected, conserved and enhanced according to SPP paragraph 137. Annex 1 is widely applicable in assessing the cultural significance of archaeological sites and monuments, for instance, while the criteria in Annex 2 can be used in defining the architectural or historic interest of buildings, whether Listed or not.

7.2.22 The special characteristics which contribute to an asset's cultural significance may include elements of its setting. Setting is defined in *Managing Change in the Historic Environment: Setting*[60] as 'the way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced'. The setting of a heritage asset is defined and analysed according to Stage 2 of the three-stage approach promoted in 'MCHE: Setting', with reference to factors listed on pages 9-10 (see Assessment of the

[59] DPSG (2016), Annexes 1-6.

[60] Historic Environment Scotland (2016), updated 2020, Section 1.

Magnitude of Impacts on Cultural Significance, below). The relevance of these factors to the understanding, appreciation and experience of the asset determines how, and to what extent, an asset's cultural significance derives from its setting. All heritage assets have settings; however, not all assets are equally sensitive to effects on their settings. In some cases, setting may contribute very little to the asset's significance, or only certain elements of the setting may be relevant.

Assessment of the Magnitude of Impacts on Cultural Significance

7.2.23 The magnitude of an impact is a measure of the degree to which the cultural significance of a heritage asset could change because of a development proposal. This definition of magnitude applies to likely effects on the setting, as well as possible physical effects on the fabric of an asset.

7.2.24 The methodology adopted for the identification and assessment of potential effects on setting follows the approach set out in *Managing Change in the Historic Environment: Setting*[61] and the Environmental Impact Assessment Handbook[62]. The guidance sets out three stages in assessing the impact of development on the setting of a heritage asset or place as follows:

- *stage 1: identify the historic assets that might be affected by a development;*
- *stage 2: define and analyse the setting by establishing how the surroundings contribute to the ways in which the historic asset or place is understood, appreciated and experienced; and*
- *stage 3: evaluate potential effect of the proposed changes on the setting, and the extent to which any negative effects can be mitigated.*

7.2.25 It is important to note the magnitude of an impact which results from an impact on setting is not a direct measure of the visual prominence, scale, proximity, or other attributes of the Proposed Development itself, or of the extent to which the setting itself is changed. Stages 2-3, outlined above, are undertaken for all heritage assets that might be affected by the Proposed Development. The methodology employed in this assessment considers whether, and to what extent, the characteristics of setting which would be changed contribute to the asset's cultural significance[63].

7.2.26 Magnitude is assessed as high/medium/low/negligible, and adverse or beneficial, or no effect, using the criteria in **Table 7.3** as a guide. In assessing the likely effects of a development, it is often necessary to consider various effects which influence an asset's cultural significance in different ways. For instance, there may be adverse effects on an asset's fabric, and beneficial effects on cultural significance, resulting from a change in setting arising from a development which would not occur in a 'do-nothing' scenario; a heritage asset that might otherwise degrade over time could be preserved, or consolidated, because of a development. The impact assessment identifies beneficial and adverse impacts for consideration separately.

[61] Historic Environment Scotland (2016), updated 2020.

[62] NatureScot & Historic Environment Scotland (2018), v5 Appendix 1.

[63] NatureScot & HES 2018, Environmental Impact Assessment Handbook, v5 Appendix 1, paras 42 and 43.

Table 7.3: Criteria for Assessing the Magnitude of Impacts on Heritage Assets

Magnitude	Description
High Beneficial	Alterations to an asset and/or its setting resulting in considerable increase in appreciation, understanding or awareness of the asset's cultural significance. Or Preservation of an asset and/or its setting where it would otherwise suffer considerable loss of cultural significance in the do-nothing scenario.
Medium Beneficial	Alterations to an asset and/or its setting resulting in moderate increase in appreciation, understanding or awareness of the asset's cultural significance. Or Preservation of an asset and/or its setting where it would otherwise suffer moderate loss of cultural significance in the do-nothing scenario.
Low Beneficial	Alterations to an asset and/or its setting resulting in a slight increase in appreciation, understanding or awareness of the asset's cultural significance. Or Preservation of an asset and/or its setting where it would otherwise suffer slight loss of cultural significance in the do-nothing scenario.
Negligible Beneficial	Alterations to an asset and/or its setting resulting in a very slight enhancement of cultural significance. Or Preservation of an asset and/or its setting where it would otherwise suffer very slight loss of cultural significance in the do-nothing scenario.
No Effect (None)	The asset's cultural significance is not altered.
Negligible Adverse	Alterations to an asset and/or its setting resulting in a very slight loss of cultural significance.
Low Adverse	Alterations to an asset and/or its setting resulting in a slight loss of cultural significance.
Medium Adverse	Alterations to an asset and/or its setting resulting in a moderate loss of cultural significance.
High Adverse	Alterations to an asset and/or its setting resulting in a considerable loss of cultural significance.

Assessment of the Significance of Effects

7.2.27 The significance of an effect ('EIA significance') on the cultural significance of a heritage asset, resulting from a direct or indirect physical effect, or an effect on its setting, is assessed by combining the magnitude of the impact and the importance of the heritage asset. The matrix in **Table 7.4** provides a guide to decision-making, but does not substitute professional judgement and interpretation, particularly where the asset importance or effect magnitude levels are not clear or are borderline between categories. EIA significance may be described on a continuous scale from none to major.

7.2.28 It is common practice to identify EIA effects as significant or not significant, and in this assessment major and moderate effects are regarded as 'significant' in EIA terms, while minor and negligible effects are 'not significant'.

Table 7.4: Criteria for Assessing the Significance of Effects on Heritage Assets

Importance	Magnitude of Change			
	High	**Medium**	**Low**	**Negligible**
Very High	Major	Major	Major or Moderate	Moderate or Minor
High	Major	Major or Moderate	Moderate or Minor	Minor
Medium	Major or Moderate	Moderate or Minor	Minor	Negligible
Low	Moderate or Minor	Minor	Negligible	Negligible

Assessment of the Impact upon Integrity of Setting

7.2.29 Impact assessment conclusions upon Scheduled Monuments are also presented in the terms of SPP paragraph 145 i.e., *"Where there is potential for a proposed development to have an adverse effect on a scheduled monument or on the integrity of its setting".*

7.2.30 SPP does not define 'integrity' in the context of paragraph 145, therefore, for the purposes of the assessment, HES recommend the following shared definition for the concept of integrity of setting should be employed. This states that *"changes to factors of setting that contribute to cultural significance such that the understanding, appreciation and experience of an asset are not adequately retained will affect the integrity of setting."*

7.2.31 Stages 2-3 outlined in para 7.2.24 are undertaken for all heritage assets that might be affected by the Proposed Development, including Scheduled Monuments, and this process is considered a suitable and robust basis upon which to test SPP paragraph 145. Following conclusions presented 'in EIA terms' regarding the Significance of Effects, the Stage 2-3 analyses are concluded in terms of SPP paragraph 145.

Assessment of Cumulative Effects

7.2.32 Within 25 km of the site there are a number of other wind farm developments that are variously operational, consented or are currently in the planning system (referred to as 'cumulative developments'), comprising:

- Langhope Rig (operational);
- Windy Edge Wind Farm (consented) ;
- Pines Burn Wind Farm (consented);
- Faw Side Wind Farm (in planning); and
- Teviot Wind Farm (in planning).

7.2.33 Proposed wind energy developments are included in the cumulative assessment where they also feature prominently within views of, or towards assets potentially affected by, the Proposed Development, as demonstrated by photomontage visualisations. A cumulative effect is considered to occur where the magnitude of the combined effect of two or more developments is greater than that of the developments considered separately.

7.2.34 Cumulative effects are considered in cases where an effect of more than negligible significance would occur as a result of the Proposed Development.

Assumptions and Limitations

7.2.35 Information held by public data sources is generally considered to be reliable; however, the following general points are noted:

- documentary sources from the medieval period are rare;
- whilst historic documents may be biased depending on the author, with content seen through the lens of context, wherever such documentary sources are used in assessing archaeological potential professional judgment is used in their interpretation in that the functionality of the document is considered;
- HER records can be limited because opportunities for research, fieldwork and discovery depend on the situation of commercial development and occasional research projects, rather than the result of a more structured research framework. A lack of data within the HER records does not necessarily equal an absence of archaeology;
- where archaeological sites have been identified solely from aerial imagery without confirmation from archaeological excavation or supporting evidence in the form of find-spots for example, it is possible the interpretation may be revised in the light of further investigation;
- the significance of sites can be difficult to identify from HER records, depending on the accuracy and reliability of the original source;
- there can often be a lack of dating evidence for archaeological sites; and
- any archaeological site visit has inherent limitations, primarily because archaeological remains below ground level may have no surface indicators.

7.3 Consultation Undertaken

7.3.1 Responses arising from Scoping and other consultation carried out during the archaeology and cultural heritage assessment are summarised in **Table 7.5**.

Table 7.5: Cultural Heritage Consultation

Consultee	Summary of Consultation Response	Response to Consultee
Historic England Scoping Opinion PL00766802 March 2022	*It is not clear that the Scoping report includes the English historic environment data in the baseline.* *The EIA should contain a thorough assessment of the likely effects which the proposed development might have upon designated heritage assets and their settings in England.* *Included list of designated heritage assets within the OSA. In particular, the following scheduled monuments are on the higher*	Response by letter to Historic England identified where English historic environment data was included in the Scoping report baseline. The letter included a detailed consideration of all heritage assets within England and within the ZTV for the Proposed Development. All but two Scheduled Monuments lie outwith the Proposed Development zone of theoretical visibility (ZTV), including the two cited by Historic England in their Scoping Opinion. The letter demonstrated no effects upon the cultural significance of the two Scheduled Monuments within the ZTV, and thus no significant effects are anticipated as a result of the Proposed Development in England. The letter proposed that further detailed

Consultee	Summary of Consultation Response	Response to Consultee
	ground within the Cheviots area some 20-35km east of the proposal, potentially with views towards the proposal: *•Roman fort, two Roman fortlets, two Roman camps, a section of Roman road and a medieval settlement and chapel at Chew Green (NHLE asset 1015847)* *•Ingram Farm (NHLE asset 1021382)*	assessment of cultural heritage assets within England (including both direct and indirect effects and potential effects upon setting) in the forthcoming EIA Report should be scoped out. Historic England responded by letter (8th July 2022) to confirm that any further consideration of heritage assets in England could be scoped out of the EIA Report.
Southdean Community Council Scoping Opinion March 2022	*Wheel Causeway is or major interest to the community, and the Community is currently exploring opening up the route in full. Request T01 and T05 are moved further from this route.* *In addition to the Cultural Heritage viewpoints selected Southdean CC requests Viewpoint from Wheel causeway up on the ridge line where the Causeway starts to come off the ridge (613019).*	T10 and T11 (formerly T01 & T05) have been moved further away from Wheel Causeway by design in iterations subsequent to that shown in the Scoping Report. A separation distance of 100m and 300m respectively has been achieved from medieval trackways SM3423 and SM3425. The requested viewpoint is included as a cultural heritage viewpoint (CHVP2) at the location requested for detailed setting assessment in the EIA Report.
Northumberland National Park Authority Scoping Opinion March 2022	*Confirm that given the ZTV plan and wireline visualisations provided we are content and welcome the inclusion of the two viewpoints set within the National Park for the LVIA assessment.*	No cultural heritage concerns.
Northumberland County Council Scoping Opinion April 2022	*No objection*	No cultural heritage concerns.
Scottish Borders Council (SBC) Scoping Opinion 22/00321/SCO April 2022	*A distance of 200m to 300m would be preferred around known designated heritage assets.*	A separation distance of 630m has been achieved for prehistoric fort Tamshiel Rig SM10605 to protect its setting. A separation distance of 100m and 300m respectively has been achieved from medieval trackways SM3423 and SM3425 as these monuments are less sensitive to change in their setting.
Scottish Borders Council (SBC) Scoping	*It would be useful if full desk-based assessment and site visit were extended to be more of a walkover survey in the approaches to the site access*	In accordance with the methodology presented in the Scoping Report, all accessible parts of the land within the ISA was inspected by two archaeologists. See Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting

Consultee	Summary of Consultation Response	Response to Consultee
Opinion 22/00321/SCO April 2022	*areas.*	Assessment, Volume 3, Appendix 7.1.
Scottish Borders Council (SBC) Scoping Opinion 22/00321/SCO April 2022	*The potential of the area to still contain, despite the widespread afforestation, archaeological remains should be recognised throughout the assessment work. Recent LiDAR information from the Scottish Government Remote Sensing Portal or the National Libraries of Scotland website should be reviewed as there has been much change in the woodland coverage of the area.*	LIDAR assessment has identified hitherto unknown prehistoric archaeological remains within the ISA (HA1-3) and archaeological potential is recognised. See Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting Assessment, Volume 3, Appendix 7.1
Scottish Borders Council (SBC) Scoping Opinion 22/00321/SCO April 2022	*Further definition and description of how monuments are to be identified as of national importance would be useful, as some sites may be of national significance nonetheless but not yet designated.*	See gazetteer Appendix 7.1.1 of Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting Assessment, Volume 3, Appendix 7.1. Potential impacts upon the setting of the following non-designated heritage assets are assessed in detail in the EIA Report: •113 Wauchope/Wolflee NIDL •56818 Lustruther tower house •56831 Highlee Hill settlement •56834 Coblaw Plantation, cairn •56835 Hare Cairn •HA4 Westshiels Farmstead
Scottish Borders Council (SBC) Scoping Opinion 22/00321/SCO April 2022	*Attention is drawn to the Tamshiel Rig sheduled monument (SM10605). The scheduled monument hillfort locations that are located to the north and west of the scheme combine together to form larger landscapes, rather than just as single sites alone (such as across Rubers Law, Bonchester Hill and Southdean Law). Views from the hillforts will form a crucial part of the archaeological view to the application, and that the relative heights of the turbines to the border ridge will be considered important. There is a moderate to high potential for adverse setting impacts to these monuments.* *Regarding visualisations,*	With appropriate visualisations, potential impacts upon the setting of the following hillforts have been assessed in detail in the EIA Report: •SM10605 Tamshiel Rig, fort, settlement and field system •SM2211 Southdean Law, fort & settlement •SM2173 Bonchester Hill, fort •SM2152 Shaw Craigs, fort •SM2129 Rubers Law, fort & Roman signal station •SM10735 Stony Law, fort •SM1700 Kirkton Hill, fort •SM2296 Penchrise Pen, fort 635m SW of Penchrise Farm Cottage In addition, the following monuments are assessed in detail in the EIA Report: •SM10742 Goshen Hill palisaded settlement SM3425 Westshiels, spur earthwork 1550m west of

Consultee	Summary of Consultation Response	Response to Consultee
	additional photomontage work would also be useful especially for the series of scheduled monument hillforts and around the Southdean area in the approaches up to wind farm. It would be helpful if the photography undertaken could show the archaeological remains in the foreground. Requested additional viewpoint at Penchrise Pen, a historic hillfort site in the general surroundings of the wind farm.	•SM3423 Wheel Causeway, section 640m long on S slope of Wardmoor Hill •SM2319 Black Hill, settlement •SM3848 Dykeraw Tower, Southdean •SM7144 Steel Knowe, medieval and later settlements and field systems Follow up consultation with SBC has sought agreement of the above CHVPs and proposed photomontages (no response received).
Historic Environment Scotland Scoping Opinion 300057009 May 2022	*Strongly recommend that design of the proposals avoids any direct impacts on nationally important assets, in line with national policies, and that efforts are made to minimise any impacts on the setting of these assets. We note that any direct impacts on these assets are likely to require scheduled monument consent as administered by HES and that based on the current information we would be unlikely to grant consent for works within the scheduled areas.*	Direct impacts upon designated heritage assets within the ISA are avoided through design, however, SMC may need to be sought for minor existing trackway upgrades for the proposed site access route. A separation distance of 630m has been achieved for prehistoric fort Tamshiel Rig SM10605 to protect its setting. A separation distance of 100m and 300m respectively has been achieved from medieval trackways SM3423 and SM3425 as these monuments are less sensitive to change in their setting.
Historic Environment Scotland Scoping Opinion 300057009 May 2022	*Based on the information provided so far, the settings of the following assets appear most likely to be significantly affected:* *• Wheel Causeway, section 640m long on south slope of Wardmoor Hill (SM3423)* *• Westshiels, spur earthwork 1550m south-west of (SM3425)* *• Tamshiel Rig, fort, settlement and field system (Index no. 10605)* *• Southdean Law, fort & settlement (Index no. 2211)* *• Black Hill, settlement (Index no. 2319)* *• Dykeraw Tower, Southdean (Index no. 3848)* *• Steel Knowe, medieval and*	With appropriate visualisations, potential impacts upon the setting of the following hillforts have been assessed in detail in the EIA Report: •SM10605 Tamshiel Rig, fort, settlement and field system •SM2211 Southdean Law, fort & settlement •SM2173 Bonchester Hill, fort •SM2152 Shaw Craigs, fort •SM2129 Rubers Law, fort & Roman signal station •SM10735 Stony Law, fort •SM1700 Kirkton Hill, fort •SM2296 Penchrise Pen, fort 635m SW of Penchrise Farm Cottage In addition, the following monuments are assessed in detail in the EIA Report: •SM10742 Goshen Hill palisaded settlement SM3425 Westshiels, spur earthwork 1550m west of •SM3423 Wheel Causeway, section 640m long

Consultee	Summary of Consultation Response	Response to Consultee
	later settlements and field systems (Index no. 7144). There is a high concentration of scheduled monuments around this area, and we consider that a visualisation from this site will help in the assessment of the others. *• Bonchester Hill, fort (Index no. 2173)* *• Rubers Law, fort & Roman signal station (Index no. 2129)* *Visualisations should be provided for any scheduled monument where a significant effect is identified*	on S slope of Wardmoor Hill •SM2319 Black Hill, settlement •SM3848 Dykeraw Tower, Southdean •SM7144 Steel Knowe, medieval and later settlements and field systems •113 Wauchope/Wolflee NIDL •56818 Lustruther tower house •56831 Highlee Hill settlement •56834 Coblaw Plantation, cairn •56835 Hare Cairn •HA4 Westshiels Farmstead Follow up consultation with HES resulted in agreement of the above CHVPs and proposed photomontages (letter dated 4th July 2022).
Historic Environment Scotland Scoping Opinion 300057009 May 2022	*The proposed buffer of 100m around designated assets is likely to be acceptable in terms of avoiding direct physical impacts. In order to ensure that accidental damage to the scheduled monuments does not occur we would also recommend that mitigation measures such as making all contractors working at the site aware of the extent of the legally protected scheduled areas of the monuments are included in any application and supporting information. We recommend that in addition to them being marked on a map, that the scheduled areas of the monuments are also marked out on the ground by some form of freestanding temporary fencing with an appropriate buffer around them to avoid any inadvertent damage.*	HES's mitigation requirements are fully reflected in Mitigation section 7.8 of this chapter.
Historic Environment Scotland Consultation 300057009 4 July 2022	Detailed setting assessment of SM10742 Goshen Hill palisaded settlement required. Detailed setting assessment of SM6599, SM6601, SM6602, SM6600 from proposed access track required.	SM10742 Goshen Hill palisaded settlement has been added to the list of monuments assessed in detail in the EIA Report. Email response to HES confirmed that the access area follows an existing trackway and that extensive works resulting in significant adverse setting effects is unlikely.
Historic Environment	Confirmation that assessment of access track on setting of	Email response to HES confirmed that no new bridge is required. An existing bridge over Carter

Consultee	Summary of Consultation Response	Response to Consultee
Scotland Consultation 300057009 14 July 2022	SM6599, SM6601, SM6602, SM6600 is not required, but that assessment of new bridge on SM6602 is required.	Burn may need to be reinforced, but this is unlikely to result in significant adverse setting effects. Confirmation that no detailed designs are available at the time of submission that would enable an assessment to be carried out, or visualisations produced. Request to HES that once detailed design is progressed that assessment of bridge reinforcement is addressed through FEI or as part of an SMC application. HES response by email (19/07/22) confirmed that this would be acceptable.

7.4 Statutory and Planning Context

Legislation, Policy and Guidance

7.4.1 The assessment has been undertaken with reference to relevant legislation, policy and guidance relating to the historic environment.

Statutory Protection

7.4.2 Scheduled Monuments and Listed Buildings are protected by statute.

7.4.3 Legislation regarding Scheduled Monuments is contained within The Ancient Monuments and Archaeological Areas Act 1979. Legislation regarding Listed Buildings is contained in The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997.

7.4.4 The 1979 Act makes no reference to the settings of Scheduled Monuments. The 1997 Act does, however, place a duty on the planning authority with respect to Listed Buildings and Conservation Areas, and their settings. Section 59 of the 1997 Act states (in part):

"In considering whether to grant planning permission for development which affects a listed building or its setting, a planning authority or the Secretary of State, as the case may be, shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses."

7.4.5 The Historic Environment Scotland Act 2014 defines the role of the public body, HES, and the processes for the designation of heritage assets, consents and rights of appeal.

National Planning Framework

7.4.6 The National Planning Framework 3 (NPF3) provides the Scottish Government's long term strategy for Scotland and provides a framework for the spatial development of Scotland as a whole. Historic Environment Policy for Scotland (HEPS) (HES 2019b) defines the Historic Environment and Scottish Government Policy. It sets out the vision and key principles on how to care for and protect Scotland's historic environment including designations of ancient monuments, principles for scheduling and listing, contexts for conservation areas, marine protected areas, gardens and designated landscapes, historic battlefields and consents and advice.

7.4.7 The Scottish Government's planning policies in relation to the historic environment are set out in paragraphs 135-151 of Scottish Planning Policy (SPP) (The Scottish Government, June 2014). The historic environment is defined as *"the physical evidence for human activity that connects people with place, linked with the associations we can see, feel and understand" and includes "individual assets, related settings and the wider cultural landscape".*

7.4.8 The policy principles are stated in paragraph 137:

"The planning system should:

- *promote the care and protection of the designated and non-designated historic environment (including individual assets, related settings and the wider cultural landscape) and its contribution to sense of place, cultural identity, social well-being, economic growth, civic participation and lifelong learning; and*
- *enable positive change in the historic environment which is informed by a clear understanding of the importance of the heritage assets affected and ensure their future use. Change should be sensitively managed to avoid or minimise adverse impacts on the fabric and setting of the asset, and ensure that its special characteristics are protected, conserved or enhanced."*

7.4.9 The SPP applies these principles to all designated assets (paragraphs 141-149). In particular, it states that:

- [Regarding developments affecting Listed Buildings], *"special regard must be given to the importance of preserving and enhancing the building, its setting and any features of special architectural or historic interest";*
- [Proposals] *"which will impact on its appearance, character or setting [of a Conservation Area], should preserve or enhance the character and appearance of the conservation area";*
- *"Where there is potential for a proposed development to have an adverse effect on a scheduled monument or on the integrity of its setting, permission should only be granted where there are exceptional circumstances";*
- *"Where a development proposal has the potential to affect a World Heritage Site, or its setting, the planning authority must protect and preserve its Outstanding Universal Value";*
- *"Planning authorities should protect and, where appropriate, seek to enhance gardens and designed landscapes included in the Inventory of Gardens and Designed Landscapes and designed landscapes of regional and local importance";* and
- *"Planning authorities should seek to protect, conserve and, where appropriate, enhance the key landscape characteristics and special qualities of sites in the Inventory of Historic Battlefields".*

7.4.10 The SPP also requires planning authorities to protect archaeological sites and monuments, preserving them in situ where possible, or otherwise ensure "appropriate excavation, recording, analysis, publication and archiving before and/or during development" (paragraph 150). *"Non-designated historic assets and areas of historical interest, including historic landscapes, other gardens and designed landscapes, woodlands and routes such as drove roads"* should also be preserved in situ wherever feasible (paragraph 151).

7.4.11 'Our Place in Time: the Historic Environment Strategy for Scotland' (2015) presents the Scottish Government's strategy for the protection and promotion of the historic environment. HEPS (2019b) and the Historic Environment Scotland Circular (2019) complement the SPP and provide further policy direction. HEPS sets out high level policies and core principles for decision-making affecting the historic environment.

Local Planning Policy

7.4.12 The Scottish Borders Local Development Plan was adopted in May 2016. It sets out land use proposals and planning policies which are intended to guide development and inform planning decisions within the Scottish Borders over the next ten years.

7.4.13 The Scottish Borders Proposed Local Development Plan 2 (PLDP2) was submitted by Scottish Borders Council (SBC) to the Scottish Government for Examination on 14th July 2022. Policies EP7: Listed Buildings, EP8: Archaeology, EP9: Conservation Areas, and EP10: Gardens and Designed Landscapes from Volume 1 of LDP1 and Key Principles from SBC's Supplementary Guidance (SG) relevant to this assessment are presented in the Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting Assessment, **Technical Appendix 7.1**.

Guidance

7.4.14 Planning Advice Note 2/2011: Planning and Archaeology provides technical advice to planning authorities and developers on dealing with archaeological remains. Among other issues it covers the balance in planning decisions between the preservation of archaeological remains and the benefits of development; the circumstances under which developers can be required to provide further information, in the form of a field evaluation, to allow planning authorities to reach a decision; and measures that can be taken to mitigate adverse impacts.

7.4.15 HES published Designation Policy and Selection Guidance (DPSG)(HES, 2019) to accompany HEPS. DPSG outlines the policy and selection guidance used by HES when designating sites and places of national importance.

7.4.16 HES provides guidance on how to apply the policies set out in the SPP in a series of documents entitled 'Managing Change in the Historic Environment', of which the guidance note on 'Setting' (HES, 2016 updated 2020) is relevant.

7.4.17 Standards and Guidance published by the Chartered Institute for Archaeologists (CIfA) have been followed in preparing this assessment[64][65][66].

7.4.18 This assessment has also been prepared with reference to IEMA, IHBC and CIfA's July 2021 publication 'Principles of Cultural Heritage Impact Assessment in the UK'. This document presents good practice for assessment of the impact of a development proposal on cultural heritage assets which is consistent with the Principles.

[64] Chartered Institute for Archaeologists (2020), Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment.

[65] Chartered Institute for Archaeologists (2020), Standard and Guidance for Historic Environment Desk-Based Assessment.

[66] Chartered Institute for Archaeologists (2021), Code of Conduct.

Standards and Acknowledgements

7.4.19 Headland Archaeology (UK) is a Registered Organisation with the Chartered Institute for Archaeologists (CIfA), an audited status which confirms that its work is carried out in accordance with the highest standards of the profession.

7.4.20 Headland Archaeology (UK), as part of the RSK Group, is recognised by the Institute of Historic Building Conservation (IHBC) under their 'Historic Environment Service Provider Recognition' scheme. This quality assurance standard acknowledges that RSK works to the conservation standards of the IHBC, the UK's lead body for built and historic environment practitioners and specialists.

7.4.21 Headland Archaeology (UK) operates a quality management system to help ensure all projects are managed in a professional and transparent manner, which enables it to qualify for ISO 9001 (Quality Management), ISO 45001 (health and safety management) and ISO 14001 (environmental management).

7.5 Existing Environment

Geology and Geomorphology

7.5.1 The bedrock geology within the turbine area (west to east) comprises various sedimentary formations, including: Riccarton Group - Wacke and Mudstone; Hawick Group – Wacke; Ballagan Formation - Sandstone, Siltstone and Dolomitic Limestone (the majority of the land within the ISA); Stratheden Group and Inverclyde Group (undifferentiated) - Sandstone and [subequal/subordinate] Argillaceous Rocks, Interbedded[67].

7.5.2 Till, Devensian – Diamicton is recorded in the lower lying parts of the land within the turbine area, with Alluvium - Silt, Sand and Gravel along the watercourses. The National Soil Map of Scotland records the majority of the area as mineral gleys, with some brown soils, and some peaty podzols to the west around Black Hill.

Overview of the Historic Environment

7.5.3 The full list of known heritage assets within the ISA and OSA is presented in the gazetteer (**Technical Appendix 7.1.1** of Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting Assessment, Volume 3, **Appendix 7.1**) and the significance of these assets is discussed by period in the DBA Statement of Significance and Importance section.

ISA - Turbine Area

7.5.4 There are two designated heritage assets within the turbine area, both Scheduled Monuments:

- SM3425 Westshiels, spur earthwork 1550 m west of; lies almost entirely within the turbine area at its south-west corner.
- SM3423 Wheel Causeway, section 640 m long on the southern slope of Wardmoor Hill; defines part of the turbine area western boundary, lying half within

[67] British Geological Survey (BGS) (2022), Available at: https://mapapps.bgs.ac.uk/geologyofbritain/home.html [accessed November 2022].

and half outwith the ISA. Despite the listing name, the scheduled section is only 530 m long, but the monument continues as a non-designated earthwork through the whole turbine area in a north-south orientation (HER Ref 179517 / 344244).

7.5.5 In addition, there is a further Scheduled Monument that borders the turbine area to the east. This monument continues into the site, but the part that lies within the turbine area is not scheduled, however, for the purposes of assessment the whole monument is considered a designated heritage asset:

- SM10605 Tamshiel Rig, fort, settlement and field system. The part of the monument within the turbine area is recorded on the HER as Ref 56832. (The monument is only partly designated due to differential preservation through historic forestry activity damage).

7.5.6 There are a further three non-designated heritage assets recorded by the HER within the turbine area, all of which are linear transport monuments preserved as surface earthworks: 56819 Wolfehopelee burn, linear earthwork, 344243 Wheel Causeway, medieval road, and 74659 Croft Plantation, hollow-ways.

7.5.7 In addition, analysis of freely available Scottish Remote Sensing Portal LIDAR data analysed for this assessment has identified a further three potential heritage assets, one heritage asset first shown on 18th century mapping and still present on modern mapping, 12 potential heritage assets on late 19th century OS mapping, and four potential heritage assets shown on 20th century OS mapping. Of these features, only the locations of HA1, HA2, HA3 and HA4 were accessible for inspection during the walkover survey, with the remaining assets all situated within dense forestry. Of these, HA1 and HA4 were confirmed to be extant features whilst there was no evidence of HA2 or HA3.

- HA1- Possible prehistoric hut circle identified on LIDAR data and confirmed to be extant during the walkover survey;
- HA2- Row of possible prehistoric enclosures on LIDAR data;
- HA3- Possible enclosure (unknown date) in LIDAR data;
- HA4- Westshiels, farmstead first shown on Roy's Lowlands Map (1752-55);
- HA5, HA6, HA8, HA9, HA14-HA17- Sheepfolds shown on first ed OS (1:10,560) 1866;
- HA18- Footbridge shown on first ed OS (1:10,560) 1866;
- HA19- Well shown on first ed OS (1:10,560) 1866;
- HA7- Sheepfold shown on first revision OS (1:10,560) 1896;
- HA20- Well shown on first revision OS (1:10,560) 1896; and
- HA10-HA13- Sheepfolds shown on modern OS (1:2000).

ISA - Access Area

7.5.8 There are three designated heritage assets within the access area, all Scheduled Monuments:

- SM6601 Martinlee Plantation, homestead SE of Martinlee Sike;
- SM6599 Martinlee Sike, enclosure bank, field system, cairns and old road; and
- SM6602 Martinlee Sike, farmstead, field system and assart bank.

7.5.9 These Scheduled Monuments define specific parts of larger or smaller areas defined by the HER:

- 74648 Martinlee Sike House Platform;

- 74615 Martinlee Sike Archaeological Landscape; and
- 74616 Martinlee Sike Farmstead.

Outer Study Area

7.5.10 Within 2 km from the turbine area there are 12 Scheduled Monuments, one Category C Listed Building, one Non-Inventory Designed Landscape (NIDL), and 93 further non-designated monuments.

7.5.11 Within 2-5 km from the turbine area there are 11 Scheduled Monuments, and nine Category B Listed Buildings.

7.5.12 Within 5-10 km from the turbine area there are 22 Scheduled Monuments (including four in England), and three Category A Listed Buildings.

7.5.13 Within 10-20 km from the turbine area there is one Inventory Garden and Designed Landscape and 21 Category A Listed Buildings.

7.5.14 One Scheduled Monument has been identified beyond the defined OSAs requiring detailed assessment- SM2296 Penchrise Pen fort is located 11.4 km west of the proposed turbines.

7.5.15 No heritage assets have been identified within the ZTV beyond 20 km for which setting contributes to cultural significance such that a significant impact is anticipated as a result of the Proposed Development over this distance.

7.5.16 A Stage 1 Setting Assessment has been carried out in order to consider whether further detailed assessment would be required for heritage assets within the OSA, based on whether it is likely that their cultural significance could be harmed through development within their setting. Summary results are presented in Part 6.2 of the Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting Assessment (EIA Report Volume 3, **Appendix 7.1**).

7.5.17 The Stage 1 Setting Assessment methodology considers each heritage asset in the OSA in turn to identify those assets in the ZTV which have a wider landscape setting that contributes to their cultural significance and whether it is likely that cultural significance could be harmed by the Proposed Development. Where heritage assets are located outwith the ZTV, third-party viewpoints within the ZTV which may provide a significant view towards the heritage asset and the Proposed Development were considered.

7.5.18 Following consultation, the Stage 1 Setting Assessment found that there may be effects through changes within their setting on the significance of 14 Scheduled Monuments and six non-designated heritage assets within the OSA because of the Proposed Development.

Previous Investigations

7.5.19 Previous investigations have been undertaken on Tamshiel Rig (SM10605) fort, settlement and field system[68]. The aim of the intrusive works was to evaluate the impact of forestry activity on archaeological remains. The turbine area was completely afforested in the 1950s and approximately two thirds of the plantation was clear-felled in 1994. In

[68] CFA (1996), published in Discovery and Excavation in Scotland by CSA, November 1996, p90.

order to define and characterise the extent of root impact on the prehistoric remains, excavation, soil analyses and a tree stump distribution survey were undertaken.

7.5.20 In summary, the report identifies that forestry root activity has influenced some archaeological remains at Tamshiel Rig. The extent of damage is concluded to depend on the proximity of trees in relation to archaeological features along with root type and drainage conditions.

Archaeological Potential of the Land Within the ISA

Turbine Area

7.5.21 Situated in proximity to the resources provided by the Black Burn and Jed Water, the known prehistoric and later historic remains within the turbine area demonstrate the suitability of the area for settlement. The potential for hitherto unknown archaeological remains to be preserved below ground would be higher if it were not for the establishment of commercial forestry across the site as a whole prior to the 1980s. Freely available Scottish Remote Sensing Portal LIDAR data analysed for this assessment and walkover survey for this assessment have identified preserved upstanding likely prehistoric remains (HA1) within the turbine area that appears to have survived this plough action. Previous investigation also indicates that it is possible that archaeological remains may be preserved below ground despite deep ploughing associated with commercial forestry activities.

7.5.22 The majority of the turbine area can, therefore, be considered to be of generally low archaeological potential; however, this may be up to medium potential in the vicinity of known heritage assets: Tamshiel Rig, fort, settlement and field system (SM10605), Westshiels farmstead (HA4), and the LIDAR remains HA1, HA2 and HA3.

7.5.23 Hitherto unknown archaeological remains, if present, are likely to relate to either agriculture or settlement, ranging from the prehistoric through to the post-medieval periods. Below ground remains that have been damaged by later/modern activities are likely to be of low importance.

Access Area

7.5.24 At Martinlee Plantation, the access area leaves the A6088 and, following an existing forestry track, passes through non-designated 74615 Martinlee Sike Archaeological Landscape followed by Scheduled Monument SM6602 Martinlee Sike, farmstead, field system and assart bank. The access area continues to the turbine area following the existing access track in a south-westerly direction as far as the Black Burn where a new crossing would be required. Beyond the Black Burn the access would divert north-west on a new track through previously deep-ploughed commercial forestry to the site at its eastern corner.

7.5.25 The archaeological potential of the access area where it passes through known heritage assets is medium, as the route has been disturbed through construction of the existing forestry track with drainage ditches. The archaeological potential of the remainder of the access area is low.

7.5.26 Hitherto unknown archaeological remains, if present, are likely to relate to either agriculture or settlement, ranging from the prehistoric through to the post-medieval periods. Below ground remains that have been damaged by later/modern activities are likely to be of low importance, but any remains within and associated with Scheduled Monument SM6602 Martinlee Sike, farmstead, field system and assart bank will be of up to high importance.

Heritage Assets Considered for Setting Effects

7.5.27 Based on the Zone of Theoretical Visibility (ZTV), heritage assets have been considered for further detailed assessment in the EIA Report chapter based on whether it is considered likely that its cultural significance could be harmed through development within its setting. The assets assessed in this chapter have been agreed with statutory consultees.

7.5.28 There are no Conservation Areas, Inventory Battlefields or World Heritage Sites within the OSA.

7.5.29 No Inventory Gardens and Designed Landscapes or Listed Buildings are assessed in the EIA Report.

7.5.30 Following Stage 1 Assessment, with full details in Cultural Heritage Baseline Desk-based Assessment and Stage 1 Setting Assessment (EIA Report Volume 3, Appendix 7.1), the following heritage assets are assessed in this EIA Report supported with photomontage and/or wireline visualisations as appropriate:

Scheduled Monuments

- SM10605 Tamshiel Rig, fort, settlement and field system;
- SM3425 Westshiels, spur earthwork 1550m west of;
- SM3423 Wheel Causeway, section 640m long on S slope of Wardmoor Hill;
- SM2211 Southdean Law, fort & settlement;
- SM2319 Black Hill, settlement;
- SM3848 Dykeraw Tower, Southdean;
- SM7144 Steel Knowe, medieval and later settlements and field systems;
- SM2173 Bonchester Hill, fort;
- SM2152 Shaw Craigs, fort;
- SM2129 Rubers Law, fort & Roman signal station;
- SM10742 Goshen Hill, palisaded settlement;
- SM10735 Stony Law, fort;
- SM1700 Kirkton Hill, fort; and
- SM2296 Penchrise Pen, fort 635m SW of Penchrise Farm Cottage.

7.5.31 All Scheduled Monuments within the turbine area are assessed in this EIA Report.

7.5.32 There are two Scheduled Monuments located partially within the turbine area. In addition, there is a further Scheduled Monument that borders the turbine area to the east. This monument continues into the ISA, but the part that lies within the turbine area is not scheduled, however, for the purposes of assessment the whole monument is considered a designated heritage asset.

7.5.33 Given their proximity, and potential for elements of setting that contribute to significance to include the turbine area, SM10605 Tamshiel Rig, fort, settlement and field system, SM3425 Westshiels, spur earthwork 1550m west of, and SM3423 Wheel Causeway, section 640m long on Southern slope of Wardmoor Hill are assessed in this EIA Report.

7.5.34 Prehistoric hillforts are interpreted as being placed in prominent positions to overlook and control a hinterland through being clearly visible over long distances and are assessed in this EIA Report as the presence of a wind farm in their setting has the potential to challenge their prominence or interrupt potential intentional sightlines (SM2173 Bonchester Hill, fort; SM2152 Shaw Craigs, fort; and SM2211 Southdean Law, fort & settlement).

7.5.35 Due to the variable topography surrounding the Proposed Development site, a number of hillforts in the OSA lie outwith the ZTV, however these along with all hillforts in the OSA will be included in a general assessment of hillforts, sightlines and intervisibility, including intervisibility with potential contemporary prehistoric settlements in the region (SM10735 Stony Law, fort; SM1700 Kirkton Hill, fort; SM2296 Penchrise Pen, fort).

7.5.36 SM2129 Rubers Law, fort & Roman signal station is a regionally prominent and distinctly conical (volcanic) hill, located between Hawick, Jedburgh and Denholm, 9.2 km north-east of the nearest proposed turbine. A Roman signal station is inferred from the presence of Roman dressed sandstone blocks on the hill, many decorated with a diamond pattern. A Roman building once stood on the hilltop, and in such a position this could only have been a signal station. The monument is assessed in this EIA Report in order to investigate the potential for the Proposed Development to interrupt any intentional sightlines with contemporary signal stations.

7.5.37 Due to its proximity to the Proposed Development site, SM3848 Dykeraw Tower, Southdean is assessed in this EIA Report. Another non-designated tower house is assessed in this EIA Report (see below), however no other tower houses have been identified in the OSA, whose setting includes views to or from, or holds a significant historical relationship with the turbine area, and are excluded from detailed assessment in the EIA Report.

7.5.38 With the agreement of HES, the Scheduled Monuments within the access area are excluded from detailed assessment of the impact of the proposed turbines within their settings. Located over 1.5 km east of the nearest proposed turbine, settlements and field systems SM6599, SM6601 and SM6602 are not of a monument type whose significance is contributed to by long-distance views. In each case, the general presence of the Proposed Development would constitute a material change to the setting of the monument, but this would not represent an impact on significance. The proposed turbines would not materially detract from an ability to appreciate the location chosen for the monument for agricultural exploitation. Depending on the final Proposed Development access track design, assessment may be required upon SM6602 Martinlee Sike, farmstead, field system and assart bank to consider the impact of a proposed crossing of the Carter Burn upon the setting of this asset. HES has confirmed that this can be carried out at a later date, if necessary, once the Proposed Development’s project parameters are confirmed (see **Table 7.5**).

7.5.39 At the request of HES through consultation, SM10742 Goshen Hill, palisaded settlement has been included in the detailed assessment (see **Table 7.5**).

7.5.40 Penchrise Pen fort (SM2296), located beyond the 10 km OSA and within the ZTV, is included at the request of the SBC Scoping Response (see **Table 7.5**).

Non-designated Heritage Assets

- 113 Wauchope/Wolflee NIDL;
- 56818 Lustruther tower house;
- 56831 Highlee Hill settlement, including HA1;
- 56834 Coblaw Plantation, cairn;
- 56835 Hare Cairn; and
- HA4 Westshiels Farmstead.

7.5.41 There is one non-inventory designed landscape (NIDL) recorded on the SBC HER within the 2 km OSA: 113 Wauchope/Wolflee. The boundary of the NIDL would appear to define woodland planting blocks shown on the first edition OS map which would have provided the designed landscaped setting to the Medieval manor houses.

7.5.42 Due to its proximity to the Proposed Development site, and the potential for its prominence to be challenged, 56818 Lustruther tower house is assessed in this EIA Report.

7.5.43 56831 Highlee Hill is a prehistoric settlement comprising the below-ground remains of hut circles (possibly including HA1) and evidence of cultivation, the extent of which may extend beyond the area as defined by the HER, as indicated on LIDAR data made recently freely available on the Scottish Remote Sensing Portal assessment and reviewed as part of this assessment. The monument may extend within the turbine area or this area may comprise elements of setting that provide valuable context to the monument and it is, therefore, assessed in this EIA Report.

7.5.44 Cairns 56834 and 56835 and Westshiels Farmstead (HA4) identified as part of this assessment are located within or alongside the land within the ISA. The turbine area may comprise elements of setting that provide valuable context to these monuments and they are assessed in this EIA Report.

7.6 Project Characteristics

7.6.1 The Proposed Development infrastructure would comprise:

- up to 13 wind turbines, of approximately 6 MW each, five with a maximum tip height of 180 m, two with a maximum tip height of 200 m, four with a maximum tip height of 210 m and two with a maximum tip height of 230m;
- hardstanding areas at the base of each turbine, with a permanent area of approximately 2,156 m2;
- Site entrance and access track from the A6088 using the route of an existing forestry track, and access track linking the turbine locations. Total length of access tracks is 14,909.9 m, of which 3,897.7 m is new access track with associated new watercourse crossings and 11,012.2 m is existing access track and watercourse crossings which would need to be upgraded;
- an operations control building with parking and welfare facilities;
- two potential substation compounds;
- an energy storage facility with a capacity of c. 20 MW;
- Telecommunications equipment;
- up to two temporary construction compounds;

- three borrow pit search areas, to provide suitable rock for access tracks, turbine bases and hardstandings; and
- underground cabling linking the turbines with the substation.

7.6.2 Direct or indirect impacts upon buried archaeological remains have the potential to occur during construction as a result of intrusive groundworks. The Proposed Development would remove any previously unknown buried archaeological remains within its footprint. Activities which may have an impact upon buried archaeological remains include construction enabling works, any areas of cut and fill, bulk excavation and topsoil stripping, site compound establishment and excavations for footings, tracks, and cables. Groundwork activities within the ISA as described above have the potential to truncate or remove buried archaeological remains, resulting in a direct impact on these assets.

7.6.3 At the access area, a 5.5 m running width would be needed with 1 m shoulder verge each side (if required), which can be accommodated by the existing track. Up to 7 m would be needed on bends, to allow for the turning of abnormal loads – these may require the existing track to be cut/filled as necessary at certain discrete locations on the bends. An existing bridge over Carter Burn (which forms the southern boundary of SM6602 Martinlee Sike, farmstead, field system and assart bank) may need to be reinforced (depending on detailed design).

7.6.4 Setting impacts upon heritage assets may occur as a result of the construction and operation of the Proposed Development causing visual or other sensory changes (such as noise, light, movement) within their settings, such that our ability to understand, appreciate or experience the significance of the asset is adversely (or beneficially) affected.

7.6.5 Likely significant environmental effects have been considered after taking into account any inherent mitigation designed into the Proposed Development, set out in **Chapter 2: Proposed Development**.

7.7 Predicted Impacts

Construction Effects

Direct Impacts

7.7.1 There are 19 known heritage assets located within the turbine area identified in **Table 7.6** below.

7.7.2 Three are Scheduled Monuments of high (national) importance (SM3425, SM3423, SM10605), all of which have been avoided through design and would not be directly impacted by the Proposed Development.

7.7.3 There are 16 non-designated heritage assets of low (local) importance, all but two of which are avoided through design and would not be directly impacted by the Proposed Development.

7.7.4 Two known heritage assets within the turbine area that would be impacted by the Proposed Development layout are 179517 Wheel Causeway (non-designated section) and 75659 Croft Plantation Holloway, both former trackways. Each of these assets is crossed once by Proposed Development access tracks. The trackways themselves would remain open and accessible, with their historic function appreciable. Only a very small part of their fabric (any earthworks, where present) would be physically disturbed by construction works. It is considered that the Proposed Development would have a negligible adverse impact on the cultural significance of 179517 and 75659, assets of low (local) importance, resulting in a negligible adverse significance of effect which is not significant in EIA terms.

7.7.5 At Martinlee Plantation, where an existing track proposed for the access area leaves the A6088, it immediately passes adjacent to the east of three Scheduled Monuments (SM6599, SM6600 and SM6601), and through non-designated 74615 Martinlee Sike Archaeological Landscape. The track then passes through Scheduled Monument SM6602 Martinlee Sike, farmstead, field system and assart bank. The access area predominantly follows the existing track: however, some limited upgrade works would be required to accommodate the abnormal indivisible loads proposed.

7.7.6 An archaeological walkover survey was carried out to assess the condition of the known heritage assets alongside the existing forestry track. To the east of SM6599, SM6600 and SM6601, the ground to both sides of the existing track is scrubby, used for rough pasture, with an existing drainage channel running alongside it. An inspection of the field to the west of the track, containing the Scheduled Monuments, indicated no surface archaeological earthworks or features. Further along the existing trackway to the south, in the vicinity of the required crossing of the Carter Burn, the access area crosses the western end of the Scheduled Monument SM6602 Martinlee Sike, farmstead, field system and assart bank. An inspection of this area indicated the only visible archaeological remains in proximity to the existing trackway is slight rig and furrow earthworks. Mapping of survey results on Canmore (74615) indicates the presence of field banks in the vicinity of Carter Burn bridge.

7.7.7 It is anticipated that any cut/fill in the access area at certain discrete locations on the existing track bends to allow for the turning of abnormal loads would be carried out to the east of the existing track and avoid any groundworks within the boundary of SM6601 and SM6599, assets of high (national) importance. Any required works would, therefore, be located within non-designated 74615 Martinlee Sike Archaeological Landscape. Any remains alongside the existing track at this location are of low (local) importance. The required works are not at this stage subject to detailed design, however, a swept path analysis (**Figure 7.1**) indicates that only a very small part of the fabric of the area would be physically disturbed by construction works. It is considered that the Proposed Development would have a negligible adverse impact on the cultural significance of 74615, an asset of low (local) importance, resulting in a **Negligible adverse** significance of effect which is **not significant** in EIA terms.

7.7.8 Cut and fill operations at certain discrete locations in the access area to allow for the turning of abnormal loads and reinforcement works to the existing bridge over Carter Burn may be required within the designated boundary of Scheduled Monument SM6602 Martinlee Sike, farmstead, field system and assart bank, an asset of high (national) importance. The required works are not at this stage subject to detailed design, however, a swept path analysis (**Figure 7.1**) indicates that only a very small part of the fabric of the designated area would be physically disturbed by construction works. The ends of three field banks may be further directly impacted to either side of the existing forestry track, where this has been previously constructed through the banks. It is considered that the Proposed Development would have a negligible adverse impact on the cultural significance of SM6602 Martinlee Sike, farmstead, field system and assart bank, an asset of high (national) importance, resulting in a **Minor adverse** significance of effect which is **not significant in EIA terms**.

7.7.9 Accidental direct impacts upon the heritage assets within the ISA may arise should activities such as, but not limited to, ancillary drainage works and uncontrolled plant movement take place in the vicinity of heritage assets.

7.7.10 Depending on the final Proposed Development access track design, further assessment may be required upon SM6602 Martinlee Sike, farmstead, field system and assart bank. HES has confirmed that this can be carried out at a later date, if necessary, once the Proposed Development's project parameters are confirmed (see paragraph 7.8.16 below).

Table 7.6: Heritage Assets in the Land Within the ISA

Ref	Name/Description	Period	Status	Importance
Within the Turbine Area				
SM3425 / 56836	Westshiels, spur earthwork 1550m SW of	Medieval	Scheduled Monument	High
SM3423 / 179517 / 344244	Wheel Causeway, section 640m long on S slope of Wardmoor Hill	Medieval	Some of this area is a Scheduled Monument	High (scheduled section) / Low
SM10605 / 56832	Tamshiel Rig, fort, settlement and field system	Prehistoric	Some of this area is a Scheduled Monument	High
56819	Wolfehopelee Burn linear earthwork	Unknown	Non-designated	Low
344243	Wheel Causeway Road	Medieval	Non-designated	Low
74659	Croft Plantation holloway	Unknown	Non-designated	Low
HA1	Possible hut circle in LIDAR data	Prehistoric	Non-designated	Low
HA2	Row of enclosures in LIDAR data	Later historic	Non-designated	Low
HA3	Possible enclosure in LIDAR data	Later historic	Non-designated	Low
HA4	Westshiels Farmstead on Roy's Lowlands Map (1752-55)	Later historic	Non-designated	Low
HA5	Sheepfold Shown on 1st ed OS 1866	Later historic	Non-designated	Low
HA6	Sheepfold Shown on 1st ed OS 1866	Later historic	Non-designated	Low
HA7	Sheepfold Shown on 1st ed OS 1866	Later historic	Non-designated	Low

Ref	Name/Description	Period	Status	Importance
HA8	Sheepfold Shown on 1st ed OS 1866	Later historic	Non-designated	Low
HA9	Sheepfold Shown on 1st ed OS 1866	Later historic	Non-designated	Low
HA14	Sheepfold Shown on 1st ed OS 1866	Later historic	Non-designated	Low
HA15	Sheepfold Shown on 1st ed OS 1866	Later historic	Non-designated	Low
HA16	Sheepfold Shown on 1st ed OS 1866	Later historic	Non-designated	Low
HA17	Sheepfold Shown on 1st ed OS 1866	Later historic	Non-designated	Low
Within the Access Area				
SM6599 (includes part of 74648 & 74615)	Martinlee Sike, enclosure bank, field system, cairns & old road	Medieval	Scheduled Monument	High
SM6601 (includes part of 74648)	Martinlee Plantation, homestead SE of Martinlee Sike	Prehistoric	Scheduled Monument	High
SM6602 (includes part of 74615 & 74616)	Martinlee Sike, farmstead, field system and assart bank	Medieval	Scheduled Monument	High

Archaeological Potential

7.7.11 Direct construction impacts on previously unknown heritage assets in the turbine area are possible. An assessment of effect significance cannot be meaningfully evaluated for unknown heritage assets, as neither the cultural significance of the asset nor the magnitude of the impact can be known. Consequently, only the likelihood of construction effects is considered.

7.7.12 The majority of the turbine area is considered to be of generally low archaeological potential, however, this may be up to medium potential in the vicinity of known heritage assets: Tamshiel Rig, fort, settlement and field system (SM10605), Westshiels farmstead (HA4), and the LIDAR remains HA1, HA2 and HA3.

7.7.13 Below ground remains that have been damaged by later/modern activities are likely to be of low importance. Based on the assessment of known heritage assets in the vicinity, any effect resulting from an impact upon archaeological remains discovered during the construction-phase without application of mitigation is likely to be of no more than **Minor adverse** significance of effect which is **not significant** in EIA terms.

7.7.14 The archaeological potential of the access area where it passes through known heritage assets is medium. The archaeological potential of the remainder of the access area is low. Below ground remains that have been damaged by later/modern activities are likely to be of low importance, but any remains within and associated with Scheduled Monument SM6602 Martinlee Sike, farmstead, field system and assart bank would be of up to high importance. Based on the assessment of known heritage assets in the vicinity, any effect resulting from an impact upon archaeological remains discovered during the construction-phase without application of mitigation is likely to be of no more than **Minor adverse** significance of effect which is **not significant** in EIA terms.

Construction Phase Setting Effects

7.7.15 The assessment of potential setting effects upon heritage assets within the ISA and OSA as a result of the construction stage of the Proposed Development, through the introduction of increased traffic, construction noise/dust, and the visual intrusion of cranes etc to the landscape, is the same as those assessed under 'operational effects' below. Construction effects would be temporary and, therefore, **not significant** in EIA terms due to their very short duration.

Operational Effects

Prehistoric Forts

7.7.16 Hillforts generally begin to appear in the Iron Age although some may be built on the sites of earlier Bronze Age enclosures. As a class of monument these comprised settlements or places of refuge, intentionally placed on hilltops, ridges, spurs or promontories and surrounded by one or more constructed circuits of banks and ditches. There are examples of prehistoric forts which are situated on the lower or middle foothills, such as SM10605 Tamshiel Rig, fort, settlement and field system and which are less prominent in the landscape. Their visual prominence over parts of their landscape setting is primarily thought to relate to defence, but they are also a display of power and influence.

7.7.17 Prehistoric forts derive much of their cultural significance from preserved intrinsic archaeological remains and archaeological potential. If subject to archaeological excavation, the forts have the potential to further elucidate the particular construction methods and dating of these monuments and provide insight into the nature of prehistoric society and how they interrelated. Contextually, prehistoric hillforts can in some cases derive their cultural significance from their prominent positions which overlook and control a hinterland through being clearly visible over long distances. They may have been placed in the landscape to be intervisible, although their contemporaneity cannot always be assumed. Prosaically, forts also derive contextual significance from their locations generally close to good free-draining arable land and close to a water source, and it is access to these resources that the hillfort was likely constructed in order to defend. Local arable land and access to water generally form the hinterland which forts overlook and control and are an important contextual element in how they are understood within the wider landscape.

SM10605 Tamshiel Rig, Fort, Settlement and Field System

7.7.18 Tamshiel Rig is located partially within the turbine area. The western section of the fort that is located within the turbine area is recorded on the SBC HER as a non-designated asset, but the remainder, which borders the turbine area is a Scheduled Monument. The monument is only partly designated due to differential preservation through historic forestry activity damage. Previous intrusive investigation aimed to evaluate the impact of forestry activity on archaeological remains. The report[69] identifies that forestry root activity has had an effect on some archaeological remains at Tamshiel Rig. The extent of damage is variable, concluded to depend on the proximity of trees in relation to archaeological features along with root type and drainage conditions.

7.7.19 The monument comprises the remains of a nearly circular multivallate fort, and a later settlement and field system, dating from the later first millennium BC, visible as upstanding earthworks. The monument was originally scheduled in 1961, but was de-scheduled in 1990, in the mistaken belief that forestry ploughing had largely destroyed the site. Although the western section of the monument was seriously damaged by ploughing, the rest of the site initially survived afforestation until more recently. The scheduled area recognises both the importance of the remains and their survival. For the purposes of this assessment, the whole of the fort is considered equivalent to a Scheduled Monument, SM10605 Tamshiel Rig, fort, settlement and field system is, therefore, of high (national) importance.

7.7.20 The monument lies between 240 m and 270 m above Ordnance Datum (AOD) on the north-facing slope of Tamshiel Rig, overlooking the Black Burn, which curves around its northern and eastern sides. The fort, with an overall diameter of about 85 m, is bounded by two banks with a median ditch. This earlier phase of activity was replaced by a walled settlement superimposed upon the fort, containing several stone-walled huts. Expansion of the settlement is suggested by the presence of further huts outside the enclosure wall. The later settlement is also roughly circular on plan and measures c. 40 m in diameter, within an earth and stone bank c. 3 m wide and up to 1 m high. There are the remains of several roundhouses within the ramparts and there is an entrance on its east side.

7.7.21 The remains of an extensive field system are present around the west and north sides of the fort and settlement. The field system is enclosed by a sub-circular arrangement of field banks. At a much later date, stone has been taken from the fort and settlement to build a sheepfold, which occupies the north-west quarter of the settlement.

7.7.22 The site is situated roughly on lower slopes which eventually lead to the peak of Carlin Tooth, approximately 4 km to the south and between 40 m and 60 m above the valley defined by the Jed Water approximately 2 km to the north. The Black Burn is located 360 m to the east and would have been an important water source for the inhabitants of the monument. Another watercourse, Fell Burn, is located approximately 150 m to the west. In the wider area, there are other prehistoric monuments such as SM2211 Southdean Law, fort & settlement, located approximately 3 km to the north, 55146 Black Hill settlement located 5 km to the west, and 56831 Highlee Hill settlement located c. 3 km to the north-west. The presence of these nearby, possibly (at times) contemporary monuments highlights the suitability of the area for settlement and it is within this wider prehistoric landscape that SM10605 Tamshiel Rig, fort, settlement and field system is understood.

7.7.23 From the east the monument is approached through dense forestry rides which obscures any views of the earthworks or ditches until within its designated boundaries. It is experienced within mature commercial forestry tight to all sides. The monument itself is overgrown with self-seeded evergreen trees, albeit with occasional gaps, which allow

[69] CFA, March 1996, published in Discovery and Excavation in Scotland by CSA, November 1996, p90.

limited views of the later earth and stone bank which defines the later settlement superimposed on top of the original fort. Due to the trees and heath which characterises any gaps between the trees, it is difficult to gain a sense of the monument as a whole, with any extant remains experienced only within their immediate vicinity. The field system at the west and north and the roundhouses at the east are indiscernible although the later post-medieval sheepfold at the north-west of the monument remains extant allowing for an appreciation of how the site has been re-used over time.

7.7.24 From the monument, views are currently obscured in all directions by commercial forestry although there are limited views to the north through the trees towards distant arable land from the area approximately 20 m north-east of the post-medieval sheepfold. Topographically, the Iron Age the fort would have overlooked lower-lying arable land around the Black Burn to the north and east. Any intervisibility with SM2211 Southdean Law, fort & settlement or 56831 Highlee Hill which may have existed is obscured by commercial forestry albeit there is no clear evidence that such views would have been possible or significant in the prehistoric period. CHVP3 Wireline **Figure 7.3** shows that Tamshiel Rig and Black Hill settlements were not intervisible. Gaps in the plantation allow a glimpse of views to the west, in the direction of the Proposed Development, to where topography limits any long-range views in this direction.

7.7.25 In its current state, the contribution made by setting to the cultural significance of the monument is limited by the commercial forestry which defines how it is experienced. The monument's setting within forestry means it is experienced as separate parts, with individual elements of the monument only becoming apparent when within their immediate vicinity; any medium-long range views in which the monument may once have been appreciated are currently obscured, limiting the ability of the visitor to appreciate how it functioned in relation to the wider landscape. Should the commercial forestry be removed in the future, the monument would be more appreciable in a more open setting, although there is no evidence that in the Iron Age the immediate surroundings of the fort were not forested at this time.

7.7.26 Unless the commercial forestry is removed it is unlikely that any view of the proposed eastern substation option would be visible from Tamshiel Rig.

7.7.27 It may be possible for a visitor's experience of Tamshiel Rig to be affected by noise from turbines and substation from the vicinity of the monument once operational.

7.7.28 CHVP3 Wireline **Figure 7.3** indicates that the hubs of all 13 proposed turbines would be visible in west facing views from SM10605 Tamshiel Rig, fort, settlement and field system, with the nearest, Turbine T03, located 634 m to the north-west of the non-designated part of the monument, and 732 m from the Scheduled Monument. Turbine T01 would be located 860 m from the Scheduled Monument. This would constitute a change to views in this direction. There is no evidence that views in this direction contribute to the cultural significance of the monument. Views west along both the 250 m and 260 m AOD contours appear to be relatively limited and not key in understanding how the monument functioned in the landscape. The positioning of the monument on a north facing slope in between two burns to the east and west would have drawn views to the north towards both the Black Burn and the valley defined by the Jed Water to the north. Such views to the north remain discernible. If the landscape were unforested at this time, the monument would have been at least partially visible in views back towards it from this area; although the fort would not have been a prominent landmark, situated as it is on the lower slopes of a hill which has its peak over 4 km to the south. The settlement and field system earthworks indicate the area, which was exploited for cultivation and settlement, with the natural limits beyond this to the east and west likely to have been defined by the two burns. The monument is, therefore, understood and appreciated in relation to these natural landmarks and in relation to the low-lying land to the north rather than in relation to the turbine area. Whilst there are other prehistoric monuments in the wider area, approximately 3 km to the west and north, there is no evidence the monument was sited with intentional intervisibility with any particular contemporary monument, and their presence and any relationship is only appreciable through map-based analysis.

7.7.29 The monument does not appear as a prominent landscape feature; based on its topographic position, it is unlikely to have appeared as such in the prehistoric period. No intentional intervisibility with other contemporary monuments has been identified. The proposed turbines would, therefore, not challenge how the monument is understood in relation to its local setting or in relation to other monuments. It would also remain possible to experience the extant earthwork features of the monument, understand how it was used for cultivation and settlement in the prehistoric period and gain an appreciation of how its use and form changed over time.

7.7.30 The monument is currently experienced within a quiet, rural setting. As such, the presence of the proposed turbines may introduce noise which would change how the monument is experienced. However, it is considered that experiencing the monument within a quiet setting makes only a minor contribution to its cultural significance and the introduction of noise would not change how it is understood and appreciated.

7.7.31 As there may be some noise from turbines, which would mark a change to one's experience of the monument it is considered that the Proposed Development would have a negligible impact on the cultural significance of SM10605 Tamshiel Rig, fort, settlement and field system, an asset of high importance. This results in a **Minor adverse** significance of effect which is **not significant** in EIA terms.

7.7.32 In the terms of SPP paragraph 145, the understanding, appreciation, and experience of Scheduled Monument SM10605 Tamshiel Rig, fort, settlement and field system would be adequately retained such that the integrity of setting would not be adversely affected. Whilst the Proposed Development would change west facing views from the monument, it would remain possible to understand, appreciate and experience factors of its setting that contribute to its cultural significance. The fort's intentional landscape position in relation to the natural landmarks of Black Burn and Fell Burn, overlooking low lying arable land to the north and east (even though views to these areas are not currently appreciable), and the relationship between the areas of settlement and wider cultivated land defined by earth and stone banks would be adequately retained.

<u>SM2211 Southdean Law Fort and Settlement</u>

7.7.33 This fort occupies the western of the two summits that make up the top of Southdean Law. Pear-shaped on plan, it measures about 88 m north-east to south-west by up to 46 m transversely within two ramparts up to 12 m apart. Both ramparts are reduced to scarps, the outer studded with intermittent outer facing stones on the south-west quarter and have been largely obliterated on the north-east by an overlying late Iron Age settlement comprising up to twelve stone-founded round-houses and platforms with a series of scooped courts and enclosures. Probably reusing the entrance into the fort on the east, the south-west side of this settlement is bounded by a bank that cuts across the interior of the fort from north-east to south-west and may even be the remains of an independent enclosure taking in the summit. As a Scheduled Monument, SM2211 Southdean Law, fort & settlement is of high (national) importance.

7.7.34 The physical remains of the fort itself are situated on a south-west facing slope near the hill summit. The hill on which the fort is positioned is bound to the south, west and north by the Jed Water which flows from the higher ground to the south and skirts the lower slopes of the hill. Carter Burn forms a valley to the south-east of the hill and would have been another important natural resource for occupants of the fort. Commercial forestry currently characterises the area to the east. Arable land is present to the north, west and south and would have formed the hinterland which the fort was intended to dominate and control. There are nearby possibly contemporary monuments present in the wider area, with SM2173 Bonchester Hill fort located approximately 4.6 km to the north-west, SM10605 Tamshiel Rig, fort, settlement and field system located approximately 3 km to the south and SM2152 Shaw Craigs, fort located approximately 3 km to the east. The presence of other prehistoric sites in the wider vicinity of the fort highlights the suitability of this area for settlement during this period and provides insight into how areas of the landscape were controlled in a limited local context, as the territories were unlikely to have overlapped significantly.

7.7.35 The hill is the most prominent natural feature in the locality of Southdean. Volume XII of the Old Statistical Account of Scotland[70] relates a local anecdotal tradition that nearby prehistoric forts were positioned within view of SM2211 Southdean Law, fort & settlement as the fort was used as a place of observation, on which fires were lit at the approach of an enemy.

7.7.36 On the approach to the fort from the west, the hill on which it is set becomes visible from a range of approximately 2.9 km, appearing as a notable landscape feature in south-easterly views along the A6088 on the western approach towards Chesters. The hill is less imposing on the approach from the east, with a block of woodland obscuring its peak, somewhat limiting its dominance. The hill appears at its most imposing when viewed from the south-west where it clearly overlooks and imposes on this area of arable land, and from where the fort's earthworks are appreciable.

7.7.37 From the south-west facing slope of the fort there are clear views to the south, south-east and south-west which overlook the low-lying arable land either side of the Jed Water, with longer range views of commercial forestry also possible. The valley created by Carter Burn to the south-east is clearly appreciable in south-east facing views which highlight the connection between the fort and this important natural resource. To the north-west there also clear open views which take in the hills on which both SM2173 Bonchester Hill fort, approximately 4.6 km to the north-west and SM2129 Rubers Law, fort & Roman signal station approximately 8.2 km to the north-west are located. Intervisibility with other prehistoric forts provide context for how the wider landscape and access to productive arable land was controlled in this period. Intervisibility with SM10605 Tamshiel Rig, fort, settlement and field system would have been possible also, given Southdean Law fort's prominent position, although, Tamshiel Rig was not positioned prominently. (Intervisibility is currently obscured by commercial forestry, however). From the fort, views to the north and east are limited to the summit of the hill; outwith the fort, from the summit of the hill views to the north and east are largely of the Jed Water valley and neighbouring hills. In

[70] Old Statistical Account of Scotland Volume XII published in 1794 for the Parish of Southdean.

east facing views, it is not possible to discern SM2152 Shaw Craigs, fort, located approximately 3 km away due to the intervening topography and the presence of commercial forestry. The physical remains of the fort are also clearly appreciable and allow for an appreciation of how the hill was evidently settled and occupied in prehistory.

7.7.38 The contribution that setting makes to the cultural significance of SM2211 Southdean Law, fort & settlement derives primarily from the informative south-east facing views from the fort along the Jed Water valley, south and south-west facing views over arable land and the Jed Water and north-west facing views which take in both SM2173 Bonchester Hill fort and SM2129 Rubers Law, fort & Roman signal station. In addition, the locally dominant nature of the hill is best appreciated on the western approach from the A6088 and when viewing it from the fields immediately south of the Jed Water. These views to and from the monument highlight how the inhabitants of the fort would have been able to monitor and control both the low-lying arable land to the south and access to fresh water from the Jed Water. Views to the south and south-east beyond the Jed Water valley and beyond the arable land immediately south of the Jed Water whilst long ranging, do not contribute significantly to how the fort is understood and appreciated in relation to its key local setting. Views to the north-west are important in terms of placing the fort in its wider later prehistoric context, with hillforts becoming increasingly common at this time. The relative proximity of the forts to one another allows for interpretation of how local areas were perhaps controlled, limiting the ability of any one settlement to dominate large areas.

7.7.39 CHVP18 Photomontage **Figure 7.4** indicates that the hubs of all 13 of the proposed turbines would be visible in south-west facing views from the fort, with the nearest, Turbine T07, located approximately 2.6 km away. Whilst this would constitute visual change in south-west facing views from the fort, it is considered that the area of the proposed turbines does not play a significant role in how the fort is understood, appreciated and experienced. Views to this area from the fort and surrounding area do not significantly contribute to its cultural significance.

7.7.40 It would remain possible to understand how the fort functioned within its key local setting in relation to Carter Burn valley, the Jed Water, and the local arable land to the south. There would also be no interruption of views to the other prehistoric hillforts visible from the fort, or vice versa, and thus it would remain possible to appreciate the relationship between these monuments. Whilst views to the fort on the approach from the west would undergo change, it would remain possible to understand how the fort would have dominated its local area; this would not be challenged by the proposed turbines, over 2.6 km away. It would remain possible to understand, appreciate and experience the function and landscape position of SM2211 Southdean Law, fort & settlement.

7.7.41 As the fort was placed on a natural landscape high-point with intentional outward defensive views in which the proposed turbines would be prominently visible, it is considered that the Proposed Development would have a negligible impact on the cultural significance of SM2211 Southdean Law, fort & settlement, an asset of high importance. This results in a **Minor adverse** significance of effect which is **not significant** in EIA terms.

7.7.42 In the terms of SPP paragraph 145, the understanding, appreciation and experience of Scheduled Monument SM2211 Southdean Law, fort & settlement would be adequately retained such that the integrity of setting would not be adversely affected. Whilst the Proposed Development would change views from the monument, it would remain possible to understand, appreciate and experience factors of its setting that contribute to its cultural significance. The fort's intentional landscape position in relation to the natural landmarks of Carter Burn and Jed Water, overlooking low lying arable land to the south and south-west, and the relationship with contemporary hillforts to the north and north-west, as well as the hillfort's intentional prominence, would be adequately retained.

SM2173 Bonchester Hill Fort

7.7.43 The fort is situated on the summit of Bonchester Hill approximately 0.8 km east-south-east of Bonchester Bridge. The fort comprises a series of enclosure banks and ditches which were constructed over various episodes of building and remodelling. Excavations carried out in 1906 and 1950 found the earliest fortification was a stone wall measuring between 3 m and 3.6 m in width which was built round the top of the summit-knoll to enclose an area measuring internally approximately 105 m north-south by approximately 85 m transversely. Outside the north arc of this wall, excavation revealed two more walls without a trace remaining on the ground. Additional banks were beyond the original enclosure and remain extant. Within the original fort enclosure, the remains of the stone foundations of eight roundhouses which varied in internal diameter from 5.7 m to 9.7 m were noted during the excavations. Between the original enclosure and the later one, a further 16 roundhouses, similar to those within the original enclosure, were identified. As a Scheduled Monument, the fort is of high (national) importance.

7.7.44 The fort is set on a hill which is bound to the west by the Rule Water and to the east by the Fodderlee Burn; from these locations, the slopes leading to the summit of the hill are particularly steep, giving the impression of the hill as an imposing local feature. As with the other forts in this area, its proximity to fresh water would have been an important aspect of the fort's siting and would have been an important resource for its inhabitants to both use and control. Arable land characterises the land either side of the Rule Water and Fodderlee Burn and would have formed the wider area over which the fort was intended to control and dominate. There are other possibly contemporary prehistoric monuments in the vicinity, the closest of which, SM2172 Bonchester Hill earthworks, lies approximately 150 m downslope to the north. This monument, largely outwith the ZTV for the Proposed Development, comprises the remains of enclosure banks and ditches as well as several possible roundhouses thought to date to the late Iron Age. SM2211 Southdean Law, fort & settlement lies approximately 4.6 km to the south-east whilst SM2129 Rubers Law, fort & Roman signal station lies approximately 4 km to the north-west. SM2173 Bonchester Hill, fort can, therefore, be understood, and appreciated, as part of a wider prehistoric landscape, situated between two locally prominent hillforts and close to broadly contemporary settlement 150 m to the north.

7.7.45 SM2173 Bonchester Hill, fort appears as a prominent landmark on the approach from the west and east along the A6088, coming into view from a range of approximately 2.3 km and 1.6 km respectively. The peak of the hill is obscured from view by woodland on the approach from the south and only comes into view from a range of approximately 700 m. From the north along the B6357, views are obscured by tall hedgerows and trees which defines the road and the single-track offshoot which skirts the bottom of the hill on which SM2173 Bonchester Hill, fort is set. From the wider area, the setting of the fort is, therefore, best appreciated in views from the west and east along the A6088.

7.7.46 From the fort itself, views are drawn to the south, south-west and west all of which are clear and open, taking in both local arable land as well as the valley defined by the Rule

Water. Access to both water and good arable land would have been key to the siting of the fort and it is possible to understand this aspect of the fort's setting when looking towards these areas of the landscape. To the south-east it is possible to see the hill on which SM2211 Southdean Law, fort & settlement is located although it is not particularly prominent as a landmark feature and is dominated by a higher ridgeline further to the south-east. It is, however, possible to appreciate that a similar prehistoric feature would have been present in this location with the area towards the hill likely to have been under the control of the inhabitants of SM2211. In north-west and north facing views, there are clear views of the hill on which SM2129 Rubers Law, fort & Roman signal station is located; in these views, this hill is particularly imposing. It is possible to appreciate how areas further to the north-west towards SM2129 would likely have been controlled by its inhabitants. Views towards the earthworks which form SM2172 approximately 150 m to the north are possible and allow for an appreciation of how the local area was settled within a broadly similar period as SM2173 Bonchester Hill, fort.

7.7.47 The contribution that setting makes to the cultural significance of SM2173 Bonchester Hill, fort derives primarily from the informative south, south-west and west facing views from the fort which take in local arable land and the Rule Water valley, south-east facing view towards SM2211 Southdean Law, fort & settlement and north-west facing view towards SM2129 Rubers Law, fort & Roman signal station. Such views allow for an appreciation of the extents of the wider landscape which the fort dominated, defined by access to fresh water, cultivatable land, and the presence of contemporary settlements. From these, it is possible to understand how the inhabitants of SM2173 Bonchester Hill, fort would have controlled the local hinterland. Whilst there are more distant views to the south-east, south and south-west, the wider landscape which this takes in does not play a significant role in how SM2173 Bonchester Hill, fort functioned. Views to the monument are limited to the eastern and western approaches; from these directions, it is possible to appreciate how the fort would have appeared dominant in its local context.

7.7.48 CHVP20 photomontage **Figure 7.5** indicates that the hubs of all 13 of the proposed turbines would be visible in south-east facing views from the fort, with the nearest, Turbine T09, located approximately 5.0 km away. Whilst this would constitute visual change in south-east facing views from the fort, it is considered that the turbine area does not play a significant role in how the fort is understood, appreciated and experienced. As such, views to this area from the fort and surrounding area do not significantly contribute to its cultural significance.

7.7.49 It would remain possible to understand how the fort functioned within its key local setting in relation to Rule Water and Fodderlee Burn and the local arable land to the south. There would also be no interruption of views to the other prehistoric hillforts, retaining possible intentional visual relationships between these features. Whilst the proposed turbines would appear in views towards SM2211 Southdean Law, fort & settlement, they would appear to the south of this hillfort and would not appear dominant over it. As such, the relationship between SM2173 and SM2211 would not be interrupted, and it would remain possible to understand and appreciate the relationship between the two forts. Views to the fort from the western approach would undergo a level of visual change, however, it would remain possible to understand and appreciate the fort as a centre of local power it would remain as the dominant local feature in this part of the wider landscape. It would remain possible to understand, appreciate and experience the function and landscape position of SM2173 Bonchester Hill, fort.

7.7.50 As the fort was placed on a natural landscape high point with intentional outward defensive views in which the proposed turbines would be prominently visible it is, therefore, considered that the Proposed Development would have a negligible impact on the cultural significance of SM2173 Bonchester Hill, fort an asset of high importance. This results in a **Minor adverse** significance of effect which is **not significant** in EIA terms.

7.7.51 In the terms of SPP paragraph 145, the understanding, appreciation and experience of Scheduled Monument SM2173 Bonchester Hill, fort would be adequately retained such that the integrity of setting would not be adversely affected. Whilst the Proposed Development would change views from the monument, it would remain possible to understand, appreciate and experience factors of its setting that contribute to its cultural significance. The fort's intentional landscape position in relation to the natural landmarks of Rule Water and Fodderlee Burn, overlooking low lying arable land to the south, and the relationship with contemporary hillforts, as well as the hillfort's intentional prominence, would be adequately retained.

SM2129 Rubers Law, Fort and Roman Signal Station

7.7.52 SM2129 Rubers Law, fort & Roman signal station is a complex fortification enclosing the summit and upper slopes of Rubers Law, a rugged and distinctive hill located between Jedburgh and Hawick. The principal remains can be divided into two elements: a prehistoric settlement enclosure on the summit, with an annexe taking in a terrace and a rocky ridge on the south-east, and a large outer enclosure contouring along natural terraces lower down the slope. The settlement at the summit is enclosed by what has been a substantial wall extending round the craggy lip of the summit and measures internally c. 72 m east-north-east to west-south-west by a maximum of 32 m transversely. There is a well-defined entrance at the ENE end, and a possible second entrance at the west end of the south-east side. Apart from a mound towards the ENE end of the grassy hollow between the rock outcrops forming the summit area, the interior is featureless although a 1907 excavation found what may be the remains of a rampart beneath the mound and the remains of a hut-circle elsewhere within the summit enclosure. The wall of the annexe springs from the foot of the summit on the south-west and swings round the leading edge of a terrace and along the flank of a rocky ridge to return across a gully at the foot of the summit on the south-east. Internally it measures about 90 m ENE to WSW by between 80 m and 35 m transversely. Its wall is largely reduced to a stony scarp, but where it crosses the gully on the east it forms a mound of rubble about 7 m in thickness by 0.6 m in height and the massive surviving facing-stones indicate an original thickness in the order of 3.6 m; another row of upright stones can be seen 9 m in front of the wall in this sector. An entrance on the south-west is approached by a hollowed trackway. A notable feature of the walls of both the settlement enclosure and the annexe is that they incorporate dressed sandstone blocks which may derive from a Roman structure, speculated to have been a signalling station on the summit. Several other fragments of walling can be seen to the north of the summit settlement, which are the remains of outworks controlling access up to the entrance on the ENE. Lower down the slope, however, there are the remains of a heavily ruined rampart contouring round the slope on all sides except the east, essentially following natural terraces and shoulders to form an enclosure of about 3.7 ha; an entrance on the south is approached by a hollowed trackway mounting the slope obliquely to expose the visitor's left side, while other entrances possibly utilise two natural gullies on the north. Remains of potential Medieval date were noted in a 1905 excavation, indicating that Rubers Law was used over a prolonged period of time[71]. As a Scheduled Monument, SM2129 Rubers Law, fort & Roman signal station is of high (national) importance.

7.7.53 SM2129 Rubers Law is understood as a potentially multi period site, a prehistoric fort and, possibly, a Roman signalling station. Whilst sharing some similar characteristics in terms of exerting control over the wider landscape, the functions of the prehistoric fort and possible Roman signalling station differ; the role each played in the wider landscape is, therefore, considered separately below.

7.7.54 As with the other prehistoric forts in the wider area, SM2129 Rubers Law, fort is situated close to and bound by water sources, with the Rule Water located approximately 1.85 km to the east, Dean Burn approximately 1.88 km to the west and Hallrule Burn approximately 1.89 km to the south. To the north, approximately 3.6 km away, is the River Teviot which would have been an important natural landmark and travel corridor for the region. Arable land surrounds the hill and, along with the nearby water sources, would have formed a key area which the fort controlled and dominated. There is evidence of nearby, possibly contemporary hillforts SM2173 Bonchester Hill, fort, located approximately 4 km to the south-east and SM1700 Kirkton Hill, fort approximately 5.4 km to the south-west; the presence of these settlements provides wider prehistoric context to Rubers Law. The inhabitants of Rubers Law would been able to monitor activity in this landscape setting and been able to control the local arable land. Its prominent position would have exerted a degree of control over the wider area, marking it out as an important centre of local power and it remains possible to understand and appreciate the fort in this capacity.

7.7.55 7.7.55The assumption that a Roman signalling station existed at the top of Rubers Law largely stems from dressed stones found during a 1905 excavation which, due the prominent location of them, were interpreted as being the remains of Roman tower[72]. Whilst there has been scepticism about this theory (Roman towers north of Hadrian's Wall are almost exclusively timber, instead of stone built), it is likely that Rubers Law played some sort of role in the Roman communications system[73]. In the wider area, there are Roman remains such as a temporary camp (55268) located 3.4 km to the north-west with Dere Street Roman Road is located approximately 12 km to the north-east. There are other Roman signalling stations within 30 km of Rubers Law such as SM2107 Eildon Hill North, located 17 km to the north, SM675 Mid Raeburn to Craik Cross Hill, Roman road and watch tower located 27 km to the south-west and SM2168 Brownhart Law fortlet, 21 km to the south-east. Research based on viewshed analysis conducted in 2018 indicates that these sites would have been intervisible with Rubers Law in the Roman period and would have been able to communicate with one another[74]. As such, SM2129 Rubers Law, Roman signal station can be understood and appreciated, in relation to the wider Roman remains in the area, as a link in a wider communication network. As with the prehistoric fort which preceded it, it is also likely the Romans would have monitored the local area as well as the native population who may still have lived in the nearby later prehistoric forts which characterise the area.

[71] Murphy et al (2018), Page 3.

[72] Ibid.

[73] Ibid, Page 26.

[74] Ibid, Page 27.

7.7.56 Rubers Law hill is a dominant landmark feature with views to the hill from the south on the A6088 are possible from a range of approximately 3.5 km. From the west it is visible from within approximately 3.3 km to the north-east of Cavers whilst from the east on the B6537, it is clearly visible from within 2.5 km. Views from the north towards the hill are screened by intervening topography and by tree cover. Rubers Law is, therefore,experienced from the wider landscape within the ranges noted above from the east, west and south which broadly correspond to the low-lying slopes of the hill which eventually lead to its summit.

7.7.57 When ascending the hill from the north, the prominent position of the fort at the top can be appreciated and allows for an understanding of how it would have monitored and controlled the local area. From the fort itself, there are clear, open views in all directions taking in local arable land, the Dean Burn valley to the west, the Rule Water valley to the east, as well as distant hills. To the south-west, the location of Kirkton hill is visible, although the fort SM1700 Kirkton Hill, fort itself is not clearly appreciable due to the woodland which skirts the northern extent of the monument. To the south-east there are clear views of SM2173 Bonchester Hill, fort and SM2211 Southdean Law, fort & settlement is also discernible although does not appear as a prominent feature. There are also distant views of SM2296 Penchrise Pen fort, located approximately 12.7 km to the south-west. The visibility of other possibly contemporary prehistoric forts allows for an appreciation of how control of the landscape was likely to have been divided between different settlements, with the inhabitants of each controlling a hinterland comprising arable land and access to fresh water. Intervisibility between the monuments may have aided in defence from raiding parties. It is also possible that views of these nearby prehistoric settlements were important in the Roman period, possibly as a means of monitoring the native population which lived in the area during the Roman occupation. There are clear views to the north which take in SM2107 Eildon Hill North, another Roman signalling station located 17 km away. There are no clear views of the other Roman signalling stations within 30 km of Rubers Law, or any other Romans remains in the area, although signalling fires/smoke may have been visible. As such, it remains possible to readily understand and appreciate the relationship between Rubers Law and Eildon Hill North, although the relationship between Rubers Law and the wider Roman landscape is now largely indiscernible in the wider landscape.

7.7.58 The contribution that setting makes to the cultural significance of the prehistoric fort element of SM2129 Rubers Law, fort primarily derives from the same factors which define other forts in the area. Whilst the fort is situated in a more elevated position, which provides much longer ranging view, it is the local area which makes the most significant contribution to how it is understood and appreciated. As with other forts, it has access to good arable land and access to water sources whilst its elevated position would have allowed for monitoring and control of this area. Views from the fort of arable land and the nearby valleys defined by watercourses reinforce this important aspect of its setting. Rubers Law is a dominant natural landmark and the fort at the top of it would have been a centre of local power; views to Rubers Law from the surrounding area reinforce this notion and it remains possible to appreciate the extent of control the fort would have had over the wider area. SM2129 Rubers Law, fort is set on the highest point in the region, which gives it a sense of dominating other nearby settlements and this is notable in views from the fort looking down over SM2173 Bonchester Hill fort to the south-east and SM1700 Kirkton Hill, fort to the south-west.

7.7.59 The contribution made by setting to the cultural significance of the Roman signalling station aspect of Rubers Law, Roman signal station also derives from its prominent landscape position, with recent research suggesting this would have allowed for communication between other distant signalling stations to the north, south-east and south-west. This would have allowed the Romans to continue to exert their control over the wider region; from this elevated position, they would also have been able to monitor local native settlement such as the nearby hillforts as well as the nearby valleys which were likely used as a thoroughfare.

7.7.60 CHVP19 photomontage **Figure 7.6** indicates that the hubs of all 13 of the proposed turbines would be visible in south-east facing views from the fort with the nearest, Turbine T09, located approximately 9 km away. Although this would constitute visual change to south-east facing views from the monument, it is considered that the Proposed Development lies outwith the area within which the prehistoric element of SM2129 Rubers Law, fort functioned, situated as it is 9 km to the south-east. The proposed turbines would appear in views looking towards SM2211 Southdean Law, fort & settlement, however, they would be located to the south of this monument, which in any case does not feature prominently in south-east views from SM2129 Rubers Law, fort. The proposed turbines would, therefore, not challenge or interfere with views to SM2211 Southdean Law, fort & settlement and it would remain possible to understand the wider prehistoric context which this monument provides along with SM2173 Bonchester Hill, fort to the south-east and SM1700 Kirkton Hill, fort to the south-west. The proposed turbines would also appear in views from SM2129 Rubers Law, fort towards Hallrule Burn to the south-east, but the distance at which they are located would not interfere with the relationship between SM2129 Rubers Law, fort and this important natural resource. Key views in all other directions, overlooking arable land and Rule Water/Dean Burn, and potentially the River Teviot would be retained, whilst views towards the fort would also remain unchanged. It would, therefore, remain possible to understand, appreciate and experience the monument as a locally dominant centre of power, close to good arable land and water sources which functioned within a wider prehistoric landscape.

7.7.61 The use of the site as a Roman signal station would also remain fully discernible; whilst the proposed turbines would appear in south-east facing views (the direction in which SM2168 Brownhart Law fortlet is located), any visual relationship between SM2129 Rubers Law, Roman signal station and this other signalling station 21 km away has been lost due to intervening commercial forestry. Any relationship between the two monuments is now understood through GIS generated research which concluded that it would have been possible for the two sites to communicate with one another in the Roman period. Should communication reconstruction be attempted through lighting of fires at day or night to generate smoke, a direct line-of-sight would be maintained to allow intervisibility, with the Proposed Development site located offset over 5 km to the south. As with the prehistoric element of the monument, views of the Jed Water valley looking south-east would undergo visual change as a result of the Proposed Development, but the distance at which they are located would not change the ability of the visitor to understand and appreciate how the Romans monitored this thoroughfare and the local native population. The relationship between the signalling station on SM2129 Rubers Law, Roman signal station and that on the clearly visible SM2107 Eildon Hill North to the north would remain intact; views in all other directions would undergo no change and it would remain possible to understand, appreciate and experience the Roman element of the monument as a section of a wider communication network as well as an area from which the more local area could be controlled and monitored in the Roman period.

7.7.62 As the fort was placed on a natural landscape high point with intentional outward defensive views in which the proposed turbines would be prominently visible it is, therefore, considered that the Proposed Development would have a negligible impact on the cultural significance of SM2129 Rubers Law, fort & Roman signal station an asset of high importance. This results in a **Minor adverse** significance of effect which is **not significant** in EIA terms.

7.7.63 In the terms of SPP paragraph 145, the understanding, appreciation, and experience of Scheduled Monument SM2129 Rubers Law, fort & Roman signal station would be adequately retained such that the integrity of setting would not be adversely affected. Whilst the Proposed Development would change views from the monument, it would remain possible to understand, appreciate and experience factors of the setting of the prehistoric fort that contribute to its cultural significance, as well as those relating to the Roman signal station. The fort's intentional landscape position in relation to the natural landmarks of Rule Water, Dean Burn, Hallrule Burn and the River Teviot, overlooking low lying arable land, and the relationship with contemporary hillforts, as well as the hillfort's intentional prominence, would remain adequately retained. The apparent position on the most prominent position in the region with intervisibility with contemporary monuments for the intention to function as a signal station during the Roman period would be adequately retained.

SM2152 Shaw Craigs Fort

7.7.64 SM2152 Shaw Craigs, fort is a complex fort situated on the elongated summit of the hill above Shaw Craigs, from which the ground falls away steeply on all sides. The defences exhibit three phases of construction, the most prominent of which belong to the second, comprising a belt of three ramparts extending along its north-west flank and around the north-east and south-west ends to enclose an area measuring 267 m from north-east to south-west by 52 m transversely. As a Scheduled Monument, SM2152 Shaw Craigs, fort is of high (national) importance.

7.7.65 The fort lies on an elongated ridge, bound by the Shaw Burn and low-lying arable land to the south, by arable land to the east, and by commercial forestry to the north and west. The ridge on which the fort is set is between two other ridge lines, creating the impression of a relatively limited area of control relating to the fort. There is another prehistoric fort, 56796 White Hill, located approximately 550 m to the north-west and this, along with SM2211 Southdean Law, fort & settlement, located 3.7 km to the west provide a wider prehistoric context for SM2152 Shaw Craigs, fort.

7.7.66 The ridgeline on which the fort is set is most clearly visible from the east on the minor road between the A68 and A6088. From here it is possible to appreciate how the fort would have controlled this area of low-lying ground. There are no clear views of the ridgeline outwith this area, with commercial forestry and topography obscuring any other views towards it.

7.7.67 From the fort itself there are clear views in most directions, with views east and west taking in nearby ridgelines and arable land in between. To the north, there are more open views of local and more distant arable land. Commercial forestry dominates much of the landscape to the west and obscures any views of 56796 White Hill although it remains possible to appreciate how this neighbouring ridgeline would have been under 56796 White Hill fort's control. Views of Shaw Burn are present in east and south facing views, highlighting the importance of this resource. To the west, there are no obvious views of SM2211 Southdean Law, fort & settlement and there is no clear relationship between this fort and SM2152 Shaw Craigs, fort. This contradicts the local tradition which suggests that other prehistoric forts in the area were sited in order to take in views of SM2211 Southdean Law, fort & settlement. SM2152 Shaw Craigs, fort has a clear visual relationship with White Hill which lies 550 m to the north-west, on which a prehistoric fort is annotated by the Ordnance Survey; however, no fort is recorded here by SBC HER.

7.7.68 The contribution made by setting to the cultural significance of SM2152 Shaw Craigs, fort is limited to a notably more local area compared to other forts in the wider landscape. Its position between two ridgelines leaves a relatively limited amount of intervening arable land for the fort to dominate, with the area to the north the only clear, unbounded area of arable land. The location of another prehistoric fort only 550 m to the west further highlights how power could be particularly localised in the prehistoric period, with access to good arable land and water key to the siting of both forts.

7.7.69 CHVP7 wireline **Figure 7.7** indicates that the hubs of all 13 of the proposed turbines would be visible in south-west facing views from SM2152 Shaw Craigs, fort, with the closest, Turbine T03 located approximately 4.7 km away. The visualisation represents the 'worst case' from the high point of the monument; however, visibility of the Proposed Development would be obscured from the eastern part of the ridge by the natural topography. Whilst this would constitute visual change in views to the south-west, it is considered that the Proposed Development lies outside the area within which the fort functioned. It is unlikely that the fort controlled much of the land south of the Shaw Burn, with its topographic setting creating a sense of a much more localised power centre. It is likely that the low-lying arable land either side of the ridgeline on which the fort is set and the land to the north formed the area which the fort dominated, whilst the presence of another fort to the west may have limited the extent of its influence in this direction. It would remain possible to understand, appreciate and experience the function and landscape position of SM2152 Shaw Craigs, fort.

7.7.70 As the fort was placed on a natural landscape high point with intentional outward defensive views in which the proposed turbines would be prominently visible it is, therefore, considered that the Proposed Development would have a negligible impact on the cultural significance of SM2152 Shaw Craigs, fort an asset of high importance. This results in a **Minor adverse** significance of effect which is **not significant** in EIA terms.

7.7.71 In the terms of SPP paragraph 145, the understanding, appreciation, and experience of Scheduled Monument SM2152 Shaw Craigs, fort would be retained, such that the integrity of setting would not be adversely affected. Whilst the Proposed Development would change views from the monument, it would remain possible to understand, appreciate and experience factors of its setting that contribute to its cultural significance. The fort's intentional landscape position in relation to Shaw Burn, overlooking low lying arable land would be adequately retained.

<u>SM10735 Stony Law Fort, SM1700 Kirkton Hill Fort, SM2296 Penchrise Pen Fort</u>

7.7.72 These forts are considered together, due to the distance at which they are located from the Proposed Development. SM10735 Stony Law, fort is located 10.1 km to the north-east, SM2296 Penchrise Pen, fort is located 12.0 km to the west and SM1700 Kirkton

Hill, fort is located 9.6 km to the north-west. In the case of SM1700, the fort is notably less prominent compared to others in the OSA. As outlined in paragraph 6.2.8 of EIA Report Volume 3, **Technical Appendix 7.1**, these assets form the basis of a wider discussion focussing on prehistoric settlement and intervisibility between forts. The extent to which intervisibility between forts exists and the extent to which these contribute to cultural significance is discussed along with how these may change as a result of the Proposed Development.

7.7.73 In common with the forts assessed above, all these forts comprise extant remains of ditches and ramparts, allowing the visitor to understand and appreciate how prehistoric forts may have appeared when in use, evident displays of power. They are all located in close proximity to water courses and arable land with views of both these features possible from all three forts, allowing for an appreciation of how they controlled and monitored access to resources in the local area. All of the forts are situated in close proximity to other prehistoric forts, further showing how localised power could be during the later prehistoric period. As Scheduled Monuments, these forts are of high (national) importance.

7.7.74 Of these forts, SM2296 Penchrise Pen fort is the most prominently visible from the wider area and has the clearest outward views; from here there are distant views of SM2129 Rubers Law, fort to the north-east, and closer range views of adjacent forts SM2297 Blakebillend, SM3412 Pleaknowe, SM3372 Denholm, and SM3373 Mid Hill, all of which are located outwith the ZTV for the Proposed Development, but may have had a relationship with SM2296 Penchrise Pen fort and/or one another as a group of closely-related monuments. SM2211 Southdean Law, fort & settlement, the closest fort to the Proposed Development, is not visible from SM2296 Penchrise Pen fort.

7.7.75 From SM10735 Stony Law, fort, there are clear views of SM10743 Heugh Law fort located 1.4 km to the west. SM2211 Southdean Law, fort & settlement is not visible from Stony Law fort.

7.7.76 From SM1700 Kirkton Hill, fort , SM2129 Rubers Law, fort is discernible through a gap in woodland which skirts the northern extent of the monument. It is likely this would have appeared as a dominant landmark in views north from SM1700 Kirkton Hill, fort in the prehistoric period. Although in relatively close proximity, SM2173 Bonchester Hill, fort and SM2211 Southdean Law, fort & settlement are not clearly discernible from SM1700 Kirkton Hill, fort . SM1700 is sited on a considerably less prominent hill compared to the other forts assessed here; its location on a local high point surrounded by arable land provides insight into the extent of the wider landscape it was intended to control, suggesting long-ranging defensive views may not have been as significant in the fort's function.

7.7.77 The intervisibility of other forts from these monuments, as with the other forts assessed above, are informative insofar as they demonstrate the suitability of this area of the Scottish Borders for settlement and highlight the competition for access to good arable land and access to fresh water. There is no indication that any one fort was sited to specifically interact or relate to another fort; it is more likely that any ridges or locally high areas would have been fortified in order to consolidate areas of local power and access to resources. As such, the contribution intervisibility makes to the cultural significance of forts is contextual in nature, allowing for an understanding of wider prehistoric settlement patterns. Nevertheless, the Proposed Development site is not located directly between any hillforts in the study area. (The only forts aligned with the turbine area are SM10605 Tamshiel Rig, fort, settlement and field system and SM2296 Penchrise Pen fort, however, as demonstrated on CHVP3 wireline **Figure 7.3**, no intervisibility between these monuments is possible due to topography).

7.7.78 For each of these forts, the Proposed Development is located outwith the key local areas which the forts were intended to be understood, appreciated and experienced within. There would be no interruption in views between forts from any of these assets and it would remain possible to understand how the forts functioned in relation to nearby resources and in relation to nearby, possibly contemporary settlement. CHVPs 8, 9, 16 wireline **Figures 7.8 - 7.10** demonstrate the number of turbines visible from each of these forts (12 hubs and one blade tip from Stony Law, 12 hubs and one blade tip from Penchrise Pen behind Pines Burn, and seven hubs and three blade tips from Kirkton Hill. Whilst this would constitute visual change in views from these assets, the fundamental aspects which contribute to the setting of these monuments and to their cultural significance would remain intact. It would remain possible to understand, appreciate and experience the function and landscape position of SM10735 Stony Law fort, SM1700 Kirkton Hill, fort and SM2296 Penchrise Pen fort.

7.7.79 Due to intervening distance the Proposed Development would not appear prominently in views from the forts, and thus, it is considered that the Proposed Development would have no impact on the cultural significance of SM10735 Stony Law fort, SM1700 Kirkton Hill, fort or SM2296 Penchrise Pen fort assets of high importance. This results in a significance of effect of none which is **not significant** in EIA terms.

7.7.80 It would remain possible to understand, appreciate and experience factors of setting of these Scheduled Monuments that contribute to their cultural significance. These factors that are outlined above would be adequately retained. In the terms of SPP paragraph 145, there would be no adverse effect on the integrity of the setting of Scheduled Monuments SM10735, SM1700 or SM2296 as a result of the Proposed Development.

Settlements

<u>SM10742 Goshen Hill Palisaded Settlement</u>

7.7.81 SM10742 Goshen Hill Palisaded Settlement comprises the remains of a palisaded enclosure, a defended farmstead dating from the early first millennium BC, visible as a series of upstanding earthworks. The enclosure is roughly oval in shape and measures approximately 60 m ENE-WSW by 25 m transversely. Unusually, it is encircled by two palisade trenches, some 4 m apart and both about 0.5 m wide. These trenches would have held the timber uprights of the palisades that defended and defined the enclosure, but it is not clear from the remains whether both palisades would have been in place at the same time, or whether one enclosure was replaced by another at some time during the life of the farmstead. The possible traces of up to four circular buildings have been recorded within the enclosure. As a Scheduled Monument, SM10742 Goshen Hill Palisaded Settlement is of high (national) importance.

7.7.82 The monument lies on a west-facing spur just below the summit of Goshen Hill. From the wider area, the hill is most prominently visible from the low-lying areas approximately 3 km to the west on the A68 and from approximately 1.5 km to the north. There is other prehistoric settlement in the wider area in the form of SM10735 Stony Law fort and SM10741 Plenderleith Scooped Settlement located respectively 1.3 km and 2 km to the north-east. In the wider area, SM2152 Shaw Craigs, fort is located 4.7 km to the south-west. It is within this wider prehistoric context that SM10742 Goshen Hill, palisaded settlement can be understood as functioning.

7.7.83 Palisaded settlements are generally understood to be small settlements, situated on locally prominent hills which were defended by rows of vertical timbers set into a foundation trench. Defensive earthwork ditches and banks that define the larger hillforts are not commonly present at palisaded settlements.

7.7.84 SM10742 Goshen Hill, palisaded settlement derives its cultural significance from its intrinsic archaeological potential; excavation could elucidate the nature of such defended settlements and the nature of prehistoric society. Contextually, the monument derives its cultural significance from its setting on a locally prominent hill close to good arable land and water sources in the form of Ettles Sike burn 400 m to the south, Pier Burn 1.1 km to the north-west, and How Burn 1.1 km to the north-east. It is within this local landscape, defined by arable land and water courses, with longer range views from the north and west which contribute to the monument’s cultural significance.

7.7.85 On the approach to the monument from the north, its easily defensible nature is appreciable, with Goshen Hill dominating the local area. From the monument, there are clear views to the north, north-west and west which overlook the low-lying arable land water courses. Views north-east are limited to the ridgeline and commercial forestry. Views south and south-west are also largely screened by commercial forestry which defines the southern extent of the hill on which the monument is set. There is no clear intervisibility with other prehistoric monuments in the wider area and the overall impression of the monument is that of a locally dominant settlement, easily defendable, able to monitor the local low-lying land and with good access to arable land and water.

7.7.86 CHVP17 wireline **Figure 7.11** indicates that the hubs of all 13 of the proposed turbines would be visible in south-east facing views from SM10742 Goshen Hill, palisaded settlement, with the closest, Turbine T03, located 9.4 km away. Whilst this would constitute visual change to south-west facing views from the monument, the location of the proposed turbines is considerably beyond the local area, which contributes to its setting and defines how it is understood, appreciated and experienced. It would remain possible to understand how SM10742 would have been defended and how it would have controlled the local arable land and access to water. The area of the Proposed Development 9.4 km away has no relationship with the monument and as such, visibility of it would not materially alter the cultural significance of SM10742. It would remain possible to understand, appreciate and experience the function and landscape position of SM10742 Goshen Hill Palisaded Settlement.

7.7.87 It is, therefore, considered that the Proposed Development would have a no impact on the cultural significance of SM10742 Goshen Hill Palisaded Settlement, an asset of high importance. This results in a significance of effect of **none** which is **not significant** in EIA terms.

7.7.88 It would remain possible to understand, appreciate and experience factors of setting of the Scheduled Monument that contribute to its cultural significance. These factors that are outlined above would be adequately retained. In the terms of SPP paragraph 145, there would be no adverse effect on the integrity of the setting of Scheduled Monument SM10742 Goshen Hill, palisaded settlement as a result of the Proposed Development.

56831 Highlee Hill Settlement

7.7.89 56831 Highlee Hill settlement comprises the remains of a sub-oval enclosure measuring 62 m from north to south by 55 m transversely. The enclosure is defined by an inner bank, external ditch and a counterscarp bank. The perimeter of the enclosure has been partially truncated by later cultivation, with the best-preserved section present to the south where the inner bank measures 6.5 m in thickness by almost 1 m in height above the bottom of a 3 m wide ditch. A prehistoric non-designated asset, 56831 Highlee Hill is of medium (regional) importance.

7.7.90 The settlement is situated on the rounded crest of Highlee Hill which forms a spur of higher ground to the north of and bordering the turbine area. The appearance of the settlement is reminiscent of a fort, although it is not recorded as such on the SBC HER. In common with forts, the settlement derives its cultural significance from its intrinsic archaeological remains and archaeological potential. Excavation would reveal insight into the nature of the settlement and prehistoric society. Contextually, the settlement derives its cultural significance from its position on a locally prominent site set within good, cultivatable land and with access to water.

7.7.91 Highlee Hill is a locally prominent natural landmark clearly visible from the north-west of the turbine area. Approximately 180 m to the west is White Burn, with Cleuch Burn located approximately 470 m to the east and Battling Sike burn approximately 650 m to the south. Access to fresh water would have been an important factor in the siting of the settlement. Other (non-designated) prehistoric sites in the immediate vicinity relate to the settlement and likely agriculture and include 81280 boundary dykes, 179592 enclosures, and 180358 field system, as well as undated features identified through LIDAR data analysis carried out for this assessment (HA1-3) which suggest that the wider landscape setting of the prehistoric settlement may have continued into the turbine area. It is within this wider prehistoric landscape that 56831 Highlee Hill can be understood.

7.7.92 On the approach to the settlement from the south-east, the outer bank comes into view from a range of approximately 300 m, suggesting it was intended to be prominently visible from the local area. Views north and north-west from the settlement are the longest ranging, with open views of local arable land. There are clear open views of local arable land to the north-east, east and south. SM2211 Southdean Law, fort & settlement is visible in north-east facing views. Long range views of SM2173 Bonchester Hill, fort, located 4.2 km to the north-west are possible from the settlement. Views in all other directions are largely focussed on local arable land, currently partially obscured by commercial forestry, but with views of more distant hills to the south possible.

7.7.93 56831 Highlee Hill is understood and appreciated in relation to the local arable land which would have been cultivated by the inhabitants of the settlement. It is a locally prominent site, situated at the crest of a hill and would have been sited here in order to overlook and control the local arable land, potentially as far, as the Black Water, 2 km to the east. Contemporary sites in the immediate vicinity and further afield (SM2173 Bonchester Hill, fort and SM2211 Southdean Law, fort & settlement) provide a prehistoric landscape context to the site, allowing for an understanding of related settlement. It is unlikely the site was located in order to specifically take in views of these sites, and it is the more prosaic setting of the settlement in relation to good arable land and close to a water source that make the most significant contribution to its setting.

7.7.94 CHVP12 photomontage **Figure 7.12** indicates that the hubs of all 13 of the proposed turbines would be visible from 56831 Highlee Hill, with the closest, Turbine T08, located 840 m to the south. The proposed turbines would constitute visual change to south facing views, with the northernmost turbines (Turbines T07 and T08) arguably situated within the wider hinterland within which 56831 Highlee Hill and related features functioned. Whilst this area is now commercial forestry, it is likely it would have been cleared cultivated land occupied and controlled by the settlement. Although, the Proposed Development would be a visual distraction, the proposed turbines would be located downslope from the settlement and would not visually dominate it. The location of the settlement on the crest of a hill, instead of on the south-facing slope of Highlee Hill, suggests it was sited in order to relate to not just the land to the south, but the arable land to the north, east and west, over which there are similarly clear views. Views towards other prehistoric monuments in the vicinity and further afield such as SM2173 Bonchester Hill, fort and SM2211 Southdean Law, fort & settlement, whilst not critical in understanding the settlement, would be retained along with the wider prehistoric context these views provide. As such south-facing views from the settlement form just one facet of how the monument is understood, appreciated and experienced. Whilst this would undergo visual change, it would remain possible to understand and appreciate 56831 Highlee Hill as a locally prominent site situated within arable land and close to water sources.

7.7.95 It is, therefore, considered that the Proposed Development would have a low impact on the cultural significance of 56831 Highlee Hill settlement, an asset of medium importance. This results in a **Minor** significance of effect which is **not significant** in EIA terms.

<u>SM7144 Steel Knowe, Medieval and Later Settlements and Field Systems</u>

7.7.96 SM7144 Steel Knowe, medieval and later settlements and field systems comprises the remains of a complex of well-preserved multi-period earthworks of domestic and agricultural buildings and associated field systems. Evidence of earlier prehistoric land use also survives in the form of the remains of a burial cairn on the summit of Steel Knowe and a pair of possible house platforms near the head of the Jordan Sike burn. There are a number of Medieval and post-medieval domestic and agricultural buildings within the scheduled area, including two round-ended farmsteads at the east side of Jordan Sike burn which are enclosed by a head dyke which has multiple periods of construction. Outwith the head dyke are large areas of rig cultivation, most of which dates to the medieval period, suggesting there was a period of abandonment between the medieval and the later post-medieval period. As a Scheduled Monument, SM7144 Steel Knowe, medieval and later settlements and field systems is of high (national) importance.

7.7.97 SM7144 Steel Knowe, medieval and later settlements and field systems derives its cultural significance from its intrinsic archaeological remains and potential. Historic Environment Scotland's list entry for the site outlines the intrinsic characteristics which contribute to its cultural significance:

'The grass covered earthworks which form the farmsteads and associated field systems are well defined and relatively undisturbed. Therefore, there is good potential for the survival of buried structures and archaeological deposits, artefacts and environmental information within, beneath and around the settlement. Buried archaeological deposits have the potential to provide information about the date and character of the site, while any artefacts and environmental information such as pollen or charcoal, would enhance

understanding of the economy, diet and social status of the occupants, as well as provide information about contemporary land use and environment.'

7.7.98 Historic Environment Scotland outlines the contextual characteristics which contribute SM7144 Steel Knowe, medieval and later settlements and field systems' cultural significance as follows:

'Deserted settlements are found throughout Scotland. The example at Steel Knowe is of significance as an upstanding and well-preserved example which shows multiple periods of activity from the medieval to post-medieval periods. The farmsteads are located within a landscape which holds a number of other deserted medieval farmsteads, settlement and tower houses which may be broadly contemporary. Some have similar features to this monument; enclosures, field systems and domestic buildings are all present, for instance at Martinlee Sike, farmstead, field system and assart bank (scheduled monument SM6144) and Crink Law (Canmore ID: 74608 and 74631). These farmsteads are located within the Royal Forest of Jedburgh Ettrick, where the land was administered to preserve the area as a hunting ground for the King.

It is likely that the farmsteads began as a 'forest-steads', which was a defined area of land that was let on an annual basis. The forest was in the hands of the Douglas family from 1320 and remained at least, in part, in their hands until the 18th century. In the 16th century the forest was increasing given over to feus - perpetual heritable tenures given in return for annual fixed payments. During this time many of the pele towers and bastle houses (such as Northbank Tower [Scheduled Monument SM3766: 700m north-east] and Slack's Tower [Scheduled Monument SM3770: 950m north-west]) recorded in this area were founded, often on site of earlier medieval farms.

Comparison with this monument and others in the Scottish Borders and with historic rural settlement sites in other parts of Scotland and within 'Jedburgh Forest', could enhance our understanding of regional variations in rural settlement in the medieval and post-medieval periods. It could add to our understanding of the structure of society and the form and nature of contemporary rural settlement. There may have been social, economic, community and familial links between other nearby farmsteads and tower houses/ bastles. Although based on a subsistence economy with each family supporting itself, resources may have been shared. This monument therefore has the potential to enhance and broaden our understanding of such agricultural and domestic practices.'

7.7.99 In addition to these aspects, the settlement is located in free draining soils, suitable for cultivation with access to fresh water from Jordan Sike burn which flows through roughly the centre of the site, and Carter Burn to the south.

7.7.100 SM7144 Steel Knowe, medieval and later settlements and field systems is approached from the A6088 from the south; upon entering the scheduled area at the south-east, there are no clear extant remains visible, with the first glimpse of rig cultivation, located approximately 300 m north-east of the road, only appreciable when within its immediate vicinity. From here, there are clearer views of the cultivation and settlement features which characterise the slopes either side of Jordan Sike burn, allowing for an appreciation of how this area of fertile land was used over time. From the settlement, views to the south are open and clear, taking in neighbouring farmland. Views east, west and north also take in local farmland, but are slightly more limited by topography and forestry to the north. It is the location of the settlement on a hilltop with a southerly aspect, overlooking the Proposed Development site, that has led to its selection requiring detailed assessment in this chapter.

7.7.101 Walking through the site allows for an understanding of the agricultural activities which took place here in the Medieval and post-medieval periods, with the intervisible extant remains allowing the visitor to appreciate the site as a whole. Views are naturally drawn towards the slopes leading to Jordan Sike burn and the cultivation rigs either side of it. There are no apparent important views towards specific areas of the landscape outwith the settlement, and no intervisibility with any nearby sites of Medieval date. Experiencing the site from within the scheduled area is, therefore, key in understanding and appreciating it as an example of an abandoned medieval settlement with later post-medieval remains.

7.7.102 CHVP6 wireline **Figure 7.13** indicates that the hubs of all 13 of the proposed turbines would be visible in south-west facing views from SM7144 Steel Knowe, medieval and later settlements and field systems, with the nearest, Turbine T03, located approximately 2.7 km away. Whilst this would constitute visual change to views to the south-west from the settlement, these views do not significantly contribute to how it functioned. The location of the settlement was chosen due to its free draining soils and access to water, with a southerly aspect good for growing crops, rather than a particular visual relationship to the wider landscape. The contextual aspects which contribute to the site’s significance, including its likely history as a forest-stead, it's possible historical relationships with nearby farmsteads or tower houses, and how it compares to other similar settlements in the wider area are largely understood through analysis of historical texts and maps; as such, it would remain possible to understand and appreciate the site in relation to these aspects of its setting. There are no culturally significant outward views from the settlement, with appreciative views rather focussed within its boundaries, and Jordan Sike burn providing the focal point around which the extant remains of the site can be understood contextually. The Proposed Development lies considerably outwith the area within which SM7144 Steel Knowe, medieval and later settlements and field systems functioned and would not materially change how it is understood, appreciated and experienced. It would remain possible to understand, appreciate and experience the function and landscape position of SM7144 Steel Knowe, medieval and later settlements and field systems.

7.7.103 It is, therefore, considered that the Proposed Development would have no impact on the cultural significance of SM7144 Steel Knowe, medieval and later settlements and field systems, an asset of high importance. This results in a significance of effect of **None** which is **not significant** in EIA terms.

7.7.104 It would remain possible to understand, appreciate and experience factors of setting of the Scheduled Monument that contribute to its cultural significance. These factors that are outlined above would be adequately retained. In the terms of SPP paragraph 145, there would be no adverse effect on the integrity of the setting of Scheduled Monument SM7144 Steel Knowe, medieval and later settlements and field systems as a result of the Proposed Development.

<u>SM2319 Black Hill, Settlement</u>

7.7.105 SM2319 Black Hill, settlement comprises the remains of a prehistoric oval settlement measuring 99 m from north-east to south-west by approximately 60 m transversely. It is formed by a ditch with an earthen bank on either side, but over 60 m of the north-west side has been broken and destroyed by cultivation and draining. There is evidence of cultivation in the interior and there are traces of an oval scooped enclosure at the north-west measuring 18 m by 12 m. Another oval enclosure lies just to the north-east measuring 15 m by 9 m and is also partly scooped. The rest of the interior is uneven, with no definite features. As a Scheduled Monument SM2319 Black Hill, settlement is of high (national) importance.

7.7.106 The site lies on the gentle, lower slopes of the west facing side of Black Hill within a clearing of commercial forestry. March Sike burn lies approximately 240 m to the north-west, with the Hyndlee Burn valley located approximately 500 m to the west. As with most prehistoric sites in this area, access to these water sources and views over the valley are likely to have been important aspects in the siting of the settlement. The approach to the site from the west is made through dense commercial forestry which surrounds the settlement. It is, therefore, not currently appreciable from outwith its immediate vicinity. The clearing within which site is located is overgrown, making the ditches and banks difficult to discern. The larger of the scooped areas is, however, evident. From the settlement, views in all directions are limited by commercial forestry, making it difficult to appreciate the wider landscape. It is likely that views to the west were important in terms of being able to overlook arable land and the Hyndlee Burn, allowing for a degree of control of this area. The presence of cultivation within the settlement itself suggests it did not control a particularly large hinterland and instead was focussed on utilising and improving land in its more immediate vicinity. The settlement's positioning on the lower slopes of Black Hill suggests that it was not intended to be a prominent or defended landscape feature; therefore, it is understood, appreciated and experienced within a limited area in relation to nearby watercourses and cultivatable land. Visual relationships with contemporary settlement apparently do not contribute, as there is no line of sight with nearby Tamshiel Rig, fort, settlement and field system SM10605, which would have been possible if the settlement were established on the top of Black Hill.

7.7.107 CHVP4 wireline **Figure 7.14** indicates that whilst there is no direct intervisibility with the turbine area, the blade tips of three of the proposed turbines and the hub of one turbine would be visible in east facing views from SM2319 Black Hill, settlement, with the closest turbine, Turbine T09 located approximately 995 m away. Whilst this would constitute visual change in east facing views, such views do not contribute to the cultural significance of SM2319 Black Hill, settlement. Views in this direction, when free of commercial forestry, would likely have been limited to the hillside which slopes upwards to the east. The siting of the settlement on the lower west facing slope of Black Hill suggest it was located in order to look west, over Hyndlee Burn valley and in an area which could be improved and cultivated. The presence of the Proposed Development would not change how the settlement is understood, appreciated and experienced in relation to its key local setting. It would remain possible to understand, appreciate and experience the function and landscape position of SM2319 Black Hill, settlement.

7.7.108 It is, therefore, considered that the Proposed Development would have no impact on the cultural significance of SM2319 Black Hill, settlement, an asset of high importance. This results in a significance of effect of **None** which is **not significant** in EIA terms.

7.7.109 It would remain possible to understand, appreciate and experience factors of setting of the Scheduled Monument that contribute to its cultural significance. These factors that are outlined above would be adequately retained. In the terms of SPP paragraph 145, there would be no adverse effect on the integrity of the setting of Scheduled Monument SM2319 Black Hill, settlement as a result of the Proposed Development.

HA4, Westshiels Farmstead

7.7.110 HA4 Westshiels Farmstead is located within the turbine area and comprises the remains of two structures and an associated enclosure wall. The southern structure is rectangular in plan and sub-divided into three rooms. The structure measures approximately 16 m in length and 6 m in width with a maximum height of approximately 5 m. The northern structure is rectangular in plan and measures approximately 9 m in length, 6 m in width and up to 5 m in height. The enclosing boundary wall is composed of up to three courses of roughly hewn boulders measuring up to 1 m in height. The wall remains extant at the western extent of HA4. William Roy's Military Map of Scotland (1752-55) shows a farmstead labelled as 'Westshiels' in roughly the same location as HA4; the area has, therefore, been in use since at least the 18th century. The First Edition Ordnance Survey of 1866 shows enclosures associated with the farm to the north between Rough Sike burn and Westshiels burn, an enclosure to the east between the farmstead and the Jed Water and enclosures to the west. As a non-designated heritage asset, HA4 Westshiels Farmstead is of low (local) importance.

7.7.111 The farmstead derives its cultural significance from its intrinsic remains and architectural interest. The remains of both preserved structures are examples of post-medieval agricultural dwellings common to this area. Contextually, the farmstead derives its cultural significance from its location on low lying arable land near to Rough Sike burn which lies approximately 240 m to the north, immediately south of Westshiels Burn and approximately 270 m west of the Jed Water. These water courses would have been important resources for the farmstead.

7.7.112 The farmstead is set within a copse of trees which do not form part of the commercial forestry which defines the surrounding area. The structures become visible in close proximity when passing on the forestry tracks to the east and north. The remains of the structures are contained within the area of woodland and bound by a stone dyke to the west which, along with the trees, creates a sense of seclusion associated with the farmstead. This sense of seclusion is reinforced by the views from the farmstead which are limited in all directions to the copse of trees in which it is set and surrounding commercial forestry. The enclosures associated with the farmstead to the north, west and east are no longer extant, further limiting the extent to which the farmstead is experienced within the landscape. The extant remains of the farmstead and the associated enclosure wall allow the visitor to understand and appreciate the building as a post-medieval dwelling and farm. Views outwith the copse of trees, in which the farmstead is situated, are informative in demonstrating an association with the farm's exploited land.

7.7.113 CHVP15 wireline **Figure 7.15** indicates that the hubs of all 13 of the proposed turbines would be visible in all directions from HA4 Westshiels Farmstead with the nearest turbine, Turbine T05 located approximately 400 m to the south. Whilst this would constitute visual and probable aural change to the setting of HA4, it would not significantly change how the farmstead is understood, appreciated and experienced as a post-medieval dwelling and farm. The farmstead is experienced within a limited, enclosed setting within a copse of trees; the enclosures which once defined its wider extents are no longer appreciable due to the presence of commercial forestry. The presence of the proposed turbines, whilst a change to the wider area, are not within the area that the farmstead functioned. It would remain possible for the visitor to appreciate its necessary location within arable land near to water sources.

7.7.114 It is, therefore, considered that the Proposed Development would have a negligible impact on the cultural significance of HA4 Westshiels Farmstead, an asset of low importance. This results in a **Negligible significance** of effect which is **not significant** in EIA terms.

Cairns

56834 Coblaw Plantation Cairn and 56835 Hare Cairn

7.7.115 Cairns can range in date from the prehistoric to post-medieval period and have a variety of functions; in the prehistoric period, cairns could be used as burial places whilst in the post-medieval period were often evidence of field clearance activities. The two non-designated cairns retained for detailed assessment, 56834 Coblaw Plantation cairn and 56835 Hare Cairn are not well understood, but are both located in close proximity to other prehistoric sites and it is considered likely they date to this period. Prehistoric cairns derive their cultural significance from their intrinsic archaeological remains and potential; excavation may yield information on the nature of these monuments and the nature of the societies who built them. Contextually, prehistoric cairns derive their cultural significance from their locations, potentially close to contemporary settlement in areas of cultivatable land. Cairns were usually sited to relate to the communities which built them, often overlooking areas of settlement, particularly if the cairns were funerary in nature as this may have forged links between the living and the dead and relate to inferred possession of discrete parts of the local landscape.

7.7.116 56834 Coblaw Plantation cairn and 56835 Hare Cairn, are no longer appreciable as landscape features, and it is likely that both cairns have been truncated by later forestry activities. As such, it is not possible to determine their function and the cairns' cultural significance derives primarily from any below ground archaeological remains which may survive. As non-designated heritage assets, the cairns are of low (local) importance.

7.7.117 It remains possible to understand and appreciate the setting of the cairns insofar as they are located close to water sources (Green Cleugh in the case of 56834 Coblaw Plantation cairn and 56835 Hare Cairn in the case of 56835 Hare Cairn) although there are no clear views of these bodies of water from the sites of either monument. The cairns would have been located in relatively low-lying ground, suggesting they were not intended to be prominent landmarks visible over long distances, with the surrounding area likely to have been suitable for cultivation and settlement. In the case of 56834 Coblaw Plantation cairn, there is a nearby prehistoric settlement located approximately 360 m to the west, although the majority of this asset has been truncated by forestry activities and it is not appreciable as an extant feature. Views from the cairns today are largely limited by commercial forestry, with any important outward views from the locations of these cairns not currently appreciable. As such, understanding and appreciation of the cairns is largely limited to map-based analysis.

7.7.118 CHVPs 13 & 14 wireline **Figures 7.16 - 7.17** indicate that the hubs of all 13 of the proposed turbines would be visible in views from the locations of 56834 Coblaw Plantation cairn and 56835 Hare Cairn. Neither feature remain extant such that their prominence would be challenged by the presence of the proposed turbines. Contextually, it would remain possible to discern the proximity of water sources to the cairns and, in the case of 56834 Coblaw Plantation, the location of nearby possibly contemporary settlement.

7.7.119 It is, therefore, considered that the Proposed Development would have a no impact on the cultural significance of 56834 Coblaw Plantation cairn and 56835 Hare Cairn, assets of low importance. This results in a significance of effect of **None** which is **not significant** in EIA terms.

Tower Houses

SM3848 Dykeraw Tower, Southdean and 56818 Lustruther Tower House

7.7.120 The construction of tower houses began in the medieval period and usually comprise a stone structure, built for defensive purposes as well as habitation. They were often built-in areas from where they could command and defend strategic points from raiding parties, they were also high-status residences intended to display social standing, rather than purely as defensive structures.

7.7.121 The cultural significance of tower houses is primarily of intrinsic interest, with the physical remains providing extant architectural information relating to high-status medieval buildings. Some include associative significance through relationships with certain historical figures. Contextually and historically, tower houses were often situated prominently within their estate, intended as a high-status building with features perhaps functioning as a deterrent to raiding parties. The buildings are intended primarily as residences and stronghold for personal wealth, rather than as a strategically placed or defensive structure although could also have been used in that capacity. Long-distance views are generally incidental or potentially aesthetic in nature, although this is difficult to evidence based on physical remains. The remains of SM3848 Dykeraw Tower allows the visitor to form an idea of how the building may originally have looked. The archaeological potential of the site also contributes to its cultural significance, with excavation likely to elucidate the nature of the structure and wider medieval society. There are no extant remains of 56818 Lustruther tower house, the location of which is now characterised by a modern farmyard. As a Scheduled Monument, SM3848 Dykeraw Tower is of high (national) importance, whilst the non-designated 56818 Lustruther tower house is of low (local) importance.

7.7.122 SM3848 Dykeraw Tower and 56818 Lustruther tower house are located within 500 m of one another approximately 2 km north of the Proposed Development. Only the lower courses of SM3848 Dykeraw Tower survives, whilst there are no extant remains of 56818 Lustruther tower house. Both sites are located on north facing lower slopes which overlook the Jed Water to the north, and the Cleugh Burn to the west, with clear views along the valleys. William Roy's Military Map of Scotland (1752-55) shows the two buildings close to a road, a likely precursor to the modern A6088, and would likely also have allowed clear views along this routeway. The track along which SM3848 Dykeraw Tower is located largely corresponds with the road shown on Roy's map; the track is no longer extant to the west towards 56818 Lustruther tower house. Views to the south-west and south-east are medium range views of local arable land with views to the south largely limited by topography.

7.7.123 On the approach to SM3848 Dykeraw Tower, the remains of the tower are visible from a range of approximately 300 m. There are no surface remains of 56818 Lustruther tower house. The towers have, therefore, lost their prominence in the wider landscape and are best understood, appreciated and experienced from within their immediate vicinities.

7.7.124 The most informative views from both tower locations are to the north, north-east and north-west which allow the visitor to understand how the towers would have been able to overlook the Jed Water as well as any passing traffic along the road which once existed close by. The north facing slope on which the towers are set naturally draws views in this direction and it is this area contributes to understanding and appreciating these monuments. Views towards the Proposed Development to the south are limited by upward sloping topography and are not informative in terms of understanding how the towers would have functioned in the wider landscape.

7.7.125 CHVP 5 wireline **Figure 7.18** indicates that the hubs of six turbines and blade tips of seven turbines would be visible in south facing views from SM3848 Dykeraw Tower. CHVP 11 wireline **Figure 7.19** indicates that hubs of 10 turbines and blade tips of three turbines of the Proposed Development would be visible and 56818 Lustruther tower house. From SM3848 Dykeraw Tower, with the nearest turbine, Turbine T07 would be located approximately 2 km away, with Turbine T08 located approximately 2.1 km away from the site of 56818 Lustruther. Whilst the proposed turbines would constitute visual change in this direction, they would not fundamentally change how the towers are understood and appreciated in relation to their key local setting. It would remain possible to understand why the towers were sited in their locations to overlook the Jed Water and in order to monitor the local accessible routes. The Proposed Development would be located approximately 2 km to the south, outwith the area in which the towers were intended to function.

7.7.126 It is, therefore, considered that the Proposed Development would have a no impact on the cultural significance of SM3848 Dykeraw Tower, Southdean and 56818 Lustruther Tower House assets of high importance and low importance respectively. This results in a significance of effect of **None** which is **not significant** in EIA terms.

7.7.127 It would remain possible to understand, appreciate and experience factors of setting of the Scheduled Monument that contribute to its cultural significance. These factors that are outlined above would be adequately retained. In the terms of SPP paragraph 145, there would be no adverse effect on the integrity of the setting of Scheduled Monument SM3848 Dykeraw Tower as a result of the Proposed Development.

Trackways

<u>SM3423 Wheel Causeway and SM3425 Westshiels, Spur Earthwork</u>

7.7.128 SM3423 Wheel Causeway comprises the scheduled section of a Medieval track which runs roughly north-south at the western boundary of the turbine area. The Medieval track may have exploited a long-lived route through that landscape that has been in use since the Prehistoric period. The causeway comprises a hollow linear feature, often poorly defined although in places marked by upstanding banks either side of the hollow. The name of the monument suggests the track was used by wheeled carts in the Medieval period, as opposed to a droveway capable of accommodating only the movement of animals. The causeway is recorded as extending to the English border, approximately 6 km to the south of SM3423 Wheel Causeway.

7.7.129 SM3425 Westshiels Spur Earthwork comprises an east-west aligned earthwork although it is ill-defined and overgrown and difficult to discern on the ground. The HES scheduling entry for the feature describes the earthwork as 'Prehistoric domestic and defensive: linear earthwork', a spur, presumably of the Wheel Causeway SM3423. Alternatively, the SBC HER entry for the feature (56836) describes the earthwork as 'A narrow insignificant ditch unlike the cross ridge dykes and other linear earthworks of the Cheviot Hills. It is probably no more than a drainage ditch.' Its location immediately east of SM3423 Wheel Causeway may suggest it is associated with this feature although there is no clear evidence for this. The significance of this monument is, therefore, uncertain. As Scheduled Monuments, both SM3423 Wheel Causeway and SM3425 Westshiels, Spur Earthwork are of high (national) importance. Wheel Causeway has been traced in the landscape between Braidhaugh in the north and Needs Law in the south, but it is only a 530 m section that defines the turbine area western boundary that is designated as a Scheduled Monument. The remainder of the causeway is a non-designated heritage asset, promoted as a tourist hiking route. Part of the non-designated section of the causeway within the turbine area has been removed by quarrying.

7.7.130 The designated section of SM3423 Wheel Causeway is better preserved than the non-designated sections. The causeway derives cultural significance from its historical interest, its route and presence in the landscape being indicative and informative of Medieval period communications. Contextually, the causeway derives its cultural significance from serving as in important link between possible Medieval settlement in the north, around the area of Hobkirk and Bonchester Bridge and the border with England to the south. The position of the causeway skirts the foothills of local peaks such as Black Hill, Brockie Law and Dod Fell, and it is likely the low lying, flatter areas of ground between the hills which characterise this area resulted in this most convenient route, thus as a function of topography rather than being related to aesthetics or specific views, none of which have been identified as contributing to the monuments' cultural significance. Intrinsically, the preserved remains of the banks may hold information regarding the construction of Medieval trackways. Similarly, SM3425 Westshiels Spur Earthwork, may hold physical information on its function, use and construction as well possibly dating the feature.

7.7.131 The scheduled section of SM3423 Wheel Causeway within the turbine area can be approached from the east through a forestry ride; from here there is a gap in the commercial forestry which allows for views north and south of the hollow of the causeway and the upstanding banks which in places define its sides. From the higher ground at the northern end of SM3423 Wheel Causeway, there are relatively open views along the gap in the forestry to the south, allowing for an appreciation of the topography traversed by this section of the causeway. Following the causeway to the south, the banks and hollow peter out with views in this direction largely of a later post-medieval sheepfold which marks roughly the location of SM3425 Westshiels Spur Earthwork. It is from within the scheduled area of SM3423 Wheel Causeway that it is best understood.

7.7.132 SM3425 Westshiels Spur Earthwork is difficult to discern and only faintly visible as a slightly raised east-west trending area and is experienced only within this immediate vicinity. From this area, views to the east, south and west are currently limited by commercial forestry with only views to the north through the gap in the forestry along the causeway possible.

7.7.133 The contribution made by setting to the cultural significance of SM3423 Wheel Causeway is largely limited to the open area which defines much of the scheduled area; it is possible to understand and appreciate the presence of the earthworks as a constructed feature, and how the causeway would have made its way through the gentler slopes which characterise this area and perhaps allows for a degree of insight into the experience of the Medieval traveller on their way to or returning from the English border. The extant remains of the monument allow an appreciation of how the causeway was constructed. Given the uncertainty over the function of SM3425 Westshiels Spur Earthwork, it is difficult to ascertain how setting contributes to its cultural significance. The monument is poorly defined on the ground, visible only very faintly and it is from within this area that provides the most informative experience for the visitor. If it is a Prehistoric monument, it may relate to a nearby prehistoric cairn which once existed just to the west (56835 Hare Cairn). If an offshoot of the wider wheel causeway, it indicates a small section of this and is clearly appreciable in relation to this monument. There are other non-designated spurs off Wheel Causeway such as 74659 droveway, which indicate contemporary routes towards destinations to the north-east of the turbine area such as Southdean, North Bank, Steel Knowe and Crink Law. It may be that SM3425 Westshiels Spur Earthwork was another connecting droveway that is no longer fully discernible in the landscape. If, as interpreted by SBC HER, this feature is a drain, then it is understood as a functional feature of likely post-medieval date. In each case, wider landscape setting makes only a very limited contribution to the setting of this earthwork, which is appreciated in its immediate vicinity, and understood in terms of the parts of the landscape that it allowed communications between.

7.7.134 CHVP1 photomontage **Figure 7.20** is located at the western end of SM3425 Westshiels Spur Earthwork and CHVP2 photomontage **Figure 7.21** is located 3.3 km south of the turbine area to illustrate a Medieval traveller's experience of the causeway on approach towards the site. CHVP1 photomontage **Figure 7.20** indicates that hubs of all 13 of the proposed turbines would be visible in north-east views from roughly the junction between SM3423 Wheel Causeway and SM3425 Westshiels Spur Earthwork, with the nearest, Turbine T12 located approximately 310 m to the east of the eastern end of SM3425 Westshiels Spur Earthwork. CHVP2 photomontage **Figure 7.21** indicates that the hubs of all 13 of the proposed turbines would be visible in north facing views on approach towards SM3423 Wheel Causeway and SM3425 Westshiels Spur Earthwork. The route of the causeway would remain discernible as a landscape feature. Although the Proposed Development would constitute visual and aural distraction in views to the east of the causeway, it would remain possible to understand and appreciate both monuments within their local setting. The monuments are currently experienced in relation to a modern, forested landscape, with a relatively narrow gap allowing for views along SM3423 Wheel Causeway to the north and south. The proposed turbines would appear at the periphery of views looking north and south along this area and would not interfere or change the ability of the visitor to appreciate the topography which this section of the causeway passes through towards the English border, likely intentionally chosen for the convenience of the low lying, flatter topography between the hills which characterise this area. The extant remains of both monuments are experienced within their immediate vicinity, and the presence of the proposed turbines would not detract from how SM3423 Wheel Causeway is understood and appreciated as a better-preserved section of the causeway or prevent speculation as to the function of SM3425 Westshiels Spur Earthwork.

7.7.135 The monument is currently experienced within a quiet, rural setting. As such, the presence of the proposed turbines may introduce noise which would change how the monument is experienced. However, it is considered that experiencing the monument within a quiet setting makes only a minor contribution to its cultural significance and the introduction of noise would not change how it is understood and appreciated. As there may be some noise from turbines that would change the experience of the monument , it is considered that the Proposed Development would have a negligible impact on the cultural significance of SM3423 Wheel Causeway and SM3425 Westshiels, Spur Earthwork, assets of high importance. This results in a **Minor adverse** significance of effect which is **not significant** in EIA terms.

7.7.136 Whilst the Proposed Development would change views from the causeway and its spur, it would remain possible to understand, appreciate and experience factors of its setting that contribute to its cultural significance. The route through the landscape as an apparent function of topography, and the ability to trace the feature as above ground earthworks between Hobkirk and Bonchester Bridge and the English border would be adequately retained. In the terms of SPP paragraph 145, there would be no adverse effect on the integrity of the setting of Scheduled Monuments SM3423 Wheel Causeway and SM3425 Westshiels, spur earthwork as a result of the Proposed Development.

Non-Inventory Designed Landscape (NIDL)

113 Wauchope/Wolflee

7.7.137 113 Wauchope/Wolflee NIDL is located approximately 1.5 km north-west of the turbine area. Wauchope house is shown on the OS Second Edition 1899 map: it was demolished in 1932. Wolfhopelee is recorded on the HER as a Medieval Grange due to its depiction on Pont's 1583-1614 map. The NIDL would appear to define woodland planting blocks shown on the First Edition OS map which would have provided the designed landscaped setting to the Medieval Wauchope Tower at the west of the NIDL, and subsequently to Wauchope house in the post-medieval period. Other than Wolfhopelee grange, non-designated heritage assets of Medieval date within the NIDL boundary include a farm building, a farmstead, rig and furrow, a moated site and a tower house. Assets of post-medieval date, other than Wauchope house, include a farmstead, houses and buildings, a hotel and settlement of likely post-medieval date. As a non-inventory designed landscape, considerably changed from its original designed form, 113 Wauchope/Wolflee NIDL is of low (local) importance.

7.7.138 113 Wauchope/Wolflee NIDL derives its cultural significance from its historical interest, with designed characteristics which once formed the landscape setting for both the Medieval Wauchope Tower and the later Wauchope house. The number of assets within its boundary contribute to its cultural significance as they demonstrate its long use and emphasise the area as a historical focal point. Some of the earlier Medieval sites, such as the moated site, were retained within the landscape and may have been intentionally kept in order to form part of the later post-medieval designed landscape. Contextually, 113 Wauchope/Wolflee NIDL derives cultural significance from location within arable land close to the Jed Water which would have made it ideally placed as a productive, agricultural landscape and aesthetic setting for the Medieval Wauchope Tower and the later Wauchope house. As both assets have been demolished, the NIDL is a remnant of associative interest to these structures which would likely have been important in a local context when in use.

7.7.139 From the wider area, the NIDL can be seen from the B6357 east of the Jed Water. From here it appears as an area of agricultural land bordered by woodland blocks. The NIDL is primarily experienced along the minor road which runs from the north to the central area of the NIDL. From roughly the centre of the NIDL views in all directions are primarily of agricultural land, albeit views are restricted by hedgerows. Through the trees to the east are views of Wolfelee Hill and to the south-east of Wolfehopelee Hill. The heritage assets within the NIDL are not visible or appreciable from this area although the extant remains of the Medieval moat site are clearly visible on satellite imagery and may have formed an interesting or aesthetic focal point of the later post-medieval designed landscape. The overarching impression of the NIDL is its current agricultural use; historically, it is likely that much of the wider NIDL outwith the locations of Wauchope Tower and the later Wauchope house was used as part of a productive estate. The presence of woodland within the NIDL serves to split up the landscape into discrete areas of arable land meaning there are no clearly designed avenues or roads which draw the eye in one particular direction. As such, the NIDL is understood and appreciated in relation to its immediate setting and in relation to the former sites of the Medieval and post-medieval buildings set within it.

7.7.140 CHVP10 wireline **Figure 7.22** indicates that the hubs of two of the proposed turbines and the blade tips of three turbines would be visible in east facing views from roughly the centre of 113 Wauchope/Wolflee NIDL. Whilst this would constitute visual change, there is no evidence there were any intentionally designed views towards this area. The NIDL is experienced in relation to the location of the once important Wauchope Tower and the later Wauchope house and would have functioned as an agricultural landscape serving these assets. It is best understood, appreciated and experienced from within its own boundaries. The Proposed Development lies considerably beyond the NIDL boundary and would not detract from the visitor's ability to understand and appreciate how the NIDL functioned as a designed setting to the demolished buildings. Woodland blocks which characterise the central area of the NIDL would in any case provide a level of screening of the proposed turbines.

7.7.141 It is, therefore, considered that the Proposed Development would have no impact on the cultural significance of 113 Wauchope/Wolflee NIDL, an asset of low importance. This results in a significance of effect of **None** which is **not significant** in EIA terms.

Access Setting Effects

<u>SM6602 Martinlee Sike, Farmstead, Field System and Assart Bank</u>

7.7.142 The detailed design of potential reinforcement works required upon an existing bridge over Carter Burn which forms the southern boundary to SM6602 Martinlee Sike, farmstead, field system and assart bank is not finalised and a definitive assessment of the impact cannot be carried out, or a visualisation produced, at the time of submission. As set out in **Table 7.5**, HES has agreed that these assessments would be carried out at a later date once the assessment parameters are confirmed (see paragraph 7.8.16).

Cumulative Effects

7.7.143 The cumulative effects of the Proposed Development with the developments of other operational, consented, or at appeal, renewable energy developments (as described in paragraph 7.2.34) have been considered.

7.7.144 In terms of direct effects, it is considered that there is no potential for cumulative construction effects on previously unrecorded cultural heritage assets. Any effects would be contained within the ISA, and none would be further directly impacted by any other developments outside this area.

7.7.145 Cumulative operational effects can occur when the contribution made by setting to the cultural significance of a heritage asset is impacted by the Proposed Development in combination with other proposed and existing wind farms. The assessment of effects uses the same methodology applied in considering the likely effects of the Proposed Development alone. All analysis of asset significance and the contribution made by setting remains unchanged. All that is altered is the nature of visual change predicted for the one or more scenarios under consideration.

7.7.146 Cumulative operational effects are considered in cases where an effect of minor or greater significance has been predicted on the setting of a heritage asset as a result of the Proposed Development. The purpose of this threshold is to ensure that the assessment remains proportionate and focused on those cases where there is potential for an EIA-significant effect to arise.

7.7.147 In terms of operational impacts upon the cultural significance of heritage assets in the study area through development within their setting, an effect of minor adverse significance is predicated upon seven Scheduled Monuments and one non-designated heritage asset:

- SM10605 - Tamshiel Rig, fort, settlement and field system;
- SM2211 - Southdean Law, fort & settlement;
- SM2173 - Bonchester Hill, fort;
- SM2129 - Rubers Law, fort & Roman signal station;
- SM2152 - Shaw Craigs, fort;
- SM3423 - Wheel Causeway, section 640m long on S slope of Wardmoor Hill;
- SM3425 - Westshiels, spur earthwork 1550m west of; and
- 56831 - Highlee Hill settlement, including HA1.

7.7.148 Of the assets listed above, cumulative schemes would appear in views from SM2211 - Southdean Law, fort & settlement (**Figure 7.4**) and SM2152 - Shaw Craigs, fort (**Figure 7.7**). However, the cumulative schemes are all located considerably outwith the areas within which these assets are understood, appreciated and experienced within such that their presence would not result in any increase in impact. No increased cumulative impacts are, therefore, predicted for these cultural heritage assets from any combination of developments.

7.7.149 No cumulative effects are identified.

Decommissioning Effects

7.7.150 Decommissioning of the Proposed Development would not directly impact upon any known cultural heritage assets, assuming that all land-take for the decommissioning works, including access, lies within the same footprint as the construction works and thus previously mitigated with no remaining archaeological potential.

7.7.151 Operational effects of minor adverse significance upon seven Scheduled Monuments and one non-designated heritage asset, and of negligible adverse significance upon one non-designated heritage asset would be reversed on decommissioning.

7.8 Mitigation

7.8.1 The preferred mitigation option is to avoid or reduce impacts through design, or through precautionary measures such as fencing off heritage assets during construction works. Impacts which cannot be eliminated in these ways would lead to residual effects.

7.8.2 Adverse effects may be mitigated by an appropriate level of survey, excavation, recording, analysis and publication of the results, in accordance with a written scheme of investigation[75]. Archaeological investigation can have a beneficial effect of increasing knowledge and understanding of the asset, thereby enhancing its archaeological and historical interest and offsetting adverse effects.

Mitigation Measures During Construction

Direct Effects

7.8.3 Known heritage assets within the turbine area that would be impacted by the Proposed Development layout are non-designated trackways 179517 Wheel Causeway (non-designated section) and 75659 Croft Plantation Holloway. The Proposed Development internal access tracks cross each trackway at one separate location each. As the trackways are routes through the landscape which would be maintained and remain open and accessible, with their historic function appreciable, no mitigation is required.

7.8.4 Known heritage assets within the access area that would be impacted by any cut or fill operations at certain discrete locations on bends to allow for the turning of abnormal loads as well as for reinforcement works to the existing bridge over Carter Burn are non-designated 74615 Martinlee Sike Archaeological Landscape and Scheduled Monument SM6602 Martinlee Sike, farmstead, field system and assart bank.

7.8.5 It is proposed that any cut/fill at discrete locations in the access area to allow for the turning of abnormal loads would be carried out to the east of the existing track and avoid any groundworks within the boundary of SM6601 and SM6599, assets of high (national) importance.

7.8.6 It is proposed that direct construction effects upon these known heritage assets are mitigated through a programme of archaeological works during or in advance of construction. The scope and nature of required evaluation and mitigation works would be described in a written scheme of investigation and agreed with SBC and HES as appropriate.

7.8.7 Scheduled Monument consent (SMC) would be required from HES for works within SM6602 Martinlee Sike, farmstead, field system and assart bank. HES has advised that the top 30 cm of the existing access track which runs through SM6602 is excluded from the scheduling, however, any upgrading works that would be deeper than this, or that would extend beyond the boundaries of the existing track and its drainage ditches would require SMC. Given the proximity, there is the possibility that substantial reinforcement

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[75] Per SPP paragraph 150 and PAN2/2011, sections 25-27.

works to the bridge over Carter Burn may involve works within the Scheduled Monument which would also require SMC.

7.8.8 Accidental direct impacts may arise should activities such as, but not limited to, ancillary drainage works, and uncontrolled plant movement take place in the vicinity of heritage assets.

7.8.9 It is proposed that certain known heritage assets within the ISA are demarcated (identified and protected) prior to construction works commencing in order to highlight their presence. This may be achieved through appropriate survey, demarcation/ fencing and signage. In their Scoping Opinion, HES stated: *'We recommend that in addition to them being marked on a map, that the scheduled areas of the monuments are also marked out on the ground by some form of freestanding temporary fencing with an appropriate buffer around them to avoid any inadvertent damage.*' It is recommended that the following heritage assets are fenced off with a suitable buffer throughout construction to prevent accidental damage:

- SM3425 - Westshiels, spur earthwork 1550m SW of
- SM3423 - Wheel Causeway, section 640m long on S slope of Wardmoor Hill
- SM10605 / 56832 - Tamshiel Rig, fort, settlement and field system
- SM6599 - Martinlee Sike, enclosure bank, field system, cairns & old road
- SM6601 - Martinlee Plantation, homestead SE of Martinlee Sike
- SM6602 - Martinlee Sike, farmstead, field system and assart bank

7.8.10 Should any element of the Proposed Development infrastructure be subject to re-design, where necessary, it is proposed that a direct impact assessment is carried out by an experienced professional archaeologist. Should any such re-design or ancillary works result in a direct impact on any of the known heritage assets within the ISA, additional mitigation work is likely to be required.

7.8.11 Any direct construction effects upon previously unknown cultural heritage assets (archaeological potential) would be mitigated through a programme of archaeological works. The scope and nature of any additional mitigation should it be required would be outlined in a written scheme of investigation and agreed with SBC.

Setting Effects

7.8.12 No significant construction phase setting effects have been identified. No mitigation is required.

Mitigation During Operation

7.8.13 Operational effects of minor adverse significance are predicted upon seven Scheduled Monuments and one non-designated heritage asset:

- SM10605 - Tamshiel Rig, fort, settlement and field system;
- SM2211 - Southdean Law, fort & settlement;
- SM2173 - Bonchester Hill, fort;
- SM2129 - Rubers Law, fort & Roman signal station;
- SM2152 - Shaw Craigs, fort;
- SM3423 - Wheel Causeway, section 640m long on S slope of Wardmoor Hill;
- SM3425 - Westshiels, spur earthwork 1550m west of; and

- 56831 - Highlee Hill settlement, including HA1.

7.8.14 Operational effects of negligible adverse significance are predicted upon one non-designated heritage asset: HA4 Westshiels Farmstead.

7.8.15 These effects are not significant in EIA terms and no mitigation is required.

7.8.16 Depending on the final Proposed Development access track design, assessment may be required to consider the impact of a proposed crossing of the Carter Burn upon the setting of SM6602 Martinlee Sike, farmstead, field system and assart bank. HES has confirmed that this can be carried out at a later date, if necessary, once the Proposed Development's project parameters are confirmed (see **Table 7.5**). Through consultation (potentially through SMC application), mitigation measures would be embedded into the design of the Proposed Development to avoid or minimise adverse effects upon SM6602. Embedded design measures may include the reuse through reinforcement of existing infrastructure, rather than the construction of a new bridge, if possible, and the use of low profile or sympathetic materials for any new infrastructure to minimise as far as possible its visibility from within the designated area of SM6602. Should any residual adverse operational effects be identified, additional mitigation measures would be proposed. Additional mitigation measures may include the removal of any temporary above ground infrastructure deemed to result in adverse setting effects, following the construction stage, thereby reversing the impact.

Mitigation During Decommissioning

7.8.17 No significant adverse decommissioning effects are predicted for any cultural heritage assets and no mitigation is required.

7.9 Summary of Residual Effects

7.9.1 Potential residual effects of the Proposed Development upon heritage assets resulting from its construction, operation and decommissioning are considered below.

Residual Construction Phase Effects

Residual Construction Phase Direct Effects

7.9.2 Direct construction phase impacts upon known heritage assets comprise impacts upon non-designated trackways 179517 Wheel Causeway (non-designated section) and 75659 Croft Plantation Holloway. No mitigation is proposed and the residual effect would remain as negligible adverse significance of effect which is not significant in EIA terms.

7.9.3 Known heritage assets within the access area that would be impacted by works for the eastern access track are non-designated 74615 Martinlee Sike Archaeological Landscape and Scheduled Monument SM6602 Martinlee Sike, farmstead, field system and assart bank. Mitigation is recommended to offset identified direct effects, resulting in a negligible adverse significance of effect which is not significant in EIA terms.

7.9.4 The majority of the turbine area and access area is considered to be of generally low archaeological potential; however, this may be up to medium potential in the vicinity of known heritage assets: Tamshiel Rig, fort, settlement and field system (SM10605), Westshiels farmstead (HA4), and the LIDAR remains HA1, HA2 and HA3 in the turbine area and 74615 Martinlee Sike Archaeological Landscape and Scheduled Monument

SM6602 Martinlee Sike, farmstead, field system and assart bank in the access area. A programme of mitigation would be agreed with SBC to offset any potential direct effects on previously unknown heritage assets which may exist within the ISA, resulting in a negligible adverse significance of effect which is not significant in EIA terms.

Residual Construction Phase Setting Effects

7.9.5 Construction phase setting effects would be temporary and are not significant in EIA due to their very short duration.

Residual Operational Effects

7.9.6 Residual operational effects of minor adverse significance are predicted upon seven Scheduled Monuments and one non-designated heritage asset:

- SM10605 - Tamshiel Rig, fort, settlement and field system;
- SM2211 - Southdean Law, fort & settlement;
- SM2173 - Bonchester Hill, fort;
- SM2129 - Rubers Law, fort & Roman signal station;;
- SM2152 - Shaw Craigs, fort
- SM3423 - Wheel Causeway, section 640m long on S slope of Wardmoor Hill;
- SM3425 - Westshiels, spur earthwork 1550m west of; and
- 56831 - Highlee Hill settlement, including HA1.

7.9.7 Residual operational effects of **Negligible adverse** significance are predicted upon one non-designated heritage asset: HA4 Westshiels Farmstead.

7.9.8 These identified residual effects are **not significant** in EIA terms.

7.9.9 Cumulative impact assessment, considering other operational, consented and submitted applications for windfarms in the vicinity has identified no significant residual effects in EIA terms.

Residual Decommissioning Effects

7.9.10 No significant residual decommissioning effects have been identified.

7.9.11 Although impacts have been assessed as if the Proposed Development was permanent (SPP paragraph 170), on decommissioning the residual operational effects of minor adverse significance upon seven Scheduled Monuments and negligible adverse significance upon one non-designated heritage asset would be reversed, resulting in no residual effects.

7.10 References

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8 ECOLOGY

8.1 Introduction

8.1.1 This chapter of the EIA Report assesses the terrestrial ecological impacts that may arise from the construction, operation and decommissioning of the Proposed Development., It should be noted that ornithology impacts are assessed in **Chapter 9: Ornithology**. This ecological impact assessment (EcIA) has been undertaken by ecological consultant Katie Farmer ACIEEM and associate director Mark Lang MCIEEM CEcol. Mark Lang has over 30 years' experience in environmental assessments. Katie has over five years of experience in consultancy. The EIA Report has been undertaken in accordance with the principles set out in the guidelines for EcIA published by the Chartered Institute of Ecology and Environmental Management (CIEEM 2019)[76].

8.1.2 The objectives of this chapter are to:

- describe the ecological baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative;
- describe the mitigation measures proposed to address any likely significant effects; and
- assess the residual effects following the implementation of mitigation.

8.1.3 The chapter is supported by the following technical appendices and associated figures presented in **Volume 3**:

- Technical Appendix 8.1: Habitats and Vegetation;
- Technical Appendix 8.2: Protected Species;
- Technical Appendix 8.3: Bats;
- Technical Appendix 8.4: Confidential Appendix; and
- Technical Appendix 8.5: Outline Habitat Management Plan

8.1.4 Due to the proximity of the Proposed Development to a number of internationally designated sites (refer to **Section 8.2** below), a Habitats Regulations Assessment (HRA) Screening Report would be required for the Proposed Development.

8.2 Legislation, Policy and Guidance

8.2.1 This assessment is carried out in accordance with the principles in the following legislation, planning policy and guidance:

International

- The Convention on Biological Diversity 1992 et seq;
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (Birds Directive) 2009;

[76] Chartered Institute of Ecology and Environmental Management, CIEEM 2019.

- Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) 1992;
- The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979; and
- The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1979.

National

- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended);
- The Wildlife and Countryside Act 1981 (as amended); The Wildlife and Natural Environment (Scotland) Act 2011;
- The Nature Conservation (Scotland) Act 2004;
- Protection of Badgers Act 1992 (as amended in Scotland);
- Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003;
- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018[77]);
- Environmental Impact Assessment Handbook (SNH 2018)
- Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH, 2012[78]);
- Standing Advice for Planning Consultations – Protected Species: Badger (NatureScot, 2020b[79]);
- Standing Advice for Planning Consultations – Protected Species: Otter (NatureScot, 2020c[80]);
- Standing Advice for Planning Consultations – Protected Species: Bats (NatureScot, 2020h[81]);
- Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation (NatureScot, 2021a[82]); and
- Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition (Collins, 2016[83]).

Local

- Scottish Borders Local Biodiversity Action Plan (LBAP).

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[77] CIEEM (2018). https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-Sept-2019.pdf [Accessed July 2021].

[78] NatureScot (2012 https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments [accessed June 2021].

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[80] NatureScot (2020c). https://www.nature.scot/doc/standing-advice-planning-consultations-otters [accessed June 2021].

[81] NatureScot (2020h). https://www.nature.scot/doc/standing-advice-planning-consultations-bats [accessed June 2021].

[82] NatureScot (2021a). https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation [accessed May 2021].

[83] Collins, J. (ed) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition. Bat Conservation Trust, London.

8.3 Scope of Assessment

8.3.1 This assessment considers the following four main potential impacts upon ecological features associated with wind farm developments within 10 km of the Proposed Development in accordance with the Chartered Institute for Ecology and Environmental Management (CIEEM) guidelines 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine' (CIEEM, 2018):

- Designated Sites - potential indirect effects upon designated sites for nature conservation within 2 km of the Proposed Development;
- Habitat Loss / Deterioration - direct and indirect loss and deterioration of habitats;
- Mortality / Injury - incidental loss of life or injury through construction and operation activities to species; and
- Disturbance / Displacement of Species - disturbance and displacement of faunal species; loss, damage or disturbance to their breeding and/or resting places.

8.3.2 The potential for effects is considered as a result of the Proposed Development alone and cumulatively, in-combination with other wind farm developments.

8.3.3 The following terminology is used throughout this EIA Report:

- The Proposed Development – The Wind Farm development outlined by the application boundary including all infrastructure, the turbine area and access area shown in **Figure 8.1.1**.
- No net loss – the impacts of the Proposed Development on biodiversity are balanced or outweighed by mitigation measures taken to avoid and minimise the impacts to offset the residual impacts, so that overall, there is no loss of biodiversity.

8.4 Assessment Methodology

8.4.1 The methodology for the assessment of likely significant ecological effects as a result of the Proposed Development is outlined below.

- identify important ecological features;
- identify and characterise impacts;
- outline mitigation to avoid / reduce significant impacts;
- determine significance of impacts; and
- identify appropriate compensation measures to offset significant residual effects.

Determining Importance

8.4.2 Relevant International national and local guidance has been referred to in order to determine the importance of ecological features.

8.4.3 The first stage of an ecological impact assessment (EcIA) is determining value of ecological features or 'receptors'. Ecological receptors are valued with regard to the guidance provided in Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018). Value is assessed through consideration of attributes including rarity, legal status, population size, distribution and connectivity, and natural range. These values are applied to the receptors within a defined geographical context and examples can be seen in **Table 8.1**.

8.4.4 It should be noted that importance does not necessarily relate solely to the level of legal protection that a feature receives, and ecological features may be important for a variety of reasons, such as their connectivity to a designated site, rarity of species or the geographical location of species relative to their known range.

8.4.5 Similarly, whilst a particular feature may be associated with a nearby internationally designated site, the feature is not automatically assigned a value of "International" importance.

Table 8.1: Value of Ecological Features

Ecological Value/ Importance	Qualifying Criteria	Relevant Significance
International	A study area is considered to be of international ecological importance when it supports: An internationally designated site or candidate site (Special Protection Area (SPA), Special Areas of Conservation (SAC), Ramsar site, Biogenetic Reserve) or an area which NatureScot has determined meets the published selection criteria for such designations, irrespective of whether or not it has yet been notified. A viable area of a habitat type listed in Annex I of the Habitats Directive are essential to maintain the viability of that ecological resource at an international scale. >1% of the European resource of an internationally important species, i.e., those listed in Annex I, II or IV of the Habitats Directive.	International
UK/National	A nationally designated site (Special Site of Scientific Interest (SSSI), National Nature Reserve (NNR), Marine Nature Reserve) or a discrete area which NatureScot has determined meets the published selection criteria for national designation irrespective of whether or not it has yet been notified. A viable area of a priority habitat referenced in the UK Post-2010 Biodiversity Framework or Scottish Biodiversity List, or smaller areas of such habitat which are essential to maintain the viability of that ecological resource at a national scale. >1% of the National Resource of a regularly occurring population of a nationally important species, i.e., a priority species listed in the Scottish Biodiversity List and/or Schedules 1, 5 (S9 (1, 4a, 4b)) or 8 of the Wildlife and Countryside Act.	UK/Scotland
Regional	Non-statutory designated sites that represent a scale, or habitat/species assemblage, of importance across a number of counties within a recognised regional context. Non-designated	Southern Scotland

Ecological Value/ Importance	Qualifying Criteria	Relevant Significance
	sites that the designating authority has determined meet the published ecological selection criteria for designation, particularly large or represent habitat or species assemblages of importance at a regional level. Viable and extensive areas of legally protected habitat/habitat identified in Regional biodiversity action plan (BAP) or County BAP, or smaller areas of such habitats that are essential to maintaining the viability of the resource at a regional scale. Any regularly occurring population of an internationally/nationally important species or a species in a relevant policy which is important for the maintenance of the regional meta-population. Semi-natural ancient woodland greater than 0.5 ha.	
District or County	County sites and other sites which the designating authority has determined meet the published ecological selection criteria for designation, e.g. local nature conservation cites. Viable areas of legally protected habitat/habitat identified in Council BAP, or smaller areas of such habitats that are essential to maintaining the viability of the resource at a county scale. Any regularly occurring population of an internationally/ nationally important species or a species in the relevant County BAP which is important for the maintenance of the county meta-population. Semi-natural ancient woodland greater than 1 ha. Networks of species-rich hedgerows.	Scottish Borders
Local or Site	Habitats of limited ecological value, e.g. amenity grassland, but which contribute to the overall function of the application site's ecological functions. Very small, but viable, populations of internationally/nationally important species or habitats, or a species or habitat in a relevant UK/Council BAP which is not important for the maintenance of the local meta-population.	Local or Site

Characterising Impacts

8.4.6 The next stage of an EcIA is to predict and characterise the likely change and impact on the ecological receptors identified. It is necessary to consider all of the following parameters:

- the sensitivity of affected receptors, on a scale of high, medium, low or negligible;
- the extent of the area subject to a predicted impact;

- the magnitude or severity of the change and whether the change is positive or negative;
- the duration the impact is expected to last prior to recovery or replacement of the resource or feature;
- the timing and frequency of the impact, i.e., conflicting with critical seasons or increasing impact through repetition; and
- whether the impacts are reversible, with recovery through natural or spontaneous regeneration, or through the implementation of mitigation measures or irreversible, when no recovery is possible within a reasonable timescale or there is no intention to reverse the impact.

8.4.7 The CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018) also stress consideration of the likelihood that ‘a change/activity would occur and also the degree of confidence in the assessment of the impact on ecological structure and function’. Likelihood is then specified using the following terms:

- certain (95% probability or higher);
- probable (50-94% probability);
- unlikely (5-49% probability); or
- extremely unlikely (less than 5% probability).

8.4.8 The criteria used to determine the magnitude of impact are set out in **Table 8.2**.

Table 8.2: Impact Magnitude

Magnitude	Definition
Very High	The impact (either on its own or in-combination with other proposals) may adversely result in the permanent total or almost complete loss of a site and/or species status or productivity.
High	The impact (either on its own or with other proposals) may adversely affect the biodiversity conservation status of a site/population, in terms of the coherence of its ecological structure and function (integrity), across its whole area, that enables it to sustain the habitat, complex of habitats and/or the population levels of species of interest.
Medium	Biodiversity conservation status of a site or population would not be adversely affected, but some element of the functioning might be adversely affected and impacts could potentially affect its ability to sustain some part of itself in the long term.
Low	None of the above applies, but some minor adverse effect is evident on a temporary basis or affects extent of habitat/species abundance in the local area.
Negligible	No observable adverse effect.
Beneficial	The impact is considered to be beneficial to a species’ or site’s nature conservation status.

Determining Significance

8.4.9 Following the classification of an effect, a clear statement is made as to whether the effect is “significant” or “not significant”. Under the CIEEM guidelines (CIEEM, 2018) the significance of effect on the ecological features has been determined based on the analysis of the factors that characterise the impact.

8.4.10 A significant effect is defined as *"an effect that either supports or undermines biodiversity conservation objectives for the ecological feature or for biodiversity in general". The assessment considers whether an effect has the potential to affect the integrity of a habitat or the conservation status of a species. Integrity of a habitat or site is defined as "the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified". The conservation status of a species is, "the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest"*. Conservation status is considered to be favourable under the following circumstances:

- population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;
- the natural range of the species is not being reduced, nor is it likely to be reduced for the foreseeable future; and
- there is (and probably would continue to be) a sufficiently large habitat to maintain its population on a long-term basis.

8.4.11 The Environmental Impact Assessment (Scotland) Regulations 2017 (hereafter 'the EIA Regulations') state that Significance should be defined as major, moderate or minor depending on the receptor and context. However, CIEEM best practice guidance differs from this and does not recommend that significance is defined as 'major', 'moderate' or 'minor' due to the complexities of ecological processes. Therefore, for the purposes of Ecological Impact Assessment (EcIA), all 'significant' effects are considered significant within the context of the EIA Regulations. However, to allow the potential effects identified in this EcIA to be considered alongside those addressed in other topic chapters, as set out in **Table 8.3**. 'Converted' effects of Major and Moderate, significance are considered 'significant' in the context of the EIA Regulations.

Table 8.3: Effects Significance Conversion

Significance using CIEEM methodology	Conversion of Significance to EIA Regulations Methodology	Definition
Significant at International level	Major significance	The impact is likely to result in a long term **significant** adverse effect on the integrity of a feature.
Significant at National level	Major significance	The impact is likely to result in a long term **significant** adverse effect on the integrity of a feature.
Significant at Regional level	Moderate significance	The impact is likely to result in a medium term or **partially significant** adverse effect on the integrity of a feature.
Significant at County level	Moderate significance	The impact is likely to result in a medium term or **partially significant** adverse effect on the integrity of a feature.

Significance using CIEEM methodology	Conversion of Significance to EIA Regulations Methodology	Definition
Significant at District/Site Level	Minor significance	The impact is likely to adversely affect a feature at an **insignificant** level by virtue of its limitations in terms of duration or extent, but there would probably be no effect on its integrity.

Mitigation and Assessing Residual Significance

8.4.12 The assessments in this EIA Report are based on the assumption that the embedded mitigation measures and standard good practice working methods outlined in **Section 8.9** would be implemented.

8.4.13 Following the assessment of likely significant effects, the requirement for additional specific mitigation measures (measures to avoid, reduce or remedy a specific adverse impact in situ) would be considered. The likelihood of any residual effects following implementation of mitigation measures (if required) would then be assessed.

Assessment of Cumulative Effects

8.4.14 Potentially significant cumulative effects can result from individually not significant, but collectively significant actions taking place over a period of time or concentrated in a location.

8.4.15 For species, potentially significant cumulative effects are only likely where other developments are located within the regular range of more mobile species (e.g., bats). Cumulative impacts have, therefore, been assessed with reference to NatureScot guidance (SNH, 2019a) for bats within 10 km of the Proposed Development.

8.4.16 The potential for cumulative impacts have, therefore, been assessed with reference to SNH guidance (2012)[84], and encompass the effects of the proposal in-combination with relevant:

- existing developments, either built or under construction;
- approved developments, awaiting construction; and
- proposals awaiting determination within the planning process with design information in the public domain.

8.4.17 Developments which have been withdrawn and/or refused are not considered.

8.4.18 The potential for the Proposed Development to contribute to cumulative effects in relation to other wind farm projects within 10 km was assessed. **Table 8.4** lists the cumulative projects that were considered.

[84] Scottish Natural Heritage (2012), Assessing the Cumulative Impact of Onshore Wind Energy Developments, Guidance Note.

Table 8.4: Projects Considered for Cumulative Effects

Site Name	Approximate Distance (m)
Pines Burn Wind Farm – Consented	4 km west

8.4.19 Pines Burn Wind Farm is consented. Once operational, this development would potentially operate at a capacity of 49.9 MW with up to 12 installed turbines at a height of between 130 – 149.9 m.

8.5 Consultation Undertaken

8.5.1 In undertaking the assessment, consideration has been given to the Scoping responses and other consultation as undertaken as detailed in **Table 8.5**.

Stakeholder/ Consultee	Issues Raise	Response	Action Taken
NatureScot	Scoping Report responses	Welcome that a habitats regulation appraisal (HRA) screening would be undertaken.	A Habitat Regulations Screening Assessment (HRA) would be undertaken.
Scottish Borders Council	Scoping Report responses	1. Bat and badger surveys are considered sufficient. 2. The 250 m buffer around watercourses for otter should also be extended to each turbine location and associated infrastructure. 100 m should be implemented around all access tracks and the buffer should extend 200 m downstream of the Proposed Development. 3. The presence of reptiles should be included in the assessment 4. Impacts on fish should be considered and assessed within the EIA as they would be considered in the HRA. Potential impacts on invertebrates and amphibians should be considered 5. Mammal passages at water crossings or access tracks should be considered and may be required as part of the mitigation.	2. The survey for otter covered all watercourses within 100 m of turbine bases and infrastructure and 250 m up and downstream of all watercourses. 3. Reptiles have been included within the assessment. 4. A HRA would be undertaken as part of the assessment within which fish would be considered. Fish are considered as part of this EIA Report. No notable assemblages of amphibians or invertebrates were identified and, therefore, these have been scoped out of detailed assessment. 5.This EIA chapter makes reference to mammal passage at water crossings and subsequent mitigation.

Stakeholder/ Consultee	Issues Raise	Response	Action Taken
Southdean Community Council	Scoping Report responses	Ecological concerns arising from the Proposed Development. A badger recorded on site. Ecology impacts on access route. Ask to reconsider Scoping in red squirrel.	Two badger setts were identified. The relevant information is outlined in the **CONFIDENTIAL Appendix 8.4.** Red squirrel, although scoped out for detailed assessment were searched for in the small areas of suitable habitat which remains on the site during the protected species survey. The results of which are outlined in the relevant technical appendix (**Technical Appendix 8.2**)

8.6 Baseline Methodology

Desk-Based Research and Data Sources

8.6.1 Existing information relating to statutory and non-statutory designated sites of nature conservation importance, priority habitats and species, and legally protected species was gathered from various sources as outlined in **Table 8.6**. The background data search (BDS) was undertaken in May 2021 and comprised a search for statutory designated sites of nature conservation importance, non-statutory designated sites and legally protected and otherwise noteworthy species within 2 km of the Proposed Development. The search was extended to 10 km for internationally designated sites including Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Ramsar sites. These search areas encompassed the likely Zones of Influence (ZoI) for the Proposed Development. The ZoI is the area over which ecological receptors may be affected by biophysical changes as a result of the Proposed Development and associated activities.

Table 8.5: Sources of Background Information

Information Obtained	Available From
Protected and Noteworthy species-records	The Wildlife Information Centre (TWIC)
Bat records near the border with England	Environmental Records Information Centre North East[85]
Bat records near the border with England	Northumberland Bat Group – unable to take data requests at the time of asking
Designated site locations and citations	NatureScot website
Designated site locations and citations	The Wildlife Information Centre

[85] Scottish records for bats were obtained from TWIC, however due to the proximity of the English border, English records were also sought.

Information Obtained	Available From
Designations and legal protection of noteworthy species	Joint Nature Conservation Committee (JNCC) website
Details of species and habitats listed on the Scottish Borders Local Biodiversity Action Plan	Local BAP website https://scottishborders.moderngov.co.uk/documents/s30454/Item%20No.%206%20-%20Appendix%20A%20-%20Local%20Biodiversity%20Action%20Plan%202018-2028-%20Supplementary%20Guidance.pdf
MacArthur Green surveys in 2013 for Highlee Hill Wind Farm – application withdrawn[86]	MacArthur Green undertook survey work for a proposed windfarm called Highlee Hill (withdrawn in 2017) which covered some of the same footprint as the Proposed Development. The following reports were used to inform the ecology baseline: • Appendix 5.3 CONFIDENTIAL_Protected Species Surveys Report; • ES_E_Fig5.6_CONFIDENTIAL_Badger_HIH_Rev2; • Highlee_CONFIDENTIAL_Technical Appendix_6.2_Rev1; • VOL_4_TECHNICAL_APPENDICES_PART_1-2770390 (Phase 1, NVC)f; • VOL_4_TECHNICAL_APPENDICES__PART_2-2770391 (Bats, Peat depth ornit); and • ES_VOL_2_MAIN REPORT_PART _2-2764612.

8.6.2 A search was also made for records of noteworthy species within 1 km of the site, extending to 10 km for bat (Chiroptera spp) records. Species included in the search parameters were:

- European protected species (listed on Schedule 2 and 4 of the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended)[87];
- nationally protected species under Schedules 1, 5 and 8 of The Wildlife & Countryside Act 1981 as amended by The Wildlife and Natural Environment (Scotland) Act 2011[88] and The Protection of Badgers Act 1992[89];
- species listed as critically endangered, endangered or vulnerable on the IUCN Red List;
- all species listed on the Birds of Conservation Concern 4 as red or amber;
- nationally rare or nationally scarce species;
- notable invertebrates;
- and species that have action plans under the Scottish Biodiversity List (SBL) or are priority species under the SBC Local Biodiversity Action Plan.

[86] The client obtained the Intellectual Property (IP) rights for this data from Renewable Energy Sources (RES)

[87] The Conservation (Natural Habitats, &c.) Regulations 1994.

[88] UK Government (1981), Wildlife and Countryside Act 1981.

[89] The Badger Trust (1992), The Protection of Badgers Act 1992.

Field Surveys

8.6.3 RSK Biocensus carried out the following ecological surveys to inform the baseline assessment:

8.6.4 A protected species survey of the land within the application boundary in June 2021. This included assessing watercourses within proximity (100 m) to proposed turbine bases and associated infrastructure for the presence of otter (Lutra lutra), in addition to 250 m up and downstream of all infrastructure, turbine bases and access tracks. A survey for water vole (Arvicola amphibius) was conducted out to 30 m.

8.6.5 A search for evidence of red squirrel (Sciurus vulgaris) was also undertaken within suitable habitats within the land within the application boundary plus 50 m. In addition, the surveys included a search for evidence of badger (Meles meles) activity within these areas. Detailed surveys for badgers were undertaken alongside the protected species surveys and focused on setts identified during the MacArthur Green surveys in 2013.

8.6.6 Bat static surveys were carried out between May 2021 and September 2021 with a preliminary roost assessment survey (PRA) carried out between June 2021 and July 2021. An additional PRA survey was carried out in May 2022 following changes in design. Static surveys were carried out in line with the current onshore wind farm guidance (NatureScot et al., 2021)[90]. The PRA followed the methodology as set out in Collins (2016)[91].

8.6.7 A walkover survey was undertaken to validate the previous Phase 1 habitat survey undertaken by MacArthur Green for the previous Highlee Hill Wind Farm submission and to ensure no significant changes in the extent of habitat had occurred.

8.6.8 A National Vegetation Classification (NVC) survey focusing on areas of priority habitat and likely areas of Groundwater Dependent Terrestrial Ecosystem (GWDTE) survey was undertaken in June 2021 and July 2021 using the methods of the NVC (Rodwell 1991)[92]. Where possible NVC types were identified in the field from simple observation and surveyor experience to confirm identification of the main NVC community type.

8.6.9 A further walkover survey for protected species and badger was undertaken in May 2022 following a change in design and once a frozen layout was available. In addition, a further NVC / GWDTE survey was conducted within the access area. A full GWDTE assessment was undertaken which is outlined in **Technical Appendix 10.3**.

8.6.10 Details of the ecological surveys undertaken, are summarised in **Table 8.7** below. Full details of all surveys, including full methods, are provided in the **Technical Appendices 8.1 - 8.5,** which support this document.

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[90] NatureScot (Scottish Natural Heritage), Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter & Bat Conservation Trust (BCT) (2021), Bats and Onshore Wind Turbines: Survey Assessment and Mitigation.

[91] Collins, J. (ed.) (2016), Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.

[92] Rodwell, J S (ed.) (1991), British Plant Communities, Vol. 1: woodlands and scrub. Vol. 2: mires and heaths Cambridge University Press, Cambridge.

Table 8.6: Summary of Detailed Ecological Surveys

Ecological Receptor	Survey	Survey Area	Dates
Botanical Surveys			
Phase 1	Walkover survey of the Proposed Development to map habitats.	Walkover survey of the land within the application boundary. Full details are provided in **Technical Appendix 8.1.**	June 2021
NVC / GWDTE	Walkover survey of the access area to map habitats	Walkover survey of the access area. Full details are provided in **Technical Appendix 8.1.**	May 2022
Terrestrial Mammals			
Red Squirrel	Walkover survey of the remaining forestry on site	All mature coniferous forestry on land within the application boundary. Full details are provided in **Technical Appendix 8.2.**	June 2021 May 2022
Otter	Walkover survey of the river and tributaries within proximity (100 m) to the land within the application boundary for evidence of otter including holts, spraints and footprints in addition to 250 m up and downstream of these features.	Jed Water and associated tributaries to a width of 100 m plus 250 m upstream and downstream. Full details are provided in **Technical Appendix 8.2.**	June 2021 May 2022
Water vole	Walkover survey of the river and tributary crossings within proximity (30 m) to the land within the application boundary for evidence of water vole including burrows, feeding signs and droppings.	Jed Water and associated tributary crossings to a width of 30 m. Full details are provided in **Technical Appendix 8.2.**	June 2021 May 2022
Bats	Static Detector monitoring	Across the Proposed Development in close proximity to prosed turbine locations. Full details are provided in **Technical Appendix 8.3.**	May – September 2021 (inclusive)

Ecological Receptor	Survey	Survey Area	Dates
	Preliminary Roost Assessment (PRA) – Ground level	All deciduous trees and structures within the land within the application boundary. Full details are provided in **Technical Appendix 8.3** which shows trees and structures assessed as having bat roosting potential.	June to July 2021 – May 2022
Badger	Walkover	All suitable habitat within the application boundary plus a 100 m buffer in addition to all setts previously identified during the MacArthur Green 2015 surveys. Full details are provided in **Confidential Appendix 8.4**	June 2021 May 2022

Assessment Limitations

8.6.11 Background data searches rely on third party data. It is possible that third party data may contain identification errors and, therefore, the reliability of archived biological data is often unknown due to the lack of any traceable validation. Archived data do not provide comprehensive lists of species present within a ZoI; and a lack of records for a species in a given area does not necessarily indicate its absence – it may simply be due to under-recording.

8.6.12 Surveys were undertaken at the appropriate time of year. However, all ecological surveys can only provide a snapshot of presence or activity in a given area. Based on the findings of the surveys, and the habitats present, the data collected during the field surveys are considered sufficient (and robust enough) to inform this EcIA.

8.6.13 Active forestry operations include felling which is ongoing through the north of the Proposed Development. In addition, some areas of mature plantation contained windblown trees. These areas could not be entered during the ecology surveys including NVC / GWDTE, protected species, and bat activity surveys. However, due to the current levels of disturbance this is not considered a constraint to the overall survey results. Specific limitations on the assessment of ecological features are given in the respective **Technical Appendices 8.1 – 8.5**.

8.7 Existing Environment

8.7.1 The results of the desk-based assessment and the field surveys undertaken during 2021 are summarised below. Full details of the survey results can be found in the Technical Appendices in **Technical Appendices 8.1 – 8.5** of this chapter. Each ecological receptor has been valued as described above in paragraph 8.4.2 – 8.4.5. The ecological baseline has been compiled using the results of both the desk-based study and field surveys.

Designated Sites for Nature Conservation

8.7.2 There are four statutory designated sites within 2 km of the Proposed Development site. These comprise the River Tweed SAC, Borders Wood SAC, Cragbank and Wolfehopelee SSSI, and Keilderhead Moors SSSI as shown in **Figure 8.2.3.**

8.7.3 A summary description of these sites is provided in **Table 8.8** below, and the locations of the statutory designated sites are illustrated in **Technical Appendix 8.2**.

Table 8.7: National Designated Sites within 2 km of the Proposed Development

Site Name	Designation	Approximate Distance to Proposed Development Site (m)
Internationally Designated Sites within 2 km		
Borders Woods SAC	Designated for the Annex 1 habitat Tilio-Acerion forests of slopes, screes and ravines. This complex of gorge woodlands are of mixed-age coppiced ash (*Fraxinus excelsior*) and wych elm (*Ulmus glabra*) with varied structure and a diverse field-layer rich in calcicolous and nitrophilous plant species.	300 m west and directly north of the existing access track
River Tweed SAC	Designated for the Annex I habitat. The river is the most species-rich example of a river with Ranunculus in Scotland, and is the only site selected for this habitat in Scotland. The river has a high ecological diversity. The site Is also designed for otter and Atlantic salmon which are both Annex II species.	Tributaries of Jed water within site boundary
Nationally Designated Sites within 2 km		
Kielderhead Moors: Carter Fell to Peel Fell SSSI	Forms one of the largest and typically diverse areas of upland habitat in this part of Britain. Reduction of burning and grazing since the 1960's has enabled a good bog moss (*Sphagnum sp*.) cover to re-establish with hummock-hollow micro-topography. Other habitats present include acid grassland, marshy grassland, bracken (*Pteridium aquilinum*) and relict scrub. In grassland areas, often where there is some bracken, adders are present. The site is important for birds, species include curlew, dunlin, golden plover, ring ouzel, snipe, teal, wheatear and whinchat as well as four raptor species.	1,120 m south
Cragbank and Wolfehopelee SSSI	A composite woodland site situated on steep slopes and is composed of two discrete compartments of ancient native woodland. It has a diverse ground flora and a wider range of woodland types than elsewhere in the area. The site is important for beetles including several rare and nationally scarce species with a presence of 37 species. The invertebrates and ground flora of the SSSI indicate the ancient, undisturbed nature of the site.	300 m west

8.7.4 There are no non-statutory designated sites within 1 km of the Proposed Development site.

8.7.5 At least 122 noteworthy species were recorded within 1 km of the Proposed Development site, extending to 10 km for bats. Of these, three are amphibians, four are fish, 20 are invertebrates, 11 are mammals, two are reptiles, and 18 are plants and lichen.

Habitats and Vegetation

8.7.6 There are 12 plant and lichen noteworthy species recorded from places within 1 km of the Proposed Development site.

8.7.7 Detailed descriptions of habitats are provided within the NVC / GWDTE survey report, **Technical Appendix 8.1**, and illustrated in **Figures 8.1.2 – 8.1.5b**. The land within the application boundary comprises the following broad habitat types; coniferous plantation, Felled coniferous plantation, open water, plantation broadleaved woodland and young coniferous plantation. In addition, the site also includes areas of bare ground, brash and dry-stone walls. Jed water and its associated tributaries flow through the site.

8.7.8 Within 1 km, the Proposed Development is surrounded by areas of clear fell and mature coniferous plantation and to the west, open farmland. There are a few areas of woodland adjacent to the Proposed Development site which includes Borders Woods SAC.

8.7.9 There are no plant species from the habitats recorded on the Proposed Development site that are critically endangered, endangered or vulnerable on the IUCN Red list.

Invasive Non-Native Species

8.7.10 No invasive non-native species were recorded during the surveys.

Invertebrates

8.7.11 No notable species were returned from the desk study and no habitats of value to notable invertebrates have been identified and the habitats on site are thought likely to support a range of common invertebrate species only and invertebrates are not considered further.

Aquatic/Fish

8.7.12 No specific fish or aquatic surveys have been undertaken, but the larger waterbodies within the site are likely to support small populations of native brown trout and other fish species typical of upland watercourses. As discussed above, waterbodies within the Proposed Development site are tributaries of the River Tweed SAC which supports a range of native fish species. No direct habitat loss of waterbodies would occur, and there would be the implementation of standard pollution prevention control measures that would be outlined in a Construction Environmental Management Plan (CEMP). No significant impacts on fish are envisaged.

Bats

8.7.13 Bat survey field methods followed standard guidance 10 & 11 and are fully outlined within **Technical Appendix 8.3** and illustrated in **Figure 8.3.1 – 8.3.6**.

8.7.14 The survey area where bat field surveys were carried out covered all deciduous trees within the application boundary, with static detectors covering the proposed turbines. The purpose of the bat surveys was to identify the bat species using the Proposed Development site, access activity levels, characterise habitat associations for species and evaluate the potential collision risk. The habitats within the application boundary were considered to be of moderate habitat risk for bats, in accordance with criteria presented in NatureScot guidelines[93].

8.7.15 Within 10 km of the Proposed Development there are 236 records of bats. These include Daubenton's bat (*Myotis daubentonii*), Brandt's bat (*Myotis brandtii*), Natterer's bat (*Myotis nattereri*), Myotis sp(p), noctule (*Nyctalus noctule*), common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*) and brown long-eared (*Plecotus auritus*).

8.7.16 The majority of the land within the application boundary consists of commercially managed mature Sitka spruce which typically has negligible bat roost suitability. The ruin steading at Westshiels was surrounded by a number of broadleaved trees with bat roost potential, ranging from low to high. The ruins themselves were classified as having low to moderate summer and hibernation potential. These features are not within a distance of 200m plus rotor radius of a turbine and were not subject to further investigation.

8.7.17 Throughout the static surveys, four species and two genera were recorded: common, soprano and Nathusius' pipistrelle, *Nyctalus spp*., Myotis spp. and brown long-eared bat. A total of 23,797 bat registrations were recorded for the survey area with a mean registration rate of 5.94 bat registrations per hour (B/h).

8.7.18 The majority of bat activity, originated from common pipistrelle and soprano pipistrelle bats which accounted for 84% of all activity within the Proposed Development site followed by Myotis spp. (13.2%), brown-long eared (1.6%), *Nyctalus* spp. (1%) and Nathusius' pipistrelle. (0.1%).

8.7.19 High collision risk species (as per NatureScot, et al., 2021) recorded within the survey area comprise soprano pipistrelle, common pipistrelle, Nathusius' pipistrelle and *Nyctalus* spp. All other bat species recorded (Myotis spp. and brown long-eared bats) are categorised as low collision risk and of low to medium population vulnerability in line with the same guidance.

8.7.20 The Proposed Development habitat risk was assessed as 'Moderate'. A 'Medium' project size combined with a 'Moderate' habitat risk level results in an overall site risk assessment of 'Medium'.

8.7.21 Given the level of activity and use of the site by foraging and commuting bats, the range of species recorded during surveys has been assessed as being of District value for *Nyctalus* spp. and Nathusius' pipistrelle and Local for all other bat species recorded within the survey area'.

Terrestrial Mammals (Excluding Bats)

8.7.22 Within 1 km of the Proposed Development there are 181 records of protected species excluding bats. These include otter (five records, with the most recent from 2011), badger (20 records, with the most recent from 2006) and red squirrel (Sciurus vulgaris) (156 records, with the most recent from 2014). Protected species field methods excluding bats

[93] NatureScot, et al. (2021a), Bats and Onshore Wind Farm Survey Assessment and Mitigation.

and badgers and are fully outlined within **Technical Appendix 8.2** and illustrated **in Figure 8.3.1 – 8.3.6**.

Otter

8.7.23 The desk study returned records of otter within 1 km of the Proposed Development. Jed Water and its associated tributaries were assessed as providing suitable foraging and commuting habitat for otter, it is also connected to the wider environment via the River Tweed SAC for which otter is a qualifying species.

8.7.24 A detailed survey to search for evidence of otter was undertaken along Jed Water and its associated tributaries (including the Black Burn) which flow through, and adjacent to, the Proposed Development site. Evidence of otter was recorded during the survey with a potential couch identified and numerous spraint varying between fresh and old recorded along the banks of Jed Water. It is evident, therefore, that otter forage and commute within the watercourses flowing through the Proposed Development. Given that this species is widespread in the geographical region and throughout Scotland, and given that Jed Water flows into the River Tweed, otter are considered to be of 'Local' value.

Water Vole

8.7.25 The desk study returned no records of water vole within 1 km of the Proposed Development site. Jed water and many of its associated tributaries are considered too wide and fast flowing for water vole. There are several small watercourses and burns which are considered suitable to support water vole, however, they lack emergent and aquatic vegetation and, therefore, a substantial enough food source in order to be able to support populations of this species. No evidence of water vole was recorded historically or during the survey. Therefore, water voles are considered unlikely to be present within the Proposed Development site. Therefore, this species has not been considered further.

Badger

8.7.26 Badger field methods are fully outlined within **Technical Appendix 8.4** and illustrated in **Figure 8.4.1 – 8.4.3**.

8.7.27 The desk study returned 20 records of badger within 1 km of the Proposed Development site.

8.7.28 A total of five badger setts were recorded during the MacArthur Green surveys in 2015. These setts were resurveyed in June 2022 with a total of two setts re-identified.

8.7.29 Habitats with the potential to support badger were recorded across the Proposed Development site. The large expanses of clear fell in addition to forestry rides and tracks offer suitable foraging and commuting habitat for badger with suitable sett building habitat recorded within the plantation woodland and drier areas along the banks of Jed Water.

8.7.30 The badger population is considered to be of 'Local' value.

Red Squirrel

8.7.31 The desk study returned 156 records of red squirrel within 1 km of the Proposed Development site with the most recent record from 2014, whilst the majority of records are over 8 years old and red squirrel have suffered a population decline since this period. No evidence of red squirrel was recorded during the surveys on the land within the application boundary. Habitats within the Proposed Development site comprise mainly coniferous plantation and clear fell at the time of survey in June 2021. Much of the remaining plantation is immature providing a lack of suitable foraging habitat and food source. The remaining mature plantation contains large areas of wind blow and is not considered substantial enough to support populations of this species. The ongoing forestry operations also contribute a high level of disturbance. Although there are a large number of records of this species within proximity to the Proposed Development site, due to the above it is unlikely that red squirrels are present within the Proposed Development site and no evidence was found during the surveys. Therefore, this species has not been considered further.

Reptiles

8.7.32 The desk study returned eight records of reptiles including a single adder (Vipera berus) and seven common lizards (Zootoca vivipara). During the surveys conducted, a total of ten common lizard were recorded including both males and females. In addition to the confirmed presence of common lizard on site, there is suitable habitat including refugia, hibernacula and foraging habitat to support populations of adder and slow worms (Anguis fragilis) including large areas of clear fell, dry stone walls, scrub and grassy vegetation.

8.7.33 Therefore, it is likely that in addition to common lizard, that adder and slow worm utilise the site and they are assumed to be present. Given that common lizard has been confirmed within the Proposed Development site, and that suitable habitat is present for slow worm and adder, coupled with an incidental sighting of an adder during the MacArthur Green ornithology surveys (MacArthur Green, 2016), reptiles are considered to be of ‘Local’ value. However, it is considered that there is abundant suitable habitat for reptiles that would not be affected by the Proposed Development, in addition, standard mitigation measures and precautionary working would prevent significant adverse effects on reptiles, as such, reptiles are not considered further in this assessment.

Amphibians

8.7.34 Within 1 km of the Proposed Development site there are two records of unidentified newts.

8.7.35 During the MacArthur Green surveys in 2015, they conducted great crested newt surveys including the habitat suitability index (HSI) followed by presence / absence surveys which included both terrestrial and aquatic surveys. No evidence of great crested newts was recorded during these surveys.

8.7.36 Two ponds were identified within 100 m of the access area. As no surveys have been undertaken within these areas historically, further surveys are scheduled for 2023 in order to ascertain whether GCN is present within ponds along the proposed access route. If GCN are found to be present (considered unlikely) then an assessment would be undertaken and an addendum to this EIA produced and submitted as additional

8.8 Future Baseline

8.8.1 Ecological features are rarely static in their extent, distribution and condition. Habitats and species populations are dynamic and so the prediction of future baseline is complex. In the absence of the Proposed Development, it is likely that existing land uses would persist and habitat structure, function and protected species assemblages would broadly reflect their current condition.

Implications of Climate Change

8.8.2 The predicted effects of climate change are likely to influence the future ecological status of the survey area. Drawing on the UK Climate Projections CP18, which generally predict hotter, drier summers and milder, wetter winters, it is likely that ecological features would be subject to:

- An increase in invasive species diversity and range;
- Changes to vegetation assemblages; and
- Range contraction/expansion of faunal species.

8.8.3 These predicted changes to the climate are unlikely to significantly affect the findings of this assessment if they occur.

8.9 Design Considerations

8.9.1 The Proposed Development has gone through four different iterations of the layout (Layout A – D) shown on **Figure 2.3**, which have been informed at different stages of the project design process. The layout iteration was informed by each discipline based on the site information available. The changes to the design allowed embedded mitigation measures to be adopted into the design so that specific ecological impacts could be scoped out of the assessment.

8.9.2 Standoff buffers of 100 m from Jed Water and 50 m from all other watercourses where practicable has been included within the final design in order to prevent disturbance to bats, otter and aquatic species during construction.

8.9.3 Badger activity has been recorded across the Proposed Development site with a sett located within close proximity to one of the potential access options considered during the design iteration process. Subsequently, the access route has been dropped and an alternative route taken to prevent disturbance / destruction of an active main sett.

Land-Take

8.9.4 Land take has been kept to a minimum and all turbine bases and access tracks have avoided habitat of botanical interest highlighted in **Technical Appendix 8.1**.

Watercourse Buffers

8.9.5 The design has ensured a minimum 100m stand-off from Jed Water and 50 m from all other watercourses where practicable in order to reduce impacts on aquatic species in addition to water quality.

Watercourse Crossings

8.9.6 A number of watercourses would be crossed by the proposed access tracks. As detailed in **Technical Appendix 10.4**, of the ten identified crossings, eight would require upgrading of existing structures and two would be entirely new structures. Details of these crossings would be provided as part of the detailed design process post-consent. Measures would be put in place to protect water quality (associated with flood risk and increased run-off; pollution and accidental spillage incidents; and sedimentation and erosion) through the implementation of standard pollution and sedimentation prevention measures, such as the safe storage of chemicals and fuels; spill kits and remediation plans; bog mats; and use of temporary hay bale barriers or silt and splash fences. These measures would be outlined within a Construction Environmental Management Plan (CEMP).

8.9.7 **Technical Appendix 10.4** indicates that the two new water crossing would maintain the existing natural hydromorphology and ecological characteristics of the crossing point, therefore, there is likely to be no barriers to in river migration for aquatic species. However, if required provision would be made for otters ensuring that they can pass through the crossings at periods of high flow.

Outline Habitat Management Plan

8.9.8 An outline habitat management plan (OHMP) and peat management plan have been drafted in support of this EIA in **Technical Appendix 8.5** and as illustrated in **Figure 8.5.1** and **Technical Appendix 10.1** and illustrated in **Figure 10.1 – 10.7**. The OHMP outlines the habitat enhancement and creation measures which should be implemented during construction to prevent an adverse effect of the Proposed Development and contribute to no net loss in biodiversity.

Bat Habitat Features

8.9.9 The steading ruin at Westshiels is surrounded by a number of broadleaved trees with bat roost potential, ranging from low to high. Potential roost features (PRFs) that were recorded included knot holes, woodpecker holes, keyhole tears and wounds. The old steading consists of two stone ruins with low to moderate summer and hibernation roost potential. These features are not within a distance of 200 m plus rotor radius (i.e., 280 m) of a turbine and were not subject to further investigation. If the access track in this area would be subject to work for the Proposed Development such as track upgrade and widening, then work should be micro-sited away from any PRF (10 m buffer). If it is not possible to microsite works away from a PRF, then further survey work would be undertaken to determine if a roost is present.

8.10 Predicted Impacts

8.10.1 This section presents an assessment of effects upon important ecological features, assuming the implementation of embedded mitigation without any additional measures, both as a result of the Proposed Development alone and cumulatively with other wind farm developments.

8.10.2 The Proposed Development has been assessed for an operational life of 35 years.

8.10.3 In accordance with the guidance provided in CIEEM Guidelines (CIEEM, 2018), Key Ecological Receptors' (KERs) are important ecological features within the ZoI of the Proposed Development, which are *"both of sufficient value to be material in decision making and likely to be affected significantly"*. For this assessment KERs have been identified as ecological receptors with a value of 'Local' importance or greater, which may be subject to significant effects from the potential impacts associated with the Proposed Development.

8.10.4 **Table 8.9** below lists the KERs identified which would be scoped into the detailed assessment of effects.

Table 8.8: Ecological Receptors Scoped In

Key Ecological Receptors (KERs) Scoped into Detailed Assessment	Ecological Value	KER - Rationale for Scoping In to the Detailed Assessment
Internationally Designated sites		
River Tweed SAC	**International**	This SAC flows through the Proposed Development and is, therefore, hydrologically linked to the Proposed Development. Jed Water is connected to the wider environment via the River Tweed. The river and its associated tributaries could provide suitable foraging and commuting habitat for otter, which are known to be present in the local area historically and within the Proposed Development and, therefore, effects should be considered
Bats	**District** for *Nyctalus* spp., and Nathusius' pipistrelle. **Local** for all other bat species recorded	Bats are listed on Annex II of the Habitats Directive, and fully protected through the Conservation (Natural Habitats &c.) Regulations 1994 (as amended). Throughout the monitoring period, four species and two genera were recorded: common, soprano and Nathusius' pipistrelle, *Nyctalus* spp., *Myotis* spp. and brown long-eared bat. When considering the information available, the Nature Conservation Value is assessed as being of District Nature Conservation Importance for *Nyctalus* and Nathusius' pipistrelle based on their likely low regional populations with Nyclatus being on the edge of its predicated range. For common pipistrelle and soprano pipistrelle, the Nature Conservation Value is assessed to be of Local value due to the favourable conservation status and these species being of least concern under the IUCN Red List For *Myotis* spp. and brown long-eared bat the Nature Conservation Value is assessed to be Local due to the favourable conservation status and

Key Ecological Receptors (KERs) Scoped into Detailed Assessment	Ecological Value	KER - Rationale for Scoping In to the Detailed Assessment
		these species being of least concern under the IUCN Red List.
Aquatic Species	**County**	Jed Water flows into the River Tweed which is designated as an SAC of which Atlantic salmon are a qualifying species. The tributaries were largely assessed as too small to support populations of salmon, however, there are a few which provide suitable habitat for commuting and spawning.

8.10.5 **Table 8.10** below lists the ecological receptors that have been scoped out of the assessment on the basis that there is no potential for significant effects and/or they are not of sufficient value to be material in decision making. These receptors would not be considered further in the assessment. Notwithstanding the above, due to their transient nature, pre-construction surveys for badger and otter would be carried out to ensure that the baseline environment has not changed.

Table 8.9: Ecological Receptors Scoped Out

Ecological Receptor	Ecological Value	KER - Rationale for Scoping Out of the Detailed Assessment
Internationally Designated Sites		
Borders Woods SAC	International	The SAC is located *c.*300 m north-west of the Proposed Development site, therefore, no likely significant impact pathways have been identified. The designated site lies adjacent to the western access track and, therefore, there is potential for pollution to effect the SAC through surface run of, dust and other air quality impacts from construction vehicles. However, given the embedded mitigation in the form of pollution prevention control measures this is considered to be **not significant**
Nationally Designated Sites		
Cragbank and Wolfehopelee SSSI	National	The SAC is located *c.*300 m north-west of the Proposed Development site, therefore, no likely significant impact pathways have been identified.
Kielderhead Moors: Carter Fell to Peel Fell SSSI	National	No impact pathways identified. This site lies 1,120 m south of the Proposed Development site and there are no hydrological links or other impact pathways to the Proposed Development.
Plants and Habitats		

Ecological Receptor	Ecological Value	KER - Rationale for Scoping Out of the Detailed Assessment
Vegetation and NVC Communities	**Local/Site**	The majority of habitat loss is conifer plantation or clearfell of limited botanical value. Only small areas of other habitat types would be affected. The embedded design of the Proposed Development avoids the majority of priority habitats. Plants and habitats within the Proposed Development have, therefore, been scoped out based on the assessment and mitigation outlined in the **Technical Appendix 10.3** which refers to construction working method recommendations in the more sensitive and botanically interesting areas.
Protected / Notable Species		
Red squirrel	**Local/Site**	Surveys have not identified the presence of red squirrels on the land within the application boundary and the coniferous woodland is considered to be suboptimal habitat due to the lack of foraging habitat and large areas of immature plantation. Similarly, there are continuing felling operations undergoing on site with high levels of human disturbance further reducing site suitability.
Water vole	**County**	Previous surveys for the now withdrawn Highlee Hill Wind Farm submission found no evidence of water vole within the Proposed Development site. As a precautionary approach, evidence of water vole was searched for in conjunction with the otter survey at all water crossings, no evidence was found, and the species is assumed to be absent.
Pine marten	**County**	Surveys have not identified the presence of pine marten on the land within the application boundary. Much of the mature coniferous plantation has been felled with large areas of clear fell, immature plantation, and wind blow. Similarly, there are continuing felling operations undergoing on site with high levels of human disturbance further reducing site suitability. Pine marten are therefore assumed to be absent.

Ecological Receptor	Ecological Value	KER - Rationale for Scoping Out of the Detailed Assessment
Reptiles	**Local/Site**	Reptiles are known to be present within the land within the application boundary with a number of common lizards identified during the surveys. There is also suitable habitat within the land within the application boundary to support adder and slow worm. Although reptiles are known to be present there is ample suitable habitat including mosaic grasslands, dry stone walls and brash piles for them to disperse to. Furthermore, the CEMP would include good practice measures during construction to ensure any reptiles present are safeguarded during vegetation removal. No potential for significant effects identified.
Otter	**County**	Otters are known to utilise Jed Water for foraging and commuting with evidence of otter recorded including spraint and a single couch. The tributaries were largely assessed as too small to support otter, however, there are a few which provide suitable habitat for commuting. Jed Water flows into the River Tweed which, as above, is designated as an SAC of which otter are a qualifying species. However, there would be a minimum 500 m buffer between all Proposed Development infrastructure with the exception of watercourse crossings. Therefore, there are not expected to be any direct effects on otter or their habitats. Standard measures to protect water quality would be followed. As such no potential significant effects were identified.
Badgers	**Local/Site**	Badgers are known to be present within the Proposed Development site with a number of setts identified historically. During the 2022 surveys undertaken by RSK Biocensus two active setts were reidentified. However, the setts are considered suitably distant from the working area (the closest at 110 m) and no potential significant effects were identified.
Great Crested Newt	**County**	Previous surveys did not identify presence of GCN in any of the ponds within the Proposed Development. As habitats on site have remained much the same and are not subject to higher levels of human disturbance, it was not considered likely that GCN are present within the Proposed Development. Historically, no surveys have been undertaken along the access route. Two ponds were identified as having excellent habitat suitability to support GCN and therefore, eDNA surveys would be undertaken prior to construction works. If the eDNA returns a positive result for GCN, further surveys would be required to ascertain population densities and a suitable

Ecological Receptor	Ecological Value	KER - Rationale for Scoping Out of the Detailed Assessment
		mitigation strategy devised in consultation with NatureScot.
Bats – *Myotis* and brown long-eared bat only.	**Local/Site**	The operational and cumulative effects of collision mortality on low collision risk bat species (Myotis species and brown long-eared bat) are scoped out of the assessment, as guidance states for assessing potential risk and applying mitigation that collision risk is carried out for all high collision risk species only recorded on site (NatureScot et al., 2021).
Invertebrates	**Local/Site**	No notable species were returned from the desk study and no habitats of value to invertebrates have been identified. The habitats on site are thought likely to support a range of common invertebrate species only and therefore no significant effect is predicted.

Potential Effects in the Absence of Mitigation

8.10.6 The potential effects associated with each phase of the Proposed Development which could lead to a significant effect on the KERs are discussed below.

8.10.7 Impacts arising from the decommissioning phase of the Proposed Development have not been presented in detail because they are considered to be of a similar nature to the construction issues identified, but of a potentially smaller scale and shorter duration. Therefore, effects arising from decommissioning are anticipated to be broadly similar in nature to, but of a lower-level effect than, those arising during the construction phase, and with all infrastructure removed and habitats reinstated to pre-development conditions.

Construction Phase

8.10.8 Potential effects scoped out of the assessment:

- Disturbance/ displacement and loss of habitat – otter (mitigation as above). No watercourses or banksides would be directly impacted as a result of the Proposed Development, and therefore otter habitats would not be affected.
- Disturbance/ displacement and loss of habitat – reptiles (mitigation as above). The footprint of the Proposed Development would result in relatively low habitat loss for reptiles with large areas of suitable habitat for them to disperse to.
- Water quality - Potential impacts associated with changes in water quality in particular the mobilisation of diffuse pollution and accidental spillage from construction plant.

8.10.9 Potential impacts scoped into the assessment:

- Designated sites - Potential impacts associated with changes in water quality in relation to the River Tweed SAC and upon habitats associated with the Borders Woods SAC.
- Disturbance/displacement – bat roosts: Potential bat roost features within trees at the old steading at Westshiels could be removed by felling/lopping works. In

addition, track widening, and upgrade works could take place adjacent to a roost, which could potentially result in disturbance to a bat roost, if it was in current use.

- Disturbance/displacement – bats (foraging/commuting): There is the potential for displacement and/or disturbance to foraging and commuting bats during construction due to the construction of wind farm infrastructure and felling required to accommodate the infrastructure. The large, closed extents of Sitka Spruce plantation reduce the suitability of the Proposed Development, however, plantation edge and clear fell habitat can create an important foraging and commuting resource for bats. Considering these factors, the Proposed Development is considered to be of moderate bat habitat suitability and quality.
- Aquatic environment - Potential impacts associated with changes in water quality in relation to the watercourses and any crossing points.

Operational Phase

8.10.10 Overall, the potential operational effects relating to ecology are expected to be minimal and have therefore been scoped out of the assessment as detailed below:

- Disturbance/ displacement and loss of habitat – During the operational phase, the Proposed Development would have regular site traffic which would be confined to the access tracks and would not be operating in areas of suitable habitat for protected species.

8.10.11 Potential impacts scoped into the assessment:

- Disturbance/ displacement and loss of habitat – bats – During the operational phase, there would be 13 turbines up to 230 m at blade tip.
- Collision risk – the potential for incidental mortality resulting from collision risk on commuting and foraging bat species.

8.10.12 Given the complexity of bats and wind farms, information on the potential effects on bats has been provided below.

8.10.13 Exeter University found that most recorded bat fatalities at UK wind farms have been common pipistrelle, soprano pipistrelle and noctule bats with single carcasses of brown long-eared bat, Nathusius' pipistrelle and Natterer's bat (Mathews et al. (2016)[94]). The work of Richardson et al. (2021)[95] on *Pipistrellus* species at wind farm sites found a potential attraction to wind turbines, with common pipistrelle relative activity 37% greater at turbines compared to control locations. Roeleke et al. (2016)[96] found that female noctules repeatedly came into close contact with wind turbines during foraging flights and flew at heights that suggested a high risk of colliding with turbine blades.

8.10.14 As discussed in **Table 8.10**, the Nature Conservation Value across the survey area is assessed as being of District Nature Conservation Importance, for *Nyctalus* and *Nathusius'* pipistrelle which is based on their likely low regional population. While for common pipistrelle and soprano pipistrelle the survey area is assessed as being of Site Nature Conservation Importance due to their favourable conservation and least concern

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[94] Mathews, F., Richardson S., Lintott, P. & Hosken, D. (2016) Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to inform Risk Management. Final report. University of Exeter.

[95] Richardson, S.M., Lintott, P.R., Hosken, D.J., Economou, T. and Matthews, F. (2021). Peaks in bat activity at turbines and the implications for mitigating the impact of wind energy developments on bats. Scientific Reports 11, 3636 (2021). https://doi.org/10.1038/s41598-021-82014-9.

[96] Roeleke, M., Blohm, T., Kramer-Schadt, S., Yovel, Y., & Voigt, C. C. (2016), Habitat use of bats in relation to wind turbines revealed by GPS tracking. Scientific reports, 6(1), 1-9.

status. For Myotis spp and Brown long-eared bat the Nature Conservation Value across the survey area is assessed to be Local due to their favourable conservation and least concern status.

8.10.15 The overall risk assessment was undertaken only for high collision risk species identified within the bat survey area (i.e., common pipistrelle, soprano pipistrelle, Nathusius pipistrelle and *Nyctalus* spp.). Low risk species (Myotis spp. brown long-eared bat) are low collision risk and medium-high population vulnerability species and are not considered in the overall risk assessment. This is in line with guidance with the potential collision risk carried out separately for all high collision risk species recorded (NatureScot et al., 2021)[97].

8.10.16 The proposed turbines have a blade tip over 150 m and would require visible aviation warning lights. There is some recent evidence that migratory pipistrelle bats may be attracted to red lights, which according to the authors, may lead to an increased collision risk of migratory bats such as soprano and Nathusius pipistrelle with wind turbines (Voigt et al. 2018)[98]. The authors did, however, note a lack of insect hunting at the red light sources, which indicates that the attraction of migratory bats to red light sources was not caused by foraging, but by phototaxis (movement of an organism in response to light, either towards the source of light or away from it).

8.10.17 Assessing the potential risk of a bat population to wind farm collision is based on activity levels recorded, population vulnerability (determined by collision risk and population size) and site risk level. These factors are multiplied to generate an overall risk assessment score of either Low, Moderate or High. **Technical Appendix 8.3** presents the analysis and results of this risk assessment for each high collision risk species. In summary, the assessment concludes that Nathusius' pipistrelle and *Nyctalus* spp. would be at 'Medium' risk and common and soprano pipistrelles are at 'High' risk from turbine operation. The periods and monitoring points (MPs) at which pipistrelles appeared to be at 'High' risk were during June, July and September at MPs 3, 4, 5 ,8 and 10. No 'High'-risk periods were identified for Nathusius' pipistrelle and *Nyctalus* spp.

8.10.18 Significance of Effect - Given the above consideration of risk scores, Nature Conservation Value, Conservation Status and Magnitude, the collision risk on *Nyctalus* and Nathusius' pipistrelle is considered **not significant** using the CIEEM guidance or **Minor adverse** under the terms of the EIA Regulations as no 'High' risk periods were identified throughout the monitoring period.

8.10.19 Significance of Effect – Common and soprano pipistrelle: Given the above consideration of risk scores, Nature Conservation Value, Conservation Status and Magnitude, the collision risk on common and soprano pipistrelle bats is considered **significant,** using the CIEEM guidance or moderate adverse in the context of the EIA Regulations as 'High' risk periods were identified during June, July and September at MPs 3, 4, 5, 8 and 10. Only two of these MPs (MP 3 and 4) are located within proximity to turbines.

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[97]NatureScot (2021a). https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation [accessed May 2021].

[98] Voigt, C.C., Reghnig, K., Lindecke, O. & Petersons, G. (2018, Migratory bats are attracted by red light but not warm-white light: Implications for the protection of nocturnal migrants. Ecology & Evolution/ Volume 8, Issue 18/p.9353 – 9361.

Decommissioning Phase

8.10.20 The operational lifespan the Proposed Development is approximately 35 years and, therefore, this assessment assumes that the Proposed Development would be decommissioned after this time.

8.10.21 A detailed methodology cannot be finalised until immediately prior to decommissioning. However, impacts would be similar to the construction phase and would be undertaken in line with relevant policy and legislation at that time.

8.10.22 Potential impacts on ecological receptors resulting from decommissioning activities would be expected to be similar to those during the construction phase and, therefore, have not been assessed separately in this chapter.

8.11 Potential Effects in the Absence of Mitigation

8.11.1 The potential for significant effects on each KER during the construction and operational phases of the Proposed Development is assessed below.

Designated Sites

8.11.2 The Proposed Development site is considered to be of 'International' Ecological Importance for designated sites. **Table 8.11 - Table 8.14** assess the significance of potential effects, but in the absence of any mitigation measures.

Table 8.10: Assessment of Potential Effects – Designated Sites – River Tweed SAC

Parameter	Potential Effect
Ecological value	International
Receptor sensitivity	**High**
Extent	The Proposed Development is hydrologically linked to the SAC. Therefore, there is the potential for pollution or runoff to affect the interest features of the designated site. The significance of any impact would depend on the magnitude and duration of any pollution event, and it is considered that fish species are more likely to be affected than otter (otter being wider ranging and less localised).
Magnitude (positive/ negative)	Magnitude will depend upon duration, type and nature of any pollution event. The most affected area is likely to be the section of the designated site closest to any pollution event. The further downstream from the source of pollution will likely be lower due to dilution.
Duration	Likely temporary, depending on severity and type of pollution incident. Duration

	effects downstream are likely to be reduced due to dilution.
Timing/ Frequency	Most likely during construction. The potential for pollution during operation is considered negligible.
Reversibility	Likely reversible over time depending on severity, type, duration, and nature of pollution incident
Likelihood	Possible in the absence of mitigation and control measures.
Significance (EcIA)	**Potentially significant depending on nature of event**
Conversion (EIA Regs)	**Potentially major**

Bats

Table 8.11: Assessment of Potential Effects – Bats (not including collision risk)

Parameter	Potential Effect		
	Loss/ fragmentation of foraging and commuting habitat	Loss of roosting habitat	Displacement
Ecological value	District/Local	District/Local	District/Local
Receptor sensitivity	**Medium**	**Medium**	**Medium**

Parameter	Potential Effect		
	Loss/ fragmentation of foraging and commuting habitat	Loss of roosting habitat	Displacement
Extent	The habitat loss within the Proposed Development is low and mainly around turbine bases. This is negligible when compared with the ongoing forestry operations within the Proposed Development. This represents a small portion of the available habitat for bats within the wider area and overall commercial woodland is not considered optimal for foraging bats. Displacement or disturbance to foraging and commuting bats as a result of construction is considered negligible given the abundance of edge habitats available that remain unaffected. Felling for infrastructure (not turbines) will create new edge habitats that may be utilised by bats within otherwise closed blocks of conifer forest, and thus overall, the abundance of edge habitat will increase. Forestry restocking will also create new habitats and edge features in the longer term.	The trees and steading at Westshiels are considered the most suitable habitat for roosting bats within the application boundary. The majority of the coniferous plantation is considered sub-optimal for roosting bats.	Limited to turbine Wind Protection Zones

Parameter	Potential Effect		
	Loss/ fragmentation of foraging and commuting habitat	**Loss of roosting habitat**	**Displacement**
Magnitude (positive/ negative)	Small / negative. The habitat loss presents a small portion of the available habitat for bats within the wider area. There may be a small positive effect of opening up closed forest habitat for infrastructure creating more open and edge habitat for commuting and foraging	Scheme design has avoided direct impacts on the steading at Westshiels. Direct impacts on the trees will be dependent on upgrades to the access track within proximity with improvement works being microsited to avoid trees with potential roost features where possible. Therefore, magnitude is dependent on whether the trees identified are likely to be directly affected by the works.	Small/negative. Displacement or disturbance to foraging and commuting bats during construction is considered small given the abundance of edge habitats available which will remain unaffected. Displacement through habitat loss is considered negligible in the context of the wider environment and ongoing felling works. Noise and lighting during construction could result in disturbance and reduce foraging habitat for bats. Extensive night-time working is not anticipated during the core bat activity period and, therefore, displacement from noise and lighting is considered negligible. Linear watercourse features have been avoided as part of the final design, except where watercourse crossings are required.
Duration	Short-term – the area is subject to ongoing forestry operations with cycles of felling and replanting	Short term – This area is subject to disturbance from ongoing forestry operations. If the trees identified are likely to be directly affected by the works, duration will be limited to construction.	Long term in the Wind Protection Zone during construction and operation period.
Timing/ Frequency	Limited felling will occur during construction.	Impact during construction if the trees are to be affected	During construction and operation.

Parameter	Potential Effect		
	Loss/ fragmentation of foraging and commuting habitat	**Loss of roosting habitat**	**Displacement**
Reversibility	Reversible	If roosting bats are identified and due to be impacted due to the works. Provision of suitable alternate roosting habitat will be provided and, therefore, impact would be reversable	Only reversible in the long term if turbines are removed
Likelihood	Certain	Dependent on the trees actually supporting roosting bats. This will be determined by further surveys if the upgrading of access cannot be microsited to avoid trees and requires felling or substantial pruning to trees	Likely that there will be a small degree of displacement through avoidance of foraging habitat as a result of construction activities around Wind Protection Zones. Abundance of edge habitats available which will remain unaffected.
Significance (EcIA)	Minor habitat loss though ongoing felling, however, this will create new foraging lines along woodland edges. Therefore, the impact is considered **Not significant**	If bats are identified, suitable mitigation strategies will be agreed with NatureScot via the appropriate protected species licence and, therefore, impacts are considered **Not significant**	Displacement around Wind Protection Zones is small and considered **Not Significant**
Conversion (EIA Regs)	**None**	**None**	**Minor, not significant**

Table 8.12: Assessment of Potential Effects – Nyctalus and Nathusius' Pipistrelle (collision risk)

Parameter	Potential Effect
	Collison Risk
Ecological value	District
Receptor sensitivity	**Medium**
Extent	During the operational phase, there is the potential for collision risk on commuting and foraging *Nyctalus* and Nathusius' pipistrelle species with the assessment concluding that the risk of collision is 'Medium'.

Parameter	Potential Effect
	Collison Risk
Magnitude (positive/ negative)	Negative
Duration	Long-term – Proposed Development operational period of 35 years.
Timing/ Frequency	Long term.
Reversibility	Reversible only once Proposed Development has been decommissioned
Likelihood	Likely at low (incidental) levels. However, due to the Proposed Development area being subject to a continual cycle of felling and replanting, bat activity and, therefore, risk of collision may change. There is also evidence that migratory pipistrelle bats may be attracted to red lights, which according to the authors, may lead to an increased collision risk of migratory bats at wind turbines (Voigt et al. 2018).
Significance (EcIA)	**Not significant. However, there remains a risk that collisions may increase once turbines are operational.**
Conversion (EIA Regs)	**Not significant. However, there remains a risk that collisions may increase once turbines are operational.**

Table 8.13: Assessment of Potential Effects – Common and Soprano Pipistrelle (collision risk)

Parameter	Potential Effect
	Collison Risk
Ecological value	Local
Receptor sensitivity	**'Medium'**
Extent	During the operational phase, there is the potential for collision risk on commuting and foraging common and soprano pipistrelle bats. The assessment concluded that common and soprano pipistrelles are at 'High' risk from collision. The periods and MPs at which pipistrelles appeared to be at 'High' risk were during June, July and September at MPs 3, 4, 5, 8 and 10. Of these, only MP 3 and 4 are located within close proximity to turbine locations.
Magnitude (positive/ negative)	Negative
Duration	Long-term – Proposed Development operational period of 35 years.
Timing/ Frequency	Long term.
Reversibility	Reversible only once Proposed Development has been decommissioned

Parameter	Potential Effect
	Collison Risk
Likelihood	Likely at low (incidental) levels. However, due to the Proposed Development area being subject to a continual cycle of felling and replanting, bat activity may change in the local area potentially reducing or increasing the risk of collision. There is also evidence that migratory pipistrelle bats may be attracted to red lights, which according to the authors, may lead to an increased collision risk of migratory bats at wind turbines (Voigt *et al.* 2018).
Significance (EcIA)	**Local adverse, not significant. However, there remains a risk that collisions may increase once turbines are operational.**
Conversion (EIA Regs)	**Minor adverse, not significant. However, there remains a risk that collisions may increase once turbines are operational.**

8.12 Cumulative Effects

8.12.1 The potential for the Proposed Development to contribute to cumulative effects in relation to other projects within 10 km was assessed. **Table 8.15** lists the projects that were considered.

Table 8.14: Development proposals included in the cumulative assessment

Development	Distance from Proposed Development
Pines Burn Wind Farm – Consented	4.6 km west

8.12.2 The consented, Pines Burn Wind Farm comprises up to 12 turbines with a capacity of 49.9 MW.

8.12.3 Bats are most likely to be affected by cumulative wind farm development because of the distances travelled by some species.

8.12.4 Pines Burn Wind Farm is the only cumulative wind farm development within 10 km of the Proposed Development. It was consented by Scottish Ministers in 2018[99] consists of up to 11 wind turbines, with tip heights of between 130 m and 149.9 m. The site consists of open areas of moorland and grassland habitats with blocks of conifer planation and broadleaved woodland. Bat activity surveys included transect and static surveys which recorded six bat species at the site: common pipistrelle, soprano pipistrelle, Myotis sp., brown long-eared bat, Nathusius' pipistrelle and *Nyctalus* spp. The most recorded bat species at the site was common and soprano pipistrelle. Bat activity for these species was mainly recorded around edge habitat such as burns and plantation edges. Surveys for the site also recorded two roosts supporting common and soprano roost pipistrelles and a possible Myotis spp. roosts located at Lurgiescleuch house as well as an unknown bat roost located in a tree.

[99] Ecological information was obtained though the Scottish Planning Portal – Planning Permission Reference 17/00010/FUL for the EIA and supporting ecological information.

8.12.5 Newson et al. (2017)[100] estimated through spatial modelling that between 16% and 24% of the regional populations of high-risk species (*Nyctalus*. and Nathusius pipistrelle) in southern Scotland overlap with existing and approved wind farms, with 50% of this overlap concentrated at just 10% of wind farms. The Proposed Development is on the edge of the main area of noctule predicted activity and is outwith the main area of predicted occurrence for Leisler's bat. Reliable population estimates for Nyctalus spp. in Scotland are currently not available.

8.12.6 The dispersed spatial pattern of distribution and activity of Nathusius' pipistrelle indicates that cumulative impacts from wind farm developments, even where lower activity rates occur, could be significant in regard to potential cumulative effects (Newson et al. 2017)[101]. There is very little data available on the population of this species in the UK.

8.12.7 Taking into account the 'Low' median risk scores for *Nyctalus* species and Nathusius' pipistrelle and the currently available distribution data of these species and nearby Wind farms within 10 km, the spatial and temporal magnitudes of cumulative effects on these populations across the survey area are considered to be Low Spatial and Long-Term Temporal. Cumulative effects are predicted to be **Negligible** and **not significant**.

8.12.8 Taking into account the overall 'Medium' and the 'High' monthly median risk scores for common and soprano pipistrelle species, their species distribution (widespread in Scotland) and cumulative wind farm development within 10 km, the spatial and temporal magnitudes of cumulative effects on these populations across the survey area are considered to be Minor Spatial and Long-Term Temporal. Cumulative effects predicted for common pipistrelle and soprano pipistrelle bats are **Minor adverse** and **not significant**.

8.13 Mitigation and Residual Effects

8.13.1 Mitigation measures are set out in **Table 8.16** below for potential adverse significant (EcIA) effects identified. Specific mitigation is designed to reduce the significance of effects, while general site-wide mitigation provides a mechanism for measures that will support compliance with wildlife legislation, irrespective of the significance of effects.

Table 8.15: Mitigation Measures for Scoped-in KERs

Ecological feature	Potential effect	General site-wide mitigation	Specific mitigation
River Tweed SSSI and SAC	Pollution and sediment running into hydrologically linked sites	The Wind Farm design Implements a 100 m buffer from Jed Water and 50 m from all other watercourses where practicable with the exception of water crossings.	Production of a comprehensive CEMP detailing how pollution and run-off including sediment control etc will be prevented
Bats	Mortality (collision risk)	The Wind Farm design has ensured that no turbines are located within 50 m of	Pre-construction acoustic surveys have been shown to be poor predictors of bat casualties

[100] Newson, S.E., Evans, H.E., Gillings, S., Jarrett, D. & Wilson, M.W. (2017), A survey of high risk bat species across southern Scotland. Scottish Natural Heritage Commissioned Report No. 1008.

[101] Ibid.

Ecological feature	Potential effect	General site-wide mitigation	Specific mitigation
	Direct habitat loss	woodland edges or watercourses (measured from end of turbine blades). In line with best practice guidance[102] (NatureScot, *et al*., 2021), turbines will reduce rotation speeds to below 2 rpm when **power is not being generated.** A species protection plan should be in place prior to the commencement of construction on site in order to protect any bats or their roosts found within the survey area.	at wind farms. Some wind farm sites which recorded high bat activity pre-construction then recorded no bat collisions and at other sites that recorded low bat activity, they found bat collisions (Lintott *et al*., 2016). There is also evidence to suggest that bats are attracted to wind turbines based on bat behavioural responses to wind turbines, with current monitoring efforts suggesting that bat activity increases post-wind turbine construction (Guest *et al.,* 2022)[103]. Red aviation lighting may be a factor in attracting bats (Voigt *et al.,* 2018). Given the high degree of habitat change and potential attraction effects, it will therefore be important to monitor bat activity levels and casualties during operation to determine if additional mitigation is required. An initial Bat Mitigation and Monitoring Plan (BMMP) will specify bat activity surreys, carcass searches and the collection of high-resolution weather data, once the turbines are operational. Based on current data, this will be limited to the turbine locations identified with moderate or high relative activity (T5 and T13). The BMMP will include the following details: who is responsible for implementing the BMMP, how it will be funded, methods, equipment and survey effort, and triggers for remedial action. This monitoring would continue for a minimum of three years.

[102] From that guidance: "There is evidence that bat casualties at wind farms is reduced by pitching the blades out of the wind ("feathering") to reduce rotation speeds below 2 rpm while idling, and in some cases increasing the cut-in speed during high-risk periods (i.e. warm evenings in summer with low wind speeds) e.g. Arnett *et al*., 2013.

The reduction in speed resulting from feathering compared with normal idling may reduce fatality rates by up to 50%. **As this option does not result in any loss of output, as best practice, it is recommended wherever it is practically possible and there remains uncertainty over the risk posed to bats**. It can be applied at *any* site with a blade pitch control system which can be automated using SCADA data."

[103] Guest, E., Stamps, B.F., Durish, N.D., Hale, A., Hein, C., Morton, B., Weaver, S.P. & Fritts, S. (2022). An Updated Review of Hypotheses Regarding Bat Attraction to Wind Turbines. Animals.2022, 12, 343 https://doi.org/10.3390/ANI12030343

Ecological feature	Potential effect	General site-wide mitigation	Specific mitigation
			After the first year, the results of casualty monitoring would inform any requirement for additional mitigation i.e. curtailment. The purpose of collecting bat activity and weather data is to ensure that if curtailment (which reduces power generation) is required, it is only applied when necessary ('smart' curtailment'.

Pre-Construction Surveys and Watching Briefs

8.13.2 Pre-construction surveys for badger and otter will be undertaken by an Ecological Clerk of Works (ECoW) to search for any new evidence of these species. Species protection plans will then be written up taking any new evidence in to account as required.

8.13.3 Should any new badger setts be identified, turbines and access tracks will be microsited to avoid affecting these.

8.13.4 During construction the ECoW would undertake a watching brief in areas of suitable reptile habitat and vegetation clearance works will be carried out in accordance with a precautionary method of working.

Residual Effects After Mitigation

8.13.5 Effects are predicted to be **Not Significant**; however, pre-construction acoustic surveys have been shown to be poor predictors of bat casualties at wind farms, and a degree of caution is required. On the assumption that a BMMP (with curtailment measures) will be implemented should casualties be regularly recorded, residual effects on all receptors are deemed to be not significant.

8.14 Summary of Effects

8.14.1 In summary, the desk-based assessment and survey work have established that the Proposed Development comprises the following habitats: bare ground, mature and immature coniferous plantation, clear fell, open water and plantation broadleaved woodland. A number of protected/notable species were recorded, including bats, which were recorded foraging and commuting. Evidence of badger was found within the Proposed Development site and Jed Water supports a population of otter. There are internationally, and nationally designated sites both within and immediately adjacent to the Proposed Development site although there are no non-statutory designated sites.

8.14.2 The inclusion of mitigation measures such as feathering of blades, post construction bat monitoring with high resolution weather data and a BMMP (if required) would reduce the significance of effects to **not significant** for all bat species. Residual effects on *Nyctalus* and Nathusius' pipistrelle bats remain Minor adverse and not significant. Residual effects on common and soprano pipistrelle bats reduce to **Minor adverse** and **not significant**.

8.14.3 Taking into account mitigation measures, **no significant effect** is expected on any other receptors.

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9 ORNITHOLOGY

9.1 Introduction

9.1.1 This chapter assesses the potential for significant effects on ornithology associated with construction, operation and decommissioning of the Proposed Development. A description of the Proposed Development is included in **Chapter 2** of the EIA Report. The specific objectives of the chapter are to:

- describe the ornithological baseline;
- describe the assessment methodology and significance criteria used in completing the assessment;
- describe the potential effects due to direct, indirect and cumulative impacts;
- describe the mitigation measures proposed to address any likely significant effects; and
- assess the residual effects following the implementation of mitigation.

9.1.2 The assessment has been carried out by MacArthur Green in accordance with NatureScot guidelines. All staff contributing to this chapter have undergraduate and/or postgraduate degrees in relevant subjects, have extensive professional ornithological impact assessment experience, hold professional membership of the Chartered Institute of Ecology and Environmental Management (CIEEM), and abide by the CIEEM Code of Conduct.

9.1.3 Effects on habitats and non-avian protected species are addressed separately in **Chapter** Error! Reference source not found.**: Ecology**.

9.1.4 This chapter is supported by the following figures and technical appendices:

- Figure 9.1: Vantage Points and Viewsheds: 2011-2012;
- Figure 9.2: Vantage Points and Viewsheds: 2012-2013;
- Figure 9.3: Vantage Points and Viewsheds: 2020-2021;
- Figure 9.4: Site Boundary and Study Areas;
- Figure 9.5: Ornithological Designated Sites within 20 km;
- Figure 9.6: Flight Activity: Goshawk;
- Figure 9.7: Flight Activity: Hen Harrier;
- Figure 9.8: Flight Activity: Merlin;
- Figure 9.9: Flight Activity: Peregrine Falcon;
- Figure 9.10: Flight Activity: Red Kite;
- Figure 9.11: Breeding Wader Activity: 2012 and 2013;
- Figure 9.12: Flight Activity: Curlew;
- Figure 9.13: Non-Breeding Wader Activity: 2020-2021;
- Figure 9.14: Flight Activity: Golden Plover;

- Figure 9.15: Flight Activity: Lapwing;
- Figure 9.16: Flight Activity: Pink-Footed Goose;
- Confidential Figure 9.2.1: Historic Black Grouse Records;
- Confidential Figure 9.2.2: Goshawk Breeding Activity;
- Confidential Figure 9.2.3: Peregrine Falcon Breeding Activity;
- Technical Appendix 9.1: Ornithology (including Annexes A – E); and
    - Annex A: Ornithological Legal Protection;
    - Annex B: Ornithological Survey Methodology;
    - Annex C: Ornithological Survey Effort and General Information;
    - Annex D: Ornithological Survey Results;
    - Annex E: Collision Risk Assessments; and
- Technical Appendix 9.2: Confidential Ornithology;

9.1.5 Figures and technical appendices are referenced in the text where relevant.

9.2 Legislation, Policy and Guidance

Legislation

9.2.1 Relevant European Union (EU) legislation has been considered as part of this ornithological assessment. Of particular relevance is the following:

- EU Directive 2009/147/EC on the Conservation of Wild Birds[104] ('Birds Directive');
- EU Directive 92/43/EEC on Conservation of Natural Habitats and of Wild Fauna and Flora (as amended)[105] ('Habitats Directive'); and
- EU Environmental Impact Assessment Directive 2014/52/EU[106].

9.2.2 The following national legislation, which has been amended as a consequence of EU exit (Scottish Government 2019[107], 2020[108]), is also considered as part of the ornithology assessment:

- The Wildlife and Countryside Act 1981[109] (as amended);
- The Conservation (Natural Habitats &c.) Regulations 1994[110] (as amended) (The Habitats Regulations);

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[104] Directive 2009/147/EC of the European Parliament and of the Council. Available at: https://www.legislation.gov.uk/eudr/2009/147/contents [accessed August 2022].

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[106] Scottish Government (2014), Directive 2014/52/EU of the European Parliament and of the Council. Available at: https://www.legislation.gov.uk/eudr/2014/52 [accessed August 2022].

[107] Scottish Government (2019), The Town and Country Planning and Electricity Works (EU Exit) (Scotland) (Miscellaneous Amendments) Regulations 2019. Available at: https://www.legislation.gov.uk/ssi/2019/80/introduction/made [accessed August 2022].

[108] Scottish Government (2020), EU Exit: The Habitats Regulations in Scotland. Available at: https://www.gov.scot/publications/eu-exit-habitats-regulations-scotland-2/ [accessed August 2022].

[109] Scottish Government (1981), Wildlife and Countryside Act 1981. Available at: https://www.legislation.gov.uk/ukpga/1981/69 [accessed August 2022].

[110] Scottish Government (1994), The Conservation (Natural Habitats, &c.) Regulations 1994. Available at: https://www.legislation.gov.uk/uksi/1994/2716/contents [accessed August 2022].

- The Nature Conservation (Scotland) Act 2004[111] (as amended); and
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)[112].

Policy

9.2.3 This ornithological assessment considers the relevant aspects of Scottish Planning Policy, Planning Advice Notes and other relevant guidance. Of relevance to ornithology are the following policies:

- UK Post-2010 Biodiversity Framework (2012[113]);
- Scottish Biodiversity Strategy: It's in Your Hands (2004[114])/2020 Challenge for Scotland's Biodiversity (2013[115]);
- Scottish Government (2000[116]). Planning Advice Note 60: Planning for Natural Heritage;
- Scottish Government (2017[117]). Planning Advice Note 1/2013-Environmental Impact Assessment, Revision 1.0;
- Scotland's Third National Planning Framework (2014[118]);
- Scotland 2045 – fourth National Planning Framework – draft consultation (November 2021[119]);
- The Scottish Borders Local Biodiversity Action Plan 2018 – 2028[120]; and
- The Scottish Biodiversity List[121].

Guidance

9.2.4 Guidance on the following topics has also been considered:

- Environmental impact assessment: NatureScot (SNH 2016a, 2018a, 2018b, NatureScot 2020a, CIEEM (2018), SERAD (2000);
- Designated sites: SNH (2016b), European Commission (2010);
- Collision modelling: SNH (2000, 2018c), Band et al. (2007);
- Cumulative assessments: SNH (2018d);

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[111] Scottish Government (2004), Nature Conservation (Scotland) Act 2004. Available at: https://www.legislation.gov.uk/asp/2004/6/contents [accessed August 2022].

[112] Scottish Government (2017), The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents [accessed August 2022].

[113] JNCC and Defra (on behalf of the Four Countries' Biodiversity Group) (2012), UK Post-2010 Biodiversity Framework. JNCC, Peterborough.

[114] Scottish Executive (2004). Scottish Biodiversity: It's In Your Hands. Scottish Executive, Edinburgh.

[115] The Scottish Government (2013), 2020 Challenge for Scotland's Biodiversity. The Scottish Government, Edinburgh.

[116] https://www.gov.scot/publications/pan-60-natural-heritage/ [accessed August 2022].

[117] Scottish Government (2017), Planning Advice Note 1/2013 – Environmental Impact Assessment, Revision 1.0. Scottish Government, Edinburgh.

[118] https://www.gov.scot/publications/national-planning-framework-3/ [accessed August 2022].

[119] https://www.gov.scot/publications/scotland-2045-fourth-national-planning-framework-draft/ [accessed August 2022].

[120] https://www.scotborders.gov.uk/downloads/file/928/local_biodiversity_action_plan [accessed August 2022].

[121] https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy-and-cop15/scottish-biodiversity-list [accessed August 2022].

- Bird populations/species specific guidance: Stanbury et al. (2021), SNH (2014, 2017), Pearce-Higgins (2021); and
- Construction and birds: SNH (2016c).

9.3 Scope of Assessment

9.3.1 This chapter considers any impacts of construction, operation and decommissioning of the Proposed Development upon those ornithological features identified during the review of desk-based information and field survey data (the extents of the study areas are set out in **Section 9.7** below). The following identified potential impacts upon ornithological features are assessed:

- direct temporary and permanent habitat loss for birds through construction and operation of the Proposed Development;
- displacement of birds through indirect loss of habitat where birds avoid the Proposed Development and its surrounding area due to construction and decommissioning disturbance, turbine operation, maintenance, and visitor disturbance. This also includes potential barriers to commuting or migrating birds due to the presence of the Proposed Development turbines and related infrastructure;
- habitat modification due to change in land cover (e.g. forestry removal) or changes in hydrological regime, and consequent impacts on bird populations; and
- death or injury of birds through collision with turbine blades, or fences (if any) associated with the Proposed Development.

9.3.2 The chapter also assesses the potential for additional cumulative impacts when considered in addition to other consented or proposed developments which are subject to EIA.

9.3.3 The assessment is based on the Proposed Development as described in **Chapter** Error! Reference source not found.**: Proposed Development**.

9.4 Assessment Methodology

Assessing Wider-Countryside Ornithological Interests

9.4.1 The evaluation for wider-countryside interests (i.e., interests unrelated to Special Protection Areas (SPAs), but including Sites of Special Scientific Interest (SSSIs) and Ramsar sites) has been made using the following process:

- identifying the potential impacts associated with the Proposed Development on an ornithological feature;
- considering the likelihood of occurrence of potential impacts;
- defining the sensitivity of a feature to impacts via the Nature Conservation Importance (NCI) of the species present and establishing each population's conservation status;
- establishing the magnitude of the impact (both spatial and temporal);
- based on the above criteria, making a judgement as to whether or not the resultant effect on an ornithological feature is significant with respect to the EIA Regulations;

- if a potential effect is determined to be significant, suggesting measures to mitigate or compensate the effect where required; and
- considering residual effects after mitigation, compensation or enhancement.

Assessing the Sensitivity of Features

9.4.2 The sensitivity of ornithological features on or near to the Proposed Development site is assessed in line with best practice guidance, legislation, statutory designations and/or professional judgement.

9.4.3 Determination of the level of sensitivity of an ornithological feature is based on a combination of the feature's NCI and conservation status. There are three levels of NCI as detailed in **Table 9.1**.

Table 9.1: Determining Factors of a Feature's Nature Conservation Importance (NCI)

Importance	Description
High	Populations receiving protection by an SPA, proposed SPA, Ramsar Site, SSSI or which would otherwise qualify under selection guidelines. Species present in nationally important numbers (>1 % national breeding or wintering population).
Medium	The presence of breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). The presence of species listed in Annex I of the Birds Directive (but population does not meet the designation criteria under selection guidelines). The presence of rare, Red-listed breeding species noted on the latest Birds of Conservation Concern (BoCC) Red list (Stanbury *et al*. 2020**Error! Bookmark not defined.**). Regularly occurring migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the Proposed Development. Species present in regionally important numbers (>1% regional breeding population).
Low	All other species' populations not covered by the above categories.

9.4.4 Important Ornithological Features (IOFs, as per CIEEM 2018**Error! Bookmark not defined.**) to be assessed for the purposes of the EIA Report, are taken to be those species of high or medium NCI.

9.4.5 As defined by NatureScot (SNH 2018a**Error! Bookmark not defined.**), the conservation status of a species is "*the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest*". Conservation status is considered by NatureScot (SNH 2018a**Error! Bookmark not defined.**) to be 'favourable' under the following circumstances:

- *"population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;*
- *the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and*
- *there is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis."*

9.4.6 NatureScot (SNH 2018a**Error! Bookmark not defined.**) recommends that "*the concept of favourable conservation status of a species should be applied at the level of its Scottish population, to determine whether an impact is sufficiently significant to be of concern. An adverse impact on a species at a regional scale (within Scotland) may adversely affect its national conservation status*". Thus, "*An impact should therefore be judged as of concern where it would adversely affect the existing favourable conservation status of a species or prevent a species from recovering to favourable conservation status, in Scotland*."

9.4.7 In the case of non-designated sites in Scotland, the relevant regional scale for breeding species is considered to be the appropriate Natural Heritage Zone (NHZ[122]) which the site falls within. The Proposed Development is within NHZ 20 (Border Hills).

9.4.8 For wintering or migratory species, the national UK population or flyway population is considered to be the relevant scale for determining effects on the conservation status, and this approach is applied here.

Assessing the Magnitude of Impact

9.4.9 An impact is defined as a change of a particular magnitude to the abundance and/or distribution of a population as a result of the Proposed Development. Impacts can be adverse, neutral or favourable.

9.4.10 In determining the magnitude of impacts, the resilience of a population to recover from temporary adverse conditions is considered in respect of each potentially affected population.

9.4.11 The sensitivity of individual species to anthropogenic activities is considered when determining spatial and temporal magnitude of impact and is assessed using guidance described by Bright *et al.* (2006[123]), Hill *et al.* (1997[124]) and Ruddock and Whitfield (2007[125]).

9.4.12 Impacts are judged in terms of magnitude in space and time. There are five levels of spatial and temporal effect magnitude as detailed in **Table 9.2** and **Table 9.3** respectively.

Table 9.2: Spatial Magnitude of Impact

Spatial Magnitude	Description
Very high	Total/near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: >80% of population lost or increase in additive mortality.

[122] SNH (2002), Natural Heritage Zones: A National Assessment of Scotland's Landscapes. Scottish Natural Heritage.

[123] Bright, J. A., Langston, R. H. W., Bullman, R., Evans, R. J., Gardner, S., Pearce-Higgins, J. & Wilson, E. (2006), Bird Sensitivity Map to provide locational guidance for onshore Windfarms in Scotland. Royal Society for the Protection of Birds.

[124] Hill, D.A., D. Hockin, D. Price, G. Tucker, R. Morris, and J. Treweek. (1997), Bird disturbance: improving the quality of disturbance research. Journal of Applied Ecology 34:275-288.

[125] Ruddock, M. & Whitfield, D. P. (2007), A Review of Disturbance Distances in Selected Bird Species, A report from Natural Research (Projects) Ltd to Scottish Natural Heritage.

High	Major reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 21-80% of population lost or increase in additive mortality.
Medium	Partial reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 6-20% of population lost or increase in additive mortality.
Low	Small, but discernible, reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 1-5% of population lost or increase in additive mortality.
Negligible	Very slight (or no discernible) reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Reduction barely discernible, approximating to the "no change" situation. Guide: <1% of population lost or increase in additive mortality.

Table 9.3: Temporal Magnitude of Impact

Temporal Magnitude	Description
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as approximately 25-30 years), except where there is likely to be substantial improvement after this period. Where this is the case, long-term may be more appropriate.
Long-term	Approximately 15-25 years or longer (see above).
Medium-term	Approximately 5-15 years.
Short-term	Up to approximately 5 years.
Negligible	<12 months.

Assessing Cumulative Effects

9.4.13 Cumulative effects are assessed in **Section** Error! Reference source not found. and present information about the potential cumulative impacts of the Proposed Development combined with other operational, consented or proposed wind farm projects.

9.4.14 NatureScot (SNH 2018d**Error! Bookmark not defined.**) has provided guidance on assessing the cumulative effects on birds. This assessment follows the principles set out in that guidance.

9.4.15 Cumulative effects may include cumulative disturbance-displacement, collision mortality, habitat loss or barrier effects. Some cumulative effects, such as collision risk, may be summed quantitatively, but according to NatureScot (SNH 2018d**Error! Bookmark not defined.**) "*In practice, however, some effects such as disturbance or barrier effects may need considerable additional research work to assess impacts quantitatively. A more qualitative process may have to be applied until quantitative information becomes available for developments in the area, e.g., from post-construction monitoring or research*".

9.4.16 The main projects likely to cause similar impacts on ornithological features are other operational wind farm developments, or those under construction, consented, or in the planning process, located within NHZ 20.

Criteria for Assessing Significance

9.4.17 The potential significance of effect was determined through a standard method of assessment based on professional judgement, considering both sensitivity and magnitude of impact as detailed in **Table 9.4**. Major and Moderate effects are considered 'significant' in the context of the EIA Regulations.

Table 9.4: Determining Significance of Effects

Significance of Effect	Definition
Major	The impact is likely to result in a long-term significant effect on the integrity of a feature.
Moderate	The impact is likely to result in a medium term or potentially significant effect on the integrity of a feature.
Minor	The impact is likely to affect a feature at an insignificant level by virtue of its limitations in terms of duration or extent, but there will probably be no effect on its integrity.
Negligible	No material impact.

9.5 Consultation Undertaken

9.5.0 Consultation for this EIA Report topic was undertaken with the organisations shown in **Table 9.5**.

Table 9.5: Consultation Responses

Consultee and Date	Scoping/ Other Consultation	Issue Raised	Response/Action Taken
Scottish Borders Council (SBC)	Scoping Opinion	It is proposed to use the data from the former Highlee Hill Wind Farm proposal as part of the EIA; as the surveys were from 2011-2015, SBC considers	An additional year of bird surveys was undertaken from September 2020 to August 2021.

Consultee and Date	Scoping/ Other Consultation	Issue Raised	Response/Action Taken
13th April 2022[126]		the data to be outdated and that further bird surveys are required.	NatureScot has confirmed that they are satisfied with this approach (see below) and the assessment will consider all the available data as one baseline dataset.
		As birds outside the Proposed Development site could be affected by potential collision risk the main wintering bird survey area should extend at least 500m beyond the site boundary. Due to the age of the Highlee Hill data, and as the 2020-21 baseline winter survey only covered parts of the Proposed Development site, this survey should be repeated with a 500 m buffer beyond the site boundary, particularly to the north of the site where there is no commercial forestry.	The 2020-2021 flight activity surveys to gather data for collision modelling were undertaken from two vantage (Figure 9.3) and as per NatureScot guidance (SNH 2017**Error! Bookmark not defined.**), flights within 500 m of the final turbine locations will be considered in the collision modelling. These were undertaken monthly from September 2020 to August 2021 and so covered the 2020/2021 non-breeding season and 2021 breeding season.
		Should goshawks or owls be found to use the site, specific mitigation plans for these species should be compiled.	Goshawk are scoped in to the assessment as an IOF, given the presence of breeding activity. As noted in paragraph 9.9.1, a Bird Disturbance Management Plan (BDMP) will be implemented during the construction phase to ensure legal compliance and safeguard breeding/wintering birds known to be in the area and will include specific guidance for any IOFs identified in the assessment. The BDMP will be included as a condition of consent and would be provided to SBC and NatureScot in advance of construction commencing (as part of

[126] A17 to A27 – this appears to be the correspondence relating to the previous Highlee Hill Wind Farm and so is superseded by the Scottish Borders Council response to the Proposed Development Scoping Report.

Consultee and Date	Scoping/ Other Consultation	Issue Raised	Response/Action Taken
			the discharge of conditions).
		Consideration should be given to the ongoing re-establishment of golden eagles in the region (South Scotland Golden Eagle Project (SSGEP)). It is likely that released birds could occupy former home ranges and young birds are now foraging and commuting to certain areas within Scottish Borders.	The SSGEP was contacted, and the project will also be considered in the assessment.
		In addition to birds listed in Schedule 1, birds associated with the local habitats and listed in the Scottish Biodiversity List should also be included.	Noted.
		For the assessment of significant effects on red- or amber - listed birds, Birds of Conservation Concern 5 (2021**Error! Bookmark not defined.**) should be used.	It is noted that since the submission of the Scoping Report, BoCC 4 has been replaced with BoCC 5 (Stanbury *et al.* 2021**Error! Bookmark not defined.**) and it is confirmed that BoCC 5 will be considered in the assessment.
NatureScot 25th March 2022	Scoping Opinion	The bird surveys proposed and the approach to the assessment of impacts appear appropriate given the current use of the land as commercial forestry and the results of bird survey work carried out for the withdrawn Highlee Hill Wind Farm application (its associated Environmental Statement is publicly available on-line).	Noted.
		Effects of the proposal on ornithological features of designated sites within 20 km of the site can be scoped out of the EIA.	Noted. Langholm-Newcastleton Hills SPA will be scoped out of the assessment (no likely significant effects) and information to inform an appropriate assessment under the terms of the HRA process has not been provided.

Consultee and Date	Scoping/ Other Consultation	Issue Raised	Response/Action Taken
		The approach to the baseline survey programme, would seem appropriate for this new proposal, given the level of bird survey effort at this site for the previous Highlee Hill Wind Farm application, and given that the land is currently a commercial forestry plantation undergoing harvesting and replanting operations.	Confirmation that the additional year of bird surveys (undertaken September 2020 to August 2021) combined with the baseline data previously gathered (2011-2015) is appropriate is noted.
		Contact with the South of Scotland Golden Eagle Project should be made	The SSGEP was contacted, and the project will also be considered in the assessment.
		We support the use of a Habitat Management Plan (HMP) on a wind farm site to provide for positive management and enhancement of habitats within the development site to benefit biodiversity and not just mitigate impacts. The EIA Report should offer an outline HMP that sets out broad measures to achieve this, which would then be worked up in detail and implemented should the development be granted permission and be constructed.	The EIA will include an outline HMP (**Technical Appendix 8.5: Outline Habitat Management Plan**) with input provided by all relevant disciplines.
Southdean Community Council 14th March 2022	Scoping Opinion	The Highlee Hill bird studies will be over 10 years old, although Southdean notes the use of the surveyor who understood the original studies.	An additional year of bird surveys was undertaken from September 2020 to August 2021.
		Southdean is already aware of bird surveys being undertaken for the Wauchope East and West site. These should be incorporated into any Application lodged (at least up to a certain date).	Should data for these projects be publicly available it will be considered as part of the desk study.
		The introduction of golden eagles in the Scottish Borders is a major positive	The SSGEP was contacted, and the project

Consultee and Date	Scoping/ Other Consultation	Issue Raised	Response/Action Taken
		for the Local communities, and Southdean would welcome their flight paths being assessed by all developers.	will also be considered in the assessment.

9.6 Baseline Methodology

Study Areas

9.6.1 A range of surveys were employed to accurately record baseline ornithological conditions within the site and appropriate survey buffers. Terms referred to are as follows:

- 'survey area' is defined as the area covered by each survey type at the time of survey; and
- 'study area' is defined as the area of consideration of impacts on each species at the time of assessment and as the area used for any desk-based study (**Figure 9.4**).

9.6.2 The spatial extent of each survey area is listed in paragraph **Error! Reference source not found.** of this chapter and detailed in **Technical Appendix 9.1: Ornithology**.

9.6.3 Following the completion of flight activity surveys, a Collision Risk Analysis Area (CRAA) was defined for the purposes of estimating turbine collision rates. The CRAA was created using a 500 m buffer from the proposed turbine locations (shown on **Figure 9.1**, **Figure 9.2** and **Figure 9.3**). As recommended by NatureScot (SNH 2017**Error! Bookmark not defined.**), using this buffer area around the turbines accounts for possible inaccuracies in the recording of flightlines by surveyors, and records any species' flight activity that was in proximity to, but not necessarily within the wind farm area at the time of surveys.

Desk-study

9.6.4 The following data sources were considered as part of the assessment:

- NatureScot SiteLink[127] for designated site information;
- Lothian and Borders Raptor Study Group (LBRSG) for historic raptor breeding data;
- RSPB Scotland, Scottish Ornithologist Club (SOC), Borders General Records and Forestry Commission Scotland (now Forestry Land Scotland) for historic black grouse breeding data (requested as part of the previous Highlee Hill submission); and
- Various EIA reports and monitoring documents for wind farm projects within NHZ 20 Border Hills.

Field Surveys

9.6.5 Fieldwork within and surrounding the site was undertaken between September 2011 and July 2015 (undertaken by MacArthur Green for the previous Highlee Hill Wind Farm EIA

[127] https://sitelink.nature.scot/home [accessed August 2022].

submission) and September 2020 and August 2021 (undertaken by MacArthur Green for the Proposed Development). This covered five breeding seasons (2011, 2012, 2013, 2015 and 2021) and four non-breeding seasons (2011/2012, 2012/2013, 2013/2014 and 2020/2021). It should be noted that the complete baseline dataset for the previous Highlee Hill Wind Farm EIA submission was purchased from RES by the applicant and is included in the baseline dataset for this submission.

9.6.6 The following surveys were undertaken (see **Technical Appendix 9.1: Ornithology** for details):

- flight activity surveys – September 2011 to August 2013 and September 2020 to August 2021 (see **Figure 9.1**, **Figure 9.2** and **Figure 9.3** for viewshed coverage);
- scarce breeding bird surveys (2 km survey area) – spring/summer 2012, 2013, 2015 and 2021;
- black grouse surveys (1.5 km survey area) – spring 2012, 2013 and 2021;
- breeding bird surveys (500 m survey area) – spring/summer 2011, 2012 and 2013 (the 2013 surveys were to the north of the current Proposed Development site in relation to a potential change to the previous Highlee Hill submission design); and
- winter walkover surveys (500 m survey area) – autumn/winter 2012/2013, 2013/2014 and 2020/2021.

9.6.7 Field surveys were conducted following the relevant recommended NatureScot survey guidance (SNH 2010[128], 2013[129], 2014[130], 2017**Error! Bookmark not defined.**) depending on survey date (refer to **Technical Appendix 9.1: Ornithology Annex B** for details of the survey methodologies and year specific survey areas).

Assessment Limitations

9.6.8 Limitations exist with regard to the knowledge base on how some species, and the populations to which they belong, react to impacts. A precautionary approach is taken in these circumstances, and as such it is considered that these limitations do not affect the robustness of this assessment.

9.6.9 In general, survey effort either met or exceeded the minimum requirements stipulated in NatureScot guidance (SNH 2017**Error! Bookmark not defined.**) with weather conditions appropriate for the surveys. Surveys were suspended (or additional surveys were undertaken) where weather conditions deteriorated (refer to **Technical Appendix 9.1: Ornithology**).

9.7 Existing Environment

9.7.1 The sections below provide information on statutory designations, a summary of target species recorded during flight activity surveys and a summary of results per target species (grouped into species groups) recorded. For each target species recorded it is

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[128] Scottish Natural Heritage (2005, revised 2010), Survey methods for use in assessing the impacts of onshore windfarms on bird communities.

[129] Scottish Natural Heritage (2013), Recommended bird survey methods to inform impact assessment of onshore windfarms.

[130] Scottish Natural Heritage (2014), Recommended bird survey methods to inform impact assessment of onshore windfarms.

also determined, based on baseline survey results and/or historic data, whether they can be reasonably scoped out if the assessment at this stage as a result of a lack of likely significant effects at a population level.

Designated Sites

9.7.2 There are no statutory designations with ornithological features within the Proposed Development site. The desk-based study has identified one SPA and two SSSIs (one of which underpins the SPA) within 20 km of the Proposed Development (**Figure 9.5**).

- Langholm-Newcastleton Hills SPA, 16.6 km (underpinned by the Langholm-Newcastleton Hills SSSI), **Table 9.6**; and
- Kielderhead Moors: Carter Fell to Peel Fell SSSI, 1.4 km, **Table 9.7**.

Table 9.6: Qualifying Features of the Langholm-Newcastleton Hills SPA (and underpinning Langholm-Newcastleton Hills SSSI)

Feature	Qualifying Feature Category	Condition	Description
Hen harrier Breeding	SPA, SSSI	Favourable recovered: August 2019	Breeding population of European importance, average of 13 breeding females (1994-1998), 3% of the GB population.
Breeding bird assemblage	SSSI	Unfavourable declining: July 2003	Supports a diverse population of breeding moorland birds which may include black grouse and red grouse, in addition to nine species of wader and six species of raptor (including hen harrier).

Table 9.7: Qualifying Features of the Kielderhead Moors: Carter Fell to Peel Fell

Feature	Qualifying Feature Category	Condition	Description
Breeding bird assemblage	SSSI	Favourable maintained: June 2003	Breeding assemblage includes golden plover, dunlin, ring ouzel, wheatear, whinchat, snipe, curlew, redshank, teal and four Schedule 1 raptor species.

9.7.3 As detailed in the Scoping Report (submitted in February 2022) and confirmed by NatureScot in their response (**Table 9.5**), considering the distance between these designated sites and the Proposed Development, and the foraging distances of qualifying features provided by NatureScot (SNH 2016b**Error! Bookmark not defined.**), there is considered to be very limited potential for connectivity between the Proposed Development and any of the designated sites located within 20 km. Consequently, the Langholm-Newcastleton Hills SPA (and associated SSSI) is scoped out of the assessment and no likely significant effects on the SPA are predicted.

Flight Activity Summary

9.7.4 A summary of all target species recorded during flight activity surveys at the site is presented in **Table 9.8**. This summarises all flights observed during the baseline periods (September 2011 to August 2013 and September 2020 to August 2021) regardless of the location of the flights in relation to the Proposed Development. For further details of the flight activity surveys, refer to **Technical Appendix 9.1: Ornithology**.

9.7.5 A summary of the collision model results is presented in **Table 9.9** (refer to **Annex E** of **Technical Appendix 9.1: Ornithology** for detailed results). Three species (golden plover, hen harrier and lapwing) were recorded during flight activity surveys, but no flights were considered to be 'at-risk' (i.e., the flights were outside of the CRAA and associated viewshed and/or were only recorded flying below/above the rotor swept area) and are therefore not included in **Table 9.9**. It should also be noted that whilst the rotor diameter for the Proposed Development turbines is given as 163m, turbines are proposed to be at a range of four hub heights (see **Chapter** Error! Reference source not found.**: Proposed Development** for detail). Collision modelling was undertaken for each hub height and **Table 9.9** provides the worst case scenario for each species (a full breakdown of the outputs of all the collision modelling is provided in **Technical Appendix 9.1, Annex E**).

Table 9.8: Target Species Recorded During Flight Activity Surveys, 2011 to 2013 and 2020 to 2021

Species	Total Number of Flights Recorded	Total Number of Birds Recorded	Total Bird Seconds[131] Recorded
Curlew	9	11	333
Golden plover	5	249	10,762
Goshawk	28	29	1,674
Hen harrier	1	1	150
Lapwing	1	4	240
Merlin	2	2	35
Peregrine falcon	9	10	343
Pink footed goose	2	105	12,075
Red kite	2	2	200

Table 9.9: Predicted Collision Rates (worst case hub height for each species)

Species	Worst case Hub Height	Mean Breeding Season	Mean Non-Breeding Season	Mean Annual	Equivalent to One Bird Every X Years
Curlew	98.5 m	0.00002	0	0.00002	61,299
Goshawk	98.5 m	0.0197	0.0053	0.0250	40
Merlin	98.5 m	0.00011	0	0.00011	8,832
Peregrine falcon	98.5 m	0.0020	0.0024	0.0044	226
Pink-footed goose	98.5 m	0	0.0012	0.0012	841

131 Bird seconds are calculated for each observation as the product of flight duration and number of individuals. This has then been summed to provide the total bird seconds for each species.

Species	Worst case Hub Height	Mean Breeding Season	Mean Non-Breeding Season	Mean Annual	Equivalent to One Bird Every X Years
Red kite	98.5 m	0.0044	0	0.0044	230

Black Grouse

9.7.6 Black grouse surveys in 2012, 2013 and 2021 recorded no evidence of black grouse and no evidence of black grouse was recorded across the whole baseline survey period.

9.7.7 The desk study undertaken as part of the previous Highlee Hill submission noted that The Wildlife Information Centre (TWIC) data did not provide any observations from within the site, although some from the 1990s, and up to 2001 were provided that were in grid squares to the east of the site in forested areas (Forestry Commission Scotland and RSPB data). Some records from 2001 and 2003, to the west of the site around Wolfehopelee Wood and Wauchope Forest were also provided. Furthermore, black grouse records from 1996 to 2012 obtained from the Southern Uplands Partnership Black Grouse Project showed few recent records, although there have been populations in the wider area in the past, particularly to the east of the site where leks of up to two males, with a single female present. No records are within 1.5 km of the proposed turbine locations (**Confidential Figure 9.2.1**). There was a small number of historical records within 750 m of the proposed access area (**Confidential Figure 9.2.1**), however, these records date to between 1996 and 2001 (the dataset available extends to 2012).

9.7.8 Considering the lack of records of black grouse across the baseline survey period and the limited activity of the species in the wider area, black grouse are scoped out of the assessment.

Raptors and Owls

Golden Eagle

9.7.9 NatureScot commissioned a report on golden eagle in southern Scotland (Fielding and Haworth 2014[132]) to identify habitat that may support breeding golden eagle with the primary aim of providing a robust estimate of the number of potential territories that could be occupied in southern Scotland. The authors split south Scotland into ten regions/hill groups and provided an assessment on the number of pairs each region could support. The Proposed Development site is situated outwith these ten identified regions, falling between the Ettrick Hills region and Cheviot Hills region (as indicated by the red dot on **Image 9.1**) and so is not considered to be an area of importance for re-establishing golden eagle territories in south Scotland. Furthermore, the Proposed Development site comprises conifer forestry unsuitable for golden eagle and is part of a larger block of commercial forestry that extends south of the site and connects to the extensive Kielder forestry complex.

9.7.10 The desk study undertaken as part of the previous Highlee Hill submission noted that the most recent evidence provided of breeding occurring within 6 km was from 2004 (from

[132] Fielding, A.H. and Haworth, P.F. 2014. Golden eagles in the south of Scotland: an overview. Scottish Natural Heritage Commissioned Report No. 626.

data provided by Forestry Commission Scotland), and birds were known to be present in that area through the previous decade. The Scoping Report of the adjacent proposed Wauchope & Newcastleton Wind Farm (EC00005268[133]) includes information provided by Forestry Commission Scotland which suggests that it is considered to be a "former" nest site/active territory. Conifer plantation has likely matured around the local area since 2004, and this may have affected the viability of the territory. The Lothian & Borders Raptor Study Group provided no data for golden eagle within the study area as part of the Highlee Hill data search.

9.7.11 Golden eagle was not recorded during the baseline survey periods. The South Scotland Golden Eagle Project (SSGEP) were contacted, however, they were not able to provide nest data or any site specific tagging data.

Image 9.1: Golden Eagle Regions in South Scotland (Fielding and Haworth[132])

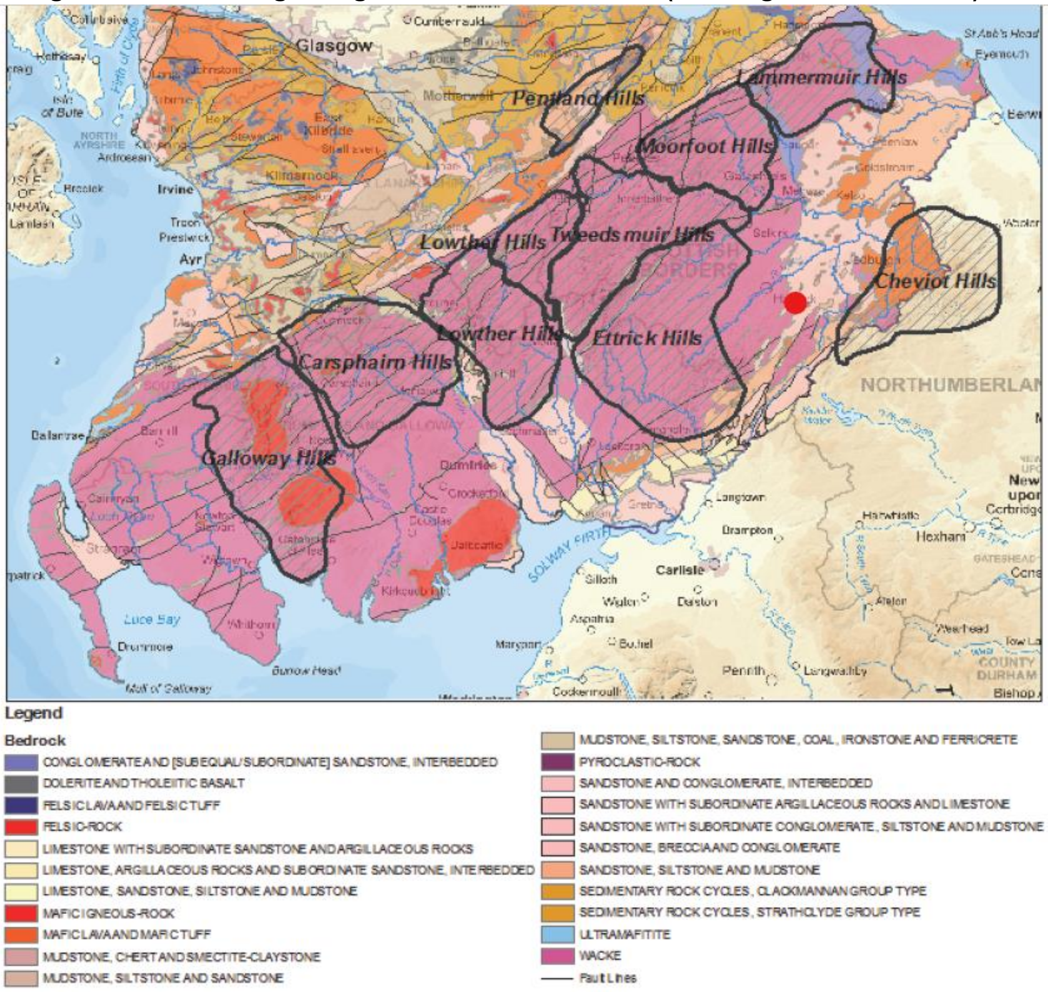

Figure 4. Southern Scotland Hill Groups and Bedrock Geology. Contains Ordnance Survey data © Crown copyright and database right 2010 and British Geological Survey ©NERC (All rights Reserved).

9.7.12 Considering the limited suitability of the Proposed Development site and the surrounding area in the context of supporting the South of Scotland breeding golden eagle population, and lack of records during baseline surveys, the species is scoped out of the assessment.

[133] https://www.energyconsents.scot/ApplicationDetails.aspx?cr=EC00005268 (accessed November 2022).

Goshawk

9.7.13 Goshawk were identified to be breeding within the forestry complex where the Proposed Development site is located. **Table 9.10** provides an overview of breeding activity within territories, with further detail provided in **Confidential Technical Appendix 9.2** and on **Confidential Figure 9.2.2**.

Table 9.10: Goshawk Breeding Activity, 2012-2015 and 2021

Territory ID	2012	2013	2015	2021	Distance to Nearest Turbine (km)[134]
GI_1	Breeding confirmed: one juvenile recorded	Breeding confirmed: two juveniles recorded	Breeding probable: pair present in territory	Outwith survey area	1.1 (T09)
GI_2	Breeding confirmed: male displaying and pair 'active' in June	Breeding unconfirmed: noted to be a 'non-active' nest site with pair present	No breeding – forestry felled	Site no longer suitable	0.7 (T07)
GI_3	No evidence recorded	Breeding confirmed: first year male carrying food	No breeding – forestry felled	Site no longer suitable	0.8 (T10, T11)
GI_4.1 GI_4.2	No evidence recorded	No evidence recorded	No evidence recorded	Breeding probable: display activity, but little further activity	0.5 (T03)
GI_5.1 GI_5.2	No evidence recorded	No evidence recorded	No evidence recorded	Breeding probable: display activity, but little further activity	1.1 (T03)

9.7.14 Flight activity surveys recorded 28 goshawk flights (**Table 9.8**, **Figure 9.6**) of which up to 18 were identified to be 'at-risk', which predicted a worst case mean annual collision rate of 0.025 (**Table 9.9**) or one every 40 years.

9.7.15 Considering this species breeding activity within 2 km, goshawk is scoped in to the assessment.

[134] Note that for GI_4 and G_5 measurements were taken from the nearest turbine to the nearest edge of the nearest territory polygon.

Hen Harrier

9.7.16 A single female hen harrier was recorded hunting in April 2012. No evidence of breeding or roosting was recorded during baseline surveys.

9.7.17 The desk study undertaken as part of the previous Highlee Hill submission noted one historic record of hen harrier within 2 km of the Proposed Development site, provided by TWIC (no breeding evidence given), but the Lothian & Borders Raptor Study Group provided no evidence of historic breeding in the study area.

9.7.18 Flight activity surveys recorded one flight (**Table 9.8**, **Figure 9.7**) which was not considered to be 'at-risk' and therefore no risk of collision is predicted.

9.7.19 Considering this species lack of breeding activity and negligible risk of collision, hen harrier is scoped out of the assessment.

Merlin

9.7.20 A male merlin was recorded on two occasions in June 2012 (same day and considered to be the same bird). No evidence of breeding was recorded during baseline surveys.

9.7.21 The desk study undertaken as part of the previous Highlee Hill submission noted one historic TWIC record of an individual in 2003 near the western site boundary, although no breeding evidence was indicated. Other historic records provided were from the Kielderhead Moors SSSI to the south-east, from 1989-1992.

9.7.22 Flight activity surveys recorded two flights (**Table 9.8**, **Figure 9.8**) of which one was identified to be 'at-risk', which predicted a worst case collision risk of one bird every 8,832 years.

9.7.23 Considering this species lack of breeding activity and negligible risk of collision, merlin is scoped out of the assessment.

Osprey

9.7.24 A single osprey was recorded flying south over the site in August 2018. No evidence of breeding was recorded during baseline surveys.

9.7.25 The desk study undertaken as part of the previous Highlee Hill submission noted the closest historic osprey record is from the Jed Water (3 km to the north-east).

9.7.26 Considering this species lack of breeding activity and negligible risk of collision, osprey is scoped out of the assessment.

Peregrine Falcon

9.7.27 A peregrine falcon territory 2.3 km to the north of the Proposed Development site was recorded as being occupied in 2012, 2013 and 2021, although breeding was unconfirmed. Details are provided in **Confidential Technical Appendix 9.2** and on **Confidential Figure 9.2.3**.

9.7.28 Flight activity surveys recorded nine flights (**Table 9.8**, **Figure 9.9**) of which up to one was identified to be 'at-risk', which predicted a worst case collision risk of one bird every 220 years.

9.7.29 Considering the nest location is over 2 km from the nearest proposed turbine and the negligible risk of collision, peregrine falcon is scoped out of the assessment.

Red Kite

9.7.30 A single red kite was recorded during flight activity surveys in May 2013. No evidence of breeding was recorded during baseline surveys.

9.7.31 Flight activity surveys recorded two flights (**Table 9.8**, **Figure 9.10**) of which up to one was identified to be 'at-risk', which predicted a worst case collision risk of one bird every 230 years.

9.7.32 Considering this species lack of breeding activity and negligible risk of collision, red kite is scoped out of the assessment.

Waders

9.7.33 The site is situated in conifer plantation which is generally unsuitable for breeding waders. Baseline surveys for the previous Highlee Hill submission extended further north than the Proposed Development site and included an area of open farmland.

Curlew

9.7.34 One pair of curlew was identified to be breeding in the farmland to the north during 2012 and 2013 baseline surveys (**Figure 9.11**). These pairs are approximately 720 m and 1.3 km to the north of the nearest proposed turbine (T08).

9.7.35 Flight activity surveys recorded nine flights (**Table 9.8**, **Figure 9.12**) of which up to one was identified to be 'at-risk', which predicted a worst case collision risk of one bird every 61,299 years.

9.7.36 Considering this species lack of breeding activity within the site and negligible risk of collision, curlew is scoped out of the assessment.

Golden Plover

9.7.37 One pair of golden plover was identified to be breeding in the farmland to the north during the 2013 baseline surveys (**Figure 9.11**). This pair is approximately 990 m to the north of the nearest proposed turbine (T08).

9.7.38 Wintering golden plover were also recorded in the same area in October 2011 (incidental record of a flock of 200 on the walk to VP 2) and April 2021 (flock of 38 was recorded on two occasions, **Figure 9.13**), and four birds were recorded flying to the west of the site in May 2021 (**Figure 9.13**).

9.7.39 Flight activity surveys recorded five flights (**Table 9.8**, **Figure 9.14**) which were not considered to be 'at-risk' and therefore no risk of collision is predicted.

9.7.40 Considering this species lack of breeding or wintering activity within the site and negligible risk of collision, golden plover is scoped out of the assessment.

Lapwing

9.7.41 Lapwing were identified to be breeding (ten pairs) in the farmland to the north during the 2013 baseline surveys (**Figure 9.11**). The closest of these pairs is approximately 830 m to the north of the nearest proposed turbine (T08).

9.7.42 Flight activity surveys recorded one flight (**Table 9.8**, **Figure 9.15**) which was not considered to be 'at-risk' and therefore no risk of collision is predicted.

9.7.43 Considering this species lack of breeding activity within the site and negligible risk of collision, lapwing is scoped out of the assessment.

Woodcock

9.7.44 Woodcock were recorded occasionally with a single bird recorded during a winter walk over in 2013 and four individuals were recorded during a winter walkover in 2020.

9.7.45 Considering this species lack of activity within the site, woodcock is scoped out of the assessment.

Wildfowl

9.7.46 A small number of pink-footed goose (two skeins comprising 20 and 85 individuals) were recorded in flight during the 2011/2012 non-breeding season, with one skein flying across the site at risk height. Two flocks of greylag goose (two and 42 individuals) were also recorded during surveys.

9.7.47 Flight activity surveys recorded two flights of pink-footed geese (**Table 9.8**, **Figure 9.16**) of which one was identified to be 'at-risk', which predicted a worst case collision risk of one bird every 841 years.

9.7.48 Considering these species lack of activity within the site, the limited suitability of the site for foraging/roosting geese and negligible risk of collision, greylag goose and pink-footed goose are scoped out of the assessment.

Summary of Scoped In Important Ornithological Features

9.7.49 An assessment is applied to any scoped-in IOFs of medium or high NCI (**Table 9.1**) that are known to be present within the site or surrounding area (as confirmed though survey results and consultations outlined above). Based on the preceding paragraphs, the only species considered to be an IOF is goshawk.

Table 9.11: Scoped In Important Ornithological Features (IOFs)

Feature	NCI	Reason for Inclusion
Goshawk	Medium	Schedule 1, BoCC Green listed**Error! Bookmark not defined.**

9.7.50 The conservation status of goshawk is detailed in **Table 9.12**.

Table 9.12: Conservation Status of Scoped In Important Ornithological Features (IOFs)

IOF	Conservation Status	Information
Goshawk	BoCC Green list	There are an estimated 620 pairs in Britain (Woodford *et al.* 2020[135]). The regional NHZ 20 (Border Hills) population was estimated by Wilson *et al*. (2015[136]) to be 13 (range 4-20) pairs in 2013. The goshawk population appears to be expanding in range in Scotland (Forrester *et al.* 2012[137]) and as the species is BoCC Green-listed**Error! Bookmark not defined.**, the national and regional/NHZ populations are likely to be in favourable conservation status.

9.8 Future Baseline

9.8.1 In the absence of the Proposed Development, assuming the continuation of current predominately commercial forestry land management practices within and around the site and allowing for changes in bird behaviour and distribution related to climate change, the bird populations are likely to continue to be present in largely similar abundances and distributions to those described in the baseline. Any changes in numbers and diversity of species are likely to be a reflection of wider population trends and influences such as climate change (e.g., delayed breeding, reduced or increased breeding success depending on the species range, Pearce-Higgins 202144) rather than site-specific factors. Areas of conifer plantation forestry outwith those areas identified for felling for the Proposed Development would continue to mature and be subject to a future felling plan, which may create temporary localised habitat changes until replanting and canopy closure. It should be noted that with a continuation of commercial rotational forestry practices, abundances and distributions of species, including goshawk, are likely to vary through time.

9.9 Design Considerations

Project Assumptions

9.9.1 The assessment below makes the following assumptions:

- All electrical cabling between the proposed turbines and the associated infrastructure would be underground in shallow trenches which would be reinstated post-construction and, in most cases, follow the proposed access tracks.
- Any ground disturbance around permanent infrastructure during construction would be temporary and surface conditions will be reinstated or restored before the construction period ends. The only excavation in these areas will be for cabling as noted above and otherwise may only be periodically used for side-casting of spoil until reinstatement.

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[135] Woodward, I., Aebischer, N., Burnell, D., Eaton, M., Frost, T., Hall, C., Stroud, D.A. & Noble, D. (2020), Population estimates of birds in Great Britain and the United Kingdom. British Birds 113: 69–104.

[136] Wilson, M. W., Austin, G. E., Gillings S. and Wernham, C. V. (2015), Natural Heritage Zone Bird Population Estimates. SWBSG Commissioned report number SWBSG_1504. pp72. Available from: www.swbsg.org [accessed August 2022].

[137] Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. & Grundy, D.S. (eds) (2012), The Digital Birds of Scotland. The Scottish Ornithologists' Club, Aberlady.

- To ensure all reasonable precautions are taken to avoid negative effects on ornithological interests during construction and decommissioning, the applicant would appoint a suitably qualified Ecological Clerk of Works (ECoW) prior to the commencement of construction and decommissioning and they would advise the developer and the Principal Contractor on all ornithological matters (with the assistance of a suitably qualified/licenced ornithologist if required). The ECoW would be required to be present on the site during the construction and decommissioning periods to carry out monitoring of works and briefings with regards to any ornithological sensitivities on the site to the relevant staff within the principal contractor and subcontractors.
- A Bird Disturbance Management Plan (BDMP) would be implemented during construction and decommissioning of the Proposed Development. The BDMP would detail measures to ensure legal compliance and safeguard birds known to be in the area. The BDMP shall include pre-construction surveys and good practice measures during construction. Pre-construction surveys would be undertaken to check for any new breeding bird activity in the vicinity of the construction/decommissioning works.
- Work on the Proposed Development, including vegetation clearance and construction of the site access tracks, turbine hard standings and site compound and erection of the turbines is predicted to last for approximately 21 months. The number of bird breeding seasons potentially disrupted would depend on the month in which construction commences and the breeding season of the potentially affected species. The main breeding season of most birds at the site would extend from April (February for goshawk) to July. For the purposes of this assessment, it is assumed that, for any given species of bird, construction activities would commence during the breeding season and would, therefore, potentially affect a maximum of up to two breeding seasons, assuming that construction would take approximately 21 months.

9.10 Predicted Impacts

9.10.1 This section provides an assessment of the likely effects of the Proposed Development on goshawk. The assessment of effects is based on the project description outlined in **Chapter 2: Proposed Development** and is structured as follows:

- construction effects – disturbance and habitat loss;
- operational effects – collision risk;
- operational effects – displacement;
- decommissioning effects; and
- cumulative effects.

Construction

9.10.2 The main potential impacts of construction activities across the Proposed Development site are the displacement and disruption of breeding, foraging and roosting birds as a result of noise and visual disturbance over a short-term period (either the duration of a particular construction activity within working hours, or the duration of the whole construction period).

9.10.3 Impacts on birds would be confined to areas in the locality of temporary construction compounds, turbines, tracks and other infrastructure. Few attempts have been made to quantify the impacts of disturbance of birds due to activities of this type, and much of the available information is inconsistent. However, as a broad generalisation, larger bird species such as raptors, or those that feed in flocks in the open tend to be more susceptible to disturbance than small birds living in structurally complex habitats (such as woodland, scrub and hedgerow) (Hill *et al.* 1997[138]).

9.10.4 Direct habitat loss would also occur due to the Proposed Development's construction, which would be both temporary (e.g., construction compounds, laydown areas) or longer term (access tracks and turbines). This has the potential to impact on breeding, foraging or roosting individuals.

9.10.5 **Impact**: breeding or foraging goshawk may be displaced from the site during construction, either by disturbance or direct habitat loss.

9.10.6 **Sensitivity**: medium NCI (**Table 9.11**) and favourable conservation status (**Table 9.12**), giving an overall sensitivity of medium.

9.10.7 **Magnitude of impact**: from the data gathered for breeding goshawk, there has been inter-annual variation in territory numbers, but in general one to three territories in any one year were found within the study area between 2012 and 2021. Variation is likely due to ongoing commercial forestry activities within the site (either clear-felling of nesting areas, or ongoing forestry activities dissuading birds from attempting to nest within a particular location). Under the future baseline scenario, this pattern of variability of nest site distribution, if not numbers, is likely to continue over the long-term period.

9.10.8 During the construction period, any breeding attempts within 400-500 m of construction activity may be subject to disturbance pressures (Petty 1996[139], Ruddock and Whitfield 2007125). Of the five goshawk nest sites located, GI_3 (breeding in 2012 and 2013, **Table 9.10**) is the only one within the main site, however, it is approximately 700 m from the nearest proposed turbine (**Confidential Figure 9.2.2**) and, therefore, the possibility of disturbance is limited should breeding occur again in a similar location.

9.10.9 Two potential goshawk territories (exact nest locations were not identified) located in 2020 (GI_4 and GI_5, **Table 9.10**) do potentially overlap with the proposed access track (**Confidential Figure 9.2.2**). The access track follows an existing forestry road that would be subject to limited upgrading (where required) until it turns west towards the site at which point it would be partially on a smaller forestry road and before new track would be built to reach the existing tracks on the site itself. Felling along the existing forestry track would be limited to where widening would be required with then a relatively small area of felling for the new track section to connect to the site itself.

9.10.10 The remaining goshawk nest sites (GI_1 and GI_2) are all over 400 m from any infrastructure or turbine (**Table 8.10**, **Confidential Figure 8.2.1**), and so it is unlikely that these locations would be significantly affected by habitat loss or construction disturbance associated with the Proposed Development. Although this may slightly reduce the amount of nesting and foraging habitat available over the long-term, the viability of any territories is unlikely to be significantly compromised, and numbers are likely to remain consistent with those under the future baseline scenario. Some felling locations may provide opportunities for nesting or foraging due to the opening up of forestry and provision of

[138] Hill, D.A., D. Hockin, D. Price, G. Tucker, R. Morris, and J. Treweek. (1997), Bird disturbance: improving the quality of disturbance research. Journal of Applied Ecology 34:275-288.

[139] Petty, S. J. (1996), Reducing disturbance to goshawks during the breeding season. Research Information Note 267, issued by the Forestry Commission.

better vantage points for birds. Direct habitat loss is, therefore, considered to be of negligible spatial and long-term temporal magnitude.

9.10.11 Based on survey results, as a worst case, one territory (GI_5) may be affected by disturbance due to construction activities along the access track should construction of this take place during the breeding season (although as noted above, an exact nest was not located for GI_5). As already stated, with the presence of ongoing forestry operations, this scenario is not dissimilar to the future baseline scenario and, therefore, continuation of breeding within the site or nearby is more likely than territory abandonment, although breeding success/productivity of one pair may be affected/reduced for up to two breeding seasons as a result of construction. The magnitude of effect due to construction disturbance is, therefore, considered to be low spatial and short-term temporal on the NHZ 20 population.

9.10.12 **Significance of effect**: the unmitigated effect is considered to be minor and, therefore, **not significant** in the context of the EIA Regulations.

Operation – Displacement

9.10.13 The displacement of nesting and foraging birds from the site has the potential to extend beyond the construction phase, as described above, and to occur during the operational phase. It is recognised that disturbance may occur due to maintenance activities throughout the operational phase, although since these are likely to be of shorter duration and smaller extent than construction activities, effects would be lower than those predicted for construction effects (see previous section).

9.10.14 **Impact**: breeding or foraging goshawks may be at risk of displacement from around turbines or other infrastructure or, as a result of habitat loss, due to felling related to the Proposed Development.

9.10.15 **Sensitivity**: medium.

9.10.16 **Magnitude of impact**: baseline survey data indicates that there may be one to three territories within 2 km of the Proposed Development site, with inter-annual variation in numbers and distribution likely to occur each year under the future baseline scenario, as a result of ongoing commercial forestry activities within the site and wider commercial forestry complex.

9.10.17 Felling and replanting to a keyhole scheme is proposed for the Proposed Development (which is located within existing forestry) and approximately 69.31 ha of commercial forestry, predominantly Sitka spruce, would be felled during construction without replanting. There are up to three territories active within the study area each year, however, these territories are all over 500 m from the nearest turbine (**Table 9.10**) and so whilst birds may be displaced from nesting/foraging, alternative nest sites are likely to be available based on previous surveys. Furthermore, the displacement breeding goshawk may experience as a result of the Proposed Development is similar to the current (and future baseline scenario) commercial forestry operations, which from the available breeding data it is evident that the goshawk breeding in the area are able to adapt to and seem to be able to continue breeding nearby. Consequently, the impact is considered to be of low spatial and long-term temporal magnitude however, it should be noted that there would continue to be available forestry habitat adjacent to the site and consequently no additional impacts on the NHZ 20 population as a result of the Proposed Development are predicted.

9.10.18 **Significance of effect**: the unmitigated effect is considered to be minor and, therefore, **not significant** in the context of the EIA Regulations.

Operation – Lighting

9.10.19 As the turbines would be in excess of 150 m height to blade tip, they are required to be lit pursuant to Article 222 of the UK Air Navigation Order (ANO) 2016[140]. The Civil Aviation Authority (CAA) Policy Statement on Lighting of Onshore Wind Turbine Generators in the United Kingdom with a Maximum Blade Tip Height At or In Excess of 150 m Above Ground Level (CAA, June 2017[141]) modifies the strict application of Article 222 to require only the hub to be lit by 2000 candela steady red lights, with a single set of intermediate steady red lights halfway down the tower at a reduced intensity of 32 candela.

9.10.20 As advised by NatureScot (2020b[142]), there are potential lighting effects on birds which, therefore, require consideration within an EIA. Here, the worst case scenario of cardinal red lighting on six turbines is the basis of the assessment. However, the type of lighting is subject to ongoing consultation between the applicant and the relevant regulatory bodies on a reduced site-specific lighting scheme.

9.10.21 In NatureScot's (2020a**Error! Bookmark not defined.**) advice on the scope of assessment for turbine lighting, it is identified that an assessment of the possible effects of lighting on birds may be required in the following three situations, where risk is greater:

- wind turbines on or adjacent to a seabird colony that hosts burrow nesting species;
- wind turbines that are on or adjacent to protected areas that host large concentrations of wintering waterbirds, where such sites are located within open country away from other sources of artificial light; and
- where wind farms are located on migratory corridors or bottlenecks for nocturnally migrating passerines.

9.10.22 It is clear that goshawk does not fit into any of the three situations, and as a predominantly woodland species, much of the turbine lighting is likely to be blocked by trees surrounding any nest sites. As such, an impact of negligible, long-term magnitude is, therefore, predicted.

9.10.23 In addition to lighting on the turbines themselves, any permanent lighting of the substation may also impact goshawk utilising the area around the substation for breeding or foraging. There are two options proposed for the substation location (SS Option 1 and SS Option 2) of which SS Option 1 falls within the potential territory of GI_4.1 (**Confidential Figure 9.2.1**). As with the turbine lighting, much of any lighting associated with the substation is likely to be blocked by the surrounding trees and would be of limited range. As such, an impact of negligible, long-term magnitude is, therefore, predicted.

9.10.24 **Significance of effect**: in conclusion, the effect on goshawk associated with lighting is predicted to be negligible and **not significant** in the context of the EIA Regulations.

140 https://www.legislation.gov.uk/uksi/2016/765/contents/made [accessed November 2022].

141 https://www.caa.co.uk/safety-initiatives-and-resources/windfarms/windfarms/ [accessed November 2022].

142 NatureScot (2020b), The Effect of Aviation Obstruction Lighting on Birds at Wind Turbines, Communication Towers and Other Structures. NatureScot Information Note.

Operation – Collision Risk

9.10.25 Birds that utilise the airspace within the site at potential collision heights during the lifetime of the Proposed Development would be at risk of collision with turbines. The risk of collision with moving wind turbine blades may be related to various factors including the amount of flight activity over the site, the topography of the site, the species' behaviour, and the ability of birds to detect and manoeuvre around rotating turbine blades. Collision risk modelling was undertaken as part of the baseline survey analysis (refer to **Table 9.9** and **Technical Appendix 9.1**) which results in a figure for the estimated collision rate at the wind farm, which is then (for those species 'scoped in' to the assessment) assessed within the context of the species' relevant populations to determine the significance of any losses.

9.10.26 **Impact**: goshawk flying within the turbine area may be subject to a collision risk with turbines or other infrastructure, thereby potentially affecting annual mortality rates at a population level.

9.10.27 **Sensitivity**: medium.

9.10.28 **Magnitude of impact**: as shown in **Table 9.9**, the CRM predicts a very low (one collision every 40 years) collision rate for goshawk based on flight activity recorded during the baseline survey periods. It should be noted that the recorded activity for goshawk may be misleading, since existing forestry within the vicinity of proposed turbine locations would be removed prior to operation (turbines would be keyholed in open areas of 65-115 m radius, depending on the turbine hub height), and so habitat and goshawk activity levels in these areas during the operational period may differ compared to the baseline conditions. However, whilst it is acknowledged that goshawk may forage within open areas in the vicinity of mature forest (i.e., forest edges), this activity is likely to take place mainly at low altitude (i.e., below turbine rotor height), as is appropriate to the type of prey that goshawks capture, and the style of hunting they deploy (being short duration sit-and-wait predators). Goshawk hunt in enclosed forest environments and are adept at avoiding collisions with trees, and so, although activity may continue in proximity to turbines, the collision risk would continue to be low. It is also worth noting that whilst goshawk may be more likely to be flying above the forestry/at collision height in the early part of the breeding season (display flights), these display flights are focussed around a nest site and given the breeding evidence for goshawk at the site this is unlikely to overlap with the turbine locations.

9.10.29 From these predictions, it can be reasonably concluded that the magnitude of impact for goshawk is negligible, long-term.

9.10.30 **Significance of effect**: the unmitigated effects on goshawk from collision risk is considered to be negligible and, therefore, **not significant** in the context of the EIA Regulations.

Decommissioning

9.10.31 Decommissioning effects for the Proposed Development are difficult to predict with any confidence because of the long timeframe until their occurrence. Decommissioning effects are considered for the purpose of this chapter to be similar in nature to those of construction effects, but are likely to be of shorter duration. The significance of effects predicted in the construction phase (paragraph 9.10.12) are, therefore, considered appropriately precautionary for assessing decommissioning effects on goshawk.

9.11 Mitigation

Construction and Decommissioning

9.11.1 No significant unmitigated effects on goshawk were predicted and, therefore, no specific mitigation other than the standard mitigation outlined in paragraph 9.9.1 (BDMP, ECoW and pre-construction surveys) is required. These measures would aim to minimise the disturbance on breeding activity by goshawk or other species by construction activities.

Operation

9.11.2 No significant unmitigated effects on goshawk were predicted and, therefore, no specific mitigation is required; however, directional lighting will be used for any permanent infrastructure (such as the substation) in order to minimise the impact of any lighting on breeding or foraging goshawk. Furthermore, the lighting scheme for the turbines has been designed to minimise lighting impacts and will comprise of cardinal red lighting on six turbines with transponder activated lighting on the six turbines proposed to be utilised if available at the time of construction.

9.12 Cumulative Effects

9.12.1 It is not considered that any further species apart from goshawk would have any potentially significant cumulative effects when considered alongside other projects.

9.12.2 In the case of goshawk, whilst there is the potential for the integrity of one possible territory to be affected as a result of displacement during construction, any additional effects caused by the Proposed Development would be non-significant for the pair/territory and, therefore, the NHZ 20 population. Consequently, a cumulative assessment is not required.

9.13 Enhancement Measures

9.13.1 As no significant effects are predicted in relation to ornithology, no targeted mitigation measures are proposed; however, the Outline Habitat Management Plan (**Technical Appendix 8.5**) proposes to increase native broadleaf woodland within the Proposed Development site. This would provide increased habitat diversity which would benefit the bird species present.

9.14 Summary of Effects

9.14.1 No significant effects are predicted in relation to ornithology during the construction and operation of the Proposed Development (including cumulatively).

9.15 References

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10 GEOLOGY, HYDROGEOLOGY, HYDROLOGY AND PEAT

10.1 Introduction

10.1.1 This chapter of the Environmental Impact Assessment Report (EIA Report) describes the existing geological, hydrogeological, hydrological and soils conditions within the Proposed Development site (hereafter the 'site'), and identifies and assesses the potential impacts that may be caused by Millmoor Rig Wind Farm (hereafter the 'Proposed Development'). This includes site preparation, construction works, restoration of construction works, site operation and decommissioning. Mitigation measures that would be employed to address any adverse effects are set out.

10.1.2 Within this chapter, the site is considered to include the land within the application boundary. The area around the site has also been considered for some constraints and sensitivities, typically making use of a buffer of 2 km. For hydrological concerns, areas downstream of the site are considered at a distance up to 5 km downstream of the application boundary as it is possible for effects to be transmitted downstream for greater distances.

10.1.3 This chapter is supported by a number of Technical Appendices which provide additional in-depth information on relevant aspects of the Proposed Development. These Technical Appendices are:

- 10.1 Peat Management Plan;
- 10.2 Borrow Pit Assessment;
- 10.3 Groundwater-Dependent Terrestrial Ecosystems Assessment; and
- 10.4 Drainage Impact Assessment and Watercourse Crossing Inventory.

10.1.4 Key findings are summarised within this chapter.

10.2 Scope and Methodology

10.2.1 The assessment is undertaken through a desk study and site inspection of existing geological, hydrogeological, hydrological and peat-related features on and surrounding the site. The existing conditions are described and potential risks that may be associated with the Proposed Development are identified and assessed. This includes potential risks from rock extraction to form aggregate, damage to groundwater-dependent areas, damage to the water environment through watercourse crossing construction, spillages or sediment release, and natural or induced instability in peat.

10.2.2 A number of data sources were considered in writing this chapter; the main sources are detailed below:

- Ordnance Survey (OS) topographical mapping;
- British Geological Survey (BGS) geological mapping, superficial and bedrock;
- BGS online borehole records;
- Centre for Ecology and Hydrology (CEH) Flood Estimation Handbook (FEH) Web Service;

- Scottish Borders Council Environmental Health Department private water supplies records;
- Scotland's Soils mapping; and
- Scottish Environment Protection Agency's A functional wetland typology for Scotland.

Effects Evaluation

10.2.3 The significance of potential effects has been classified taking into account three principal factors: the sensitivity of the receiving environment, the potential magnitude of the effect and the likelihood of that effect occurring. This approach is based on guidance contained within the joint Scottish Natural Heritage (now NatureScot)/Historic Environment Scotland publication Environmental Impact Assessment Handbook v5[143].

Receptor Sensitivity

10.2.4 The sensitivity of a receptor represents its ability to absorb the anticipated effect without resulting in perceptible change. Four levels of sensitivity have been used, as defined in **Table 10.1**.

Table 10.1: Receptor Sensitivity Ratings

Sensitivity	Definition
Very high	The receptor has very limited ability to absorb change without fundamentally altering its present character, is of very high environmental value and/or is of international importance.
High	The receptor has limited ability to absorb change without significantly altering its present character, is of high environmental value and/or is of national importance.
Moderate	The receptor has moderate capacity to absorb change without significantly altering its present character, has moderate environmental value and/or is of regional importance.
Low	The receptor is tolerant of change without detriment to its present character, is of low environmental value and/or of local importance.

Effect Magnitude

10.2.5 The magnitude of effects includes the timing, scale, size and duration of the potential effect. Four levels of magnitude have been used, as defined in **Table 10.2**.

Table 10.2: Effect Magnitude Ratings

Magnitude	Definition
Substantial	Substantial changes, over a significant area, to key characteristics or to the geological/hydrogeological/peatland classification or status for more than 2 years.

[143] SNH/HES (2018), Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland [v5]. Scottish Natural Heritage & Historic Environment Scotland. Available at: https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf [accessed June 2022].

Magnitude	Definition
Moderate	Noticeable, but not substantial changes for more than 2 years or substantial changes for more than 6 months, but less than 2 years, over a substantial area, to key characteristics or to the geological/hydrogeological/peatland classification or status.
Slight	Noticeable changes for less than 2 years, substantial changes for less than 6 months, or barely discernible changes for any length of time.
Negligible or no change	Any change would be negligible, unnoticeable or there are no predicted changes.

Likelihood of Effect

10.2.6 The likelihood of an effect occurring is evaluated to three levels: **unlikely**, **possible** or **likely.**

Effects Significance

10.2.7 The findings in relation to the three criteria discussed above have been brought together to provide an assessment of significance for each potential effect. Potential effects are concluded to be of **Major**, **Moderate**, **Minor** or **Negligible** significance. Potential effects are assessed taking into account the proposed mitigation measures. The assessment concludes with a review of various effects to determine if they would be significant in terms of the *Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017*. Effects assessed as **Major** or **Moderate** are deemed to be significant; those assessed as **Minor** or **Negligible** are deemed to be not significant (**Table 10.3**).

Table 10.3: Effects Significance Matrix. Effects considered to be Significant, within the terms of the EIA Regulations, are indicated in bold

Sensitivity	Magnitude	Likelihood	Significance
Very High	Substantial	Likely	**Major**
		Possible	**Major**
		Unlikely	**Moderate**
	Moderate	Likely	**Major**
		Possible	**Moderate**
		Unlikely	**Moderate**
	Slight	Likely	**Moderate**
		Possible	Minor
		Unlikely	Minor
	Negligible/no change	Likely	Minor
		Possible	Negligible
		Unlikely	Negligible
High	Substantial	Likely	**Major**
		Possible	**Major**
		Unlikely	**Moderate**
	Moderate	Likely	**Moderate**
		Possible	**Moderate**
		Unlikely	Minor
	Slight	Likely	Minor
		Possible	Minor
		Unlikely	Minor
	Negligible/no change	Likely	Minor
		Possible	Negligible
		Unlikely	Negligible
		Likely	**Major**

Sensitivity	Magnitude	Likelihood	Significance
Moderate	Substantial	Possible	**Moderate**
		Unlikely	Minor
	Moderate	Likely	**Moderate**
		Possible	Minor
		Unlikely	Minor
	Slight	Likely	Minor
		Possible	Minor
		Unlikely	Negligible
	Negligible/no change	Likely	Negligible
		Possible	Negligible
		Unlikely	Negligible
Low	Substantial	Likely	**Moderate**
		Possible	Minor
		Unlikely	Negligible
	Moderate	Likely	Minor
		Possible	Minor
		Unlikely	Minor
	Slight	Likely	Minor
		Possible	Negligible
		Unlikely	Negligible
	Negligible/no change	Likely	Negligible
		Possible	Negligible
		Unlikely	Negligible

10.2.8 In addition to the **sensitivity**, **magnitude** and **likelihood** of an effect, effects can be **adverse** or **beneficial**, **temporary** or **long-term**, **direct** or **indirect**, **single** or **cumulative**.

Limitations and Uncertainties

10.2.9 There were no desk-based gaps, but were some potential limitations on the field surveys, as discussed below.

10.2.10 The site visit followed a standard 'reconnaissance level' walkover survey to obtain an overview of the site conditions at the time of the visit. A reconnaissance level survey involves walking through and around an area to gather visual information concerning elements such as slope, rock outcrop, ground wetness and bogginess, nature and type of watercourses, and the presence or absence of groundwater seepages or spring points. No ground investigation was undertaken as part of the site visits. As a result, information is limited to detail that can be gathered from a visual survey of this kind. Uncertainties may arise as a result of preceding weather conditions; e.g. very wet preceding conditions may cause an over-estimation of the watercourse nature or ground bogginess than would be considered 'normal' for the area.

10.2.11 The information gathered has been combined with information from site visits for other disciplines, including site surveys to map peat depths and vegetation classes, and available photography to give as full a picture of the site conditions as possible. All reasonable attempts were made to ensure that good coverage of the site was included. However, it is possible, from the type of srvey undertaken or the areas visited during the surveys, that some information was not collected.

10.2.12 The reconnaissance level survey was undertaken in November 2021. Phase 1 peat survey data were provided by the applicant from the now withdrawn Highlee Hill Wind Farm EIA and a Phase 2 survey to gather additional peat depth and condition data was undertaken in April 2022.

10.3 Consultation Undertaken

10.3.1 Consultation was undertaken with a number of statutory and non-statutory consultees and interested parties, including the Scottish Government, the Scottish Borders Council (SBC), Scottish Environment Protection Agency (SEPA), NatureScot (formerly SNH), Scottish Water and local stakeholders. Responses with relevance to geology, hydrogeology, hydrology and peat are provided in

10.3.2 **Table** 10.4.

Table 10.4: Consultee Responses Relevant to Geology, Hydrogeology, Hydrology and Peat

Name of Stakeholder/ Consultee	Key Concerns	Response
Energy Consents Unit (ECU)	Developments to be included in the cumulative landscape impact assessment should be discussed and agreed by the Company and Scottish Borders Council.	Cumulative effects are assessed in paragraphs 10.7.160 to 10.7.167.
	Where borrow pits are to be used as a source of onsite aggregate they should be included in the EIA Report. Information should cover the requirements set out in 'PAN 50: Controlling the Environmental Effects of Surface Mineral Workings'.	Borrow pits are assessed in **Technical Appendix 10.2**.
	Advice from Scottish Water should be addressed in the EIA Report.	Advice from Scottish Water is addressed in **Table** 10.4.
	Investigate the presence of any private water supplies potentially impacted. EIA Report to include details of any supplies identified, and an assessment of impacts, risks and mitigation.	Private Water Supplies have been identified in **Table 10.11** and assessed in paragraph 10.7.46.
	Identify the main watercourse and waterbodies within and downstream of the Proposed Development area. Identify and consider any Special Areas of Conservation related to fish.	Watercourses and waterbodies are identified in **Section** Error! Reference source not found. and assessed in **Section** Error! Reference source not found. and **Technical Appendix 10.4**. Considerations relating to fish are covered in **Chapter 8: Ecology.**

Name of Stakeholder/ Consultee	Key Concerns	Response
	Contact NatureScot, Northumberland National Park Authority and Northumberland County Council to discuss and agree designated sites to be included in the EIA Report and subsequent survey work, modelling and research that will be required.	Designated Sites are identified in paragraph 10.5.56 and discussed in paragraph 10.7.36.
	A peat landslide hazard and risk assessment to be undertaken as part of the EIA process where there is a demonstrable requirement for the assessment.	Due to minimal peat within the site a peat landslide hazard and risk assessment is not considered to be required. Peat is discussed fully in **Technical Appendix 10.1**.
	Mitigation measures suggested for any significant environmental impacts identified should be presented as a conclusion to each chapter in the EIAR.	Mitigation measures are addressed in **Section** Error! Reference source not found..
Scottish Borders Council	Wind Farms that have reached Scoping stage to be included in cumulative impacts assessment. The 20 km study area to be widened to 25 km to include consideration of Fawside WF.	Cumulative effects are assessed in paragraphs 10.7.160 to 10.7.167.
	Survey for GWDTEs should cover the site and 500 m from site boundary. During construction phase buffers should be created around GWDTEs.	GWDTE are addressed in **Technical Appendix 10.3**.
	No turbines should be located on peat.	Careful design has ensured that the majority of turbines are not located on peat, and no turbines are located on deep peat. Full assessment of the impacts on peat can be found in **Technical Appendix 10.1**.
	New hard surface such as access roads should be attenuated to at least existing Greenfield runoff rates; culverts, watercourse crossings or alterations to crossings must not reduce flow conveyance of watercourses; details of silt traps / other sediment control features should be submitted; a buffer zone between watercourses and turbines is recommended.	Watercourse crossings and associated features are addressed in **Section** Error! Reference source not found. and fully assessed in

Name of Stakeholder/ Consultee	Key Concerns	Response
		Technical Appendix 10.4.
NatureScot	Reference should be made to all information available regarding the original planning application for Highlee Hill Wind Farm which was submitted in 2016 and withdrawn in 2017.	Noted.
	Black Burn, Catlee Burn and all watercourses within the site are part of the River Tweed SAC – concern over the potential impacts on hydrology and hydrogeology both in and surrounding the development area. Consideration must be given to the potential effects of construction, operation and decommissioning of the Proposed Development in relation to the qualifying feature of the SAC. Of particular concern are silt and sediment entering the watercourses and smothering gravel beds, suspended solids in the water column, pollution events, and changes in water quality and chemistry.	Careful construction and adherence to pollution prevention plans would mitigate impacts on the River Tweed SAC. Watercourses, impacts on hydrology and hydrogeology, and silt and sediment management are addressed in **Section** Error! Reference source not found. and **Technical Appendix 10.4**.
	Concern of negative impact to Borders Wood SAC due to: • Silt and sediment runoff • Pollution events • Changes in water quality and chemistry • Changes to microclimate	Designated Sites are identified in paragraph 10.5.56 and discussed in paragraph 10.7.36.
	Kielderhead Moss: Carter Fell to Peel Fell SSSI is notified for Blanket bog, subalpine dry heath and breeding bird assemblage and should be included in the EIAR.	Designated Sites are identified in paragraph 10.5.56 and discussed in paragraph 10.7.36.
Scottish Environment Protection Agency (SEPA)	The following is required in the EIA Report: 1. Map and assessment of all engineering works within and near the water environment including buffers, details of any flood risk assessment and details of any related CAR applications. 2. Map and assessment of impacts upon Groundwater Dependent Terrestrial Ecosystems and buffers. 3. Map and assessment of impacts upon groundwater abstractions and buffers. 4. Peat depth survey and table detailing re-use proposals. 5. Map and table detailing forest removal.	Drainage impact and watercourse crossings are assessed in **Technical Appendix 10.4**. GWDTE are assessed in **Technical Appendix 10.3**. Peat is discussed in **Technical Appendix 10.1**.

Name of Stakeholder/ Consultee	Key Concerns	Response
	6. Map and site layout of borrow pits. 7. Schedule of mitigation including pollution prevention measures. 8. Map of proposed waste water drainage layout. 9. Map of proposed water abstractions including details of the proposed operating regime. 10. Decommissioning statement.	Borrow Pits are assessed in **Technical Appendix 10.2**. Pollution prevention is discussed in **Section** Error! Reference source not found.. Mitigation is discussed in **Section** Error! Reference source not found.. Forest removal is considered within **Chapter: 17 Forestry**. Wastewater disposal and water abstractions are not being proposed.
	Management of peat or soils may require an exemption under The Waste Management Licensing (Scotland) Regulations 2011.	Management of peat and soils is covered in **Technical Appendices 10.1 and 10.2**.
	Proposed crushing or screening will require a permit under The Pollution Prevention and Control (Scotland) Regulations 2012.	Noted.
	Consider if other environmental licences may be required for any installations or processes.	It is anticipated that a Construction Runoff Permit and that some watercourse crossing works would require engineering licences.
Denholm & District Community Council	Flooding, particularly in the Chesters/Southdean area is a concern. Further investigation of flood risk associated with removing woodland and infilling areas with concrete is required.	Flooding is addressed in paragraphs 10.5.53, 10.7.50 and 10.7.99, and is further discussed in **Technical Appendix 10.4**.
Historic England	Consideration should be given to potential alterations to drainage patterns that might cause in situ decomposition or destruction of below ground archaeological remains and	Drainage is discussed in **Sections** Error! Reference source

Name of Stakeholder/ Consultee	Key Concerns	Response
	deposits, and that could lead to subsistence of buildings and monuments.	not found., Error! Reference source not found. and **Technical Appendix 10.4**.
Hobkirk Community Council	Considering only those proposed developments that have submitted a full application or have been approved is not acceptable for assessment of cumulative impacts due to the significant amount of other projects being considered in the wider area which are not yet at that stage.	Cumulative effects are assessed in **Sections 10.7.160 to 10.7.167.** .
	Flooding is a serious and increasing concern in the local area. There should be a detailed assessment of impacts downstream, impact of increased run off and impacts of felling with robust mitigation put in place. Suggested that flooding issues are discussed with Scottish Borders Council; the Hawick Flood Group; the engineers currently working on the Hawick (and other) flood defences; and local community councils particularly Hobkirk, Hawick and Newcastleton.	Flooding is addressed in paragraphs 10.5.53, 10.7.50 and 10.7.99, and is further discussed in **Technical Appendix 10.4.**
River Tweed Commission	Construction should avoid water bodies wherever possible. Where this is not possible establish buffer zone of at least 50 m. Employ appropriate sediment and silt controls.	Watercourses have been considered carefully within the design and new watercourse crossings have been minimised. Sediment management is discussed in **Section** Error! Reference source not found..
	For watercourse crossings the use of 'clear span bridge crossings' is encouraged and SEPA's Engineering in the Water Environment Good Practice Guide should be consulted.	Watercourse crossings are discussed in **Technical Appendix 10.4**.
	Peat - Peat slide risk to be assessed. - Construction to avoid areas of deep peat. - Natural peat drainage channels should be preserved - Excavated material should not be stock piled in areas of unstable peat	Due to minimal peat within the site a peat landslide hazard and risk assessment is not considered to be required. Peat is discussed fully in **Technical Appendix 10.1**.

Name of Stakeholder/ Consultee	Key Concerns	Response
	- Concentrated water flows onto peat sloped should be avoided.	
	Surface water run-off must be discharged in line with CAR and in such a way as to minimise the risk of pollution of the water environment.	Noted. All relevant environmental licences would be put in place prior to construction.
	Surface water monitoring programme to be clearly defined in EIA Report. Following construction, there should be 3-5 years post development monitoring, with continued monitoring if impacts are detected.	The proposed monitoring programme is provided in **Table 10.14**.
	Drainage schemes and silt/sediment controls to be maintained throughout decommissioning of the development.	Noted.
	Site specific mitigation to be included in the EIA Report. Mitigation measures may include: - Avoidance of water bodies - Avoidance of peat - Hydrological buffer zones - Drainage schemes which allow no direct discharges to water course - Pollution prevention - Adherence to current legislation.	Waterbodies and peat have been avoided as much as is practically possible. **Technical Appendix 10.1** provides a detailed assessment of peat. **Technical Appendix 10.4** provides information on drainage and watercourse crossings. Pollution prevention is discussed in **Section** Error! Reference source not found..
Scottish Water	Will not accept any surface water connections into Scottish Water's combined sewer system. If a connection to the combined sewer system is anticipated Scottish Water should be contacted at the earliest opportunity with evidence to support the intended drainage plan prior to making a connection.	Noted. No connection to the combined sewer system is proposed.
Southdean Community Council	Scoped applications in the local area should be included in Cumulative Impacts assessment. The following applications should be considered: Consented Pines Burn, Windy Edge (also worth noting that there is a new Scoping request) Applications Faw Side, Teviot Wind farm (due very shortly -which the new Windy Edge adjoins) Scoping Cliffhope, Wauchope East, Wauchope West, and possibly Newcastleton.	Cumulative effects are assessed in paragraphs 10.7.160 to 10.7.167. .

Name of Stakeholder/ Consultee	Key Concerns	Response
	Recent increased flooding of Jed Water to be appropriately investigated. Concern over installation of major infrastructure close to the headwaters of rivers in the local area that feed into the Teviot and then the Tweed.	Flooding is addressed in paragraphs 10.5.53, 10.7.50 and 10.7.99, and is further discussed in **Technical Appendix 10.4**.
Upper Liddesdale & Hermitage Community Council	Cumulative impacts have increased since the Highlee Hill proposal and should be taken into consideration accordingly. The following Wind farms should be considered: - Consented: Windy Edge, Pines Burn - Applied: Faw Side, Teviot - Scoping: new Windy Edge, Cliffhope, Wauchope East, Wauchope West	Cumulative effects are assessed in paragraphs 10.7.160 to 10.7.167
Marine Scotland Science	Describe waterbodies and potential impacts on pre-construction condition	Hydrology is outlined in paragraphs 10.5.35-10.5.50 and assessed in **Section** Error! Reference source not found.**.**
	Consider potential cumulative effects	Cumulative effects are assessed in paragraphs 10.7.160 to 10.7.167.
	Propose monitoring procedures during and post construction and during decommissioning.	Proposed monitoring procedures are outlines in **Sections** Error! Reference source not found. and Error! Reference source not found., and summarised in **Table 10.14**.
	Discuss and assess impacts and mitigation of the following: - The presence of a large density of watercourses - The presence of large areas of deep peat	Hydrology is outlined in paragraphs 10.5.35-10.5.50 and assessed in **Section** Error! Reference source not found.. There are no large areas of peat on site.
	Carry out a site specific water quality monitoring programme before, during and after	Noted.

Name of Stakeholder/ Consultee	Key Concerns	Response
	construction. MSS guidance should be followed when drawing up monitoring programmes.	
	Recommended that an Ecological Clerk of works is appointed.	Noted.
	Recommended that MSS is consulted about the monitoring programme.	Noted.

10.4 Error! Reference source not found.Statutory and Planning Context

10.4.1 In preparing this section of the EIA Report, consideration has been given to relevant planning guidance at all levels. This includes, but is not limited to, the following:

- The European Water Framework Directive (2000/60/EC) and associated daughter Directives including the Groundwater Daughter Directive (Protection of Groundwater Against Pollution, 2006/118/EC);
- The European Mining Waste Directive (2006/21/EC);
- The European Floods Directive (2007/60/EC);
- The Environmental Protection Act 1990 (as amended);
- The Water Environment and Water Services (Scotland) Act 2003;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended);
- The Pollution Prevention and Control (Scotland) Regulations 2012;
- The Water Environment (Oil Storage) (Scotland) Regulations 2006;
- Scottish Planning Policy 2014, with particular respect to the section on the Low Carbon Economy;
- SEPA's Position Statement WAT-PS-10-01: Assigning Groundwater Assessment Criteria for Pollutant Inputs;
- Scottish Planning Policy 2014, with particular respect to the section on Flooding and Drainage;
- Fourth National Planning Policy (draft) (NPF4), due to be presented for approval in Summer 2022;
- Scottish Government's Planning Advice Notes (PAN):
  - PAN 51: planning, environmental protection and regulation, 2006;
  - PAN 61: sustainable urban drainage systems, 2001;
  - PAN 69: flood risk, 2015;
  - PAN 79: water and drainage, 2006.
- Scottish Environment Protection Agency's Guidance for Pollution Prevention (GPP & PPG):
  - PPG 1: Understanding your environmental responsibilities – good environmental practices, 2013;
  - GPP 2: Above ground oil storage tanks, 2017;
  - PPG 3: Use and design of oil separators in surface water drainage systems, 2006;

- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer, 2017;
- GPP 5: Works and maintenance in or near water, 2017;
- GPP 8: Safe storage and disposal of used oils, 2017;
- GPP 13: Vehicle washing and cleaning, 2017;
- PPG 18: Managing fire water and major spillages, 2000;
- GPP 21: Pollution incident response planning, 2017;
- GPP 22: Dealing with spills, 2018;
- Code of Practice for Using Plant Protection Products in Scotland.

10.5 Existing Environment

Meteorology and Climate

10.5.1 The Proposed Development is located in the Scottish Borders south of Chesters, within the south-western part of the UK Meteorological (Met) Office's Eastern Scotland climate region. Much of Eastern Scotland is protected from the rain-bearing westerly winds associated with Atlantic depressions which pass close to, or across, the UK. However, the Proposed Development is situated within an upland area which would afford less protection from rain-bearing westerly winds than some of the surrounding low-lying areas further east.

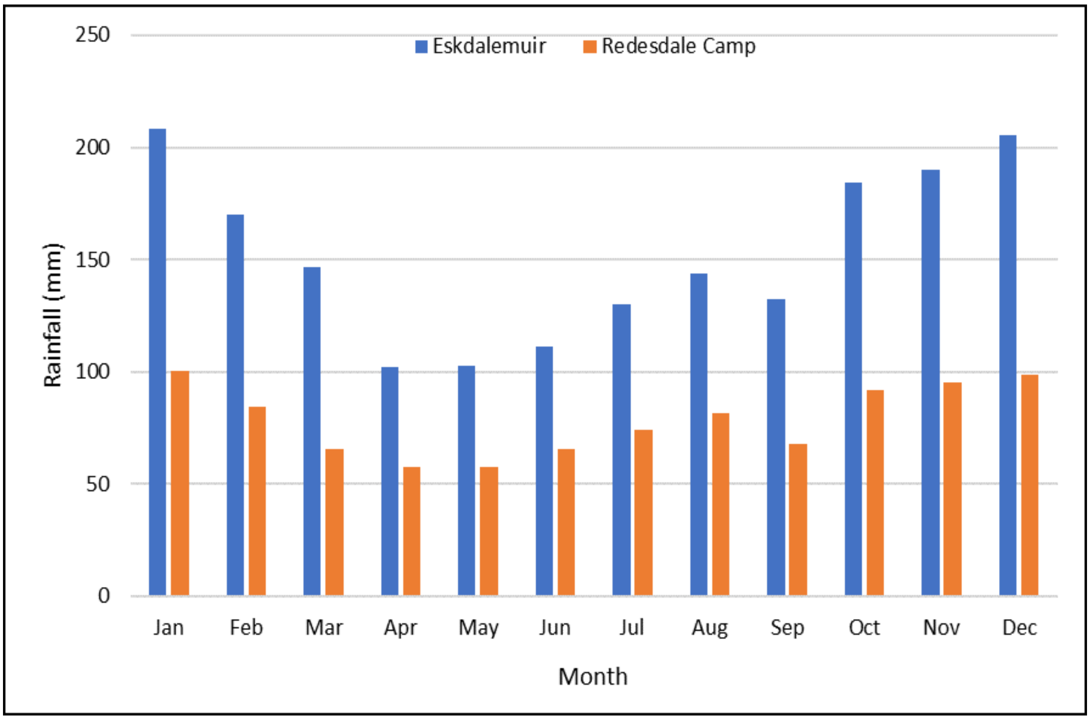
10.5.2 The Eastern Scotland climate region comprises the valleys and estuaries of the eastward-flowing Rivers Tweed, Forth, Tay and Dee and extensive upland areas including the Grampian Mountains in the northern part of the region and the Southern Uplands in the southern part of the region. The site is located to the east of the Tweedsmuir Hills at a height of 840 m above Ordnance Datum (AOD) in the Southern Uplands, which offers some protection from rain-bearing westerly winds to the Proposed Development in the east.

Rainfall

10.5.3 The site lies between (and just north of) the Redesdale Camp and Eskdalemuir climate monitoring stations[144]. Rainfall volumes are likely to be similar to the patterns observed at Eskdalemuir and Redesdale Camp.

[144] Met Office (2022), UK Climate. Available at https://www.metoffice.gov.uk/public/weather/climate [accessed June 2022].

10.5.4 **Graph 10.1** shows the average rainfall distribution through the year from Redesdale Camp and Eskdalemuir monitoring stations.



Graph 10.1: Monthly rainfall averages at Eskdalemuir and Redesdale Camp monitoring stations. Averages cover the period 1991-2020 (Met Office, 2022)

10.5.5 Average annual rainfall for the climate monitoring station at Eskdalemuir, located approximately 20 km west of the site, is 1827.17 mm. The altitude of this monitoring station is 242 m above sea level. The average annual rainfall for the climate monitoring station at Redesdale Camp, located approximately 19.7 km south-east of the site, is 940.76 mm, at an altitude of 211 m above sea level.

Geology

10.5.6 Geological information is derived from the BGS GeoIndex online geological mapping on a 1:50,000 scale and the British Geological Survey Lexicon of Named Rock Units[145][146]. Geology mapping is shown in **Figure 10.1**.

Bedrock Geology

10.5.7 The BGS GeoIndex indicates that the northern region of the site is underlain by bedrock of the Hawick Group. The bedrock consists of thin to medium bedded calcareous greywacke and interbedded silty mudstones.

10.5.8 The southern region of the site, including the access area, is underlain by bedrock of the Ballagan Formation, which comprises grey mudstone and siltstones, with nodules and

[145] BGS (2022). GeoIndex online geological mapping. British Geological Survey. http://mapapps2.bgs.ac.uk/geoindex/home.html, accessed June 2022.

[146] UKRI (2022) BGS Lexicon of Named Rock Units. Available at: https://www.bgs.ac.uk/technologies/the-bgs-lexicon-of-named-rock-units/, accessed July 2022.

beds of ferroan dolomite; evaporite deposits are also present within the formation. Thin sandstones are found across much of the formation while thick sandstone layers are localised.

10.5.9 The north-westernmost part of the site is underlain by bedrock from the Riccarton Group, with small areas from the Stratheden and Inverclyde Groups and from the Hawick Group. The Riccarton Group strata consist of greywackes with interbedded mudstones and dark grey, finely laminated siltstone beds. The Stratheden and Inverclyde Groups include undifferentiated sandstone and fine-grained (argillaceous) rocks.

10.5.10 A small area in the south of the site is underlain by the Birrenswark Volcanic Formation, comprising olivine-basalt lavas with impersistent sedimentary intercalations.

10.5.11 Some minor faulting is present in the area, with two faults located in the westernmost part of the site trending in a north-east to south-west direction. One minor earthquake has been recorded in the area south-west of the site, with a local magnitude (R_L) of 1.1, in 2016.

Mineral Extraction

10.5.12 The BGS GeoIndex has identified no mapped mineral occurrences or mineral abstraction sites on the land within the application boundary. The Coal Authority map[147] has identified no occurrences of coal mining.

10.5.13 There are three quarries on the land within the application boundary indicated on 1:25,000 OS maps. These quarries are located within the western part of the site. Data from the BGS GeoIndex and OS maps at 1:25,000 scale indicate that there are 21 quarries within 2 km of the application boundary. Details are provided in **Table 10.5**.

Table 10.5: Quarries Within or Near the Site (OS 1:25,000 maps)

No	Source Location	Commodity	Status	Distance & Direction From the Site
1	630480 607260	Unknown	Disused	Within north-west region of the site
2	360872 606844	Unknown	Disused	Within western region of the site
3	360905 606454	Unknown	Disused	Within western region of the site
4	359889 604794	Unknown	Disused	1.1 km south-west of the RLB
5	359204 605840	Unknown	Disused	1.6 km west of the RLB
6	359140 606530	Unknown	Disused	1.4 km west of the RLB
7	358670 606620	Unknown	Disused	1.8 km west of the RLB
8	358366 607058	Unknown	Unknown	1.9 km west of the RLB
9	358377 607085	Unknown	Unknown	1.9 km west of the RLB
10	358900 607730	Unknown	Unknown	1.3 km north-west of the RLB

[147] Coal Authority (2022). Interactive Map Viewer. Available at: https://mapapps2.bgs.ac.uk/coalauthority/home.html, accessed June 2022.

No	Source Location	Commodity	Status	Distance & Direction From the Site
11	359664 607529	Unknown	Unknown	0.5 km north-west of the RLB
12	360361 609322	Unknown	Unknown	1.9 km north of the RLB
13	360891 609350	Unknown	Unknown	1.8 km north of the RLB
14	361913 608747	Unknown	Unknown	0.5 km north-west of the RLB
15	361852 608719	Unknown	Unknown	0.5 km north-west of the RLB
16	361883 608675	Unknown	Unknown	0.5 km north-west of the RLB
17	363358 609370	Unknown	Unknown	0.9 km north-west of the RLB
18	363500 609150	Unknown	Unknown	0.7 km north of the RLB
19	363796 609124	Unknown	Unknown	0.7 km north-east of the RLB
20	363824 609390	Unknown	Unknown	1 km north-east of the RLB
21	364806 609235	Unknown	Unknown	1.8 km north-east of the RLB
22	365020 608610	Unknown	Disused	1.4 km north-east of the RLB
23	365085 608620	Unknown	Disused	1.5 km north-east of the RLB
24	365335 603730	Unknown	Unknown	2 km south-east of the RLB

Superficial Geology

10.5.14 Superficial deposits are dominated by Devensian till, comprising diamicton deposited during the last glacial period. Diamicton is a very variable glacial sediment consisting of unsorted material ranging in size from clay to boulders, usually with a matrix of clay to sand. The till covers the majority of the site, with the exception of high elevation areas of Wardmoor Hill in the west, Weasel Hill in the north and Green Law in the south; these areas have no superficial deposits present.

10.5.15 The channels of the Black Burn and Carter Burn in the east and the Jed Water in the central region of the site are indicated to contain alluvial deposits. The alluvium is a sorted or semi-sorted mixture of clay, silt, sand and gravel of fluvial origin deposited in the Holocene period.

Soils and Peat

10.5.16 National soil maps of Scotland[148][149] indicate that the northern and central regions of the site are covered by noncalcareous mineral gleys with some brown forest soils of the

[148] Soil Survey of Scotland (1981), Soil maps of Scotland at a scale of 1:250,000. Macaulay Institute for Soil Research, Aberdeen. Available at https://soils.environment.gov.scot/maps/soil-maps/national-soil-map-of-scotland/ [accessed July 2022].

[149] Soil survey of Scotland (1982), 1:250,000 scanned maps, South East Scotland, Macaulay Institute for Soil Research, Aberdeen. Available at https://www.hutton.ac.uk/sites/default/files/files/soils/Soil250k_7_South_East_Scotland_A4.pdf [accessed July 2022].

Ettrick and Carter soil associations, while the southern region is dominated by peaty gleys with dystrophic blanket peat. Some minor areas of brown forest soils and peaty gleyed podzols are present in the west of the site, around Wardmoor Hill and Black Hill. A small area to the west of the site is overlain by peaty podzols, some peaty gleys and peat of the Ettrick association. Further details on soils within the site are provided in **Table 10.6**.

10.5.17 Blanket peat is not mapped within the application boundary, although some areas of blanket peat are indicated south of the southern boundary.

Table 10.6: 1010Soil Types Within the Site

Soil Assoc.	Parent Material	Component Soils	Landforms	Vegetation	Area %
Carter	Drifts derived from Lower Carboniferous sandstones of the Calciferous Sandstone series	Peaty gleys, peat	Undulating hill and upland with gentle and strong slopes	Bog heather moor, flying bent grassland, blanket and flying bent bog	43.1
		Noncalcareous gleys, brown forest soils with gleying	Valley sides with gentle and strong slopes	Arable and permanent pastures. Sharp-flowered rush pasture. Tussock-grass pasture	30.3
Ettrick	Drifts derived from Lower Palaeozoic greywackes and shales	Noncalcareous gleys; some brown forest soils with gleying	Foothills and depressions with gentle slopes	Sharp-flowered rush pasture, Tussock-grass pasture, Arable and permanent pastures	11.2
		Peaty gleys, noncalcareous gleys	Valleys and depressions amongst hills and uplands with gentle slopes	Rush pastures and sedge mires, Moist Atlantic heather moor, Flying bent grassland	10.3
		Brown forest soils	Hills and valley sides with steep and strong slopes	Acid bent-fescue grassland, Dry Atlantic heather moor, Oak and Birchwood	3.6
		Peaty podzols; some peaty gleys, peat	Hills with simple convex steep and strong slopes	Moist Atlantic heather moor, Heath-rush fescue grassland, Blanket and flying bent bog	1.5

10.5.18 NatureScot's Carbon and Peatland map[150] has been consulted to understand the carbon-rich soils, deep peat and priority peatland habitat within the site. The map classifies soils into five carbon classes plus three classes for mineral soils, non-soil or unknown. Classes

[150] NatureScot (2016). Scotland's Soils: Carbon and Peatland 2016 map, https://map.environment.gov.scot/Soil_maps/?layer=10#, accessed July 2022.

1 and 2 are considered to be nationally important carbon-rich soils. Within the site, the soils are principally Classes 0 and 3.

10.5.19 The site is dominated by Class 3 soils, primarily in the south-eastern region of the site. Small areas of Class 5 are identified around the Wellcleuch Plantation and small areas of Class 4 are identified in the north of the access area. The rest of the site has been classified as Class 0 mineral soil which does not typically support peatland habitats. The areas of each carbon and peatland class within the site are provided in **Table 10.7**. Soils and peatland are shown in **Figure 10.2**.

10.5.20 There is widespread evidence of modification to peatland within the site due to drainage channels and particularly in areas which have been recently felled or planted.

Table 10.7: Carbon and Peatland Classes Present Within the Site

Peatland Class	Description	Area %
Class 0	Mineral soil - Peatland habitats are not typically found on such soils.	35.2
Class 3	Dominant vegetation cover is not priority peatland habitat, but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat.	62.1
Class 4	Area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon rich-soils.	0.2
Class 5	Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat.	2.5

10.5.21 Phase 1 peat depth data from the former, withdrawn Highlee Hill Wind Farm application were provided by the applicant[151]. A further peat depth and peat condition survey was undertaken across the site in April 2022 for areas of proposed infrastructure.

10.5.22 The peat depth surveys confirm that peat cover within the site is patchy, with the majority of the site consisting of peaty soils with a depth of less than 0.5 m. Some localised areas of peat and rare pockets of deeper peat are present in the north central and southern parts of the site, mainly away from areas of proposed infrastructure.

10.5.23 More details of peat depth and peat depth variation are provided in **Technical Appendix 10.1**. An overview map of the peat depth distribution within the site is provided in **Figure 10.3**.

Geomorphology

10.5.24 The site lies on relatively high ground, with elevations above 200 m AOD. The topography of the site is characterised by higher ground in the south-east and western sections, and lower ground in the north-east in the Jed Water and Black Burn valleys. Five prominent hills surround the site: Green Law (368 m AOD) in the south, Wardmoor Hill (365 m AOD)

[151] Phase 1 peat data were purchased by ESB. Neither ESB nor any of the consultants contracted for the Millmoor Rig project were involved in collection of this information or with the Highlee Hill application.

in the west, Highlee Hill (307 m AOD) in the north, and Charlie's Knowe (258 m AOD) and Tamshiel Rig (280 m AOD) in the east.

10.5.25 The highest point in the site is the eastern slope of Wardmoor Hill (located in the west) standing at 365 m AOD. The lowest elevations in the site are primarily located along the Jed Water, in the north-east of the site, with elevations below 200 m in the north-eastern corner.

Hydrogeology

10.5.26 The southern region of the Ballagan Formation is part of the Inverclyde Group aquifer system; the aquifer is classified as a moderately productive, multi-layered aquifer with fracture flow. The very north-westernmost region of the site contains the Stratheden Group, which is classed as a moderately productive aquifer, consisting of sandstone, partly pebbly with subordinate siltstone and mudstone, producing moderate amounts of groundwater.

10.5.27 The Hawick and Riccarton Groups are both classified as low productivity aquifers, both consisting of highly indurated greywackes with limited groundwater in the near-surface weathered zone.

10.5.28 The superficial deposits covering the majority of the site have a range of potential permeabilities, and their productivity depends on their local composition and connectivity. Any pockets of sand and gravel-rich material within the diamicton till and alluvium are likely to have higher permeability, whereas areas of clay and silt would have low or negligible permeability.

Groundwater Vulnerability

10.5.29 Groundwater vulnerability mapping[152] has identified that the majority of the site is considered to have a vulnerability class of 4a, with a smaller region of vulnerability class of 4b in the western region of the site. Both class 4a and 4b are vulnerable to those pollutants not readily adsorbed or transformed. Class 4a may have low permeability soil and is less likely to have clay present in superficial deposits, whereas class 4b is more likely to have clay present in superficial deposits.

Groundwater-Dependent Terrestrial Ecosystems

10.5.30 Groundwater-dependent terrestrial ecosystems (GWDTE) are defined by UKTAG (2004)[153] as:

"A terrestrial ecosystem of importance at Member State level that is directly dependent on the water level in or flow of water from a groundwater body (that is, in or from the saturated zone). Such an ecosystem may also be dependent on the concentrations of

[152] Dochartaigh, B., Doce, D., Rutter, H. and MacDonald, A. (2011), British Geological Survey, User Guide: Groundwater Vulnerability (Scotland) GIS dataset, Version 2. http://nora.nerc.ac.uk/id/eprint/17084/1/OR11064.pdf [accessed June 2022].

[153] UKTAG (2004), Guidance on the identification and risk assessment of groundwater dependent terrestrial ecosystems. UK Technical Advisory Group on the Water Framework Directive. Available at: https://www.wfduk.org/sites/default/files/Media/Characterisation%20of%20the%20water%20environment/Risk%20assessment%20of%20terrestrial%20ecosystems%20groundwater_Draft_210104.pdf [accessed June 2022].

substances (and potentially pollutants) within that groundwater body, but there must be a direct hydraulic connection with the groundwater body."

10.5.31 In line with the guidance provided in UKTAG (2004)[154], a dual approach to identifying GWDTE has been used. This involves detailed study of vegetation communities in order to determine the potential level of groundwater dependency, combined with detailed hydrogeological study in order to identify locations where groundwater reaches the surface and is able, therefore, to provide a source of water to associated habitats.

10.5.32 National Vegetation Classification (NVC) communities identified by SEPA as potentially highly or moderately groundwater-dependent, depending on the hydrogeological setting, are listed in SEPA's publication "Planning guidance on on-shore windfarm sites"[155]. Within the site potentially groundwater-dependent NVC communities identified are:

- M6 *Carex rostrata – Sphagnum squarrosum* mire;
- M15 *Scirpus cespitosus – Erica tetralix* wet heath;
- M23 *Juncus effusus/acutiflorus – Galium palustre* rush-pasture;
- M25 *Molinia caerulea – Potentilla erecta* mire;
- M27 *Filipendula ulmaria – Angelica sylvestris* mire;
- MG9 *Holcus lanatus – Deschampsia cespitosa* grassland;
- MG10 *Holcus lanatus – Juncus effusus* rush-pasture;
- S7 *Carex acutiformis* swamp;
- W2 *Salix cinerea – Betula pubescens – Phragmites australis* woodland;
- W4 *Betula pubescens – Molinia caerulea* woodland; and
- W7 Residual alluvial forests (*Alnus glutinoso-incanae*).

10.5.33 The list of NVC communities provided by SEPA in Land Use Planning System SEPA Guidance Note 4 indicates that M6, M23, W4 and W7 are likely to have high groundwater dependency, while M15, M25, M27, MG9, MG10, S7 and W2 are likely to have moderate groundwater dependency in Scottish situations, dependent on the hydrogeological setting[156].

10.5.34 GWDTE have been assessed separately; details are provided in **Technical Appendix 10.3**.

Hydrology

10.5.35 The site lies within two catchment areas: the Jed Water and the Catlee Burn catchments. The catchment areas are shown in **Figure 10.4**.

[154] *Ibid.*

[155] SEPA (2017), Planning guidance on onshore windfarm Proposed Developments. Scottish Environment Protection Agency, Land Use Planning System Guidance Note 4 (LUPS-GU4). Available at: https://www.sepa.org.uk/media/136117/planning-guidance-on-on-shore-windfarms-Proposed Developments.pdf, [accessed June 2022].

[156] *Ibid.*

10.5.36 Most of the site lies within the Jed Water catchment, but the north-west and a small section of the south-west of the site lies within the Catlee Burn catchment.

10.5.37 The catchment wetness index (PROPWET) for both the Jed Water and Catlee Burn is 0.57, indicating soils in the site are wet for 57% of the time. The area has a base flow index (BFI HOST19) of between 0.32 and 0.45, indicating a moderate to low input of groundwater baseflow to surface watercourses. The standard percentage runoff (SPR HOST) is 37-50%, indicating that this percentage of rainfall on site is converted into surface runoff from rainfall events; this represents a high runoff risk where soils have a limited capacity to store rainfall and/or a slow infiltration rate and would quickly saturate, leading to rapid runoff.

10.5.38 Catchment statistics derived from the Flood Estimation Handbook Web Service[157] are provided in **Table 10.8**. Catchment statistics have only been provided for the main catchments within the site.

Table 10.8: Site Catchment Statistics

Catchment Name	Catchment Wetness Index (PROPWET)	Base Flow Index (BFI HOST19)	Standard Percentage Runoff (SPR HOST)	Site Area %
Jed Water	0.57	0.451	37.12 %	95.5
Catlee Burn	0.57	0.322	50.03 %	4.5

Watercourses

10.5.39 Watercourses within the site all appear to be in their natural or near-natural conditions, with generally high levels of sinuosity, defined as having lots of river meanders.

10.5.40 Key watercourses in the catchments are shown in **Figure 10.4**.

Jed Water Catchment

10.5.41 The Jed Water catchment has a total area of 49.5 km^2[158] and drains 95.5% of the site.

10.5.42 The Jed Water, which flows north-east through the area, provides the main drainage for the site. The Rough Sike and Westshiels Burn tributaries drain the central region of the site into the Jed Water at Westshiels, while the Battling Sike tributary drains the north central region of the site into the Jed Water. Several smaller unnamed tributaries drain into the Jed Water as it flows north-east The Black Burn and its tributary, the Fell Burn, drain the eastern region of the site around hill named Millmoor Rig. The Black Burn and Jed Water merge in the very north-eastern region of the site, flowing out of the site northwards.

10.5.43 The Jed Water catchment is an upland region characterised by moorland, commercial forestry in the south and agricultural fields in the north.

Catlee Burn catchment

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[157] CEH (2022), Flood Estimation Handbook Web Service. Centre for Ecology and Hydrology. Available at https://fehweb.ceh.ac.uk/ (subscription service) [accessed July 2022].

[158] *Ibid.*

10.5.44 The Catlee Burn catchment has a total area of 18.3 km^2[159] and drains 4.5% of the site.

10.5.45 The Catlee Burn catchment consists of the Hass Sike and Harecairn Sike watercourses draining the very south-western region of the site; both watercourses drain into the Hyndlee Burn. The very north-western region of the site is drained by the Wolfehopelee Burn and its tributaries. The Wolfehopelee Burn drains into the Catlee Burn.

10.5.46 The Catlee Burn catchment is an upland region characterised by moorland, commercial forestry and agricultural fields.

Water Quality

Surface Waterbodies

10.5.47 SEPA's Water Classification and Water Environment Hubs have been consulted to determine the existing baseline water quality for the main watercourses and waterbodies within the site[160][161]. The details are summarised in **Table 10.9**.

Table 10.9: Baseline Surface Water Quality Status, Summarised

Waterbody Name and ID	Status		Pressures
Jed Water/ Raven Burn (ID 5232)	**Condition in 2014**	Overall: Good Water flows & levels: High Physical condition: Good Water quality: Good	None
	Classification in 2018	Overall: Good Biology (fish): High Hydromorphology: Good	
Black Burn (ID 5235)	**Condition in 2014**	Overall: Good Water flows & levels: High Physical condition: Good Water quality: Good	None
	Classification in 2018	Overall: Good Biology (fish): High Hydromorphology: Good	
Hyndlee Burn (ID 5245)	**Condition in 2014**	Overall: Good Water flows & levels: High Physical condition: Good Water quality: High	None
	Classification in 2018	Overall: Good Biology (fish): High Hydromorphology: Good	

159 *Ibid.*

160 SEPA (2022a). Water Classification Hub. Scottish Environment Protection Agency. https://www.sepa.org.uk/data-visualisation/water-classification-hub/ [accessed June 2022].

161 SEPA (2022b). Water Environment Hub. Scottish Environment Protection Agency. https://www.sepa.org.uk/data-visualisation/water-environment-hub/ [accessed June 2022].

Groundwater

10.5.48 Scotland's Environment groundwater classification map (2022)[162] was also consulted for groundwater quality information. The Tweed Sub-basin catchment groundwater body has been classified as 'Good' status.

Receiving Waterbodies

10.5.49 SEPA's Water Classification and Water Environment Hubs have also been consulted to determine the existing baseline water quality for the site's receiving waterbodies[163][164]. The details are summarised in **Table 10.10**.

10.5.50 The Jed Water, Black Burn and Hyndlee Burn all drain northwards into the Teviot Water, a tributary to the River Tweed.

Table 10.10: Receiving Waterbody Quality Status, Summarised

Waterbody Name and ID	Status		Pressures
Teviot Water (ID 5220)	**Condition in 2014**	Overall: Good Water flows & levels: High Physical condition: Good Water quality: High	None
	Classification in 2018	Overall: Good Biology (fish): High Hydromorphology: Good	
River Tweed (ID 5201)	**Condition in 2014**	Overall: Good Water flows & levels: Good Physical condition: Good Water quality: High	None
	Classification in 2018	Overall: Good Biology (fish): High Hydromorphology: Good	

Water Resources

10.5.51 The BGS GeoIndex[165] identifies several boreholes within 2 km of the application boundary. The South Deanrig Borehole is a 51 m deep water well at Charlies Hill, approximately 0.8 km north-west of the access track entrance and 1.2 km north-east of

[162] *Ibid.*

[163] SEPA (2022a), Water Classification Hub. Scottish Environment Protection Agency. https://www.sepa.org.uk/data-visualisation/water-classification-hub/ [accessed June 2022].

[164] SEPA (2022b), Water Environment Hub. Scottish Environment Protection Agency. https://www.sepa.org.uk/data-visualisation/water-environment-hub/ [accessed June 2022].

[165] BGS (2022), GeoIndex online geological mapping. British Geological Survey. http://mapapps2.bgs.ac.uk/geoindex/home.html [accessed June 2022].

the turbine area. On the B6357 between Hyndlee and Wolfehopelee, 13 other borehole records have been identified.

10.5.52 Data obtained from SBC's Environmental Health Department regarding private water supplies (PWS) identifies one spring present within the application boundary at Dykeraw. Within 2 km of the site boundary, 14 other PWS were identified. Details of all PWS identified are provided in **Table 10.11** and shown on **Figure 10.5**.

Table 10.11: Private Water Supplies Within 2 km of the Site Boundary.

Supply Name	Source Location	Source Type	Properties Served	Distance to Project Boundary	Linkage
Dykeraw	362800, 608300	Spring	3	Within application boundary	No linkage, located in separate subcatchment
Southdean Lodge	364000, 608000	Spring	1	0.3 km north-east	No linkage, located in separate subcatchment
Lustruther	361700, 608100	Spring	1	0.4 km north-west	No linkage, located upslope
Charlies Hill	363000, 609000	Spring	1	0.5 km north	No linkage, located in separate subcatchment
Southdean Farmhouse	363000, 609000	Spring	1	0.5 km north	No linkage, located in separate subcatchment
Southdean House	363000, 609000	Spring	1	0.5 km north	No linkage, located in separate subcatchment
George House	367000, 608000	Borehole	1	1.1 km east	No linkage, located in different catchment
Lethem Cottage	367126, 607675	Borehole	1	1.3 km east	No linkage, located in different catchment
Blacklee	360163, 608776	Spring	12	1.4 km north-west	No linkage, located upslope
Southdean Mill	363000, 610000	Spring	1	1.4 km north	No linkage, located in separate subcatchment

Supply Name	Source Location	Source Type	Properties Served	Distance to Project Boundary	Linkage
Carterhouse	367200, 607200	Borehole	1	1.5 km east	No linkage, located upstream
Hyndlee Farm	359000, 606000	Spring	1	1.6 km west	No linkage, located in separate subcatchment
Lethem	367283, 608845	Spring	4	1.7 km north-east	No linkage, located in different catchment
Lethamwood	367536, 608692	Borehole	1	1.8 km north-east	No linkage, located in different catchment
Southdean Farm	363200, 610450	Spring	1	1.9 km north	No linkage, located in separate subcatchment

Flood Risk

10.5.53 SEPA's Indicative Flood Map[166] was consulted to gain an overview of the likelihood of flooding within and downstream of the site. Flood risk within the site is shown to be minimal, with some localised regions of river (fluvial) and surface water (pluvial) flood risk.

10.5.54 River flooding is confined to the main channels of the Jed Water, Black Burn and Carter Burn, all of which have a high likelihood of flooding, defined as having a 10% chance of a flooding in a given year. Additionally, there are a few small isolated locations of high fluvial and surface water (pluvial) flood risk scattered across the site, mainly associated with small minor watercourses/ditches.

10.5.55 Downstream of the site, areas of high flood risk are present within the Jed Water flood plain and along the Catlee Burn and Rule Water.

Designated Sites

10.5.56 Designated sites of relevance to geology, hydrogeology and hydrology that are located within 5 km of the site are identified within **Table 10.12**. Data were collated from NatureScot (2022)[167]. Designated sites reviewed include SSSI, SAC and Ramsar sites (internationally recognised wetlands). Geological Conservation Review (GCR) sites were also reviewed for completeness; these do not have a statutory designation, but are considered to be important for geological understanding and many are also protected as SSSI.

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[166] SEPA (2022c), Flood Map. Scottish Environment Protection Agency. Available at http://map.sepa.org.uk/floodmap/map.htm [accessed June 2022].

[167] NatureScot (2022), SiteLink Map. Available at https://sitelink.nature.scot/map [accessed July 2022].

Table 10.12: Designated Sites Relevant to Geology, Hydrogeology, Hydrology, Soils and Peat

Site Name	Qualifying Features Relating to Geology, Hydrogeology, Hydrology & Peat	Distance From Project Area	Linkage?
River Tweed SAC	Fish and otter designations within the river systems (Jed Water as part of River Tweed catchment).	0 km	Clear linkage – the Jed Water and the Catlee Burn are both part of the SAC.
Borders Wood SAC Cragbank & Wolfehopelee SSSI	Mixed woodland on base-rich soils associated with rocky slopes	350 m west	Potential linkage to part of protected area - woodland areas are located to either side of Wolfehopelee Burn downstream of site
Kielderhead Moors: Carter Fell to Peel Fell SSSI	Blanket bog, subalpine dry heath and breeding bird assemblage.	2 km south	No linkage -SSSI is located upstream of the Proposed Development.

10.6 Influence on Design

10.6.1 The importance of hydrology, hydrogeology, geology and peat has been recognised throughout the Proposed Development design process. Key constraints that have had a considerable influence on design are:

- peatland and peat depth;
- watercourses and waterbodies;
- potential GWDTE;
- private water supplies; and
- Designated Sites.

10.6.2 The Scoping layout of turbines was identified as requiring changes as some of the turbines and hardstanding areas were located on areas of peat identified by the Phase 1 peat depth survey. Given the limited amount of peat present, the design preference was to avoid all areas of peat if at all possible.

10.6.3 The extensive existing track network has been made use of where possible, to minimise requirement for construction of new track. No significant infrastructure is located in areas with peat deeper than 1.0 m and the vast majority of infrastructure is located in areas with no peat. Some minor incursion into peat pockets has been unavoidable, either because these areas are immediately adjacent to existing track or because other constraints including engineering requirements have meant it has not been possible to realign crane hardstandings to avoid identified small peat pockets. All larger areas of peat have been avoided completely. No turbines or turbine foundations have been located on any identified areas of peat.

10.6.4 Watercourse crossings have been kept to a practical minimum, making as much use of existing crossings as possible. Only two new regulated crossings are proposed, with others requiring upgrade as necessary.

10.6.5 Potentially sensitive wetland habitats have been avoided where possible. The forestry planting at the site has already caused damage to the habitats within the site, with open areas along track sides and in fire breaks providing the main areas for non-forestry habitats to develop. The use of existing tracks where possible, to minimise felling and other environmental disturbance, makes it difficult to avoid wetland habitats where they occur adjacent to track routes. Other constraints including ecology, forestry felling, visual impact and engineering constructability were important considerations that required balancing with peat, hydrology and wetland habitats.

10.6.6 Key infrastructure design iterations are shown on **Figure 10.6**.

10.7 Predicted Impacts

Proposed Development Characteristics

10.7.1 The construction phase would involve a number of different elements. **Chapter 2: Proposed Development** of the EIA Report describes the Proposed Development elements in detail. The elements with particular relevance to geology, hydrogeology, hydrology and soils are as follows:

- construction of access routes and watercourse crossings;
- excavation and construction of turbine foundations and associated crane pads;
- creation of construction compounds and laydown areas;
- excavation of borrow pits and processing of excavated rock;
- installation of drainage features around permanent infrastructure;
- batching of concrete (if required);
- temporary welfare facilities and site utilities including water supply and foul water disposal; and
- excavation, handling and temporary storage of peat and soils.

10.7.2 During operation of the project, activities with particular relevance to geology, hydrogeology, hydrology and soils are as follows:

- Surface water drainage, including treatment and discharge of surface drainage;
- Maintenance of tracks and trackside drainage;
- Long-term drainage around permanent infrastructure;
- Additional extraction and processing of rock for necessary maintenance.

Effects During Construction

Physical Changes to Overland Drainage and Surface Water Flows

10.7.3 Changes to overland drainage patterns would arise principally from construction of the access track network with subsidiary effects from construction of the turbine foundations, crane hardstandings and ancillary infrastructure.

10.7.4 The new access tracks would require installation of trackside drainage and cross-drains to protect the tracks from water damage. Modifications to the existing access track would require relocation of some trackside drainage, where track widening is required, and additional cross-drains may be necessary. Constructed drains would be no longer and deeper than necessary to provide the required track drainage. Cross-drains would be installed at an appropriate frequency to minimise concentration of flows from above the track, where cross-slopes are present, and to prevent diversion of flows between sub-catchment areas, to minimise changes to the hydrological regime. All drainage infrastructure would be designed with suitable capacity for a rainfall intensity of a 1-in-200 year storm event, plus allowance for climate change.

10.7.5 All long-term and temporary drainage infrastructure would be established on a running basis ahead of excavation works. This includes temporary bunding and cut-off drains around turbine bases, hardstanding areas and borrow pits. Where possible, trackside drainage would be laid up to 100 m ahead of track construction works on a running basis.

10.7.6 A number of watercourses would be crossed by the access track. Ten crossings of regulated watercourses have been identified and details are provided in **Technical Appendix 10.4**. Seven of these crossings would require upgrading of existing structures, while two crossings would be new structures. One crossing does not require upgrading.

10.7.7 A number of minor, unregulated watercourses would also require a crossing to be upgraded. These crossings would be designed with sufficient capacity for a rainfall intensity of a 1-in-200 year storm event, plus allowance for climate change.

10.7.8 All necessary permissions required for watercourse crossing works would be obtained prior to commencement of associated works.

10.7.9 The receptor, site surface watercourses, is considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be of **Slight** magnitude. The likelihood of effect is considered to be **Likely**.

10.7.10 The effect of physical changes to overland drainage from construction works is assessed as **Minor**, long-term and adverse, and **not significant**.

Particulates and Suspended Solids

10.7.11 All site work involving earthmoving operations would generate loose sediment, which could potentially gain access to surface watercourses and waterbodies through entrainment in surface runoff. This could potentially have an adverse effect on the downstream watercourses through damage to fish spawning habitat and changes to dissolved oxygen and nutrient levels in watercourses and waterbodies.

10.7.12 Surface water from the areas surrounding the turbine bases, all hardstanding areas (including crane hardstandings, substation, construction compounds and laydown areas) and borrow pits would be prevented from entering the working areas by appropriate use of peripheral bunding and cut-off drains. These would help to divert clean water around and away from the working areas.

10.7.13 During excavation works for turbine foundations, cut sections of track, cut areas for hardstandings and borrow pits, silt fencing or appropriate alternative sediment control protection would be installed on the downhill side of the excavation to prevent inadvertent discharge of silty water into any of the site's watercourses. Pre-construction installation of long-term drainage would provide an additional level of sediment control.

10.7.14 All engineering work adjacent to watercourses, including track construction and installation of watercourse crossings, would have appropriate sediment control measures established prior to any groundworks. Vegetation would be retained along watercourse banks to act as additional protection. The two new watercourse crossings would not require any in-stream works. However, it is likely that crossing upgrading works would require limited in-stream works as all current crossings are circular or oval culverts. Any widening works would be anticipated to extend existing crossings rather than replacement, in order to minimise watercourse disturbance.

10.7.15 It is expected that upgrading works to minor watercourse crossings would also require minor in-stream works.

10.7.16 For all in-stream works associated with watercourse upgrading works, works would be undertaken using a temporary dam to control flow while the crossing extensions are added. Over-pumping would only be used if flow conditions require this.

10.7.17 The existing crossing of the Jed Water (WC06) is understood not to require any widening works and, therefore, no instream works are expected at this location.

10.7.18 For areas of larger excavation, such as turbine bases, crane hardstandings and borrow pit excavations, temporary water control measures would be used. These would include use of temporary settlement ponds and/or the use of proprietary treatment systems such as SiltBusters, as appropriate.

10.7.19 Construction activities would be restricted during periods of wet weather, particularly for any work occurring within 20 m of a watercourse or within areas of identified deeper peat, to minimise mobilisation of sediment in heavy rainfall. The following 'stop' conditions are recommended to guide construction activity[168]:

Table 10.13: Recommended 'Stop' Conditions for Earthmoving Activities

'Stop' rule	Requirements
High intensity rainfall	Rainfall during construction greater than 10 mm per hour
Long duration rainfall	Rainfall in the preceding 24 hours greater than 25 mm
7-day cumulative rainfall (1)	Preceding 7 days of rainfall greater than 50% of the monthly average
7-day cumulative rainfall (2)	Preceding 7 days of rainfall greater than 50 mm

[168] CH2M & Fairhurst (2018), Outline Peat Management Plan. Appendix 10.6, A9 Dualling – Dalwhinnie to Crubenmore, DMRB Stage 3 Environmental Impact Assessment. Available ay https://www.transport.gov.scot/media/41104/appendix-a106-outline-peat-management-plan.pdf [accessed June 2022].

10.7.20 Any water collecting within excavations would be pumped out prior to further work in the excavation. This water may require treatment to remove suspended solids prior to discharge to ground.

10.7.21 Vegetation cover would be re-established as quickly as possible on track verges and cut slopes, by re-laying of excavated soil turves to improve slope stability and provide erosion protection. Additional methods, including hydroseeding and/or use of a biodegradable geotextile, would be considered if necessary, in specific areas and areas of particular sensitivity.

10.7.22 All necessary permissions relating to construction works, plus accompanying pollution prevention plans, would be obtained prior to any construction work beginning within the site. All the management and control measures, including emergency response procedures, would be set out in a Construction Environment Management Plan (CEMP) produced by the appointed Contractor prior to any works beginning. This would be a live document and would be updated as required throughout construction.

10.7.23 A water quality monitoring programme would be established at key locations around the site. Monitoring would begin prior to any construction works, to allow pre-construction baseline quality to be determined. Details are provided in **Table 10.14**.

10.7.24 The receptor, site surface watercourses, is considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be **Slight**. The likelihood of effect is considered to be **Likely**.

10.7.25 The effect of particulates and suspended solids from construction works is assessed as **Minor**, temporary and adverse, and **not significant**.

Water Contamination from Fuels, Oils or Foul Drainage

10.7.26 Spillage of fuels, oils, wet concrete or concrete washout water could have an adverse effect on surface water quality, and major spillages could have a potential influence on the Jed Water catchment, with very much smaller potential influences on the Catlee Burn catchment system as a result of the very small infrastructure footprint in this catchment.

10.7.27 Oil and fuel storage and handling within the Proposed Development would be undertaken following published guidance, in particular *Guidance on Pollution Prevention 2 – Above ground oil storage tanks*[169] and in compliance with the *Water Environment (Oil Storage) (Scotland) Regulations 2006* and the *Water Environment (Miscellaneous) (Scotland) Regulations 2017*. The details would be contained in the CEMP and are summarised as follows:

- Risk assessments would be undertaken and all Hazardous Substances and Non-Hazardous Pollutants that would be used and/or stored within the site would be identified. Hazardous substances likely to be within the site include oils, fuels, hydraulic fluids and anti-freeze. No non-hazardous pollutants have been identified as likely to be used within the site. Herbicides would not be used.

[169] NetRegs (2018). Above ground oil storage tanks. Available at https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/guidance-for-pollution-prevention-gpps-full-list/, accessed July 2022.

- All deliveries of oils and fuels would be supervised by the site manager or nominated deputy.
- All storage tanks would be located within impermeable, bunded containers where the bund is sufficient to contain 110% of the tank's capacity. For areas containing more than one tank, the bund would be sufficient to contain 110% of the largest tank's capacity or 25% of the total capacity, whichever is the greater.
- Any valve, filter, sight gauge, vent pipe or other ancillary equipment would be located within the containment area.
- Waste oil would not be stored within the study area, but would be removed to dedicated storage or disposal facilities.
- Management procedures and physical measures would be put in place to deal with spillages, such as spill kits and booms.
- Maintenance procedures and checks would ensure the minimisation of leakage of fuels or oils from plant.
- Refuelling and servicing would be undertaken in a designated area or location with adequate precautions in place, such as a dedicated impermeable surface with lipped edges to contain any contaminants. This area would have a self-contained drainage system fully separated from the main drainage system within the compound.
- Where vehicle maintenance is necessary in the field, owing to breakdown, additional precautions would be taken to contain contaminants, such as spill trays or absorbent mattresses.
- The access track would be designed and constructed to promote good visibility where possible and two-way access where visibility is restricted, to minimise risk of vehicle collisions.
- If concrete batching within the site is required, this would take place in one designated location within the site's construction compound. This location would be at least 250 m from the nearest watercourse. Protective bunding would be installed around the batching area to ensure that contaminated runoff is contained. Dedicated drainage would be installed to ensure that water from the batching area can be suitably treated to reduce alkalinity and suspended sediment load prior to discharge or removed from the site by tanker for treatment and disposal off-site.

Foul Drainage Provision

10.7.28 It is anticipated that site welfare facilities would include a suitably-sized holding tank, which would be emptied by tanker and removed from the site on an appropriate timescale for disposal at a suitably licensed facility.

Spillage and Emergency Procedures

10.7.29 The Spillage and Emergency Procedures would form part of the CEMP and would be prominently displayed at the site and staff would be trained in their application. The Procedures document would incorporate guidance from the relevant SEPA Guidance Notes.

10.7.30 In the event of any spillage or discharge that has the potential to be harmful to or to pollute the water environment, all necessary measures would be taken to remedy the situation. These measures would include:

- identifying and stopping the source of the spillage;
- containing the spillage to prevent it spreading or entering watercourses, by means of suitable material and equipment;
- absorbent materials, including materials capable of absorbing oils, would be available on site to mop up spillages. These would be in the form of oil booms and pads and, for smaller spillages, quantities of proprietary absorbent materials. Sandbags would also be readily available for use to prevent spread of spillages and create dams if appropriate;
- where an oil/fuel spillage may have soaked into the ground, the contaminated ground would be excavated and removed from the site area by a licensed waste carrier to a suitable landfill facility;
- the emergency contact telephone number of a specialist oil pollution control company would be displayed within the site; and
- sub-contractors would be made aware of the guidelines for handling of oils and fuels and of the spillage procedures at the Proposed Development.

10.7.31 SEPA would be informed of any discharge or spillage that may be harmful or polluting to the water environment. Written details of the incident would be forwarded to SEPA no later than 14 days after the incident, in line with SEPA's requirements.

10.7.32 A water quality monitoring programme would be established at key locations around the Proposed Development. Monitoring would begin prior to any construction works, to allow pre-construction baseline quality to be determined. Details are provided in **Table 10.14**.

10.7.33 The receptor, site surface watercourses, is considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be **Moderate**. The likelihood of effect is considered to be **Unlikely**.

10.7.34 The effect of water contamination from fuels, oils, concrete batching or foul drainage from construction works is assessed as **Minor**, temporary and adverse, and **not significant**.

Changes in or Contamination of Water Supply to Vulnerable Receptors

10.7.35 Vulnerable receptors that have the potential to be affected by Proposed Development works have been identified. These include two designated sites and a number of potential GWDTE. Eight PWS have also been identified as requiring assessment.

Designated Sites

10.7.36 The River Tweed SAC and Borders Wood SAC/Cragbank and Wolfehopelee SSSI both have potential links to the site and proposed works.

10.7.37 The Black Burn is part of the River Tweed SAC and the Jed Water and Catlee Burn are both tributaries feeding into the River Tweed SAC. The Jed Water flows through the centre of the site, the Black Burn is crossed by the access route, and the Catlee Burn flows west of the site. The majority of the site is drained by the Jed Water/Black Burn catchment, with two very small sections in the west of the site drained by the Catlee Burn catchment. Turbine T02 and its crane hardstanding north are located within the Catlee Burn catchment, with all other infrastructure located within the Jed Water catchment (**Figure 10.4**).

10.7.38 There is a clear hydrological linkage to the River Tweed SAC, via both the Black Burn and the Jed Water. The link to Borders Wood SAC/Cragbank and Wolfehopelee SSSI is slightly indirect, as the Wolfehopelee Burn passes through the designated area, but the designation does not include the watercourse.

10.7.39 Precautions would be taken during construction to prevent or minimise any potentially contaminating materials from entering any watercourses within the site. Dust suppression sprays would be used as required in dry weather. Water monitoring locations at key points downstream of proposed works would be included in the project water quality monitoring programme. Ten watercourse crossings would be required.

10.7.40 The designated sites with hydrological linkage are considered to be of **Very High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be **Slight**. The likelihood of effect is considered to be **Possible.**

Groundwater-Dependent Terrestrial Ecosystems

10.7.41 A detailed assessment of the interaction between the Proposed Development and potential GWDTE has been undertaken. Eleven potentially groundwater-dependent NVC communities have been identified within the site: M6 mire, M23 rush-pasture, W4 woodland and W7 residual alluvial forests are likely to have high groundwater dependency, while M15 wet heath, M25 mire, M27 mire, MG9 grassland, MG10 rush pasture, S7 swamp and W2 woodland are likely to have moderate groundwater dependency in Scottish situations, dependent on the hydrogeological setting[170]. Information from the site surveys indicated that habitat types were of relatively low quality in all parts of the site, although sections along the access area are considered to be of relatively high quality.

10.7.42 A total of 11 areas of potentially groundwater-dependent wetland habitats have been identified within 100 m of excavations less than 1 m in depth or within 250 m of excavations deeper than 1 m. The potentially groundwater-dependent habitats have been assessed specifically within the context of the Proposed Development, taking into account the local bedrock and superficial geology, peat distribution and site observations.

10.7.43 No groundwater discharges were identified at any location within the site. The superficial deposits, primarily consisting of clay-rich diamicton till, would act to insulate the groundwater in the bedrock from the ground surface, effectively preventing groundwater discharge at surface. As a result, it is considered very unlikely that any of the 11 potentially groundwater-dependent communities within the site is actually groundwater-dependent in this area, but rely on a mix of surface water, shallow throughflow in surface vegetation and rainwater.

10.7.44 Details of the GWDTE assessment are provided in **Technical Appendix 10.3**.

[170]SEPA (2017). Planning guidance on onshore windfarm Proposed Developments. Scottish Environment Protection Agency, Land Use Planning System Guidance Note 4 (LUPS-GU4). Available at: https://www.sepa.org.uk/media/136117/planning-guidance-on-on-shore-windfarms-Proposed Developments.pdf [accessed June 2022].

10.7.45 The potential GWDTE within the site are considered to be of **Moderate** sensitivity as a result of the absence of any hydrogeological linkage. With appropriate mitigation measures in place, as described, the magnitude of works is considered to be **Slight**. The likelihood of effect is considered to be **Likely**.

Private Water Supplies

10.7.46 Eight PWS have been identified that have potential to be at risk from the Proposed Development, defined as being within the site or within 2 km downstream of the site. These are detailed in **Table 10.11**.

10.7.47 None of the identified PWS has been identified as having any form of linkage to the Proposed Development, and are, therefore, not at risk from the Proposed Development.

10.7.48 PWS are considered to be of **High** sensitivity. The magnitude of effect is considered to be **Negligible**. The likelihood of effect is considered to be **Unlikely**.

10.7.49 The effect of changes in or contamination of water supply to vulnerable receptors from construction works is assessed as **Minor**, temporary and adverse**.**

Increased Flood Risk

10.7.50 The Proposed Development infrastructure is not at risk of flooding from any source.

10.7.51 The drainage installed around long-term development infrastructure would be designed to minimise concentration of flows. This would be achieved by:

- Use of cut-off drains to divert runoff around necessary 'hard' infrastructure such as turbine bases and hardstanding areas.
- Use of regular cross-drains underneath access tracks. These would be installed in line with the natural terrain, making use of low points where runoff would naturally be focused. Cross-drains under existing tracks would be maintained.
- Use of a slight gradient on installed 'hard' infrastructure to encourage drainage into a filter drain or swale, for infiltration into vegetated areas and as shallow through-flow.

10.7.52 Long-term drainage would be installed ahead of related construction works or excavations taking place, to ensure that site drainage can be controlled appropriately. For tracks, the required trackside drainage would be put in place ahead of access track construction, on a rolling basis as the track development progresses.

10.7.53 Any areas which have to be left unvegetated during the construction phase, such as turbine foundations, hardstanding areas and borrow pits, would have settlement ponds put in place to attenuate flow until vegetation can be re-established at the end of the construction period.

10.7.54 In line with best practice guidance, site runoff would not be greater than natural pre-development runoff. Details are provided in **Technical Appendix 10.4**.

10.7.55 The receptors, infrastructure and property downstream of the site, are considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of any increased flood risk is considered to be **Negligible**. The likelihood of effect is considered to be **Unlikely**.

10.7.56 The effect of increase in flood risk resulting from the construction works is assessed as **Negligible**, and **not significant**.

Physical Removal of Bedrock

10.7.57 Bedrock and superficial materials would require to be removed to form turbine foundations, platforms for construction of hardstanding areas and, particularly, to facilitate development of borrow pits in order to provide aggregate for the project construction works.

10.7.58 These works would require permanent modification to the natural geology at the site. As the footprint of the works within the overall site area is small, overall changes to the geological character of the area would be limited. There are no areas designated for geological characteristics within or adjacent to the Proposed Development.

10.7.59 Rock testing would be undertaken on appropriate samples from the three borrow pit areas to determine their suitability for unbound track and hardstanding construction. This would include testing to determine likely degradation patterns during the lifespan of the development. Should the tests identify problems with parts of the rock within the borrow pit footprints, care would be taken to ensure that unsuitable material is not used for construction, but would be retained for use in borrow pit restoration.

10.7.60 The site bedrock receptor is considered to be of **Low** sensitivity. The magnitude of the works is considered to be **Slight**. The likelihood of effect is considered to be **Likely**.

10.7.61 The effect of physical removal of bedrock from construction works is assessed as **Minor**, long-term and adverse, and **not significant**.

Modification to Groundwater Flow Paths

10.7.62 Physical changes to the shallow subsurface as a result of all excavation work have potential to interrupt shallow groundwater flow paths. This would include cut-and-fill track sections, turbine foundations, hardstanding areas, substation, laydown area, construction compounds and cable trenches.

10.7.63 Physical changes to the deeper subsurface (>5 m below ground surface) have potential to interrupt deeper groundwater flow paths. This would include borrow pit excavations and some turbine foundation areas.

10.7.64 The superficial deposits are noted to be low productivity aquifers, although some localised groundwater would be present within the peat bodies and alluvium, and occasionally in parts of the glacial till. There is likely to be some groundwater flow via weathered zones and fracture networks within the bedrock.

10.7.65 Groundwater monitoring boreholes would be established within the three borrow pit areas prior to any construction work beginning, to a depth at least 1 m below the deepest expected excavation. Groundwater level monitoring would be undertaken to determine whether groundwater is present within the borrow pit areas and, if it is, at what level the seasonally highest groundwater table stands. Any groundwater within the borrow pit area would be managed in line with best practice, with discharge via a settlement pond to allow any entrained sediment to be removed prior to discharge. Any required discharge licence would be obtained prior to excavation commencing.

10.7.66 Excavation of cable trenches could lead to groundwater flow between catchments if the trenches act as preferential flow paths. This can be avoided by laying cables in disturbed ground adjacent to access tracks. In areas where cable routes cross up or down notable slopes, clay bunds or alternative impermeable barrier would be placed for every 0.5 m change in elevation along the length of the trench to minimise in-trench groundwater flow. As the site is comparatively flat, this is not anticipated to be a frequent requirement.

10.7.67 The site groundwater receptor is considered to be of **Moderate** sensitivity. With appropriate design constraints and mitigation measures in place, as described, the magnitude of the works is considered to be **Slight**. The likelihood of effect is considered to be **Likely**.

10.7.68 The effect of modification to groundwater flow paths from construction works is assessed as **Minor**, long-term and adverse, and **not significant**.

Soil Erosion and Compaction

10.7.69 Construction activity, particularly plant and vehicle movements, soil stripping and stockpiling, would affect the nature of the site soils. Plant movements would act to compact soils through movements over unstripped ground. All activity requiring removal, transport and stockpiling of soils would have potential to lead to soil erosion and loss of structure, resulting in overall soil degradation.

10.7.70 All vehicular routes would be clearly demarcated, and vehicles would not be permitted access out with these areas.

10.7.71 Only tracked or low ground pressure vehicles would be permitted access to unstripped ground.

10.7.72 Soil stripping would be undertaken with care and would be restricted to as small a working area as practicable. Topsoil would be removed and laid in a storage bund, up to 2 m in height, on unstripped ground adjacent to the working area. It would be attempted to retain the turf layer vegetation-side-up where possible, although ground conditions may make this challenging. Subsoils and superficial geological deposits would be removed subsequently and laid in storage bunds, also up to 2 m in height, clearly separated from the topsoil bund. Care would be taken to maintain separate stockpiles for separate soil types in order to preserve the soil quality.

10.7.73 For work within areas of peat, acrotelmic peat (the uppermost 0.5 m) would be removed as for the topsoil. It would be attempted to retain the acrotelm vegetation-side-up where possible, although ground conditions may make this challenging. The underlying catotelmic peat would be stored in bunds up to 1 m in height. Catotelmic peat is sensitive to handling, and loses its internal structure easily, so would be transported as short a distance as possible to its storage location. Excavation of catotelmic peat would be limited due to careful infrastructure design and the lack of peat across the site generally.

10.7.74 Limited smoothing or 'blading' of stockpiled soils and catotelmic peat would be undertaken to help shed rainwater and prevent ponding of water on the stockpile. Bunds on notably sloping ground would have sediment control measures installed near the base, on the downslope side, to collect and retain any sediment mobilised by rainfall.

10.7.75 Excavated soil and peat would be used in site restoration and rehabilitation at the end of the construction period, in order to promote fast re-establishment of vegetation cover on worked areas and areas of bare soil or peat that are not required for the operational phase of the Proposed Development. Soils and peat would be stored for as short a time as practicable, in order to minimise degradation through erosion and desiccation.

10.7.76 Should prolonged periods of dry weather occur, a damping spray would be employed to maintain surface moisture on the soil and peat bunds. This would help to maintain vegetation growth in the turves and to retain the soil structure.

10.7.77 The receptor, study area soils and peat, is considered to be of **Moderate** sensitivity. The magnitude of the works is considered to be **Slight**. The likelihood of effect is considered to be **Likely**.

10.7.78 The effect of soil erosion and compaction from construction works is considered to be **Minor**, temporary and adverse, and **not significant**.

Peat Instability

10.7.79 Construction activity on peatland can affect the natural stability of the peat deposits in areas near to or associated with construction works. Particular risk areas are associated with works at or near breaks in slope, areas where natural peat instability has been recorded and locations where the peat has degraded through, for example, erosion processes, drying out or overgrazing.

10.7.80 A Peat Slide Risk Assessment was not considered to be necessary for the Proposed Development due to a lack of peat within areas of proposed infrastructure, and within the site generally. Peat at the site has been described and assessed in detail in a Peat Management Plan which is provided in **Technical Appendix 10.1**.

Effects During Operation

Physical Changes to Overland Drainage and Surface Water Flows

10.7.81 No additional changes to overland drainage and surface water flows are anticipated during the operational phase. Trackside and infrastructure drainage would remain in place during site operation. A monitoring and maintenance programme would be put in place for the drainage infrastructure, to include regular visual inspection of drainage ditches, crossing structures and cross-drains to check for blockages, debris or damage that might impede water flow. Any identified blockage, including build-up of sediment that may lead to future blockage, or damage to structures would be remediated immediately. Where practicable, routine maintenance would be undertaken during dry weather; where this is not practicable, additional sediment control measures may need to be established to manage silty water arising from the work.

10.7.82 The receptor, site surface watercourses, is considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be of **Negligible** magnitude. The likelihood of effect is considered to be **Unlikely**.

10.7.83 The effect of physical changes to overland drainage from operational works is assessed as **Negligible**, and **not significant**.

Particulates and Suspended Solids

10.7.84 The main operational phase work would involve track and hardstanding maintenance and repair. Regular monitoring of the track and hardstanding condition would be undertaken, particularly following periods of heavy or prolonged rainfall and after snowfall and clearance, if relevant. Any sections of the track showing signs of excessive wear would be repaired as necessary with suitable rock from onsite borrow pits or external sources.

10.7.85 The drainage network would also be subject to regular monitoring to ensure that it remains fully operational, as water build-up can cause considerable damage to unbound track construction.

10.7.86 All bridge structures would have appropriate splash control measures as part of their design, to prevent silty water splashing into the watercourse from vehicle movements. These splash controls would be monitored regularly to ensure they remain effective and have not become damaged in any way.

10.7.87 The receptor, site surface watercourses, is considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be **Slight**. The likelihood of effect is considered to be **Possible**.

10.7.88 The effect of particulates or suspended solids from operational works is assessed as **Minor**, temporary and adverse, and **not significant**.

Water Contamination from Fuels, Oils or Foul Drainage

10.7.89 The risk of water contamination from fuels or oils is considerably lower during operation than during construction as there are significantly decreased levels of activity onsite. The majority of potential pollutants would no longer be present onsite. Lubricants for turbine gearboxes, transformer oils and maintenance vehicle fuels would remain present in small quantities. There are no plans for herbicide use during operation; physical cutting of vegetation would be the preferred form of management, where required.

10.7.90 The pollution prevention plan and site spillage and emergency procedures, as set out above, would remain in force throughout the operational phase. There would be no concrete batching onsite.

10.7.91 It is anticipated that foul drainage from the control building would be provided by either a suitably sized holding tank and tankering to off-site disposal or by installation of a suitable package treatment plant and septic tank system. Should a package treatment plant and septic tank system be the preferred option, any required discharge licence would be put in place prior to installation.

10.7.92 The receptor, site surface watercourses, is considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be **Negligible**. The likelihood of effect is considered to be **Unlikely**.

10.7.93 The effect of water contamination from fuels or oils from operational works is assessed as **Negligible**, and **not significant**.

Changes in or Contamination of Water Supply to Vulnerable Receptors

10.7.94 Only minor works would take place within the site during the operational phase, to allow necessary maintenance activities for the project. No additional works would be expected in or near the watercourses which are connected to the River Tweed SAC.

10.7.95 Additional works affecting the identified wetland habitats would also be of minor scale.

10.7.96 No ongoing or maintenance works would have any effect on PWS as there is no identified linkage to any source location.

10.7.97 The designated sites are considered to be of **Very High** sensitivity. The potential GWDTE within the site are considered to be of **Moderate** sensitivity. The magnitude of effect is considered to be **Negligible**. The likelihood of effect is considered to be **Unlikely**.

10.7.98 The effect of changes in or contamination of water supply to vulnerable receptors is assessed as **Negligible**, and **not significant**.

Increased Flood Risk

10.7.99 Infrastructure drainage would remain in place during the operational phase. A regular monitoring and maintenance programme for all the drainage infrastructure would be implemented to ensure that it remains fully operational and in good condition. Where practicable, routine maintenance would be undertaken during dry weather, to help ensure that drainage operation during wet weather is fully functional.

10.7.100 Post-development runoff would be designed such that there is no change from natural pre-development runoff.

10.7.101 The receptors, infrastructure and property downstream of the Proposed Development, are considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of any increased flood risk is considered to be **Negligible**. The likelihood of effect is considered to be **Unlikely**.

10.7.102 The effect of increase in flood risk resulting from the operational works is assessed as **Negligible**, and **not significant**.

Physical Removal of Bedrock

10.7.103 Although most physical removal of bedrock would have occurred during construction, the ongoing requirement for track and hardstanding maintenance would require some extraction of rock from the borrow pit sites during the operational phase of the Proposed Development. These operations would be very limited in nature.

10.7.104 The bedrock receptor is considered to be of **Low** sensitivity. The magnitude of the works is considered to be **Negligible**. The likelihood of effect is considered to be **Likely**.

10.7.105 The effect of physical removal of bedrock from operational works is assessed as **Negligible**, and **not significant**.

Modification to Groundwater Flow Paths

10.7.106 There is a minor ongoing requirement for additional rock extraction at the borrow pit sites during operation, for track and hardstanding maintenance. These operations would be limited in nature.

10.7.107 The site groundwater receptor is considered to be of **Moderate** sensitivity. The magnitude of the works is considered to be **Negligible**, the likelihood of effect is assessed as **Likely**.

10.7.108 The effect of modification to groundwater flow paths from operational works is assessed as **Negligible**, long-term and adverse, and **not significant**.

Soil Erosion and Compaction

10.7.109 There are no soil stripping or stockpiling activities planned for the operational phase.

10.7.110 Ongoing monitoring and maintenance work at the Proposed Development site would require vehicle activity onsite. This would be much reduced from the construction phase and would mostly involve significantly lighter vehicles than heavy construction plant. The ongoing vehicle activity would have some effect on soil and peat compaction below access tracks, although at a significantly lower level than during construction.

10.7.111 The receptor, site soils and peat, is considered to be of **Moderate** sensitivity. The magnitude of the works is considered to be **Slight**. The likelihood of effect is considered to be **Possible**.

10.7.112 The effect of soil erosion and compaction from operational works is considered to be **Minor**, temporary and adverse, and **not significant**.

Effects During Decommissioning

10.7.113 Potential effects of decommissioning the Proposed Development are similar to those encountered in the construction phase, although generally with lower magnitude as the level of site activity is lower.

10.7.114 Discussions would be held with the applicant and the appropriate Regulatory Authorities prior to decommissioning to agree an appropriate Decommissioning Strategy.

Physical Changes to Overland Drainage and Surface Water Flows

10.7.115 Decommissioning would require removal of all above-ground infrastructure associated with the Proposed Development. This would include removal and reinstatement of the drainage network around the turbines and hardstanding areas as well as the trackside and cross-track drainage.

10.7.116 Removal works would also include removal and reinstatement of watercourse crossing structures. All necessary permissions associated with this work would be acquired prior to commencement of the removal process.

10.7.117 As the area is used for commercial forestry, it is likely that some of the track network, including drainage and watercourse crossings, would remain in place.

10.7.118 As far as is practicable, reinstatement of the site would aim to return the area to its pre-development condition.

10.7.119 The receptor, site surface watercourses, is considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be of **Slight** magnitude. The likelihood of effect is considered to be **Likely**.

10.7.120 The effect of physical changes to overland drainage from decommissioning works is assessed as **Minor**, long-term and adverse, and **not significant**.

Particulates and Suspended Solids

10.7.121 Works to remove turbine foundations to 0.5 m below ground surface, all hardstanding areas and access tracks would involve excavation and earthmoving activities and would generate loose sediment and potentially concrete dust. This material could potentially gain access to the surface watercourses and waterbodies through entrainment in surface runoff. This could potentially have an adverse effect on the downstream watercourses through damage to fish spawning habitat, reduction in dissolved oxygen levels, changes to nutrient levels and natural pH of the watercourses and waterbodies.

10.7.122 Site drainage infrastructure would be retained in situ until the excavation and earthmoving activities are complete, in order to retain as much control over water movement as possible during this phase of work. Where necessary additional bunding and cut-off drains would be put in place to divert water around and away from excavations.

10.7.123 Silt control measures, such as silt fencing, straw bales and settlement ponds/sumps, would be used to manage silty runoff from excavation works relating to turbines, hardstanding areas and tracks. These measures would be located such that any silty water arising from the works is captured and managed to prevent inadvertent discharge of silty water into any site watercourse.

10.7.124 All excavation activity within 10 m of watercourses would have appropriate sediment control measures established prior to groundworks beginning. Where possible, vegetation cover would be retained between earthworks areas and any watercourse or waterbody to provide additional protection. Limited in-stream works to remove culverts from minor watercourses and drainage channels would be undertaken using temporary check-dams.

10.7.125 For larger areas of excavation, such as turbine foundations and crane pads, temporary water control measures may be used. These may include use of temporary settlement ponds or the use of proprietary treatment systems such as SiltBusters, as appropriate.

10.7.126 Decommissioning activities would be restricted during periods of wet weather, particularly for any work occurring within 20 m of a watercourse, to minimise mobilisation of sediment in heavy rainfall. Recommended ‘stop’ conditions are provided in **Table 10.13**. Any water collecting within excavations would be pumped out prior to further work in the excavation. This water may require treatment to remove suspended solids prior to discharge to ground.

10.7.127 Vegetation cover would be re-established as quickly as possible on decommissioned areas by use of any excavated soil material, use of hydroseeding and/or use of a biodegradable geotextile as appropriate to help maintain slope stability and provide erosion protection whilst vegetation cover becomes re-established.

10.7.128 Shallow drainage infrastructure around turbines, hardstandings and access tracks would be removed and remaining ditches or trenches would be backfilled with suitable soil material. For drainage trenches on sloping ground, temporary check dams constructed from untreated wood planks would be placed periodically to prevent reinstated soil from washing away down the channel.

10.7.129 Should there be a requirement for permissions relating to decommissioning activity, all necessary documentation would be put in place prior to works commencing. This may require revised and updated pollution prevention plans or similar documents as necessary.

10.7.130 The receptor, site surface watercourses, is considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be **Slight**. The likelihood of effect is considered to be **Likely**.

10.7.131 The effect of particulates and suspended solids from decommissioning works is assessed as **Minor**, temporary and adverse, and **not significant**.

Water Contamination from Fuels, Oils or Foul Drainage

10.7.132 The risk of water contamination from fuels or oils is somewhat lower during decommissioning than during construction as activity on site would be different. Notably, there would be no wet concrete present on site, although fuels and oils would remain present through decommissioning operations.

10.7.133 The pollution prevention plan and site spillage and emergency procedures, as set out above, would remain in force throughout the decommissioning phase and would be updated on a regular basis throughout to ensure that any changes are captured.

10.7.134 Site welfare facilities for decommissioning would make use of the control building facilities from the operational phase. Should additional welfare facilities be required, foul drainage would be provided by a suitably sized holding tank and tankering to off-site disposal. Any required discharge permit would be maintained from the operational phase.

10.7.135 The receptor, site surface watercourses, is considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be **Slight**. The likelihood of effect is considered to be **Unlikely**.

10.7.136 The effect of water contamination from fuels, oils, concrete batching or foul drainage from decommissioning works is assessed as **Negligible**, and **not significant**.

Changes in or Contamination of Water Supply to Vulnerable Receptors

10.7.137 Works for removal of turbines, their associated foundations and hardstandings, and the substation and battery storage area would be required to take place within the site catchment areas. Prior to the work beginning, the existing drainage infrastructure around existing infrastructure would be checked to ensure its continued effective operation during decommissioning works.

10.7.138 The mitigation measures and monitoring programme set out in **Table 10.14** would be implemented during decommissioning.

10.7.139 The designated sites with hydrological linkage are considered to be of **Very High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be **Slight**. The likelihood of effect is considered to be **Possible.**

10.7.140 The potential GWDTE within the site are considered to be of **Moderate** sensitivity as a result of the absence of any hydrogeological linkage. With appropriate mitigation measures in place, as described, the magnitude of works is considered to be **Slight**. The likelihood of effect is considered to be **Possible**.

10.7.141 The effect of changes in or contamination of water supply to vulnerable receptors from decommissioning works is assessed as **Minor**, temporary and adverse, and **not significant.**

Increased Flood Risk

10.7.142 Infrastructure drainage would remain in place throughout most of the decommissioning works and would be fully reinstated to as close to pre-construction natural conditions as is practicable.

10.7.143 Vegetation cover would be encouraged to re-establish through use of soil turves where available, with use of hydroseeding and/or biodegradable geotextile to promote vegetation growth in other areas as appropriate. Vegetation would be retained across as much of the site as is practicable, in order to control surface runoff rates and flow concentration.

10.7.144 Larger areas of bare ground, such as compound areas, former hardstandings and borrow pits, would have settlement ponds put in place to attenuate flow until vegetation can be re-established as part of the decommissioning and reinstatement programme.

10.7.145 The receptors, infrastructure and property downstream of the site, are considered to be of **High** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of any increased flood risk is considered to be **Negligible**. The likelihood of effect is considered to be **Unlikely**.

10.7.146 The effect of increase in flood risk resulting from the decommissioning works is assessed as **Negligible**, and **not significant**.

Physical Removal of Bedrock

10.7.147 No additional removal of bedrock is anticipated during decommissioning. Therefore, the effect of physical removal of bedrock during decommissioning is assessed as **No change**, and **not significant.**

Modification to Groundwater Flow Paths

10.7.148 Decommissioning of the Proposed Development would require removal of all hard (concrete) infrastructure to a depth of 0.5 m below ground surface. Following removal of rock layers and underlying geotextile, the substrate below track and hardstanding areas would be ripped or routed and would be covered with a sufficient depth of soil to blend into the adjacent vegetated ground.

10.7.149 Borrow pit floors would be ripped or routed. Any remaining unused or unsuitable aggregate material, plus any spare rock material arising from hardstanding or track reinstatement, may be used to reinstate the borrow pits to a suitable profile, and capped with soil or turf to promote re-establishment of natural vegetation cover.

10.7.150 Subsurface electrical cables would be left in-situ.

10.7.151 The site groundwater receptor is considered to be of **Moderate** sensitivity. With appropriate mitigation measures in place, as described, the magnitude of the works is considered to be **Slight** and beneficial. The likelihood of effect is considered to be **Likely**.

10.7.152 The effect of modification to groundwater flow paths from decommissioning works is assessed as **Minor**, long-term and beneficial, and **not significant**.

Soil Erosion and Compaction

10.7.153 Decommissioning activity would have a similar level of plant and vehicle movement to construction and would also involve soil stripping, ripping or routing of substrate and some stockpiling of materials. As with construction, these activities have potential to lead to soil erosion, loss of structure and soil compaction particularly under vehicle track routes.

10.7.154 Traffic routes would follow established access routes. Decommissioning would be phased such that more distant infrastructure is removed first, in order to avoid vehicle movement across unaffected or already reinstated ground.

10.7.155 Soil stripping would be restricted to as small a footprint as necessary to allow the required decommissioning works. Soil storage, handling and reinstatement would follow the same guidelines as provided under ‘Effects during construction’ above.

10.7.156 All areas that have been subject to heavy trafficking at any stage of the development, notably hardstandings and access tracks, would have the exposed subsurface carefully ripped to restore a more natural structure to the underlying subsoils that have been compacted over the lifetime of the Proposed Development.

10.7.157 The receptor, study area soils and peat, is considered to be of **Moderate** sensitivity. The magnitude of the works is considered to be **Slight** and beneficial. The likelihood of effect is considered to be **Likely**.

10.7.158 The effect of soil erosion and compaction from construction works is considered to be **Minor**, temporary and beneficial, and **not significant**.

Indirect and Secondary Effects

10.7.159 No indirect or secondary effects relating to hydrology, hydrogeology, geology or peat have been identified for the Proposed Development.

Cumulative Effects

10.7.160 The potential for the Proposed Development to contribute to cumulative effects in relation to other projects within 5 km was assessed. One development, Pines Burn Wind Farm, was identified within this area. Pines Burn Wind Farm is located 4.6 km to the west of the Proposed Development and is consented and awaiting construction.

Geology and Soils

10.7.161 Effects on geology and soils are very localised. As a result, there are no cumulative effects relating to geology and soils from this development and effects do not transmit over any noticeable distance. As no other developments lie within 1 km of the Proposed Development, there are no cumulative effects relating to geology or soils.

Hydrogeology

10.7.162 Effects on hydrogeology are confined to shallow groundwater found within the same hydrological catchment as the Proposed Development.

10.7.163 There are no other proposed developments located within the relevant hydrological subcatchments; therefore, there are considered to be no cumulative effects relating to hydrogeology.

Hydrology & Designated Areas

10.7.164 Effects on hydrology are generally confined to developments located within the same hydrological catchment as the Proposed Development, or that drain into the same receiving waterbodies.

10.7.165 There are no other proposed developments located within the Jed Water or Catlee Burn catchments; however, the consented Pines Burn Wind Farm development drains into the Teviot Water (part of the River Tweed catchment), as do the Catlee Burn and Jed Water catchments.

10.7.166 Should construction works for both developments occur in parallel, there is potential for cumulative effects on the River Tweed catchment and on the River Tweed SAC. As Pines Burn Wind Farm is already consented, it is anticipated that construction for this project would take place ahead of construction works for the Proposed Development. While it is possible there would be a short overlap in construction works, a significant overlap in timeline is unlikely.

10.7.167 Assuming that best practice construction methods, including best practice surface water and sediment management techniques, are put in place for both developments, cumulative effects on the River Tweed and River Tweed SAC are considered to be **Minor** and temporary. As a result, cumulative impacts arising from the Proposed Development are considered to be **not significant.**

10.8 Mitigation

10.8.1 While outlined and accounted for within the assessment above, this section provides a detailed summary of the mitigation that would be adopted for the Proposed Development.

Mitigation by Design

10.8.2 All excavation works requiring removal of bedrock or superficial deposits have been kept to a practical minimum by good site design, including use of existing tracks as far as possible.

10.8.3 Owing to local ground conditions effects on groundwater flow are not anticipated.

10.8.4 New access tracks are anticipated to be constructed using established cut-and-fill construction methods. Areas of peat have been avoided as far as possible, with access track sections within areas of deeper peat avoided except where necessitated by widening of existing tracks.

Mitigation Commitments

Soil and Peat

10.8.5 Soil stripping would be undertaken with care and would be restricted to as small a working area as practicable. Topsoil would be removed and laid in a storage bund, up to 2 m in height, on unstripped ground adjacent to the working area. It would be attempted to retain the turf layer vegetation-side-up where possible, although ground conditions may make this challenging. Subsoils and superficial geological deposits would be removed subsequently and laid in storage bunds, also up to 2 m in height, clearly separated from the topsoil bund. Care would be taken to maintain separate bunds for separate soil types in order to preserve the soil quality.

10.8.6 For work within areas of peat, acrotelmic peat (the uppermost 0.5 m) would be removed as for the topsoil. It would be attempted to retain the acrotelm vegetation-side-up where possible, although ground conditions may make this challenging. The underlying catotelmic peat would be stored in bunds up to 1 m in height. Catotelmic peat is sensitive to handling, and loses its internal structure easily, so would be transported as short a distance as possible to its storage location. Excavation of peat has been limited by careful infrastructure design.

10.8.7 Limited smoothing or 'blading' of stockpiled soils and catotelmic peat would be undertaken to help shed rainwater and prevent ponding of water on the stockpile. Bunds on notably sloping ground would have sediment control measures installed near the base, on the downslope side, to collect and retain any sediment mobilised by rainfall.

10.8.8 Excavated soil and peat would be used in site restoration and rehabilitation at the end of the construction period, in order to promote fast re-establishment of vegetation cover on worked areas and areas of bare soil or peat that are not required for the operational phase of the Proposed Development. Soils and peat would be stored for as short a time as practicable, in order to minimise degradation through erosion and desiccation.

10.8.9 Should prolonged periods of dry weather occur, a damping spray would be employed to maintain surface moisture on the soil and peat bunds. This would help to maintain vegetation growth in the turves and to retain the soil structure.

10.8.10 Construction work would make use of current best practice guidance relating to developments in peatland areas. A risk management system, such as a geotechnical risk register, would be compiled and maintained at all stages of the project and developed as part of the post-consent detailed design works, and would be updated as new information becomes available.

10.8.11 Micrositing would be used to avoid possible problem areas identified during ground investigation or other detailed design works. This would be assisted by additional verification of peat depths, to full depth, in any highlighted areas where construction work is required. Track drainage would be installed in accordance with published good practice documentation and would be minimised in terms of length and depth in order to minimise concentration of flows.

10.8.12 Construction activities would be restricted during periods of wet weather, particularly for any work occurring within 20 m of a watercourse or within areas of identified deeper peat. Careful track design would ensure that the volume and storage timescale for excavated materials would be minimised as far as practicable during construction works.

10.8.13 Vegetation cover would be re-established as quickly as possible on track and infrastructure verges and cut slopes, by re-laying of excavated peat acrotelm, to improve slope stability and provide erosion protection. Additional methods, including hydroseeding and/or use of a biodegradable geotextile, would be considered if necessary in specific areas.

Surface Watercourses and Groundwater

10.8.14 Silt fencing and other appropriate alternative sediment control protection, such as cut-off drains or barrier bunds, would be installed on the downhill side of excavations to prevent inadvertent discharge of silty water into or towards any site watercourse.

10.8.15 All engineering works adjacent to watercourses, including access tracks and watercourse crossing structures, would have appropriate sediment control measures established prior to any groundworks.

10.8.16 Vegetation would be retained along watercourse banks to act as additional protection to the watercourses.

10.8.17 A water quality monitoring programme would be established. Details would be agreed with SEPA, but are anticipated to include at least the following:

- visual checks for entrained sediment; and
- in situ measurements of pH, temperature, specific conductivity.

10.8.18 In situ measurement of turbidity and dissolved oxygen may be recommended for locations with particular sensitivity, such as the Jed Water and Black Burn downstream from the Proposed Development.

10.8.19 Pre-construction monitoring would be undertaken on a monthly basis for a minimum period of three months prior to any work taking place within the Proposed Development site.

10.8.20 During construction, the monitoring would be undertaken by the Environmental Clerk of Works or suitably experienced alternative individual. Any change from baseline conditions of pH and/or specific conductivity would potentially indicate an incident and additional investigation would be required in order to identify the origin of the change. Control locations (WQ2 and 6) are intended to help differentiate between incidents arising within the Proposed Development and incidents that are unrelated to the development.

10.8.21 Recommended frequency of monitoring for the different locations are provided in **Table 10.14**. Monitoring locations are shown on **Figure 10.7**.

Table 10.14: Water Quality Monitoring Locations and Recommended Monitoring Frequency by Phase of Development

ID	Location	Monitoring Schedule
WQ1	Carter Burn d/s of crossing WC01	**Baseline:** Monthly, min. 3 months **Construction:** Twice daily during all construction work on first half of access route (to Burns Plantation); otherwise monthly.
WQ2 (control)	Black Burn u/s of crossing WC02	**Baseline:** Monthly, min. 3 months **Construction:** Twice daily during all construction work on second half of access route (from Burns Plantation to site boundary); otherwise weekly.
WQ3	Black Burn d/s of crossing WC02	**Baseline:** Monthly, min. 3 months **Construction:** Twice daily during all construction work on second half of access route (from Burns Plantation to site boundary); otherwise weekly.

ID	Location	Monitoring Schedule
WQ4	Jed Water d/s of confluence with Black Burn	**Baseline:** Monthly, min. 3 months **Construction:** Daily throughout construction period.
WQ5	Jed Water d/s of confluence with Rough Sike	**Baseline:** Monthly, min. 3 months **Construction:** Daily throughout construction period.
WQ6 (control)	Jed Water on southern site boundary	**Baseline:** Monthly, min. 3 months **Construction:** Twice daily during all construction work on western half of turbine area; otherwise weekly.
WQ7	Wolfehopelee Burn on western site boundary	**Baseline:** Monthly, min. 3 months **Construction:** Twice daily during all construction work on Turbines T01 and T02 and associated access tracks; otherwise weekly.

10.8.22 Groundwater monitoring boreholes would be established within the two borrow pit areas prior to any construction work beginning, to a depth at least 1 m below the deepest expected excavation. Groundwater level monitoring would be undertaken to determine whether groundwater is present within the borrow pit areas and, if it is, at what level the seasonally highest groundwater table stands. Any groundwater within the borrow pit area would be managed in line with best practice, with discharge via a settlement pond to allow any entrained sediment to be removed prior to discharge. Additional sediment management such as use of a SiltBuster may be used if necessary. Any required discharge licence would be obtained prior to excavation commencing.

10.8.23 All works through and adjacent to wetland areas would be supervised by the Environmental Clerk of Works.

Drainage Infrastructure

10.8.24 Trackside drainage would be no longer or deeper than necessary to provide the required track drainage.

10.8.25 Cross-drains under tracks would be installed at an appropriate frequency to mimic natural drainage patterns and to minimise concentration of flows.

10.8.26 All drainage infrastructure would be designed with a capacity suitable for a rainfall intensity of a 1-in-200 year storm event plus allowance for climate change.

10.8.27 Where track sections cross wetland or bog areas, cross-drainage would be provided within the track construction to ensure continuity of flow. This may take the form of a drainage layer within the track, suitably closely-spaced drainage pipes, or both as appropriate. These would be determined on a case-by-case basis to suit each individual area.

10.8.28 All required licences for watercourse crossings and construction site works would be in place prior to works within the site beginning.

10.8.29 All long-term and temporary drainage infrastructure would be established on a running-basis ahead of excavation works. This includes temporary bunding and cut-off drains around turbine bases, hardstanding areas and borrow pits. Where possible, trackside drainage would be laid up to 100 m ahead of track construction works on a running basis.

10.8.30 Temporary water control measures would be implemented as necessary adjacent to larger areas of excavation. These would include borrow pit sites and may also include turbine base excavations and hardstanding areas. These measures would take the form of temporary settlement ponds, filter drains or proprietary treatment measures such as SiltBusters. Detail would be provided within the Pollution Prevention Plan(s) required for the Construction Runoff Permit and suitability would be determined following appropriate onsite soil tests.

10.8.31 All earthmoving activity would be restricted during periods of wet weather, particularly for work occurring within 20 m of a watercourse, to minimise mobilisation of sediment in heavy rainfall. The 'stop' conditions provided in **Table 10.13** are recommended to guide all earthmoving activity at all stages of the Proposed Development.

10.8.32 Long-term drainage infrastructure would have a monitoring and maintenance programme established, to include regular visual inspection of drainage infrastructure to check for blockages, debris or damage that may impede flow. Remediation would be undertaken immediately. Routine maintenance would be scheduled where possible for dry weather.

Excavations

10.8.33 Any water collecting within excavations would be pumped out prior to further work within the excavation. The water is likely to require treatment to remove suspended solids prior to discharge to ground.

10.8.34 Cable trenches would be laid in disturbed trackside material. In areas where cable routes cross up or down steep slopes, clay bunds or alternative impermeable barrier would be placed for every 0.5 m change in elevation along the length of the trench to minimise in-trench groundwater flow.

10.8.35 Vegetation cover would be re-established as quickly as possible on all areas of stripped ground, once activity involving these areas is complete. This would include track verges, cut slopes and much of the design development area during decommissioning and restoration works. Where possible this would be achieved using excavated peat acrotelm and soil turves. Additional measures including hydroseeding and/or use of a biodegradable geotextile would be considered if insufficient peat and soil turf is available and for areas of particular sensitivity that require immediate protection.

10.8.36 Rock testing would be undertaken on appropriate samples from the borrow pit areas to determine its suitability for unbound track and hardstanding construction. This would include testing to determine likely degradation patterns during the lifespan of the Proposed Development. Should the tests identify problems with parts of the rock within the borrow pit footprints, care would be taken to ensure that unsuitable material is not used for construction, but would be retained for use in borrow pit restoration.

10.8.37 Any unused or remaining unsuitable aggregate material, plus any spare rock material arising from hardstanding or track reinstatement, may be used to reinstate the borrow pits to a suitable profile, and capped with soil or turf to promote re-establishment of natural vegetation cover.

10.8.38 Only tracked or low ground pressure vehicles would be permitted access to unstripped ground.

Site Traffic

10.8.39 Tracks and hardstanding areas would be monitored on a regular basis, particularly following periods of heavy or prolonged rainfall or after snow clearance. Any sections of track or hardstanding showing signs of excessive wear would be repaired as necessary with suitable rock from the borrow pits or external sources.

10.8.40 The bridge structures at watercourse crossings would have appropriate splash control measures as part of their design, to prevent silty water splashing into the watercourses from vehicle movements. The splash controls would be monitored regularly to ensure they remain effective and have not become damaged in any way.

10.8.41 Routine monitoring checks of project infrastructure, including track and hardstanding surfaces and all drainage infrastructure, would be undertaken on a quarterly basis throughout project operation. Monitoring would involve visiting all aspects of the infrastructure and undertaking a visual inspection to identify the following:

- areas where track surfaces or hardstanding areas were showing evidence of erosion or surface damage;
- any areas where surface water was ponding or collecting on tracks or hardstanding areas;
- any areas where drainage infrastructure was damaged, blocked or inadequate.

10.8.42 Any areas of track or hardstanding surface showing signs of damage, erosion or excessive wear would be repaired as necessary. Drainage features would be repaired, reinstated or replaced as necessary to ensure continued efficient operation.

10.8.43 Site-specific mitigation, including track drainage segregation to avoid 'flushing' from excavation works, and micrositing to avoid specific higher sensitivity areas, would be identified and established where appropriate.

10.8.44 All traffic routes would be clearly demarcated and vehicles would not be permitted access outwith these areas.

Pollution Prevention

10.8.45 Oil and fuel storage and handling on site would be undertaken in compliance with SEPA's Guidance on Pollution Prevention 2 – Above ground oil storage tanks[171] and with the *Water Environment (Oil Storage) (Scotland) Regulations 2006* and *Water Environment (Miscellaneous) (Scotland) Regulations 2017*.

10.8.46 Risk assessments would be undertaken and all Hazardous Substances and Non-Hazardous Pollutants that would be used and/or stored within the site would be identified. Hazardous substances likely to be on site include oils, fuels, hydraulic fluids and anti-freeze. No non-hazardous pollutants have been identified as likely to be used on site. Herbicides would not be used.

10.8.47 All deliveries of oils and fuels would be supervised by the site manager or nominated deputy.

10.8.48 All storage tanks would be located within impermeable, bunded containers where the bund is sufficient to contain 110% of the tank's capacity. For areas containing more than

[171] NetRegs (2018). Above ground oil storage tanks. Available at https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/guidance-for-pollution-prevention-gpps-full-list/, accessed July 2022.

one tank, the bund would be sufficient to contain 110% of the largest tank's capacity or 25% of the total capacity, whichever is the greater.

10.8.49 Any valve, filter, sight gauge, vent pipe or other ancillary equipment would be located within the containment area.

10.8.50 Waste oil would not be stored within the site, but would be removed to dedicated storage or disposal facilities off-site.

10.8.51 Management procedures and physical measures would be put in place to deal with spillages, such as spill kits and booms.

10.8.52 Maintenance procedures and checks would ensure the minimisation of leakage of fuels or oils from plant.

10.8.53 Refuelling and servicing would be undertaken in a designated area or location with adequate precautions in place, such as a dedicated impermeable surface with lipped edges to contain any contaminants, plus a self-contained drainage network to prevent any cross-contamination.

10.8.54 Where vehicle maintenance is necessary in the field, owing to breakdown, additional precautions would be taken to contain contaminants, such as spill trays or absorbent mattresses.

10.8.55 The access track would be designed and constructed to promote good visibility where possible and two-way access where visibility is restricted, to minimise risk of vehicle collisions.

10.8.56 If required, concrete batching would take place in one designated location within the site construction compound. This location would be at least 100 m from the nearest watercourse. Protective bunding would be installed around the batching area to ensure that contaminated runoff is contained. Dedicated drainage would be installed to ensure that water from the batching area can be suitably treated to reduce alkalinity and suspended sediment load prior to discharge or removed from site by tanker for treatment and disposal off-site.

10.8.57 Washing-out of concrete mixers and tankers would take place at a designated location within the construction compound with an impermeable surface and dedicated drainage, to ensure that the water is captured for treatment or off-site disposal.

10.8.58 It is anticipated that construction-phase welfare facilities would use a suitably sized holding tank with waste water removed off site by tanker for disposal at a licensed disposal facility. Operational and decommissioning-phase welfare facilities may use a similar procedure, or would install a waste treatment package plant with associated discharge. All relevant water environment authorisations would be put in place should there be any requirement for these.

10.8.59 The Site Spillage and Emergency Procedures would be prominently displayed at the site office and staff would be trained in their application. The Procedures document would incorporate guidance from the relevant SEPA Guidance Notes.

10.8.60 In the event of any spillage or discharge that has the potential to be harmful to or to pollute the water environment, all necessary measures would be taken to remedy the situation. These measures would include:

- identifying and stopping the source of the spillage;

- containing the spillage to prevent it spreading or entering watercourses by means of suitable material and equipment;
- absorbent materials, including materials capable of absorbing oils, would be available on site to mop up spillages. These would be in the form of oil booms and pads and, for smaller spillages, quantities of proprietary absorbent materials;
- sandbags would also be readily available for use to prevent spread of spillages and create dams if appropriate;
- where an oil/fuel spillage may have soaked into the ground, the contaminated ground would be excavated and removed from site by a licensed waste carrier to a suitable landfill facility;
- the emergency contact telephone number of a specialist oil pollution control company would be displayed on site; and
- sub-contractors would be made aware of the guidelines for handling of oils and fuels and of the spillage procedures at the site.

10.8.61 SEPA would be informed of any discharge or spillage that may be harmful or polluting to the water environment. Written details of the incident and its resolution would be forwarded to SEPA no later than 14 days after the incident.

10.8.62 All works through and adjacent to wetland areas would be supervised by the Environmental Clerk of Works.

10.9 Summary of Residual Effects

10.9.1 This assessment is based on a site-specific risk assessment method following recommended environmental impact assessment techniques. Potential effects, both positive and negative, long-term or temporary, adverse or beneficial, to the geological, hydrogeological and hydrological regime have been considered. These effects are summarised in **Table 10.15**.

Table 10.15: Summary of Residual Effects

Effect	Phase	Assessment Consequence	Effect Significance
Physical changes to overland drainage and surface water flows	Construction	Minor, long-term and adverse	Not Significant
	Operation	Negligible	Not Significant
	Decommissioning	Minor, long-term and adverse	Not Significant
Particulates and suspended solids	Construction	Minor, temporary and adverse	Not Significant
	Operation	Minor, temporary and adverse	Not Significant
	Decommissioning	Minor, temporary and adverse	Not Significant
Water contamination	Construction	Minor, temporary and adverse	Not Significant

Effect	Phase	Assessment Consequence	Effect Significance
from fuels, oils, concrete batching or foul drainage	Operation	Negligible	Not Significant
	Decommissioning	Negligible	Not Significant
Changes in or contamination of water supply to vulnerable receptors	Construction	Minor, temporary and adverse	Not Significant
	Operation	Negligible	Not Significant
	Decommissioning	Minor, temporary and adverse	Not Significant
Increased flood risk	Construction	Negligible	Not Significant
	Operation	Negligible	Not Significant
	Decommissioning	Negligible	Not Significant
Physical removal of bedrock	Construction	Negligible	Not Significant
	Operation	No change	Not Significant
	Decommissioning	No change	Not Significant
Modification to groundwater flow paths	Construction	Minor, long term and adverse	Not Significant
	Operation	Negligible	Not Significant
	Decommissioning	Minor, long term and beneficial	Not Significant
Soil erosion and compaction	Construction	Minor, temporary and adverse	Not Significant
	Operation	Negligible	Not Significant
	Decommissioning	Minor, long term and beneficial	Not Significant
Peat instability	Construction	Negligible	Not Significant
	Operation	Not assessed	
	Decommissioning	Not assessed	
Hydrology, hydrogeology, geology and soils cumulative effects	Construction	Minor, temporary and adverse	Not Significant
	Operation	Negligible	Not Significant
	Decommissioning	Minor, temporary and adverse	Not Significant

10.10 References

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11 NOISE AND VIBRATION

11.1 Introduction

11.1.1 This chapter of the Environmental Impact Assessment Report (EIA Report) assesses whether there are any likely significant effects resulting from the Proposed Development on the acoustic environment of the area. The assessment considers the noise and vibration generated during the Proposed Development's construction, its operation and decommissioning.

11.1.2 This chapter of the EIA Report is supported by the following Technical Appendix document provided in **Volume 3 Technical Appendices**:

- **Technical Appendix 11.1**: wind turbine noise modelling and background noise survey details.

11.2 Scope and Methodology

Scope

11.2.1 Noise and vibration which arises from the construction of a wind farm is a factor which should be taken into account when considering the total effect of the Proposed Development. However, in assessing the effects of construction noise, it is accepted that the associated works are of a temporary nature. The main work locations for construction of the proposed turbines are distant from the nearest noise sensitive residences and are unlikely to cause significant effects. The construction and use of access tracks and some of the required infrastructure would, however, occur at lesser separation distances. Assessment of the temporary effects of construction noise is primarily aimed at understanding the need for dedicated management measures and, if so, the types of measures that are required. Further details of construction traffic routes and proposed working hours are described in **Chapter 2: Proposed Development**.

11.2.2 Once constructed and operating, wind turbines may emit two types of noise: aerodynamic noise from the blades, and mechanical noise from other components (which is easier to minimise by good engineering design). Aerodynamic noise tends to be perceived when the wind speeds are low, although, at very low wind speeds the blades do not rotate or rotate very slowly and so, at these wind speeds, negligible aerodynamic noise is generated. In higher winds, aerodynamic noise is generally masked by the normal sound of wind blowing through trees and around buildings. The level of this natural 'masking' noise relative to the level of wind turbine noise determines the subjective audibility of the wind farm. The relationship between wind turbine noise and the naturally occurring masking noise at residential dwellings around the site would, therefore, generally form the basis of the assessment of the levels of noise against accepted standards.

11.2.3 The following effects have been assessed in full:

- the potential effect of noise and vibration during construction and decommissioning of the Proposed Development (including construction traffic noise and potential cumulative effects); and
- the potential effect of noise during operation of the Proposed Development, including cumulative effects.

11.2.4 Based on the desk-based work undertaken, the professional judgement of the EIA team, experience from other relevant projects and policy guidance or standards, the following effects have been 'scoped out', which are discussed further below:

- low frequency noise and infrasound occurring from the operation of the wind turbines;
- amplitude modulation resulting from the operation of the wind turbines; and
- vibration from the operation of the Proposed Development.

Low-Frequency Noise and Infrasound

11.2.5 A study, published in 2006 by acoustic consultants Hayes McKenzie[172], on the behalf of the Department of Trade and Industry (DTI), investigated low frequency noise from wind farms (Hayes McKenzie, 2006). This study concluded there is no evidence of health effects arising from infrasound, or low frequency noise generated by wind turbines, but that complaints attributed to low frequency noise were possibly due to a phenomenon known as Amplitude Modulation (AM).

11.2.6 Further, in February 2013, the Environmental Protection Authority of South Australia[173] published the results of a study into infrasound levels near wind farms (Environment Protection Authority, 2013). This study measured infrasound levels at urban locations, rural locations with wind turbines close by, and rural locations with no wind turbines in the vicinity. It found that infrasound levels near wind farms are comparable to levels away from wind farms in both urban and rural locations. Infrasound levels were also measured during organised shut-downs of the wind farms; the results showed there was no noticeable difference in infrasound levels, whether the turbines were active or inactive.

11.2.7 Leventhall et al. (2009)[174] concludes that: *"...there is no robust evidence that low frequency noise (including 'infrasound') or ground-borne vibration from wind farms generally has adverse effects on wind farm neighbours."*

11.2.8 Therefore, it is current practice not to carry out a specific assessment of infrasound and low-frequency noise, as per the Scoping Report. This is consistent with advice in the Scottish Government's Onshore Wind Turbine web-based guidance document[175].

Amplitude Modulation (AM)

11.2.9 A study was carried out on behalf of the Department for Business, Enterprise and Regulatory Reform (BERR) by the University of Salford[176], which investigated the incidence of noise complaints associated with wind farms and whether these were associated with AM (University of Salford, 2007). This report defined AM as aerodynamic noise fluctuations from wind turbines at blade passing frequency. Its aims were to

172 Hayes McKenzie (2006), 'The measurement of low frequency noise at three UK wind farms', DTI URN 06/1412.

173 Environment Protection Authority (2013), 'Infrasound levels near wind farms and in other environments'.

174 Leventhall et al. (2009), 'Prediction and assessment of wind turbine noise: Agreement about relevant factors for noise assessment from wind energy projects.', Institute of Acoustics: Acoustic Bulletin, Vol 34 No2, March/April 2009.

175 Scottish Government (2014), 'Onshore Wind Turbines: Planning advice', available online from: https://www.gov.scot/publications/onshore-wind-turbines-planning-advice/.

176 University of Salford (2007), 'Research into aerodynamic modulation of wind turbine noise', University of Salford.

ascertain the prevalence of AM on UK wind farm sites, to try and gain a better understanding of the likely causes, and to establish whether further research into AM is required.

11.2.10 The study concluded that AM with a greater degree of fluctuation than normal had occurred at only a small number of wind farms in the UK (4 of 133), and only for between 7% and 15% of the time. It also states that, at the time of writing, the causes of this were not well understood and that prediction of the effect was not currently possible.

11.2.11 This research was updated in 2013 by an in-depth study undertaken by Renewable UK[177], which considered 'other AM' (OAM), defined as AM with atypical characteristics which could not be explained by standard causal factors. The study identified that many of the previously suggested causes of OAM have little or no association to the occurrence of OAM in practice. The generation of OAM was likely based upon the interaction of several factors, the combination and contributions of which are unique to each site. With the current knowledge, it is not possible to predict whether any particular site is more or less likely to give rise to OAM.

11.2.12 In 2016, the IOA proposed a measurement technique to quantify the level of AM present in any particular sample of wind farm noise (Institute of Acoustics, 2016)[178]. This technique is supported by the Department of Business, Energy & Industrial Strategy (BEIS, formerly the Department of Energy & Climate Change) who have published guidance[179], which follows on from the conclusions of the IOA study in order to define an appropriate assessment method for AM, including a penalty scheme and an outline planning condition (BEIS, 2016). On publication of the report, BEIS encouraged local authorities in England to consider the research, but provided limited guidance on how the outcomes should be accounted for within the planning system. The Scottish Government is understood to be reviewing this report in the context of the Scottish planning system[180].

11.2.13 Section 7.2.1 of the Institute of Acoustics document[181] 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (IOA GPG) remains current, stating: *"The evidence in relation to 'Excess' or 'Other' Amplitude Modulation (AM) is still developing. At the time of writing, current practice is not to assign a planning condition to deal with AM"*.

11.2.14 It is, therefore, current practice not to carry out a specific assessment of AM, as per the Scoping Report.

Vibration – Impact on Human Health

11.2.15 Research undertaken by Snow[182] found that levels of ground-borne vibration 100 m from the nearest wind turbine were significantly below criteria for 'critical working areas' given

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[177] Renewable UK (2013), 'Wind turbine amplitude modulation: Research to improve understanding as to its cause and effects', REUK.

[178] Institute of Acoustics (2016), 'A Method for Rating Amplitude Modulation in Wind Turbine Noise', IOA.

[179] BEIS (2016), 'Review of the evidence on the response to amplitude modulation from wind turbines', Department of Business, Energy & Industrial Strategy.

[180] Scottish Government (2021), Onshore wind - policy statement refresh 2021: consultative draft.

[181] Institute of Acoustics (2013), 'A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise'.

[182] Snow, D. J. (1997), 'Low frequency noise and vibrations measurement at a modern wind farm', ETSU W/13/00392/REP.

by British Standard BS 6472:1992 Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz) and were lower than limits specified for residential premises by an even greater margin (Snow, 1997).

11.2.16 Ground-borne vibration from wind turbines can be detected using sophisticated instruments several kilometres (km) from a wind farm site, as reported by Keele University[183] (Keele University, 2005). This report clearly shows that, although detectable using highly sensitive instruments, the magnitude of the vibration is orders of magnitude below the human level of perception and does not pose any risk to human health.

11.2.17 It is, therefore, current practice not to carry out a specific assessment of vibration arising from the operation of wind turbines effecting human health, as per the Scoping Report.

Vibration - Instrumentation

11.2.18 The Proposed Development is within the safeguarding area around Eskdalemuir seismic array which contains equipment highly sensitive to ground-borne vibration. This means that any ground-borne vibration produced by the Proposed Development and other wind turbines in the safeguarding area must be within a total noise budget. Separate discussions are taking place with the Defence Infrastructure Organisation and Eskdalemuir Working Group (as discussed in **Chapter 13: Aviation and Radar**) regarding any allowable budget and the determination of which falls outside the scope of this chapter.

Noise Sensitive Receptors (NSR)

11.2.19 NSRs are properties which are potentially sensitive to noise and, as such, may require protection from nearby noise sources.

11.2.20 All the NSRs identified within this assessment are residential properties. Wind turbine noise immission levels are predicted to a location representative of each outdoor amenity area rather than the façade of the property. This is in line with the IOA GPG which states (at paragraph 4.3.8) that, "*calculations should be made at points representative of the relevant outdoor amenity area (as defined in ETSU-R-97[184]) at locations nearest to the proposed wind farm development*".

11.2.21 Note that in the above, and subsequently in this assessment, the term 'noise emission' relates to the sound power level of a wind turbine, whereas the term 'noise immission' relates to the sound pressure level experienced at a receptor location.

11.2.22 It is not always practical or necessary to assess impacts at all nearby NSRs, and as a worst case can be presented with a selection of NSRs. Where multiple NSRs are in the same general direction from the Proposed Development, it may be appropriate to present results for just one of these which represents the worst case for all. This is the case for this assessment. The NSRs presented in this assessment are those who are calculated to have a wind turbine noise immission level from the Proposed Development close to 35 dB L_{A90}. It should be noted that wind turbine noise is measured and quantified using the dB L_{A90} noise parameter. The guidance provided in ETSU-R-97 and the IOA GPG is to

[183] Styles et. al. (2005), 'Microseismic and Infrasound Monitoring of Low Frequency Noise and Vibrations from Windfarms', Keele University.

[184] ETSU R 97, The Assessment and Rating of Noise from Wind Farms, Final Report for the Department of Trade & Industry, September 1996. The Working Group on Noise from Wind Turbines.

limit the study area to 35 dB L_{A90}; however, it was agreed during the consultation process (see **Section 11.3**) that some NSRs exposed to wind turbine noise from the Proposed Development of less than 35 dB L_{A90} will also be included.

11.2.23 **Table 11.1** details the identified NSRs for the assessment of operational noise in relation to the Proposed Development.

Table 11.1: Noise Sensitive Receptors

NSR ID	NSR Name	Easting	Northing	Approximate distance to nearest turbine (m)
R1	Charlies Hill	364887	608360	2,150 (T03)
R2	Southdean Lodge Bothy	364019	608755	2,100 (T03)
R3	Dykeraw Farmhouse	363199	608518	1,700 (T07)
R4	Lustruther	362462	609159	2,100 (T07)
R5	Hyndlee	359093	606346	1,560 (T09)

Significance of Effect

11.2.24 The significance of effect that a noise impact has upon a receptor has been determined through a standard method of assessment, based on professional judgement of the Competent Expert, considering the sensitivity of the NSR and the magnitude of noise impact.

11.2.25 The only relevant NSRs within the assessment area are dwellings, which are of high sensitivity. Operational noise impacts have been determined following ETSU-R-97 and the IOA GPG, which if they do not exceed noise limits derived following the same guidance, are considered to be not significant in EIA terms.

11.2.26 The calculated construction noise levels have been compared against absolute noise limits for temporary construction activities which are commonly regarded as providing an acceptable level of protection from the short-term noise levels associated with construction activities. British Standard 5228:2009+A1:2014 Part 1[185] (BS 5228-1) Annex E provides example criteria of absolute noise limits for construction activities and has been used to determine the significance of any construction noise impacts within this assessment. The criteria do not represent mandatory limits, but rather a set of example approaches intended to reflect the type of methods commonly applied to construction noise. In broad terms, the example criteria are based on a set of fixed limit values which, if exceeded, may result in a significant effect unless ambient noise levels are sufficiently high to provide a degree of masking of construction noise.

11.2.27 The range of guidance values detailed in BS 5228-1 Annex E and other reference criteria such as the Scottish Government Planning Advice Note 50[186] (PAN50) have been used to numerically define the magnitude of impact. As construction noise will always be an

[185] BSI (2014), 'BS5228:2009+A1:2014 Parts 1 & 2 – Code of practice for noise and vibration control on construction and open sites', London: British Standards Institute.

[186] Scottish Government (1996), 'Planning Advice Note PAN 50: Controlling the environmental effects of surface mineral workings'.

introduction of a noise source which would otherwise not be there, where impacts are identified to occur, they will always be adverse:

- where construction noise levels at receptors are below the adopted daytime noise limit of 65 dB L_{Aeq} for a sustained period of time, this is determined to be 'not significant'; and
- where construction noise levels at receptors are above the adopted daytime noise limit of 65 dB L_{Aeq} for a sustained period of time, this is determined to be 'significant'.

11.2.28 For construction traffic impacts on roads that have been determined using the Calculation of Road Traffic Noise[187] (CRTN) methodology, the significant effect of change in the BNL has been determined using guidance found in CRTN and the 'Design Manual for Roads and Bridges'[188] criteria for short-term noise impacts:

- where the change in BNL (due to construction traffic) is predicted to be less than 3 dB, this is determined to be 'not significant'; and
- where the change in BNL (due to construction traffic) is predicted to be more than 3 dB, this is determined to be 'significant'.

11.2.29 For construction traffic impacts on roads that have been determined using the BS5228 haul route method, the significance of effect may also be determined using the criteria discussed in paragraph 11.2.27.

11.2.30 These adverse effects, while important at a local scale, are temporary and would only occur during the anticipated construction period.

11.2.31 The assessment of the significance of effects from operational and cumulative (wind turbine) noise is made as follows, with reference to ETSU-R-97 and Scottish Planning Guidance:

- where operational and cumulative noise levels at receptors are below the relevant ETSU-R-97 noise limits, this is determined to be 'not significant'; and
- where operational and cumulative noise levels at receptors are above the relevant ETSU-R-97 noise limits, this is determined to be 'significant'.

Data Sources

11.2.32 The following data sources have informed the assessment:

- Ordnance Survey (OS) information concerning the locations of all noise sensitive receptors in the vicinity of the site;
- British Standard (BS) reference material for the sound emission characteristics of various construction activities associated with Proposed Development;
- manufacturer data for the candidate and proposed neighbouring turbines considered, as set out in **Technical Appendix 11.1**; and
- EIA Report for the proposed Pines Burn Wind Farm considered in the cumulative assessment.

[187] Department of Transport (1988), 'Calculation of Road Traffic Noise', HMSO Department of Transport.

[188] Transport Scotland (2020), 'Design Manual for Roads and Bridges, LA 111 Noise and vibration', revision 2.

Assessment Methods

Construction

11.2.33 Any development of this nature has the potential to generate noise during the construction phase, particularly if appropriate mitigation is not employed. However, disruption due to construction noise is a localised phenomenon, and is both temporary and intermittent in nature.

11.2.34 BS 5228-1 has been used as the appropriate reference for the calculation of construction noise impacts. At this stage of a project, it is not feasible to accurately specify exact construction techniques, or locations where construction activity is likely to take place. Therefore, various worst case assumptions have been made based on best practice and typical wind farm construction projects. **Table 11.2** details the overall sound power level (L_{WA}) assumed for all plant that would be operational during the corresponding construction activity. It should be noted that type and number of plant and the sound power level assumed are at the upper end of those available and, therefore, conservative. The calculation follows Annex F of BS 5228-1 and assumes the following:

- plant is operational for between 75% and 100% of the working day;
- there would be no screening effects;
- propagation over mixed ground (50% hard 50% soft); and
- construction activity assumed to occur at a single point from receiver.

Table 11.2: Construction Activity Sound Power Levels

Activity	Description	Sound Power Level, L_{WA}, dB
Upgrade access track	2 x 67kW hydraulic breaker, 2 x 17t excavators, 2 x 11t bulldozers, 2 x 4t vibratory rollers and 2 x 60kg vibratory compactor	121
Construct temporary site compound	8t backhoe loader, 40t articulated dump truck, concrete mixer truck	118
Build new access tracks	2 x 40t excavators, 2 x 25t articulated dump truck, 2 x articulated dump truck, 35t bulldozer & 4t vibratory roller	118
Construct substation	25t excavator, concrete mixer truck, 4-axle lorry	112
Crane hardstandings	2 x 32t excavators, 4 x 23t articulated dump truck and concrete mixer truck	116
Turbine foundations	Continuous Flight Augering (CFA) piling, 2 x 32t excavator, 4 x 40t dump truck, 4 x concrete mixer trucks, 100t mobile crane, 2 x 100kg diesel water pumps, 2 x pneumatic road breakers + compressors and 4 vibratory pokers	121
Constructing turbines	1200t crane, 400t crane, delivery vehicles, 10 x articulated lorries, diesel generator and hand tools	117

Activity	Description	Sound Power Level, L_{WA}, dB
Borrow pit quarrying	37t hydraulic excavator, 19t hydraulic excavator, 2 x semi-mobile crushers, 17t screen, hopper feed and field conveyors with drive units	127
Forestry felling around turbines and access tracks	Harvesters and forwarders, chain saws, tractors and excavators.	115

11.2.35 The calculated construction noise levels are compared with absolute noise limits for temporary construction activities which are commonly regarded as providing an acceptable level of protection from the short-term noise levels associated with construction activities, based on guidance from BS 5228-1.

11.2.36 Rock extraction from borrow pits by means of blasting operations is not anticipated, but could be required; however, as a worst case has been included in the assessment. Blasting operations can generate airborne pressure waves or "air overpressure" which contains both audible (approximately 20Hz to 20kHz) and infrasonic pressure waves (<20Hz), which, although outside the range of human hearing, can sometimes be felt. The relevant guidance documents advise controlling air overpressure with good practices during the setting and detonation of charges as opposed to absolute limits on the levels produced; therefore, no absolute limits for air overpressure or noise from blasting can be presented in the assessment. Other site activity associated with rock extraction, such as stone crushing and the operation of plant including excavators, breakers and conveyors will be included in the noise assessment as listed in **Table 11.2.**

11.2.37 Separate consideration is also given to the possible noise impacts of construction-related traffic passing to and from the site along local surrounding roads. In considering potential noise levels associated with construction traffic movement on public roads, reference is made to the accepted UK prediction methodology provided by CRTN.

11.2.38 Road traffic data have been provided for roads used by construction vehicles, as summarised in **Table 11.3**, which represents the average annual weekday (AAWT) total two-way flows, between the hours of 06:00 and 24:00, for the worst case period of construction. The full prediction given in CRTN results in an absolute road traffic noise level at a receiver location. For the purpose of this assessment the change in road traffic noise is of concern and not the absolute level. This has been achieved by calculating the Basic Noise Level (BNL) with corrections for heavy vehicles and low flow as described in CRTN. This is considered acceptable to provide a reasonable estimate of the likely change in road traffic noise. For any roads considered with a traffic flow below the applicability threshold of CRTN (1000 vehicles per day), the haul route method specified in BS5228-1 has been used.

Table 11.3: Construction Traffic Flow Data

Road link description	Baseline, no construction		Baseline + construction	
	Total flow	% HGV	Total flow	% HGV
A68 (South of Main St Roundabout)	15003	3.2%	15089	3.5%

Road link description	Baseline, no construction		Baseline + construction	
	Total flow	% HGV	Total flow	% HGV
A68 (South of B6398)	12151	4.0%	12237	4.5%
A68 (Monteath Mausoleum)	7583	6.5%	7669	7.2%
A68 (East of A698)	8579	4.5%	8665	5.2%
A68 (South of Bonjedward)	8358	5.3%	8444	6.0%
A68 (South of Jedburgh)	3525	6.9%	3611	8.5%
A68 (North of Huntford)	3516	5.3%	3602	6.9%
A6088 (Kirkton)	1323	5.4%	1348	5.3%
A6088 (Southdean)	436	6.9%	461	6.6%
A68 (Carter Bar)	2754	5.8%	2805	6.6%
A68 (South of Cottonshopeburnfoot)	3670	6.8%	3721	7.4%
A696 (Elishaw)	1638	12.1%	1675	12.6%
A68 (South of West Woodburn)	2957	3.9%	2989	4.1%

11.2.39 The nature of works and distances involved in the construction of a wind farm are such that the risk of significant effects relating to ground-borne vibration are very low, and no Scoping responses or other consultation responses have expressed concerns about vibration effects during construction.

11.2.40 Given the large separation distances to the closest sensitive receptors (see **Table 11.1**), no significant vibration effects during construction are likely and as such, vibration has been scoped out of further assessment and is not considered in this chapter, as set out in the Scoping Report.

Operational

11.2.41 Typically, the operational noise assessment process comprises of:

- identification of potential NSRs, i.e., residential properties and other potentially noise-sensitive locations;
- if required, measurement of prevailing wind speed dependant background noise levels at nearby properties;
- establishment of limits for acceptable levels of wind turbine noise;
- prediction of the likely levels of wind turbine noise received at each NSR; and
- comparison of the predicted levels with the noise limits.

Background Noise Survey

11.2.42 As outlined in **Section 11.3**, a baseline noise survey was carried out between Monday 16 May 2022 and Tuesday 14 June 2022, at a total of three noise measurement positions which are considered to represent the NSRs in the study area, as well as accounting for feedback received during consultation. This equates to a total of 29 days of background noise data, which exceeds the one-week requirement set out in ETSU-R-97 and the two weeks recommended in the IOA GPG. **Table 11.4** details the background noise survey locations and **Figure 11.1** shows their location relative to the Proposed Development.

Table 11.4: Background Noise Measurement Positions

Position ID	Property Name	Easting	Northing
S1	Southdean Lodge Bothy	364019	608755
S2	Dykeraw Farmhouse	363254	608572
S3	Hyndlee	359030	606343

11.2.43 In line with ETSU-R-97 and the IOA GPG, the background survey data have been used as a proxy for some NSRs where monitoring was not carried out. This is considered appropriate due to the comparable distances from local roads or burns. Furthermore, as set out in paragraph 11.2.22, it is not necessary to assess every NSR in the area. Details of which survey location has been used as a proxy for the corresponding assessment location are included in **Table 11.5**. None of the NSRs considered in **Table 11.5** are financially involved with the Proposed Development.

Table 11.5: Proxy Locations for Noise Sensitive Receptors

NSR ID	NSR Name	Survey ID	Survey Property Name
R1	Charlies Hill	S1	Southdean Lodge Bothy
R2	Southdean Lodge Bothy	S1	Southdean Lodge Bothy
R3	Dykeraw Farmhouse	S2	Dykeraw Farmhouse
R4	Lustruther	S2	Dykeraw Farmhouse
R5	Hyndlee	S3	Hyndlee

11.2.44 The equipment used for the background noise survey comprised two Rion NL-52 and one Rion NL-32 logging sound level meters, each enclosed in environmental cases to protect from the weather. Outdoor enhanced windshields were used to reduce wind induced noise on the microphones and provide protection from rain. These windshields were supplied by the sound level meter manufacturer and maintain the required performance of the whole measurement system when fitted. The installed microphone height was approximately 1.5 m.

11.2.45 The sound level meters were located between 3.5 m and 20 m from the façade of the property and as far away as was practical from obvious atypical, localised sources of noise such as running water, tall trees or boiler flues. Details and photographs of the measurement locations can be found in **Technical Appendix 11.1**.

11.2.46 Sound level meters were all field calibrated during their installation and collection, with no acoustically significant (>0.5 dB(A)) drifts in calibration observed. The equipment used and locations chosen followed the IOA GPG guidelines in all cases.

11.2.47 The sound level meters logged the $L_{A90,10min}$ and $L_{Aeq,10min}$ noise levels continuously over the survey period, using Greenwich Mean Time (GMT) time reference. Wind data were measured using a SODAR remote sensing measurement system that also logged data using the same 10-minute periods and GMT time reference.

11.2.48 The use of a SODAR to monitor the wind data is endorsed by the IOA GPG as one of three preferred methods of capturing such data. The SODAR was installed onsite (coordinates 362446, 607052) by Carbon2050. Further details regarding the SODAR and the calculation of the corresponding wind speed referenced to a standardised height of 10 m in accordance with the IOA GPG are set out in **Annex F** of **Technical Appendix 11.1**.

11.2.49 The measured background noise data, standardised wind speed data and rain data for identical periods have been collated and reviewed for atypical relationships between noise level and wind speed, periods of rain fall and any extraneous data. Where these traits have been identified this data has been excluded from the analysis. In the case of rainfall, its effects on noise can be detected both during (as it hits vegetation), and immediately after it stops, and in some cases for a short while after it has stopped (as streams and burns swell to carry run-off rainwater). Periods of rain plus the previous and following 10-minute periods have been excluded. Data measured during 03:00 to 06:00 (GMT) was excluded at all locations as it would be influenced by the bird dawn chorus and is not representative of the noise climate all year round for the whole night-time period. Full details of excluded periods can be found in **Technical Appendix 11.1**.

11.2.50 Best fit lines were generated through the remaining data using a polynomial fit of a maximum of 2nd order, so as to best represent the typical values. These lines form the prevailing background noise level curve for each measurement location which were used to derive the noise limits in accordance with ETSU-R-97.

11.2.51 Survey location S2, Dykeraw Farmhouse, had a rain logger installed to monitor periods of rainfall during the background noise survey. The rain logger comprised a Davis tipping bucket detector, set to record if any rain was detected during the same 10-minute measurement period used by the sound level meters and wind data. The rain logger also used the GMT time reference.

Noise Limit Selection

11.2.52 It is set out in ETSU-R-97, and subsequently the IOA GPG, that noise limits for wind turbines should be set at the nearest properties and that these limits should reflect the variation in both turbine source noise and background noise with wind speed. The wind speed range which should be considered is that of the operation of the turbines, typically between the cut-in speed and 12 m/s. It should be noted that, within this assessment, unless specified otherwise, all references to wind speeds are to a standardised 10 m height, derived in accordance with Section 2.6 of the IOA GPG. Whilst the assessment should cover this range of wind speeds, often modern pitch-regulated wind turbines reach maximum sound power levels at a wind speed less than 12 m/s. Therefore, the IOA GPG recommends that the baseline noise survey data captures a range of wind speeds from the cut-in speed and the wind speed corresponding to the turbine's maximum sound power level, and for the Proposed Development this is 7 m/s.

11.2.53 Separate noise limits apply for the daytime and night-time, chosen to protect a property's external amenity and to prevent sleep disturbance indoors, respectively. Noise limits comprise two elements: a lower fixed value and a derived relative value equal to the prevailing background curve plus 5 dB(A). The noise limit will be equal to the greater of these two elements. The assessment needs to consider the combined operational noise of the Proposed Development with the other wind farms in the area to ensure the combined cumulative noise levels are within the relevant ETSU-R-97 criterion.

11.2.54 The prevailing background curve is derived from noise data, using the $L_{A90,\ 10min}$ parameter, measured at a representative location of a receptor and wind data measured on the Proposed Development site. Data measured during the ETSU-R-97 'quiet periods of the day' inform the daytime prevailing background curve. These quiet periods are: weekdays between 18:00 and 23:00, Saturdays between 13:00 and 23:00 and all day on Sundays (07:00 to 23:00). Data measured between 23:00 and 07:00 inform the night-time prevailing background curve.

11.2.55 The fixed lower value of the daytime noise limit is provided in ETSU-R-97 as a single value in the range between 35 dB L_{A90} and 40 dB L_{A90}. The exception to this is when a property is financially involved with the project and in such cases the appropriate fixed lower limit is 45 dB L_{A90} during the day and night-time. For non-financially involved properties, there are three factors that should be considered when determining an appropriate value for the lower fixed daytime noise limit:

- the number of noise-affected properties;
- the potential impact on the power output of the wind farm; and
- the likely duration and level of exposure.

11.2.56 For the case of the Proposed Development, 35 dB L_{A90} is considered appropriate for the fixed lower value element of the daytime noise limit. The reasons for this are primarily based on the low impact on power generation of the choice of limit. Whilst the low number of properties affected by noise, when compared to the power output of the wind turbines, would initially indicate a higher fixed lower value to be more appropriate; a lower value has been selected to provide a robust assessment and to not preclude further wind development in the area.

11.2.57 The fixed lower value of the night-time noise limit for non-financially involved properties is given in ETSU-R-97 as 43 dB L_{A90}; therefore, this assessment uses a value of 43 dB L_{A90} for the lower fixed value of the night-time noise limit.

Wind Turbine Noise Predictions

11.2.58 The ISO 9613-2 model has been used to calculate the noise immission levels at the selected nearest residential neighbours as advised in the IOA GPG. The model accounts for the attenuation due to geometric spreading, atmospheric absorption, and barrier and ground effects. All attenuation calculations have been made on an octave band basis and, therefore, account for the sound frequency characteristics of the turbines. The model assumes:

- candidate turbine: Nordex N163 5.7 MW with emission levels in line with IOA GPG guidance, with details provided in Annex B of **Technical Appendix 11.1**;
- mixed ground absorption factor of G = 0.5;
- air absorption based on temperature of 10°C and 70% relative humidity;
- receiver height 4 m;
- screening effects limited to 2 dB(A); and
- downwind propagation assumed between all turbines and receivers.

11.2.59 Where concave ground is present along the propagation path between a wind turbine and NSR a +3 dB correction has been added due to the presence of additional reflection paths that are not present over more flat ground (see details in **Technical Appendix**

11.1). The following formula (from the IOA GPG) has been used to determine if concave ground is present:

$$h_m \geq 1.5 \times \left(\frac{abs(h_s - h_r)}{2}\right)$$

11.2.60 Where h_m is the mean height above the ground of the direct line of sight from the receiver to the source, and h_s and h_r are the heights above local ground level of the source and receiver respectively.

11.2.61 This method is consistent with the recommendations of the IOA GPG. The IOA GPG also allows for directional effects to be included within the noise modelling: under upwind propagation conditions the wind farm noise immission level at a receiver can be as much as 10 dB(A) to 15 dB(A) lower than the level predicted using the ISO 9613-2 model. However, predictions have been made assuming downwind propagation from every turbine to every receptor at the same time as a worst case.

11.2.62 The assessment assumes that wind turbine noise contains no audible tones. Where tones are present a correction is added to the measured or predicted noise level before comparison with the recommended limits. The audibility of any tones can be assessed by comparing the narrow band level of such tones with the masking level contained in a band of frequencies around the tone called the critical band. The ETSU-R-97 recommendations suggest a tone correction, which depends on the amount by which the tone exceeds the audibility threshold and should be included as part of the consent conditions. The turbines to be used for the Proposed Development would be chosen such that the noise emitted would comply with the requirements of ETSU-R-97, including any relevant tonality corrections.

Substation

11.2.63 No significant noise effects are anticipated from the onsite substation, given the substantial (approximately 1.8 km) separation distance between the substation and nearest Noise Sensitive Receptor (NSR) (R2 Southdean Lodge Bothy) and experience of typical levels of noise emissions from such facilities. Substation noise has, therefore, been scoped out of further assessment and is not considered in this chapter.

Battery Energy Storage

11.2.64 The Proposed Development includes a battery energy storage facility housed within the substation compound. No significant effects are anticipated from the battery storage facility, given the substantial separation distance (see above) between the substation compound and the nearest NSR and experience of typical levels of noise emissions from such facilities. Operational noise from the plant associated with the battery storage facility has, therefore, been scoped out of further assessment and is not considered in this chapter.

Cumulative

11.2.65 ETSU-R-97 states that assessments should take account of the effect of noise from all existing consented or, in some cases, proposed wind turbines that may affect a particular NSR. To facilitate this, a screening exercise was conducted to identify any wind turbines either operational, consented, or part of a current planning application, located within

10 km of the Proposed Development wind turbines. Potential cumulative noise effects are typically restricted to turbines within 5 km; as such, a 10 km search ensures that all potential developments are identified and considered for inclusion where necessary. Paragraph 2.1.5 provides a list of cumulative wind farm sites within 25 km.

11.2.66 Following the screening exercise, the only wind farm identified was the consented Pines Burn Wind Farm which is located approximately 5 km away from the Proposed Development.

11.2.67 As noted in the IOA GPG, when assessing cumulative noise levels, consideration should be given to the noise limits applicable to each development.

11.2.68 Where there is no reasonable prospect of a cumulative development producing noise levels up to its consented (or proposed) limits, the IOA GPG recommends that predicted noise levels should be used along with an additional safety margin. This approach prevents the sterilisation of an area in which existing wind turbine noise levels are substantially lower than the ETSU-R-97 limits, enabling further appropriate development to be considered.

11.2.69 In such instances, an additional safety margin is applied to the noise emissions of that development, on top of the required addition for uncertainty (typically a further 2 dB). Furthermore, this assessment assumes that a receptor is downwind of all turbines; however, the closest NSR to Pines Burn Wind Farm and the Proposed Development is Hyndlee, which is situated between the two wind farms. Therefore, it would not be possible to be downwind of both Pines Burn Wind Farm and the Proposed Development simultaneously and this assessment presents a worst case.

11.2.70 The noise immission level from Pines Burn Wind Farm, with an additional safety margin of 2 dB, remains below 25 dB L_{A90} at all NSRs for all wind speeds, which is 10 dB below the lowest applicable limit for the Proposed Development. The IOA GPG states that *'in such cases where noise from the proposed wind farm is predicted to be 10 dB greater than that from the existing wind farm (but compliant with ETSU-R-97 in its own right), then a cumulative noise impact assessment would not be necessary.'* Therefore, the cumulative noise effect of the Pines Burn Wind Farm is negligible and there are no further potential cumulative noise effects to consider .

11.2.71 Details of the noise emission data for Pines Burn Wind Farm assumed as the basis for the above analysis is presented in **Technical Appendix 11.1**.

Assumptions and Limitations

11.2.72 No significant information gaps were identified, and the assessment was undertaken in line with relevant standards, policy and guidance documents and current best practice.

11.2.73 The road traffic noise model used in this assessment is dependent upon the predicted future traffic data, which would have inherent uncertainties associated with them, details of which are set out in **Chapter 12: Traffic and Transportation**.

11.2.74 Details of specific construction activity, plant used, or likely programme are not available at this stage of the Proposed Development. The construction noise assessment assumes typical activity for the type and scale of the Proposed Development, that all plant and equipment used are operated continuously throughout the 10-hour working day and are located at the same distance from the noise sensitive receptor. This is unlikely to occur in practice and, therefore, represents a likely worst case scenario.

11.3 Consultation Undertaken

11.3.1 During the initial stages of the noise assessment, and prior to the baseline noise survey, the Environmental Health Officer (EHO) at the Scottish Borders Council (SBC) was consulted to discuss the approach to the assessment and the potential survey locations. Consultation took place via email on 03 May 2022 based on an initial layout where the proposed approach and survey locations were detailed.

11.3.2 No response was received from SBC at the time of writing and prior to the baseline noise survey. Therefore, the noise loggers were installed at the advised locations. A follow up email was issued on 13 June 2022, while the noise survey was taking place, to confirm the survey locations, including justification for their selection and photographs of the monitoring equipment in situ. No response was received to the second consultation at the time of writing.

11.3.3 The Scoping Opinion, dated May 2022, contained a section on noise that set out the Scottish Government Energy Consents Unit's (ECU) requirements for this assessment on behalf of Scottish Ministers. Reference is made to the noise assessment being carried out in accordance with the relevant legislations and standards and the report to be in line with the IOA GPG. This assessment follows current best practice and complies with the requirements of ETSU-R-97 and the IOA GPG as the relevant guidance documentation.

11.3.4 The Scoping Opinion also discusses the Eskdalemuir seismic array, as per paragraph 11.2.18.

11.3.5 The Scoping response from Southdean Community Council specifically requested that noise monitoring was undertaken at Southdean Lodge Bothy, and this property was included in the baseline noise survey. The present chapter also addresses other concerns raised in this response including the impacts of construction activities including felling and blasting, as well as the effect of terrain on noise propagation (see paragraph 11.2.59).

11.4 Statutory and Planning Context

Legislation

11.4.1 In the UK, noise and vibration and nuisance are controlled using the Environmental Protection Act, 1990 and the Control of Pollution Act, 1974.

Environmental Protection Act (1990)

11.4.2 The Environmental Protection Act[189] (EPA) provides powers to control noise where a statutory noise nuisance exists. Section 80 of the EPA states that where a statutory nuisance exists, or is likely to occur or reoccur, then the responsible Local Authority shall serve a notice requiring the abatement of the nuisance; or prohibiting its occurrence or reoccurrence, as well as requiring any such steps that may be necessary to abate the nuisance including a specification of the timescales in which to take such action. Section 82 of the EPA provides an individual subject to a statutory nuisance the right to

[189] The Environmental Protection Act, Part III (1990), London: HMSO.

make representations to the courts and for the courts to take such action, as may be appropriate, against the originator of that nuisance such that the nuisance is abated.

Control of Pollution Act (1974)

11.4.3 The Control of Pollution Act[190] (CoPA) requires that 'Best Practicable Means' (as defined in section 72 of CoPA) are adopted to control construction noise on any given site.

11.4.4 Sections 60 and 61 of the CoPA provide the key legislative provisions regarding noise and vibration from demolition and construction sites. If noise complaints are received, a Section 60 notice may be issued by the Local Authority, with instructions to cease work until specific conditions to reduce noise have been adopted.

11.4.5 Section 61 of the CoPA provides a means for applying for prior consent to carry out noise generating activities during construction. Once prior consent has been agreed under Section 61, a Section 60 notice cannot be served, provided the agreed conditions are complied with.

Planning Policy

Scottish Planning Policy

11.4.6 Scottish Planning Policy[191] (Scottish Government, 2014) sets out national planning policies which reflect Scottish Ministers' priorities for operation of the planning system and for the development and use of land with the objective of contributing to sustainable development. It states, in paragraph 169, that proposals for energy infrastructure should always take account of spatial frameworks for wind farms and that noise should be one of the environmental considerations when assessing impacts on communities and individual dwellings. It is further stated in paragraph 170 that wind farms should be sited and designed to ensure impacts are minimised and to protect an acceptable level of amenity for adjacent communities.

Planning Advice Note PAN 1/2011

11.4.7 PAN 1/2011[192] (Scottish Government, 2011) provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. PAN1/2011 provides general advice on a range of noise related planning matters, including references to noise associated with both construction activities and operational wind farms. In relation to operational noise from wind farms, Paragraph 29 states that:

"There are two sources of noise from wind turbines - the mechanical noise from the turbines and the aerodynamic noise from the blades. Mechanical noise is related to engineering design. Aerodynamic noise varies with rotor design and wind speed, and is generally greatest at low speeds. Good acoustical design and siting of turbines is essential to minimise the potential to generate noise. Web based planning advice on renewable technologies for Onshore wind turbines provides advice on 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97) published by the former Department

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[190] The Control of Pollution Act, Part III (1974), London: HMSO.

[191] Scottish Government (2014), 'Scottish Planning Policy'.

[192] Scottish Government (2011), 'Planning Advice Note PAN 1/2011'.

of Trade and Industry [DTI] and the findings of the Salford University report into Aerodynamic Modulation of Wind Turbine Noise."

11.4.8 PAN 1/2011 advises the preference to control construction noise through the CoPA, over the use of planning conditions.

Planning Advice Note PAN 50

11.4.9 PAN 50[193] (Scottish Government, 1996) provides advice on the control of environmental effects, including noise, of surface mineral workings and processing such as road traffic, blasting, noise etc. British Standard BS 5228 is referenced as the method to use when predicting noise from construction activity. In addition, several annexes have been published which consider specific aspects in more detail, those relevant to this assessment include: Annex A, The Control of Noise at Surface Mineral Workings and Annex D, The Control of Blasting at Surface Mineral Workings, which contains guidance on the control of vibration and air overpressure from blasting operations.

Onshore Wind Turbines: Planning Advice

11.4.10 The Scottish Government's[194] Onshore Wind Turbine web-based guidance document (Scottish Government, 2014) provides further advice on noise from wind turbines. It also confirms that ETSU-R-97 should be followed to assess and rate noise from wind turbines until such a time an update is available. Further reference is made to the Institute of Acoustics 'Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' as current industry good practice and the appropriate document to be used by all IOA members and those undertaking assessments to ETSU-R-97.

Assessment of Noise: Technical Advice Note

11.4.11 The Technical Advice Note[195] (Scottish Government, 2011) provides guidance aimed to assist in the technical evaluation of noise assessment and the significance of impact. This document refers to the web-based planning advice and ETSU-R-97 when assessing noise from wind turbines.

Guidelines and Technical Standards

ETSU-R-97 The Assessment and Rating of Noise from Wind Farms

11.4.12 As introduced above, the ETSU report ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97) (The Working Group for Noise from Wind Turbines, 1996) is endorsed by national planning policy as the appropriate guidance document for the assessment of noise from wind turbines. The basic aim of ETSU-R-97 is to provide indicative noise levels thought to offer reasonable protection to wind farm neighbours, without placing unreasonable restrictions on wind farm developments, or adding unduly to the costs and administrative burdens on wind farm developers or local authorities.

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[193] Scottish Government (1996), 'Planning Advice Note PAN 50: Controlling the environmental effects of surface mineral workings'.

[194] Scottish Government (2014), 'Onshore Wind Turbines: Planning advice'.

[195] Scottish Government (2011), 'Assessment of noise: Technical Advice Note'.

11.4.13 ETSU-R-97 recommends the acceptability of wind farm noise should be assessed relative to existing background noise levels at nearby properties. It recognises that both background noise and wind turbine noise vary with wind speed and suggests that noise from wind turbines should be limited to 5 dB above the background noise. It does, however, also suggest absolute lower fixed limits of between 35 and 40 dB L_{A90} for daytime and 43 dB L_{A90} for night-time.

11.4.14 An increased noise limit of 45 dB L_{A90}, or background noise, plus 5 dB, whichever is greater, is suggested for both daytime and night-time periods for properties where the occupier has financial involvement in the wind farm.

11.4.15 Where noise at the nearest property is limited to 35 dB L_{A90} up to wind speeds of 10 m/s, then it need not be considered in the noise assessment, as protection of the amenity of these properties can be controlled through a simplified noise limit.

11.4.16 Where the need for a background noise survey is required, ETSU-R-97 provides guidance on the appropriate positioning, equipment, and duration of survey.

Institute of Acoustics' Good Practice Guide to ETSU-R-97

11.4.17 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (IOA GPG) (Institute of Acoustics, 2013) provides guidance on noise assessment of wind turbines above 50 kW, reflecting the original principles within ETSU-R-97. The IOA GPG contains six Supplementary Guidance Notes that covers data collection, data processing, wind turbine sound power levels, wind shear, post completion measurements and propagation over water for onshore.

11.4.18 The IOA GPG does not replace the limits within ETSU-R-97, but it does provide good practice guidance on the use of ETSU-R-97 in relation to background noise surveys and on the prediction of wind turbine noise and other aspects such as cumulative noise. It recommends appropriate input parameters and correction factors for the prediction of wind turbine noise, as follows:

- a receptor height of 4 m;
- atmospheric conditions of 10°C and 70% humidity;
- a ground absorption factor of G = 0.5; and
- turbine noise emission levels which include a margin for uncertainty.

British Standard BS 5228

11.4.19 British Standard BS 5228:2009 + A1:2014 'Code of practice for noise and vibration control on construction and open sites' (BSI, 2014) refers to the need for the protection against noise (in Part 1) and vibration (in Part 2) for people living in the vicinity of construction or open sites.

11.4.20 Part 1 of BS 5228-1:2009+A1:2014, sets out a methodology for predicting noise levels arising from a wide variety of construction activities and it contains tables of sound power levels generated by mobile and fixed plant. Annex E of BS 5228-1 gives example criteria that may be used to consider the significant effect of any construction noise impact. The criteria are not mandatory and are presented as a set of example approaches that reflect the type of methods commonly applied to construction noise.

11.4.21 Part 2 of BS 5228-2:2009+A1:2014, gives recommendations for basic methods of vibration control relating to construction and open sites. Annexes E and F of BS 5228-2 includes guidance on the subject of vibration from blasting sites, whereas Annex G discusses air overpressure resulting from blasting.

11.5 Existing Environment

11.5.1 The Proposed Development site is located in the Hawick and Denholm ward of the Scottish Borders Council region. The area around the Proposed Development is rural with a noise climate considered typical for its setting.

11.5.2 Baseline (background) noise levels were measured at three locations as detailed in **Table 11.4**, to inform this assessment. Overall, it was found that noise levels at these properties were predominantly influenced by wind-disturbed vegetation and, also, from agricultural sources such as livestock and distant machinery, and occasional road traffic using nearby and more distant roads. Watercourse noise from the Catlee Burn was noted to be barely audible at the installed logger position in the rear garden of S3, Hyndlee. Further details regarding the baseline survey can be found in **Technical Appendix 11.1**.

11.5.3 **Annex E** of **Technical Appendix 11.1** provides graphs of the measured background noise levels plotted against standardised wind speed. Each measurement location has two graphs: one displaying data for the quiet daytime period; and the second for the night-time period, as defined in paragraph 11.2.54. The corresponding ETSU-R-97 noise limits are summarised in **Table 11.6** and **Table 11.7**.

11.5.4 Also included in **Technical Appendix 11.1** are figures illustrating the range of wind speed and direction data measured during the noise survey is in accordance with the IOA GPG requirements. There are two wind speed and direction figures in total covering the quiet daytime and night-time periods.

Table 11.6: Daytime ETSU-R-97 Noise Limits, dB L_{A90}

NSR ID	Standardised wind speed, m/s								
	4	5	6	7	8	9	10	11	12
R1	36	38	41	43	46	49	53	56	60
R2	36	38	41	43	46	49	53	56	60
R3	35	37	39	41	44	47	50	53	56
R4	35	37	39	41	44	47	50	53	56
R5	35	36	37	39	40	43	45	47	50

Table 11.7: Night-time ETSU-R-97 Noise Limits, dB L_{A90}

NSR ID	Standardised wind speed, m/s								
	4	5	6	7	8	9	10	11	12
R1	43	43	43	43	43	46	51	55	61
R2	43	43	43	43	43	46	51	55	61
R3	43	43	43	43	43	43	47	52	57

NSR ID	Standardised wind speed, m/s								
	4	5	6	7	8	9	10	11	12
R4	43	43	43	43	43	43	47	52	57
R5	43	43	43	43	43	43	43	45	47

11.6 Predicted Impacts

Construction

11.6.1 **Table 11.8** details the predicted worst case construction noise levels for each of the key activities identified in **Table 11.2**. It must be emphasised that these predictions only relate the noise level occurring during the time when the activity is closest to the referenced property. In many cases such as access track construction and turbine erection, the separating distances would be considerably greater for the majority of the construction period and the predictions are, therefore, the worst case periods of the construction phase.

Table 11.8: Construction Activity Noise Levels

Activity	Worst Case Receptor	Noise Level, $L_{Aeq,T}$, dB
Upgrade access track	R1 Charlies Hill	51
Construct temporary site compound	R2 Southdean Lodge Bothy	41
Build new access tracks	R1 Charlies Hill	43
Construct substation	R2 Southdean Lodge Bothy	34
Crane hardstandings	R5 Hyndlee	40
Turbine foundations	R5 Hyndlee	45
Constructing turbines	R5 Hyndlee	41
Borrow pit quarrying	R3 Dykeraw Farm	50
Forestry felling around turbines and access tracks	R5 Hyndlee	36

11.6.2 All predicted worst case construction noise levels are below the threshold of significance set out in paragraph 11.2.27 and would, therefore, be not significant.

11.6.3 Changes in road traffic noise due to construction vehicles are set out in **Table 11.9**. The traffic flow on one road link, A6088 (Southdean), was below the applicability threshold of CRTN, so the BS5228-1 haul route method was used to calculate the level of traffic noise at a set distance of 10 m from the centre of that road. A comparison of the scenarios with and without construction traffic resulted in a 0.1 dB increase during construction. Comparing this and the results for the other roads given in **Table 11.9**, the greatest change in road traffic noise would be 0.6 dB, which is not significant (see paragraph 11.2.28).

Table 11.9: Change in Road Traffic Noise

Road link description	Road traffic Basic Noise Level, dB L_{A10}		
	Without construction	With construction	Difference
A68 (South of Main St Roundabout)	71.2	71.3	0.1
A68 (South of B6398)	70.6	70.7	0.1
A68 (Monteath Mausoleum)	69.2	69.4	0.2
A68 (East of A698)	69.4	69.6	0.2
A68 (South of Bonjedward)	69.6	69.7	0.2
A68 (South of Jedburgh)	66.2	66.6	0.4
A68 (North of Huntford)	65.9	66.4	0.4
A6088 (Kirkton)	60.0	60.1	0.1
A68 (Carter Bar)	65.1	65.4	0.3
A68 (South of Cottonshopeburnfoot)	66.8	67.0	0.3
A696 (Elishaw)	63.1	63.4	0.2
A68 (South of West Woodburn)	65.3	65.4	0.1

Operation

11.6.4 The predicted operational noise immission levels of the Proposed Development, noise limit and margin, at each of the identified receptors are presented numerically in **Table 11.10** and **Table 11.11**, for the daytime and night-time periods respectively. A positive margin value indicates the turbine immission exceeds the limit and a negative value shows it is below the limit. **Technical Appendix 11.1** illustrates this information graphically. The noise levels shown in these tables are predicted for a standardised wind speed range of 4 – 12m/s.

Table 11.10: Daytime Noise Assessment for the Proposed Development, L_{A90} (dB)

NSR ID	Detail	Noise level, L_{A90} (dB), at Standardised wind speed (m/s)								
		4	5	6	7	8	9	10	11	12
R1	Immission	22	27	31	31	31	31	31	31	31
	Limit	36	38	41	43	46	49	53	56	60
	Margin	**-14**	**-11**	**-10**	**-12**	**-15**	**-18**	**-21**	**-25**	**-29**
R2	Immission	23	28	32	32	32	32	32	32	32
	Limit	36	38	41	43	46	49	53	56	60
	Margin	**-13**	**-11**	**-9**	**-12**	**-14**	**-17**	**-21**	**-24**	**-28**
R3	Immission	25	30	34	34	34	34	34	34	34
	Limit	35	37	39	41	44	47	50	53	56
	Margin	**-10**	**-7**	**-5**	**-7**	**-10**	**-13**	**-15**	**-18**	**-22**
R4	Immission	23	28	32	32	32	32	32	32	32

NSR ID	Detail	Noise level, L_{A90} (dB), at Standardised wind speed (m/s)								
		4	5	6	7	8	9	10	11	12
	Limit	35	37	39	41	44	47	50	53	56
	Margin	**-12**	**-9**	**-7**	**-9**	**-12**	**-15**	**-18**	**-21**	**-24**
R5	Immission	23	28	31	32	32	32	32	32	32
	Limit	35	36	37	39	40	43	45	47	50
	Margin	**-12**	**-8**	**-6**	**-7**	**-9**	**-11**	**-13**	**-16**	**-19**

Table 11.11: Night-time Noise Assessment for the Proposed Development, L_{A90} (dB)

NSR ID	Detail	Noise level, L_{A90} (dB), at Standardised wind speed (m/s)								
		4	5	6	7	8	9	10	11	12
R1	Immission	22	27	31	31	31	31	31	31	31
	Limit	43	43	43	43	43	46	51	55	61
	Margin	**-21**	**-16**	**-12**	**-12**	**-12**	**-15**	**-19**	**-24**	**-29**
R2	Immission	23	28	32	32	32	32	32	32	32
	Limit	43	43	43	43	43	46	51	55	61
	Margin	**-20**	**-15**	**-11**	**-11**	**-11**	**-14**	**-19**	**-24**	**-29**
R3	Immission	25	30	34	34	34	34	34	34	34
	Limit	43	43	43	43	43	43	47	52	57
	Margin	**-18**	**-13**	**-9**	**-9**	**-9**	**-9**	**-13**	**-18**	**-23**
R4	Immission	23	28	32	32	32	32	32	32	32
	Limit	43	43	43	43	43	43	47	52	57
	Margin	**-20**	**-15**	**-11**	**-11**	**-11**	**-11**	**-15**	**-20**	**-25**
R5	Immission	23	28	31	32	32	32	32	32	32
	Limit	43	43	43	43	43	43	43	45	47
	Margin	**-20**	**-15**	**-12**	**-11**	**-11**	**-11**	**-11**	**-13**	**-16**

11.6.5 It can be seen in **Table 11.10** and **Table 11.11** that the predicted wind turbine noise immission level from the Proposed Development does not exceed the ETSU-R-97 noise limit at any receptor for any given wind speed and would, therefore, be not significant. This was determined based on the Nordex N163 5.7 MW candidate turbine model which is considered representative of the turbines which would be installed for the Proposed Development.

11.7 Mitigation

Construction Noise

11.7.1 No significant effect of construction noise has been determined, therefore, no mitigation is required.

Operational Noise

11.7.2 The selection of the final turbine to be installed at the site would be made on the basis of enabling the relevant ETSU-R-97 noise limits to be achieved at the surrounding properties, accounting for any correction for tonality if relevant.

11.8 Summary of Effects

11.8.1 The effect of construction noise, including construction traffic, is predicted to be **not significant** and no specific mitigation measures are considered necessary.

11.8.2 The effect of operational noise is also predicted to be **not significant** and no specific mitigation measures are considered necessary.

11.9 References

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12 TRAFFIC AND TRANSPORTATION

12.1 Introduction

12.1.1 This chapter assesses the potential effects of the Proposed Development on the highway network (in transport terms) and its users. This chapter should be read in conjunction with **Chapter 2: Proposed Development**.

12.1.2 The Chapter describes the assessment methodology that has been adopted and identifies how baseline conditions have been established. The access, traffic and transport receptors have been identified within a defined assessment area (the 'Study Area') which has the potential to be adversely or positively impacted by the Proposed Development.

12.1.3 Potentially significant access, traffic and transport related environmental effects may result from two forms of potential impacts:

- transport configurations made for the movement of turbines including blade, tower sections, and nacelle of the wind turbines that are transported as abnormal loads. Abnormal loads are those which exceed the length, weight or height criteria defined in 'Abnormal Load Movements – A brief guide to Notification and Authorisation requirements' (Transport Scotland, June 2007)[196]; and
- import of general construction materials transported via 'conventional' heavy goods vehicles (HGVs) and low loaders.

12.1.4 The assessment detailed within this chapter includes worst case assumptions made for the purpose of forming a robust assessment of the Proposed Development, within the parameters identified in **Chapter 2: Proposed Development** in addition to a more realistic scenario.

12.1.5 For a worst case assessment, the following assumptions have been made:

- all construction materials are assumed to be sourced from offsite locations (i.e., outside of the application boundary), including all aggregate required for track construction, thus ensuring that the estimated level of trip generation is considered as a maximum worst case. This is an unlikely situation as onsite borrow pits are likely to be used, but has been included as Scenario 1 to provide a robust assessment; and
- future traffic increases associated with the construction of the Proposed Development have been measured against baseline flows with a low National Road Traffic Forecast (NRTF) growth factor applied.

12.1.6 This chapter does not focus on the transport configurations made for the movement of wind turbine components to the site entrance. The off-site delivery routes have been considered in the supporting Desktop Route Survey Report prepared by Tetra Tech Group Limited ,which includes swept path analysis and a detailed review of the preferred routes for access. Given that the identified routes have been used previously for the transport of abnormal loads associated with renewable energy developments, it is considered that there would be no major issues for the use of the routes, notwithstanding any specific mitigation that may be required, which would include hedge/vegetation

[196] Transport Scotland (2007), Abnormal Load Movements – A brief guide to Notification and Authorisation requirements.

trimming, removal of street furniture and provision of load bearing surfaces where required. **Technical Appendix 12.1** includes the indicative access junction design drawing from the A6088 into the site including Swept Path Analysis, as well as Visibility Splays, Drawings **Figures 12.1.1**, **12.1.2** and **12.1.3**, respectively.

12.1.7 An assessment has been made of the potential effects of the Proposed Development, with a focus on the construction phase on the basis that this would have the greatest impact on the local transport network within the Study Area. Where required, mitigation measures have been defined to reduce any significant effects.

12.1.8 During operation, the Proposed Development would generate occasional maintenance trips, which would not lead to any variation in the baseline traffic flows beyond that of everyday fluctuation.

12.2 Statutory and Planning Context

12.2.1 This chapter has been prepared taking cognisance of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations) and relevant documents set out in **Chapter 5: Planning Policy Context of this EIA Report**.

12.2.2 The following policy documents, data sources and guidelines have been used to inform this assessment:

- Guidelines for the Environmental Assessment of Road Traffic (institute of Environmental Management and Assessment, 2005a);
- Transport Assessment Guidance (Scottish Government, 2012);
- Design Manual for Roads and Bridges TA 46 and 79, (HA, SOED, TWO, DoE (NI), 1997); and
- National Roads Development Guide (SCOTS, 2017).

Local Policy

12.2.3 Relevant Local, National and Regional Policies are as follows:

12.2.4 The Local Access and Transport Strategy (LATS) is a key document for the Scottish Borders, setting out what are considered to be the key transport and access issues affecting the area, along with proposed approach to these issues. The key aspects of the policy in respect to development such as renewable energy are:

12.2.5 Ensuring that development does not adversely impact on the transport network; and

12.2.6 Identifying requirements for developer contributions to help mitigate against any adverse impact on the transport network from development.

12.2.7 The LATS Main Issues Report (LATS - MIR) was published in October 2015 and has yet to be fully approved by SBC.

Regional Policy

12.2.8 The Regional Transport Strategy for the South East of Scotland is prepared by South-East Scotland Transport Partnership (SEStran), which the SBC is a member of. The Strategy lays out the strategic vision for transport development in the south-east of Scotland up to 2025.

12.2.9 The key objectives relevant to renewable energy development are:

12.2.10 Environment: to ensure that development is achieved in an environmentally sustainable manner; and

12.2.11 Safety & Health: to promote a healthier and more active SEStran area population.

National Policy

12.2.12 The Scottish Government's vision for transport at a national and regional level is set out in national policy frameworks which include:

12.2.13 Scotland's National Transport Strategy (2015): This strategy maps out the objectives, priorities and plans for the long-term future for transport in Scotland; and

12.2.14 Scottish Planning Policy (2014): This policy sets out national planning policies for operation of the planning system and for the development and use of land. It promotes consistency in the application of policy areas across Scotland (for further details please refer to **Chapter 5 Planning Policy Context**).

12.3 Consultation Undertaken

12.3.1 **Table 12.1** summarises the consultation responses regarding transport and access matters and provides information on where and/or how they have been addressed in this assessment. The following regulatory bodies made comment on transport matters during the Scoping process. A Scoping request was submitted by the applicant in February 2022:

- the SBC Transport Department (as local roads agency); and
- Transport Scotland (as trunk road agency).

Table 12.1: Consultation Summary

Consultee and Date	Summary of Key Issues	Action Taken
SBC, 13 April 2022	Content with the proposed assessment methodology.	None required
Transport Scotland, 18 March 2022	Transport Scotland request that potential trunk road related environmental impacts such as driver delay, pedestrian amenity, severance, safety etc be considered and assessed where appropriate for trunk road links (i.e., where IEMA Guidelines for further assessment are breached). Transport Scotland recommend that base traffic for the two years impacted by the COVID19 pandemic should be avoided. Transport Scotland will require to be satisfied that the size of turbines proposed can negotiate the selected route and that their transportation will not have any	**Chapter 12: Traffic and Transport** will summarise the assessment of effects on receptors in accordance with the agreed scope, along with IEMA and Scottish Government Guidance. To determine the baseline conditions against which the effects of the Proposed Development have been assessed, data from the Department for Transport (DfT) website has been obtained for the study area. Annual traffic statistics are accrued via continuous data

Consultee and Date	Summary of Key Issues	Action Taken
	detrimental effect on structures within the trunk road route path. A full Abnormal Loads Assessment report should be provided with the EIAR that identifies key pinch points on the trunk road network. Swept path analysis should be undertaken and details provided with regard to any required changes to street furniture or structures along the route.	from Automatic Traffic Counters (ATCs). Pre-Covid traffic flows will be used and factored to the proposed construction year using the NRTF factors. Abnormal Loads Route Survey was undertaken by Tetra Tech (Desktop Route Survey Report) and is attached as an appendix to the EIA Report. The report shows the major pinch points along the delivery route with corresponding Swept Path Analysis drawings.

12.4 Scope and Methodology

12.4.1 The below outlines the steps taken in the assessment to establish the effects on road users due to traffic associated with the construction of the Proposed Development:

- an assessment of the existing baseline conditions based on Department for Transport (DfT) traffic data and additional automatic traffic count data;
- an assessment of the surrounding road network to determine its suitability to accommodate the anticipated volume of construction traffic e.g. HGVs;
- an assessment of the increase in traffic compared to baseline traffic flows for the opening year of construction, which is assumed to be 2027, for the roads included in the Study Area, as shown on **Figure 12.1**. The approach for this has been to define the level of traffic anticipated to access the Proposed Development during its construction phase, calculated from first principles and distributed over an anticipated construction programme of 21 months; and
- an assessment of operational traffic. This provides a brief summary of typical maintenance activities and the types of vehicles used as traffic impacts during the operation of the Proposed Development are minimal.

Study Area

12.4.2 The Study Area includes local roads that are likely to experience increased traffic flows resulting from the Proposed Development. The geographic scope was determined through the review of Ordnance Survey (OS) plans and an assessment of the potential origin locations of construction staff and supply locations for construction materials.

12.4.3 The Proposed Development would take access from the north-east-bound A6088, via an existing forestry access junction upgraded for this purpose.

12.4.4 Access for construction materials would be predominantly from the north via the A68, A696 and A6088.

12.4.5 It is anticipated that access for Abnormal Indivisible Loads (AIL) associated with the wind turbine generator (WTG) components would be via the A1, A696, A68 and A6088. A full description of the route is described in later sections with details of the identified constraints.

12.4.6 The proposed Port of Entry (PoE) is the Port of Blyth in Northumberland. It is the closest port to the site and as such is in line with the Highways England's "Water Preferred"[197] policy towards abnormal load movements.

12.4.7 The port has handled thousands of component parts for both onshore and offshore wind farm developments, and has up to 15 ha of land available across two secure terminals served by heavy lift quays, and is well located for access to the trunk road network.

12.4.8 The following route would be used for the transport of the WTG components:

- loads would exit the Port of Blyth onto the B1329 and would head south;
- loads would proceed westbound on the A1061, bypassing Blyth to the north, before turning onto the A189 southbound;
- loads would turn right onto the westbound carriageway of the A19, before turning south and entering the A1 southbound;
- at the junction of the A1/A696, loads would depart the A1 and head north-west on the A696;
- continue on the A696 for 30 miles before continuing onto the A68 for 13 miles;
- turn left onto the A6088 and proceed westbound; and
- turn left into an existing upgraded forestry access track junction through Martinlee Plantation and proceed to the site via Forestry and Land Scotland (FLS) forestry tracks, upgraded to suit turbine deliveries.

12.4.9 The Study Area is focused only on the immediate roads surrounding and leading to the Proposed Development, as it is expected that traffic flows outside this area would be dissipated within the wider road network without any significant effect. Therefore, this chapter only considers the likely increases in traffic along these routes.

Information and Data Sources

12.4.10 To determine the baseline conditions against which the effects of the Proposed Development have been assessed, data from the DfT website has been obtained on the A68 between St Boswell and West Woodburn, A6088 between Southdean and Kirkton and A696 in Elishaw. Annual traffic statistics are accrued via continuous data from Automatic Traffic Counters (ATCs). The location of the existing ATCs is shown on **Figure 12.2**.

12.4.11 In addition to the above, road traffic collision data for the most recent five-year period from 2016 – 2020 were obtained from the DfT. The locations of the accidents in the Study Area are illustrated by **Figure 12.3** accompanying this chapter.

Effects Scoped Out

12.4.12 The operational phase of the Proposed Development would generate no more than five two-way vehicular trips in any one day and zero trips on most days. Typical duties onsite would include routine maintenance, such as planned servicing, safety checks, and

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[197] Highways England (2019), Water preferred policy Guidelines for the movement of abnormal indivisible loads.

repairing faults. These visits would normally require light vans or similar vehicles and would use the same routes as those used during construction.

12.4.13 The trips generated by the operational activities onsite would be no greater than those expected and accounted for in the background variations to the existing traffic flows. As such, these negligible traffic flows would be indistinguishable from normal daily traffic flows. Therefore, assessment of operational effects has been scoped out of this assessment.

12.4.14 As the operational impacts of the Proposed Development on the Study Area is indiscernible, the operational cumulative effects have also been scoped out of the assessment.

12.4.15 The traffic generated from the operational replacement of wind turbines has also been scoped out. When wind turbines are replaced, the following elements would lead to future traffic movements:

- dismantling and removal of turbine components; and
- the installation of new turbines.

12.4.16 Trip generation associated with these activities would not exceed the levels experienced during their original installation during construction of the Proposed Development and therefore has been scoped out of this assessment.

12.4.17 As the application seeks planning consent for an operational life of the Proposed Development of 35 years, decommissioning would be required; however, decommissioning is likely to comprise a reversal of the construction activities and any effects would not be greater than those resulting from construction of the Proposed Development. Decommissioning has therefore been scoped out of the assessment.

Approach to Assessment of Effects

12.4.18 The approach to this assessment is based upon the IEMA guidelines[198] and is primarily based upon the change in total traffic flows or the change in HGV flows along a specific section of road. Professional judgement must also be considered, particularly where the baseline traffic flow may be low and therefore a small increase in traffic may result in a high relative increase. In this case, the absolute value of change must be considered in the overall assessment of significance.

12.4.19 The IEMA guidance suggests that a day-to-day traffic flow of plus or minus 10% is expected to be the baseline situation and that projected traffic flow changes of less than 10% would be imperceptible to the general public and create no discernible environmental impact. Therefore, increases in traffic levels below 10% are considered insignificant.

12.4.20 Based on the IEMA guidance, the following factors have been identified as being the most discernible potential environmental effects likely to arise from changes in traffic movements. Therefore, these are considered in the assessment of potential effects which may arise from changes in traffic flows resulting from the Proposed Development:

[198] Institute of Environmental Management and Assessment (IEMA) (199), Guidelines for the Environmental Assessment of Road Traffic.

- driver severance and delay – the potential delays to existing drivers and their potential severance from other areas;
- community severance and delay – the potential delays to pedestrians in their movements and ability to crossroads;
- pedestrian delay and amenity – the potential impact of local amenity and delay in movement around and between communities;
- noise and vibration – the potential effect caused by additional traffic on sensitive receptors, which in this case relate to residential properties near the road. This is considered by separate assessment contained in **Chapter 11: Noise and Vibration**;
- vulnerable road users and road safety – the potential effect on vulnerable users of the road (e.g. pedestrians and cyclists);
- hazardous and dangerous loads – the potential effect on road users and local residents caused by the movement of abnormal loads; and
- dust and dirt – the potential effect of dust, dirt and other detritus being brought onto the road.

12.4.21 In addition to the effects listed here, human health effects are considered in transport terms with reference to pedestrians within the vulnerable road user and road safety effects.

12.4.22 The significance of likely effects has been determined by consideration of the sensitivity of receptors to change, taking account of the specific issues relating to the Study Area, and then the magnitude of that change.

Sensitivity of Receptors

12.4.23 The potential sensitivity of receptors to change in traffic levels has been determined by considering the Study Area and the presence of receptors in relation to each potential impact.

12.4.24 The IEMA guidelines provide two thresholds when considering predicted increase in traffic, whereby a full assessment of impact would be required:

- where the total traffic would increase by over 30% or more (10% in sensitive areas); and/or
- where the HGV traffic would increase by over 30% or more (10% in sensitive areas).

12.4.25 In this context, the IEMA guidelines do not define the value placed on the receptors and therefore their sensitivity; therefore, the assessor makes a professional judgement based on experience and the nature of the Study Area. Each receptor has been assessed individually to determine its sensitivity and the assessment criteria chosen are shown in **Table 12.2** below.

Table 12.2: Receptor Sensitivity

Impact	Low Sensitivity	Medium Sensitivity	High Sensitivity
Driver Severance & Delay	Road Network not affected	Road Network not experiencing congestion at peak times	Road Network experiencing congestion at peak times

Community Severance & Delay	No presence of existing communities severed by road	Presence of existing communities with a moderate level of existing severance (subjective assessment)	Presence of communities with existing severance (subjective assessment)
Noise	No sensitive receptors	Presence of sensitive receptors near to the road	Presence of sensitive receptors adjacent to the road
Road Safety	High sensitivity receptor		
Vulnerable Road Users	High sensitivity receptor		
Wider Disruption due to dangerous loads	No hazardous or dangerous loads on the road network	Some hazardous or dangerous loads on the road network. Loads are generally permitted on UK roads	Abnormal and oversized loads to use road network
Dust & Dirt	Limited presence of sensitive receptors (subjective assessment)	Low to Medium presence of sensitive receptors (subjective assessment)	High presence of sensitive receptors (subjective assessment)

Magnitude of Impact

12.4.26 The determination of magnitude has been undertaken by considering the parameters of the Proposed Development, establishing the scope of the receptors that may be affected,quantifying these effects utilising IEMA Guidelines, and professional judgement. The magnitude of impact or change has been considered according to the criteria defined in **Table 12.3**.

Table 12.3: Magnitude of Impact

Impact	Negligible	Minor	Moderate	Major
Driver Severance & Delay	< 10% Increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future levels		
Community Severance & Delay	< 10% Increase in traffic	< 30% Increase in traffic	< 60% Increase in traffic	> 60% Increase in traffic
Noise	< 25% Increase in traffic	> 25% Increase in traffic. Quantitative assessment based on predicted increase in traffic against measured baseline (See **Chapter 11: Noise and Vibration**)		
Road Safety	< 10% Increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future levels		
Vulnerable Road Users	< 10% Increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future levels		
Wider Disruption due to dangerous loads	0% Increase in traffic	< 30% Increase in traffic	< 60% Increase in traffic	> 60% Increase in traffic

Impact	Negligible	Minor	Moderate	Major
Dust & Dirt	< 10% Increase in traffic	< 30% Increase in traffic	< 60% Increase in traffic	> 60% Increase in traffic

Significance of Effect

12.4.27 Sensitivity and magnitude of change as assessed under the detailed criteria have then been considered collectively to determine the potential effect and their significance. The collective assessment is a considered assessment by the assessor, based on the likely sensitivity of the receptor to the change (e.g. is a receptor present which would be affected by the change), and then the magnitude of that change. **Table 12.4** is used as a guide to determine the level of effect. '**Major**' and '**Moderate**' effects are considered to be 'significant' in terms of the relevant guidance.

Table 12.4: Level of Effect

Sensitivity of receptor	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
Low	None	Slight	Slight	Moderate
Medium	Slight	Slight	Moderate	Major
High	Slight	Moderate	Major	Major

Potential Cumulative Effects

12.4.28 An assessment of the cumulative effect on the Study Area of all relevant developments, including local wind farms, within a 5 km radius of the site (either in planning system or under construction) which may utilise the same access routes as the Proposed Development has been undertaken.

Assessment Assumptions and Limitations

12.4.29 The assessment has been undertaken based on the assumption that good construction practices would be employed, including the following:

- all vehicles delivering plant and materials to the site would be roadworthy, maintained and sheeted, as required;
- suitable traffic management would be deployed for the movement of HGVs and other site traffic;
- banksmen and police escort would be deployed for the movement of abnormal loads as required; and
- HGV loads would be managed to ensure part-load deliveries would be minimised where possible, to limit the overall number of loads.

12.4.30 The predicted increases in traffic levels against the baseline levels have been calculated in this section, then an assessment of the significance of the effect has been made against the criteria described in **Table 12.4**.

12.4.31 Although sensitive receptors e.g. residential properties are present within the Study Area, the Study Area in its entirety is not considered to be sensitive, and therefore the IEMA threshold of 30% has been applied.

12.4.32 It is anticipated that the main construction hours for the Proposed Development would be between 07.00 and 19.00 from Monday to Friday, and 08.00 and 13.00 on Saturdays unless otherwise agreed with Scottish Borders Council (SBC). Certain activities, such as electrical works in the substation or turbine erection in the event of delays due to high winds, may require to be undertaken outwith these hours. Construction hours generally also apply to the delivery of materials to the Proposed Development; however, abnormal loads may be delivered out of these hours when the road network is at its quietest to reduce traffic disturbance. Delivery of the nacelles, towers and blades to the Proposed Development would require the use of abnormal sized and slow-moving trucks. These trucks would require a police escort and the timing of these deliveries may be dictated by the police.

12.4.33 The assessment is based upon an assumed construction programme for the Proposed Development and is based upon average traffic flows. There may be localised peaks with construction days where flows can be higher for a specific hour, such as shift change on site.

12.4.34 Assumption on the origin points for materials have been made to provide a worst case assessment scenario.

12.5 Existing Environment

Baseline Traffic Surveys

12.5.1 Access to the site would be taken form the A6088 via an existing upgraded forestry access junction and will be described in more detail in paragraphs 12.6.2 and 12.6.3.

12.5.2 The A68 is the main trunk road in the area and connects Darlington and the A720 in Edinburgh via Scottish Borders. In Scotland the road is operated by Transport Scotland. Within the Study Area generally, and in the vicinity of the site, the road is subject to the national speed limit of 60 mph.

12.5.3 In order to assess the impact of development traffic on the Study Area, Annual Average Daily Traffic (AADT) flows were obtained from the DfT traffic database. It was not possible to collect new traffic flow data for the whole of the study network due to the ongoing impact on transport and access arising from COVID-19 travel restrictions.

12.5.4 The counts sites used were as follows:

- A68 South of Main Street Roundabout (80569);
- A68 South of B6398 (80571);
- A68 Monteath Mausoleum (50737);
- A68 East of A698 (10730);
- A68 South of Bonjedward (40733);
- A68 South of Jedburgh (729);
- A68 North of Huntford (30737)
- A6088 Kirkton (41012);
- A6088 Southdean (11010);
- A68 Carter Bar (10731);
- A68 South of Cottonshopeburnfoot (56646);
- A696 Elishaw (47494); and

- A68 South of West Woodburn (26635).

12.5.5 The locations of the traffic count sites used in this assessment are illustrated in **Figure 12.2**. The DfT traffic data allows the traffic flows to be split in vehicle classes. The data were summarised into Cars/Light Good Vehicles (LGVs) and HGVs (all goods vehicles > 3.5 tonnes gross maximum weight).

12.5.6 **Table 12.5** summarises the AADT traffic data collected and used in this assessment.

Table 12.1: Existing Annual Average Daily Traffic (AADT) Traffic Conditions

Survey Location (Count Point ID)	Cars & LGVs	HGVs	Total
A68 South of Main Street Roundabout (80569)	12,793	420	13,213
A68 South of B6398 (80571)	10,288	435	10,723
A68 Monteath Mausoleum (50737)	6,095	438	6,533
A68 East of A698 (10730)	7,177	346	7,523
A68 South of Bonjedward (40733)	6,831	396	7,227
A68 South of Jedburgh (729)	2,815	220	3,035
A68 North of Huntford (30737)	2,795	165	2,960
A6088 Kirkton (41012)	1,092	66	1,158
A6088 Southdean (11010)	346	26	372
A68 Carter Bar (10731)	2,276	142	2,418
A68 South of Cottonshopeburnfoot (56646)	2,851	221	3,072
A696 Elishaw (47494)	1,224	179	1,403
A68 South of West Woodburn (26635)	2,415	104	2,519

Baseline Road Safety Review

12.5.7 Personal Injury Accident (PIA) data covering the study area was obtained from the DfT (available at https://www.gov.uk/government/collections/road-accidents-and-safety-statistics) for the five-year period between 2016 and 2020 (inclusive), which relates to the most recent period of available data. The locations of recorded accidents are shown on **Figure 12.3**.

12.5.8 The accident analysis is used to inform the review of the proposed route where any deficiencies in the road layout and condition identified. A total of 86 accidents were recorded across the study area during the five-year period. Of these, 50 resulted in slight injury (e.g. slight shock with occurrences of sprains or bruises) and 31 resulted in serious injury (e.g. breakages, lacerations, concussion, or hospital admittance) and 5 resulted in fatal injury (resulted in a mortality/death within 30 days after the accident).

12.5.9 The number and severity of accidents recorded in the Study Area is provided in **Table 12.6** below:

Table 12.2: Personal Accident Analysis Statistics (Study Area) 2016-2020

Severity		
Slight	Serious	Fatal
50	31	5

12.5.10 Review of the available accident data indicates that no HGVs were involved in any of the fatal accidents within the study area. The majority of the fatal accidents involved a car and a motorbike (up to 250cc). Therefore, the increase in HGV movements should not have impact nor increase the probability of accidents caused/involving HGVs.

Baseline Sustainable Travel Infrastructure Review

12.5.11 There are no Core Paths recorded by SBC within the site or near the proposed Site access point. Rights of Way are present within 5 km of the turbine area, which connect the A6088 with the Scottish Borders on the south of the Proposed Development.

12.5.12 There are no bicycle friendly roads/lanes along the A6088 in close proximity to the site. Additionally, there are no National Cycle Network is present, neither designated horse-riding tracks nor trekking stables within the turbine area.

12.5.13 There are Rights of Way crossing the site as shown on **Figure 14.1**. Additionally, the site is accessible via the general access rights granted under the Land Reform Act (Scotland) 2003. During construction, access to areas where construction is taking place or where there are construction related activities may be restricted for health and safety purposes, in accordance with the Construction (Design and Management) Regulations 2015. Notices would be placed in prominent locations around the site outlining any areas of restricted access. Measures for ensuring public safety during construction would be agreed with the SBC Access Officer and set out in the Construction Environmental Management Plan (CEMP). The CEMP would set out measures to ensure that recreational users of the site are informed of the construction work and directed into safe areas where there would be no conflict with plant and machinery. Such measures would be agreed in advance with SBC.

Future Baseline

12.5.14 Construction of the Proposed Development could commence during 2027 if consent is granted and is anticipated to take up to 21 months depending on weather conditions and ecological considerations.

12.5.15 To assess the likely effects during construction, base construction year traffic flows were determined by applying a NRTF low growth factor to the surveyed traffic flows.

12.5.16 The NRTF low growth factor for 2018 to 2027 is 1.057 and 2019 to 2027 is 1.049. These factors were applied to the 2018 and 2019 survey data to estimate the 2027 Base traffic flows shown in **Table 12.7**. This will be used in the Construction Peak Traffic Impact Assessment.

Table 12.3: Estimated Baseline 2027 Traffic Conditions

Survey Location (Count Point ID)	Cars &LGVs	HGVs	Total
A68 South of Main Street Roundabout (80569)	13516	543	14059

A68 South of B6398 (80571)	10933	456	11389
A68 Monteath Mausoleum (50737)	6646	459	7106
A68 East of A698 (10730)	7678	363	8041
A68 South of Bonjedward (40733)	7419	415	7834
A68 South of Jedburgh (729)	3076	231	3306
A68 North of Huntford (30737)	3057	237	3294
A6088 Kirkton (41012)	1172	70	1242
A6088 Southdean (11010)	378	28	407
A68 Carter Bar (10731)	2412	168	2580
A68 South of Cottonshopeburnfoot (56646)	3168	269	3437
A696 Elishaw (47494)	1352	199	1551
A68 South of West Woodburn (26635)	2644	128	2772

12.5.17 In the scenario that the Proposed Development did not proceed; traffic growth estimated in **Table 12.7** would still occur.

12.6 Predicted impacts

12.6.1 The Proposed Development is described fully in **Chapter 2: Proposed Development**. A summary is provided here highlighting those features pertinent to the assessment of traffic and transport.

Site Access and Onsite Tracks

12.6.2 Access to the site would be provided via forestry access junction upgraded for this purpose in the form of a priority-controlled T-junction. The access would be designed to allow access for both standard HGVs as well as abnormal loads of the junction would take a form of a widened bellmouth with merge tapers to accommodate the larger vehicles transporting the WTG component abnormal loads would be provided. Improvements would also be made to increase visibility splays at the access junction. **Figure 12.1.1** shows the proposed indicative access junction design, **Figure 12.1.2** provides Swept Path Analysis for vehicles transporting the WTG components blade and tower section. **Figure 12.1.3** shows achievable visibility splays to either side of the proposed access junction.

12.6.3 New access tracks would be required for access to the proposed turbine locations, battery storage and borrow pits. A total of 14.91 km of new and upgraded tracks, including the access route from A6088, would be constructed. Approximately 3.90 km of new access tracks would be constructed and approximately 11.01 km of existing forestry tracks would be upgraded.

Construction Traffic

12.6.4 During the 21-month construction period illustrated by **Chapter 2: Proposed Development, Table 2.2**, the following traffic would require access to the site:

- staff transport (cars or staff minibuses);

- construction equipment and materials, deliveries of machinery and supplies such as crushed rock and concrete; and
- abnormal loads consisting of the wind turbine sections and also heavy lift crane, transported to site in sectional loads.

12.6.5 Average monthly traffic flow data were used to establish the construction trips associated with the Proposed Development.

Abnormal Load Access Route

12.6.6 Abnormal load deliveries associated with the turbine components would access the Proposed Development from the Port of Blyth via the A1, A696, A68 and A6088, as shown on **Figure 12.3**.

12.6.7 Given that the proposed route is a key route for both local and national traffic movements, movement of abnormal loads at night or on a Sunday when traffic flows are lower may be proposed subject to approval by Police Scotland and other stakeholders.

Construction Materials

12.6.8 The Proposed Development would require the transportation of a range of construction materials to the site. The key elements of construction work which would result in the generation of vehicular trips are summarised in **Table 12.8**.

Table 12.4: Construction Activities Requiring Vehicle Trips

Key Work Element	Details and Assumptions	Conventional HGVs	Abnormal loads
Site establishment	Delivery of site cabins and plant for construction activities at commencement of construction and later removal from site	Yes	No
Import of material from quarry	Delivery of materials that are not able to be extracted from within the site	Yes	No
Borrow pit	Delivery of plant associated with establishing borrow pit	Yes	No
Access track upgrade and construction	Delivery of materials related to the upgrade of existing track and new onsite track. Includes the temporary turbine layby area.	Yes	No
Turbine foundations and crane hardstandings	Delivery of plant associated with construction of crane hardstandings. Delivery of plant and materials including concrete, aggregate and reinforcement materials for turbine foundations	Yes	No
Control building and control building compound/substation	Delivery of material for construction of building foundations, structure and finishings. Delivery of electrical equipment and storage of batteries	Yes	No

Electrical installation	Delivery of sand and cables to connect turbines to substation	Yes	No
Wind turbine delivery	Delivery of turbine components to project area Delivery of crane equipment to erect turbines. Includes escort vehicles associated with movement of abnormal loads	Yes	Yes

12.6.9 The precise quantities of construction materials required for the Proposed Development would depend on whether suitable rock material can be extracted from onsite borrow pits.

12.6.10 Whilst borrow pits are proposed on site, a robust assessment of a worst case scenario has been included in the assessment. Therefore, the potential impact of the transportation of construction materials to the site has been modelled using the following two scenarios:

- Scenario 1: All construction materials are assumed to be sourced from off-site locations, including all aggregate required for track construction and upgrade, thus ensuring that the estimated level of trip generation is considered as a worst case; and
- Scenario 2: Aggregates used for formation, capping and subbase materials are assumed to be sourced from proposed onsite borrow pits with all remaining construction materials, specifically concrete for turbine and met mast bases are assumed to be sourced from off-site locations. However, upgrades to a section of the existing access track from the A6088 access junction would require the import of construction material.

12.6.11 An estimation of the material quantities for all elements of the Proposed Development has been made. **Table 12.9** provides a summary of the material quantities (aggregates only) required to be imported should resources not be available from borrow pits.

Table 12.5: Estimated Aggregate Material Quantities – Scenario 1: Worst Case

Infrastructure		Material Quantities	
		m^3	tonne
Forestry Clearance	Timber (Logs + Brash)	8686	17372
Access tracks	New/Upgraded onsite access track	31300	62600
Construction compound	Substation (incl. BESS, LiDAR compound and electrical compound)	6750	13500
	Main Construction Compound	4500	9000
	Mobilisation Compound (Site Entrance at A6088)	945	1890
	Turbine Laydown Areas (x2)	472	944
Turbine foundations	Turbine bases – formation only	2077	4154
	Fill above turbine bases	26770	53540
	Hardstanding Areas	970	1940
Total		**82470**	**164940**

12.6.12 Scenario 2 is the more realistic scenario whereby onsite borrow pits are taken into account with aggregate extraction. The borrow pits totalled together are expected to provide aggregate material exceeding the amount required for importation in the worst case scenario (Scenario 1). However, it is expected that aggregates for a Mobilisation Compound as well as upgrades to an initial section of the existing track (up to the Black Burn) would be required for Scenario 2.

12.6.13 In addition to the aggregates required summarised in **Table 12.9**, the material quantities for all materials other than aggregates are provided in **Table 12.10** below.

Table 12.6: Estimated Material Quantities – Excluding Aggregates (both scenarios)

Infrastructure		Material Quantities	
		m^3 (unless otherwise stated)	tonne
Turbine Bases, BESS and substation	Concrete	8155	16310
Turbine foundations	Installation 6N structural fill	4082	8164
	Blinding	1276	2552
	Installation of can/bolts	13 no.	
	Reinforcement	845	
	Plinth shutter	40	80
	Foundation slab perimeter shutter	57	114
	Ducts	78 no.	
	Transformer plinths	13 no.	
	Step plinth	13 no.	
Electrical connection	Sand layer	4343	8687
	Cable	14909 m	30
Total		**17953 m3 / 14909 m**	**35906**

Traffic Generation

HGV Trip Generation Calculations

12.6.14 The total number of HGV trips predicted to arise during the construction phase of the Proposed Development has been calculated based on the estimated material quantities provided in **Table 12.9** and **Table 12.10**. These have then been doubled to provide the two-way movements that would occur from delivery and then returning vehicles, as shown in **Table 12.11.**

Table 12.11: Total Number of HGV Trips (conventional HGVs)

Infrastructure Item		Load size	Scenario 1		Scenario 2	
			No of Loads	Two-Way Movements	No of Loads	Two-Way Movements
Access tracks	New and upgraded onsite access track	20 t	3130	6260	329	658
Forestry Clearance	Timber (logs) + Brash	25 t	695	1390	695	1390
Construction compound	Substation + BESS	20 t	675	1350	-	-
	Main Construction Compound	20 t	450	900		
	Mobilisation Compound (at A6088 Site Entrance)	20 t	95	190	95	190
	Turbine Laydown Area	20 t	47	96	-	-
Foundations (Turbine, BESS and Substation)	Concrete	20 t	816	1632	816	1632
Turbine Foundations	Foundations – formation only	20 t	208	416	208	416
	Fill above turbine bases	20 t	2677	5354	-	-
	Hardstanding Areas	20 t	97	196	97	196
	Installation 6N structural fill	20 t	408	818	408	818
	Blinding	20 t	128	256	128	256
	Installation of can/bolts	-	1	2	1	2
	Reinforcement	20 t	42	84	42	84
	Plinth shutter	-	4	8	4	8
	Foundation slab perimeter shutter	-	6	12	6	12
	Ducts	-	2	4	2	4
	Transformer plinths	-	1	2	1	2
	Step plinth	-	1	2	1	2
Electrical	Sand layer	20 t	434	868	434	868
	Cable	-	6	12	6	12
Turbine Delivery, Erection and Commissioning		10	130	260	130	260
Reinstatement and Restoration		20 t	20	40	20	40
Total			**10073**	**20146**	**3423**	**6846**

Programme

12.6.15 The two-way movements for HGVs have been distributed over the anticipated 21-month construction programme according to the relevant site activity. The total two-way trip generation has been divided by the number of operational days in each month (assumed to be 22) to provide daily two-way trip generation for both scenarios. Scenario 1 is shown in **Table 12.12** and Scenario 2 in **Table 12.13**.

12.6.16 For both scenarios, the month with the highest volume of traffic has been highlighted. For Scenario 1, months 7 through to 12 are predicted to experience the highest traffic levels, with 138 two-way vehicle movements daily. Similarly, for Scenario 2, months 7 through to 12 are expected to experience the highest traffic levels, with 76 two-way vehicle movements daily.

Table 12.12: Scenario 1 – Two-way Movements by Construction Vehicles

Activity	1	2	3	4	5	6	7	8	9	10	11	12	12	14	15	16	17	18	19	20	21
Site establishment	283	283	283																		
Forestry felling and export	695	695																			
Construction of new access tracks and crane hardstandings			85	85	85	85	85	85	85	85	85	85									
Turbine foundation construction				178	178	178	178	178	178	178	178	178									
Substation, energy storage,and electrical works				148	148	148	148	148	148	148	148	148	148	148							
Cable trenching and installation						98	98	98	98	98	98	98	98	98							
Crane Delivery						13															
Turbine delivery, erection and commissioning							29	29	29	29	29	29	29	29	29	29					
Site reinstatement							3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
General Site Traffic	1100	1100	1100	1100	1100	1100	**1100**	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Monthly ALL Total	2078	2078	1468	1512	1512	1622	**1641**	1641	1641	1641	1641	1641	1378	1378	1132	1132	1103	1103	1103	1103	1103
Daily ALL Total	96	96	68	70	70	74	**76**	76	76	76	76	76	64	64	52	52	52	52	52	52	52
Monthly HGV Total	978	978	368	412	412	522	**541**	541	541	541	541	541	278	278	32	32	3	3	3	3	3
Daily HGV Total	46	46	18	20	20	24	**26**	26	26	26	26	26	14	14	2	2	2	2	2	2	2

Table 12.7: Scenario 2 – Two-way Movements by Construction Vehicles

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Site establishment (incl. section of tracks)	315	315	315																		
Forestry felling and export	695	695																			
Construction of access tracks and crane hardstandings			736	736	736	736	736	736	736	736	736	736									
Turbine foundation construction				774	774	774	774	774	774	774	774	774									
Substation, energy storage,and electrical works				271	271	271	271	271	271	271	271	271	271	271							
Cable trenching and installation						98	98	98	98	98	98	98	98	98							
Crane delivery						13															
Turbine delivery, erection and commissioning							29	29	29	29	29	29	29	29	29	29					
Site reinstatement							3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
General Site Traffic (Personnel)	1100	1100	1100	1100	1100	1100	**1100**	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Monthly ALL Total	2110	2110	2150	2880	2880	2991	**3010**	3010	3010	3010	3010	3010	1501	1501	1132	1132	1103	1103	1103	1103	1103
Daily ALL Total	96	96	98	132	132	136	**138**	138	138	138	138	138	70	70	52	52	52	52	52	52	52
Monthly HGV Total	1010	1010	1050	1780	1780	1891	**1910**	1910	1910	1910	1910	1910	401	401	32	32	3	3	3	3	3
Daily HGV Total	46	46	48	82	82	86	**88**	88	88	88	88	88	20	20	2	2	2	2	2	2	2

HGV Trip Generation Summary

12.6.17 The maximum level of two-way trips generated for the two construction programmes and the two construction material sourcing scenarios are as follows:

- Scenario 1: the maximum number of daily two-way HGV movements is 88; and
- Scenario 2: the maximum number of daily two-way HGV movements is 26.

Light Vehicle Trip generation

12.6.18 Light vehicles (i.e., smaller vehicles such as cars and vans, which would typically be associated with the workforce) have also been calculated to provide total two-way vehicle movements predicted to arise from the Proposed Development.

12.6.19 Light vehicle trips would be generated by the approximately 50 workers who would be working onsite during the construction phase. It is anticipated that there would be a maximum of 50 two-way movements daily based on an average vehicle occupancy of 2 people.

Total Trip Generation

12.6.20 The total trip generation (maximum daily and average) for a 21-month construction programme for HGV and LGV is set out in **Table 12.14**.

Table 12.8: Maximum and Average Daily Two-way Vehicle Movements

	Scenario 1			Scenario 2		
	HGV	LGV	Total	HGV	LGV	Total
Maximum	88	50	138	26	50	76
Average	48	50	98	18	50	68

12.6.21 Construction HGV traffic flows would be spread across the working day (07:00-19:00), which at peak would equate to a maximum of 88 two-way trips per day / 7 two-way trips per hour, or 1 HGVs in each direction every 10 minutes. On average across the 21-month programme this reduces to 26 two-way trips per day / 2 two-way trips per hour, or 1 HGV in each direction every 30 minute.

Trip Distribution

12.6.22 The distribution of construction trips on the wider network would vary depending on the types of loads being transported. All trips would approach the site using the A68 and A6088.

12.6.23 For Scenario 1 it is assumed that ready-mix concrete and aggregates would be supplied from local sources using suppliers located to the north of the site. However, some of the materials might be provided from locations to the south. Accordingly, the HGV trips were split 70/30 between A68 North and A68 South.

12.6.24 General construction, building supply deliveries, geotextile, cable and reinforcement deliveries would be made from the A68 via the A6088.

12.6.25 It has been assumed that staff working at the construction site would either live locally, based in Hawick and Jedburgh, or stay in local bed and breakfast, guest houses or hotels for the duration of the construction programme. Therefore, it has been assumed that 70% of traffic would arrive along the A68 north and 30% from the A68 south for the purpose of the assessment.

12.6.26 Given that the peak traffic generation associated with the Proposed Development is predicted to occur in the construction year 2027, a forecast baseline year of 2027 is assumed. As noted above, the NRTF was utilised to generate growth factors of 1.057 for 2018 and 1.049 for 2019 flows based on 'low' growth. The 2027 forecast future baseline traffic flows are presented in **Table 12.7** previously.

12.7 Assessment of Effects

12.7.1 The Proposed Development has been designed to include a range of measures to mitigate potential effects. Included within this are the design of the site entrance to include radii and width suitable for ease of abnormal load access. All such measures are described in **Chapter 2: Proposed Development**.

Construction Effects

12.7.2 The impact of the Proposed Development has been assessed using AADT flows on the principal road links in the Study Area that would be used by the general construction traffic – cars/LGVs, and HGVs involved in the delivery of construction materials and plant to/from the site.

12.7.3 The increase in traffic flow along the A86, A696 and A6088 (for vehicle movements other than the abnormal loads) has been calculated for both Scenarios 1 and 2 for the following two cases:

- the maximum trip generation occurring over the construction period; and
- the average trip generation throughout the entire active construction period.

12.7.4 **Table 12.15** and **Table 12.16** show the predicted daily total and HGV traffic increases for the two cases above.

Table 12.15: Predicted Increases in Traffic – Scenario 1

Link		2027 Baseline		2027 Baseline+ Construction		Increase	
		Total	HGVs	Total	HGVs	Total	HGVs
A68 (South of Main St Roundabout)	Max	14059	543	14145	605	0.61%	11.34%
	Avg			14117	577	0.41%	6.19%
A68 (South of B6398)	Max	11389	456	11475	518	0.76%	13.51%
	Avg			11447	490	0.51%	7.37%
A68 (Monteath Mausoleum)	Max	7106	459	7192	521	1.21%	13.42%
	Avg			7164	493	0.82%	7.32%
A68 (East of A698)	Max	8041	363	8127	424	1.07%	16.98%
	Avg			8099	396	0.72%	9.26%
	Max	7834	415	7920	477	1.10%	14.84%

Link		2027 Baseline		2027 Baseline+ Construction		Increase	
		Total	HGVs	Total	HGVs	Total	HGVs
A68 (South of Bonjedward)	Avg			7892	449	0.74%	8.09%
A68 (South of Jedburgh)	Max	3306	231	3393	292	2.60%	26.71%
	Avg			3365	264	1.76%	14.57%
A68 (North of Huntford)	Max	3294	237	3380	299	2.61%	26.00%
	Avg			3352	271	1.76%	14.18%
A6088 (Kirkton)	Max	1242	70	1267	70	1.97%	0.00%
	Avg			1253	70	0.85%	0.00%
A6088 (Southdean)	Max	407	28	431	28	6.02%	0.00%
	Avg			417	28	2.58%	0.00%
A68 (Carter Bar)	Max	2580	168	2660	223	1.97%	15.74%
	Avg			2638	211	1.14%	8.59%
A68 (South of Cottonshopeburnfoot)	Max	3437	269	3517	325	1.48%	9.80%
	Avg			3496	313	0.86%	5.34%
A696 (Elishaw)	Max	1551	199	1618	241	2.43%	6.63%
	Avg			1595	235	0.95%	3.61%
A68 (South of West Woodburn)	Max	2772	128	2809	141	1.36%	10.32%
	Avg			2786	135	0.53%	5.63%

Table 12.9: Predicted Increases in Traffic – Scenario 2

Link		2027 Baseline		2027 Baseline+ Construction		Increase	
		Total	HGVs	Total	HGVs	Total	HGVs
A68 (South of Main St Roundabout)	Max	14059	543	14100	560	0.29%	3.09%
	Avg			14096	556	0.26%	2.32%
A68 (South of B6398)	Max	11389	456	11430	473	0.36%	3.68%
	Avg			11426	469	0.33%	2.76%
A68 (Monteath Mausoleum)	Max	7106	459	7147	476	0.58%	3.66%
	Avg			7143	472	0.52%	2.74%
A68 (East of A698)	Max	8041	363	8082	380	0.51%	4.63%
	Avg			8078	375	0.46%	3.47%
A68 (South of Bonjedward)	Max	7834	415	7875	499	0.53%	20.23%
	Avg			7871	453	0.47%	9.15%
A68 (South of Jedburgh)	Max	3306	231	3348	247	1.25%	7.28%
	Avg			3344	243	1.12%	5.46%

Link		2027 Baseline		2027 Baseline+ Construction		Increase	
		Total	HGVs	Total	HGVs	Total	HGVs
A68 (North of Huntford)	Max	3294	237	3335	254	1.25%	7.09%
	Avg			3331	250	1.13%	5.32%
A6088 (Kirkton)	Max	1242	70	1253	70	0.85%	0.00%
	Avg			1253	70	0.85%	0.00%
A6088 (Southdean)	Max	407	28	417	28	2.58%	0.00%
	Avg			417	28	2.58%	0.00%
A68 (Carter Bar)	Max	2580	168	2631	204	0.86%	4.29%
	Avg			2629	202	0.79%	3.22%
A68 (South of Cottonshopeburnfoot)	Max	3437	269	3489	306	0.65%	2.67%
	Avg			3487	304	0.59%	2.00%
A696 (Elishaw)	Max	1551	199	1591	232	0.72%	1.81%
	Avg			1590	231	0.66%	1.36%
A68 (South of West Woodburn)	Max	2772	128	2783	131	0.40%	2.81%
	Avg			2782	131	0.37%	2.11%

Scenario 1: Traffic Increase Summary

12.7.5 The results above show that all percentage increases in total traffic volumes as well as HGVs are below the IEMA thresholds (i.e., an increase of 30%).

12.7.6 The largest increase is where the total traffic flows increase by 2.60% (26.71% HGV increase) for a worst case day.

12.7.7 The average day during the construction period would see only a 1.76% increase to total traffic flows with a corresponding 14.57% increase in HGVs.

12.7.8 In summary, for Scenario 1, total traffic levels as well as the HGV levels are within the IEMA threshold of a 30% increase in traffic flows for both the worst case scenario and for an average day.

Scenario 2: Traffic Increase Summary

12.7.9 The results above show that all percentage increases in total traffic volumes are below the IEMA thresholds (i.e., an increase of 30%).

12.7.10 Under Scenario 2, the largest increase would be where the total traffic flows increase by 2.58% along the A6088 near Southdean with 20.23% HGV increase along the A68 south of Bonjedward for a worst case day.

12.7.11 On an average day during the construction period, a 2.58% increase to total traffic flows along A6088 near Southdean and 9.15% increase to HGVs would be experienced along the A68 south of Bonjedward.

12.7.12 In summary, for Scenario 2, total traffic levels as well as HGV levels are within the IEMA thresholds of a 30% increase to traffic flows for both the worst case scenario and the average day.

12.8 Potential Effects

Effect on Driver Severance and Delay

12.8.1 The IEMA guidance states that there are a number of factors which determine driver severance and delay: these include delay caused by additional turning vehicles and additional cars parked at the site, delays at junctions due to increased traffic, as well as delays at side roads due to reduced gaps in the oncoming traffic.

12.8.2 The principal road network in the Study Area consists of high-quality A68 and A6088 roads suitable of carrying HGVs. The use of well-established quarried material suppliers to the north of the Proposed Development location would assist in reducing excess mileage used to transport materials to the site. Accordingly, these receptors are of low and medium sensitivity. Magnitude of impact by the construction phase HGV traffic is typically minor to moderate, resulting in a level of effect on driver severance and delay of **Slight to Moderate** impact respectively, and therefore **not significant.**

12.8.3 The main potential impact of driver severance and delay would relate to the transportation of abnormal loads, which are set out in paragraphs 12.6.6 to 12.6.7.

Effect on Road Safety

12.8.4 **Table 12.2** and **Table 12.3** define road safety as a high sensitivity receptor with a magnitude of impact based on the volume of accidents along the routes used to the project area. An increase, or decrease, in accidents may result from changes in traffic flows and the composition of traffic on the local highway network.

12.8.5 The accidents recorded within the Study Area are set out in paragraphs 12.5.8 to 12.5.9. A total of 86 injury accidents were recorded within the study area: 50 resulting in a slight injury, 31 resulting in serious injury and 5 resulting in fatal injuries.

12.8.6 There would be a moderate increase in HGVs against baseline HGV flows: however, these would be spread evenly throughout the working hours of 07:00 to 19:00 Monday to Friday and 08:00 to 13:00 on a Saturday.

12.8.7 Abnormal loads would be delivered to the site under police escort. Other large components would be moved in accordance with an agreed Construction Traffic Management Plan (CTMP).

12.8.8 The movement of abnormal loads has the potential to create a general hazard on the road. All turbine components would be transported from Port of Blyth along the A1, A696, A68 and A6088 to the site. The abnormal loads must be delivered to the site under controlled conditions with a suitable escort. The manner in which abnormal loads are transported along the public /trunk road network would be subject to the approval of Transport Scotland, SBC, Northumberland County Council and respective Police forces in advance and would be planned to ensure road safety is not compromised.

12.8.9 In summary, the Proposed Development would create a moderate increase to HGV traffic levels within the Study Area, but these levels would remain within the design capacity of the local road network. The accidents record for the Study Area over the five-year study period is good. Therefore, the level of effect on road safety is considered to be **Moderate** and, therefore, **significant.**

Effect on Community Severance and Delay

12.8.10 The IEMA guidance identifies severance as '*the perceived division that can occur within a community when it becomes separated by a major traffic artery'*. As an example, a road that passes through a community such as a town or village, where amenities may be located on one side of the road and residential properties are located on the other side, causes severance to the movements between those places. The degree of severance depends on the traffic levels on the road and the presence of adequate crossing opportunities.

12.8.11 There are local amenities directly fronting the A68 whilst passing through Jedburgh, although the majority of these are within the town's 20mph speed restriction zone, where traffic would be travelling at low speeds.

12.8.12 In accordance with significance criteria in **Table 12.3** community severance has been classified as a medium sensitivity receptor and the magnitude of change of the Proposed Development on community severance would be moderate (<60% increase in traffic). Therefore, the effect is considered **Moderate** and, therefore, **significant**, for Scenario 1.

12.8.13 For Scenario 2 the magnitude of change of the Proposed Development on community severance is minor (<30% increase in traffic). Therefore, the effect is considered **Slight** and therefore **not significant**.

Effects on Noise and Vibration

12.8.14 The effects of noise can be high in relation to sensitive receptors such as those residential properties which are sparsely present within the study area. A noise assessment has been undertaken for the Proposed Development and is presented in **Chapter 10: Noise and Vibration.**

12.8.15 As discussed in **Table 12.2**, the IEMA Guidelines state that an increase in noise, due to an increase in total traffic of less than 25%, is deemed a negligible noise impact to receptors, with anything greater than 25% requiring a quantitative assessment.

12.8.16 The maximum traffic increase predicted for the Proposed Development is 86 two-way vehicle movements per day for Scenario 1 on A68 North of A6088/A68 junction and 41 two-way vehicle movements per day for Scenario 2 on A68 North of A6088/A68 junction.

12.8.17 This is 2.6% of the current number daily vehicle movements along the section of A68 passing through Jedburgh in Scenario 1 and 1.24% for Scenario 2 and hence, the traffic noise effects are considered to be **Slight** and **not significant**. This corresponds with the findings of the noise assessment which describes the full environmental effects of noise and vibration in **Chapter 10: Noise and Vibration**.

Effects on Vulnerable Users

12.8.18 Vulnerable road users are considered to be a high sensitivity receptor according to the assessment criteria detailed in **Table 12.3**.

12.8.19 The impact of traffic on vulnerable road users would be most noticeable within settlements along the proposed access routes where the presence of road users such as pedestrians and cyclists are highest.

12.8.20 The percentage increase in traffic would be less than 10% for both scenarios. The majority of trip generation from the Proposed Development would arise from 20 tonne HGVs. Consequently, there would be a potential worsening of conditions for vulnerable users during the construction period. This magnitude of effect is considered to be moderate and the effect on vulnerable road users for both Scenario 1 and 2 is considered to be **Major** during the construction period and **significant** in terms of the EIA regulations.

Effects Due to Dust and Dirt

12.8.21 The movement of construction traffic to and from the project area would have the potential to bring dust and dirt and other detritus onto the highway. Sensitive receptors within the study area include residential properties, B&Bs, local shops and other facilities, which may experience dust and dirt and have been classified as low to medium sensitivity receptors.

12.8.22 HGVs are likely to create the greatest impact in terms of dust and dirt with an anticipated significant increase of HGV traffic on the A68 – South of Jedburgh for the worst case day for Scenario 1 with a predicated maximum increase of 26.71% and on the A68 – South of Bonjedward with predicted increase of 21.87% for Scenario 2 with average day increases of 14.57% for Scenario 1 and 9.15% for Scenario 2.

12.8.23 Given that the magnitude of effect of dust and dirt have been classified as minor (<30% increase) and would affect medium sensitivity receptors, the potential effect would be **Moderate** and therefore **not significant** for both scenarios.

Impact Caused by Movement of Abnormal Loads

12.8.24 The route proposed for the delivery of abnormal loads from Port of Blyth to the site is considered suitable for such movements, subject to the potential need for localised temporary works at junctions to facilitate movements. Any modifications to junction layouts would be confirmed through trial run and further surveys, and any modifications or works required to accommodate abnormal loads would be discussed with the relevant Roads Authority and the necessary consents and permits would be obtained in advance of any works or delivery periods.

12.8.25 Transportation of the turbine equipment as abnormal loads would lead to the following effects:

- the rolling closures of roads and footways causing temporary driver and pedestrian delay; and
- the perceived effect to pedestrians and vulnerable road users caused by the movement of large turbine components in proximity to property and infrastructure.

12.8.26 The severity of these impacts is considered as follows:

- delays due to lane/road closures would be inevitable, although abnormal loads would be timed to avoid the peak hours and therefore abnormal loads would have a temporary slight adverse effect; and

- the perceived effect to residents is subjective and it is likely that the transport of abnormal loads close to properties may lead to local objection, stress, and anxiety.

12.8.27 The residential properties, B&Bs, local shops and other facilities within the Study Area are classed as high sensitivity receptors.

12.8.28 The magnitude of change of transporting the abnormal loads during the day would be moderate and therefore consideration could be given to abnormal load deliveries being undertaken overnight to reduce the potential for disruption and delay, subject to approval. However, this would depend on the type of transport vehicle used and only by agreement with the relevant authorities

Cumulative Effects

12.8.29 Paragraph 2.1.5 in **Chapter 2** of this EIA Report provides information on the potential cumulative developments within the Study Area.

12.8.30 The cumulative assessment of traffic, transport and access effects only considers wind farms that are approved, approved, but not yet under construction, submitted, but pending decision or at appeal as only these schemes may potentially be under construction concurrently with the Proposed Development and therefore provides the potential for significant cumulative construction effects. The timescale for delivery of proposals currently in Scoping to successfully securing planning consent is considered to be of a duration by which it is unlikely that cumulative construction would occur. There is no potential for significant cumulative effects to occur from those wind farms which are operational, due to the minimal vehicle trips attributed to the operational phase of a development.

12.8.31 Secondly, cumulative effects are only considered for wind farm proposals which meet the former criteria, and where they use any of the road network utilised by traffic associated with the construction, operation and decommissioning phases of the Proposed Development.

12.8.32 After analysis of the available data for the developments identified in **Chapter 2** of this EIA Report it is concluded that none of the developments meet the criteria outlined in the paragraphs 12.8.30 and 12.8.31. Therefore, no cumulative assessment is required.

Residual Effects

12.8.33 Given the temporary nature of construction programme (21 months), and with the implementation of mitigation measures through a CTMP and ATMP, all effects can be effectively managed and mitigated and are assessed to be **Minor or Negligible** and **not significant**. No residual significant effects remain after mitigation measures have been implemented.

12.9 Mitigation

Construction Phase Mitigation

12.9.1 A CTMP would be in place to actively mitigate the predicted effects as discussed above.

12.9.2 The following measures would be implemented through a CTMP during the construction phase. The CTMP would be agreed with SBC prior to construction works commencing:

- where possible, further detailed design processes would minimise the volume of material to be imported to site to help reduce HGV numbers;
- a site worker transport and travel arrangement plan, including transport modes to and from the worksite (including pick up and drop off times);
- a Traffic Management Plan to control the operation of the access junctions;
- all materials delivery lorries (dry materials) should be sheeted to reduce dust and stop spillage on public roads;
- specific training and disciplinary measures should be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway;
- wheel cleaning facilities would be provided at both access junctions;
- normal site working hours would be limited to between 07:00 and 19:00 (Monday to Friday) and 08:00 and 13:00 (Saturday) though component delivery and turbine erection may take place outside these hours; and
- all drivers would be required to attend a detailed induction prior to undertaking any works on the Proposed Development site.

12.9.3 Advance warning signs would be installed on the approaches to the affected road network. Information signage could be installed to help improve driver information and allow other road users to consider alternative routes or times for their journey (where such options exist).

12.9.4 The location and numbers of signs would be agreed post consent and would form part of the wider traffic management proposals for the Proposed Development.

12.9.5 A police escort would be required to facilitate the delivery of the predicted abnormal loads. The police escort would be further supplemented by a civilian pilot car to assist with the escort duty. It is proposed that an advance escort would warn oncoming vehicles ahead of the convoy, with one escort staying with the convoy at all times. The escorts and convoy would remain in radio contact at all times where possible.

12.9.6 The abnormal loads convoys would be no more than four-long, or as advised by the police, to permit safe transit along the delivery route and to allow limited overtaking opportunities for following traffic where it is safe to do so.

12.9.7 The times in which the convoys would travel would need to be agreed with Police Scotland who have sole discretion on when loads can be moved.

Operational Phase Mitigation

12.9.8 The site entrance would be well maintained and monitored during the operational life of the Proposed Development. Regular maintenance would be undertaken to keep the site access track drainage systems fully operational and the road surface in good condition and to ensure there are no adverse issues affecting the public road network.

12.10 Summary of Effects

12.10.0 **Table 12.18** provides a summary of the construction environmental effects, in terms of transport and access, of the Proposed Development.

Table 12.10: Summary of Access, Traffic and Transport Effects

Potential Impact	Duration	Sensitivity	Magnitude	Effect	Significance
Driver severance and delay	Temporary	Low to Medium	Minor to Moderate	Slight to Moderate	Not Significant
Community severance and delay	Temporary	Medium	Moderate	Minor to Moderate	Not Significant
Vulnerable Road Users	Temporary	High	Moderate	Major	**Significant**
Noise and vibration	Temporary	Medium	Negligible	Negligible	Not Significant
Road Safety	Temporary	High	Moderate	Moderate	Significant
Abnormal loads	Temporary	High	Minor	Moderate	Significant
Dust and dirt	Temporary	Medium	Minor	Slight	Not Significant

12.10.1 **Table 12.19** provides a summary comparing the significance of the effects during the construction period before and after the implementation of the mitigation proposed in **Section 12.9** of this chapter.

Table 12.11: Summary of Pre/Post Mitigation Access, Traffic and Transport Effects

Potential Impact	Pre-mitigation		Proposed Mitigation	Post-mitigation residual effects	
	Magnitude	Significance		Magnitude	Significance
Driver severance and delay	Minor/ Moderate	Not Significant	Implementation of an approved CTMP. Trial Run for abnormal loads prior to commencement of construction. Road condition survey (including assessment of existing structures as appropriate) prior to the commencement of construction and a similar assessment following completion of the works. Good construction practices including wheel	Minor	Not Significant
Community severance and delay	Moderate	Significant		Minor	Not Significant
Vulnerable Road Users	Moderate	Significant		Minor	Not Significant
Noise and vibration	Negligible	Not Significant		Minor	Not Significant
Road Safety	Moderate	Significant		Minor	Not Significant
Abnormal loads	Moderate	Significant		Minor	Not Significant
Dust and dirt	Minor	Not Significant		Minor	Not Significant

			wash and careful loading.		

12.11 References

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13 AVIATION AND RADAR

13.1 Introduction

13.1.1 This chapter considers the potential effects of the Proposed Development on existing and planned military and civil aviation activities, including those resulting from impacts to radar. Other potential effects result from the physical presence of the turbines as obstacles, and effects on navigational aids ('Navaids') and radio communication stations.

13.1.2 The chapter includes a description of the assessment methodology that has been adopted, the consultations conducted, relevant policy and legislation, the overall baseline conditions, the criteria used to assess the significance of potential impacts and measures that would be taken to mitigate any significant impacts. The chapter concludes with a summary of the impacts and mitigation requirements.

13.1.3 Radio waves are used in a variety of Navaids, radio communication systems and radar; any large structure has the potential to interfere with their propagation and reception. Radars are designed to detect movement; hence, a turbine's rotating blades can be interpreted as aircraft, with the potential to then affect air traffic management.

13.1.4 Wind turbines can also have an impact on flying, simply by virtue of their physical presence. In this respect they are no different to any other tall obstacles such as pylons or television masts, with recognised criteria for safeguarding the airspace around airfields. Away from airfields, such obstacles are a normal part of the aviation scenery and measures are in place to enable aircraft to safely navigate around them.

13.1.5 The potential effects are highly dependent on the location of the wind farm and on the positions of the individual turbines. In some cases, there are no significant consequences, and no mitigation is required; whilst, in other cases, the turbine specification or layout must be designed to accommodate local infrastructure. Mitigation is often available and appropriate to manage impacts.

13.2 Scope and Methodology

13.2.1 The requirement is for the Proposed Development to have no significant residual impacts on aviation infrastructure. This is addressed through consultation with all relevant stakeholders within the consenting process. The task of the applicant is to independently assess the potential effects and, where significant effects may occur, to enter a dialogue with the affected stakeholders prior to submission as far as is possible. Whilst the aim of this pre-submission dialogue is to elicit the approval of all stakeholders, typically solutions are identified, but do not reach full maturity in terms of the assessment by the stakeholders and the contracting of mitigation where required. The stakeholders consider dialogue a higher priority and more meaningful once design iterations are completed and a live application exists.

13.2.2 An initial Scoping assessment identified those stakeholders potentially affected by the Proposed Development. The assessment process involves considering all military and civil aerodromes in the wider area out to approximately 60 km; all radar installations out to the limit of their range; all navigational aids; air-ground-air communications stations and low flying activities. A key sensitivity is the visibility of the Proposed Development to those radars potentially affected. As a result of this, studies have been conducted prior to submission to assess the visibility of the Proposed Development to all relevant radars in the area.

13.2.3 As the Proposed Development includes structures over 150 m high, there is a statutory requirement for aviation lighting on the Proposed Development. The precise details of the lighting would be agreed with the Civil Aviation Authority (CAA) prior to construction. The requirements for the lighting of En–route obstacles (i.e., those away from the vicinity of a licensed aerodrome) are set out in Article 222 of the UK Air Navigation Order (ANO) 2016 as modified by the June 2017 CAA Policy Statement: ‘Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150 m Above Ground Level’. Article 222 requires medium intensity (2000 candela) steady red aviation warning lights to be mounted as close as possible to the top of all structures, at or above 150 m above ground level (AGL) and illuminated at night. In terms of requirement for lighting wind turbines generators, the CAA interprets this as the fitting of lights on the top of the supporting structure (the nacelle), rather than the blade tips. Additionally, the 2017 Policy Statement requires at least three (to provide 360-degree coverage) low-intensity lights (32 candela) be provided at an intermediate level of half the nacelle height. The lights should be turned on only when illuminance reaching a vertical surface fall below 500 LUX (dusk like conditions). If the horizontal meteorological visibility in all directions from every wind turbine generator in the Proposed Development is more than 5 km, the intensity of the nacelle mounted lights may be reduced to not less than 10% of the minimum peak intensity specified for a light of this type.

13.2.4 If four or more wind turbine generators are located together in the same group, with the permission of the CAA, only those on the periphery of the group need be fitted with a light and intermediate lights may not be required. Where acceptable to airspace users, and very much subject to the specific location, the CAA has increasingly supported the use of visible spectrum lighting of the cardinal turbines only; these being the ‘corner’ turbines that mark the geographical extent of the development and in addition removing the requirement for any lights on the towers. In addition to this, infra-red lights would be used on all peripheral turbines. This reduces the visual impacts of the lighting scheme.

13.2.5 The Proposed Development is located within the Consultation Zone of the Eskdalemuir Seismic Array (see **Table 13.1**). A desk-based study to inform the seismic impact of the turbines of the Proposed Development in the Eskdalemuir Consultation Zone has been undertaken. This desk-based study assesses the vibration impact of the Proposed Development on the MoD’s Eskdalemuir Seismic Array and is included as Technical **Appendix 13.1**.

13.3 Consultation Undertaken

13.3.1 Consultation has been undertaken with National Air Traffic Services (NATS), the UK Civil Aviation Authority (CAA) and the Ministry of Defence (MoD) as relevant stakeholders as part of the Scoping process with the Energy Consents Unit. The CAA was consulted only with respect to the provisional approval of the lighting design, as it does not have a wider role in commenting on specific wind energy proposals, other than through the provision of guidance to all stakeholders. Summaries of Scoping responses are set out in **Table 13.1**.

Table 13.1: Aviation Consultee Responses

Consultee	Response
CAA	Response on lighting design outstanding at the time of submission.
Defence Infrastructure Organisation/MoD	The MoD raised concerns in relation to the Eskdalemuir Seismological Recording Station (the 'array'), impacts to Threat Radar and to the ATC radars at Spadeadam Deadwater Fell and Great Dun Fell. This site is within the statutory consultation zone of the array, a UK asset that contributes to the Comprehensive Nuclear Test Ban Treaty. In order to ensure the United Kingdom can continue to implement its obligations in maintaining the Comprehensive Nuclear Test Ban Treaty a noise budget, for the 50 km radius surrounding the array, is managed by the MoD. At this time, there is no noise budget available. Therefore, this proposed wind energy development will be of concern due to the impact upon the array. The Proposed Development is in the vicinity of sites used by the RAF Spadeadam electronic warfare tactical training facility and may cause unacceptable interference to the operation of threat radars that can be deployed at these sites. The proposed turbines are likely to be detected by the threat radar systems when operated at the Wigg Knowe, Monkside and Larriston Fell threat radar sites. The turbines will be approximately 9.3 km from, detectable by, and will cause unacceptable interference to the ATC radar at RAF Spadeadam Deadwater Fell. This primary surveillance radar is used by RAF Spadeadam to manage air traffic movements in the locality of the electronic warfare tactics facility. The turbines will be approximately 74.8 km from, detectable by, and will cause unacceptable interference to the ATC radar at Great Dun Fell which provides a data feed to the Air Traffic Control Radar at Warton Aerodrome. The development site occupies Tactical Training Area 20T (TTA 20T). The proposed turbines will impact upon military low flying training activities conducted in this area. To mitigate this impact aviation safety lighting would be required in accordance with the Air Navigation Order 2016.
NATS	NATS considers the predicted impacts on the Great Dun Fell En-route radar to be unacceptable. It also notes that the MOD, as a user of their radar services, considers the impacts to this radar to be unacceptable. A technical mitigation has been approved by NATS.
Police Scotland and Scottish Air Ambulance	Have responded to the proposed lighting scheme stating that the proposed visible spectrum and IR cardinal lighting scheme is acceptable to our flying operations in support of the Scottish Ambulance Service and Police Scotland.
Edinburgh Airport – BAA Aerodrome Safeguarding	Declared that the location of the Proposed Development falls out with the Aerodrome Safeguarding Zone for Edinburgh Airport and, therefore, no further consultation was required.
Newcastle Airport	Declared that given the location of the Proposed Development in relation to arriving/departing and Lower Airspace Radar service (LARS) traffic there is to be no significant risk and, therefore, no further consultation was required.

13.3.2 Aviation consultee responses are discussed in detail within the 'predicted impacts' **Section 13.6**.

13.4 Statutory and Planning Context

13.4.1 The relevant sections of key legislation, policy and guidance documents are described below, which together place a responsibility on the decision maker and the applicant to assess potential impacts on aviation.

Legislation

13.4.2 CAA CAP 393 (February 2021), The Air Navigation Order (ANO) and Regulations, specifies the statutory requirements for the lighting of onshore wind turbines over 150 m tall.

Policy

Scottish Planning Policy (SPP), (2014)

13.4.3 The SPP states, under paragraph 169 on Development Management, that consideration should be given to the *"impacts on aviation and defence interests and seismological recording; [and] impacts on telecommunications and broadcasting installations, particularly ensuring that transmission links are not compromised".*

Scottish Onshore Wind Policy Statement (December 2017)

13.4.4 Under Chapter 4, Barriers to Deployment, it is noted wind developments can impact significantly on civil air traffic control primary radar systems because they appear as clutter on radar displays, potentially obscuring aircraft flying above them from view.

13.4.5 Paragraphs 61 to 66 of Chapter 4 specifically address impacts to civil aviation radar, extracted below:

"The main mitigation method which has been deployed in numerous schemes over a number of years involves 'in-filling' from a radar which has no line of sight of the turbines in question.

While this is a proven mitigation (albeit not one that can be deployed for every development), the Scottish Government recognises that it can result in a significant financial burden, especially in cases where more than one in-fill feed is necessary. Since the financial environment facing wind energy development has changed radically, we believe that we need to reconsider this approach.

The Scottish Government remains committed to working with airports, radar operators and the wind industry in order to pursue and develop a more strategic approach to mitigating impacts of wind development on civil aviation radar.

Wind farms are no longer the new and unexpected feature that they once were, and are an established part of Scotland's landscape. Given this, we expect in the longer term, a move on the part of the air navigation industry towards self-management of this issue. This could be achieved through the deployment of wind farm tolerant radar, or other technical solutions.

In the shorter term, we will support any strategic use of radar, with a special focus across the central belt, where there is potential to maximise the application of mitigation and reduce costs.

The Scottish Government will also continue to work as part of the UK Government Chaired Aviation Management Board (AMB), and as part of the Renewable UK Aviation Working Group to make progress on this issue."

Planning Circular 2/03: Safeguarding of Aerodromes, Technical Sites and Military Explosives Storage Areas (revised March 2016)

13.4.6 This Circular summarises the Scottish Ministers' understanding of the general effect of the relevant primary or secondary legislation.

13.4.7 It contains four annexes. Annexes 1 and 2 describe the formal process by which decision makers should take into account safeguarding, including in relation to wind energy developments. Annex 3 lists officially safeguarded civil aerodromes and Annex 4 lists planning authority areas containing civil En-route technical sites for which separate official safeguarding maps have been issued (as of 27th January 2003).

13.4.8 The Circular also refers planning authorities, statutory consultees, developers and others to CAA CAP 764 (CAA Policy and Guidance on Wind Turbines), which is discussed further under Guidance below, and The Meteorological Office (Met Office) guidelines.

CAA Policy Statement: Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150 m Above Ground Level (June 2017)

13.4.9 This policy statement highlights and clarifies the requirements set out in CAP 393, the Air Navigation Order, for the lighting of onshore turbines. Key sections are described further under the assessment methodology below.

Guidance

CAP 764: CAA Policy and Guidance on Wind Turbines (Feb 2016)

13.4.10 CAA guidance within CAP 764, sets out recommended consultation and assessment criteria for the impacts of wind turbines on all aspects of civil aviation.

13.4.11 The CAA involvement in the Wind Farm Pre-Planning Consultation Process ceased on 25th December 2010. CAP 764 now states that *"developers are required to undertake their own pre- planning assessment of potential civil aviation related issues."*

13.4.12 Within CAP 764 the CAA provides a chapter describing the "wind turbine development planning process", within which the main civil aviation stakeholders and their interests are listed and described in brief. Table 1 within the guidance document provides an overview of considerations and the following paragraphs detail what developers will need to consider, conducting associated consultations as appropriate.

13.4.13 The CAA observes in section 2.36 that impact on communications, navigation and surveillance infrastructure alone is not sufficient to support an objection; rather those impacts need to have a negative impact on the provision of an air traffic service.

13.4.14 The CAA notes in section 5.25 of CAP 764 that *"it is incumbent upon the developer to liaise with the appropriate aviation stakeholder to discuss – and hopefully resolve or mitigate – aviation related concerns without requiring further CAA input. However, if these discussions break down or an impasse is reached, the CAA can be asked to provide objective comment".*

13.4.15 Section 5.26 of CAP 764 states that *"the CAA will not provide comment on MoD objections or arguments unless such comments have been requested by the MoD."*

13.5 Baseline Environment

13.5.1 The Proposed Development site lies within a military tactical training area (TTA 20T) and the MoD safeguarding zone for the Eskdalemuir Seismological Array (the 'array'), that contributes to the Comprehensive Nuclear Test Ban Treaty. This is a 100 km diameter circular area centred upon the array, located within the Eskdalemuir Forest. As wind turbines generate ground noise at the low frequencies detected by the array, the MoD manages the total noise generated by wind turbines within this safeguarded area and object if the total noise budget is exceeded. Currently, the MoD is objecting to all new developments within the Eskdalemuir safeguarded area because there is no remaining noise budget, which has been allocated to operational, consented and in planning wind farm developments located in the safeguarded area, as of December 2017. On-going work with the Eskdalemuir Working Group (EWG) and the Scottish Government will potentially release sufficient budget for additional development within the region including the Proposed Development. The predicted levels of seismic vibration required by the site have been calculated using the best available science, as set out in **Technical Appendix 13.1**.

13.5.2 The site is close to a safeguarded MoD air traffic control radar called Spadeadam Deadwater Fell. This radar is used to provide services only when the TTA is active. It is not associated with any military aerodromes. The Proposed Development site is also in the vicinity of threat radar sites used by the RAF Spadeadam electronic warfare tactical training facility.

13.5.3 Across the entire UK, NATS En-route operate infrastructure to provide communication, navigation and surveillance services. In this area the visibility of the Proposed Development to the primary radars at Lowther Hill and Great Dun Fell require assessment.

13.5.4 Because the proposed turbines exceed 150m in height, there would be a requirement for visible spectrum aviation obstacle lighting, the details of which will need to be agreed with the CAA. In addition, infra-red lighting will be required by the MoD.

13.6 Predicted Impacts

13.6.1 Scoping consultation responses have been received from the MoD, NATS and Newcastle International Airport. Newcastle International Airport responded with no objection, whilst the MoD and NATS raised issues (presented in **Table 13.1** above), addressed below.

MoD

13.6.2 The MoD has raised concerns in relation to potential impacts to the Eskdalemuir Seismological Array, Spadeadam Deadwater Fell ATC radar, Great Dun Fell radar which provides a data feed to the Air Traffic Control Radar at Warton Aerodrome and to Threat radar when located at the Wigg Knowe, Monkside or Larriston Fell locations. It has also requested that, in order to address low flying impacts, aviation safety lighting should be fitted in accordance with the Air Navigation Order 2016.

13.6.3 The Proposed Development is within the Eskdalemuir seismological array safeguarding zone and hence the ground noise vibrations it would generate would be taken into account by the MoD.

13.6.4 All turbines generate some underground vibrations. The seismological array at Eskdalemuir detects low frequency vibrations associated with nuclear testing. It is fully effective provided the background levels of vibration are sufficiently low. As wind turbines generate some low frequency vibrations of the type being detected by the array, a total noise (vibration) budget has been set. This is managed by the MoD, with all existing and planned developments monitored out to 50 km from the array centre. Background noise levels beyond 50 km are too small to be of concern. Provided all consented and in planning developments cumulatively do not exceed the total noise budget, the MoD does not object on the grounds of impacts to the array. As consented and submitted developments at present do exceed the noise budget, the MoD is currently objecting to all applications within the safeguarded area.

13.6.5 The Proposed Development has partial visibility to the Spadeadam Deadwater Fell ATC radar. Only the westernmost turbines (T09, T10 and T11) are expected to be detectable. This is sufficient to cause unacceptable operational impacts at times when the radar is in use.

13.6.6 Threat radars are deployed to provide surface-to-air missile threat training to aircrew. The proposed turbines may be detected by threat radar when operated at the Wigg Knowe, Monkside, or Larriston Fell locations. Other proposed wind energy developments in the area have not been considered by the MoD to generate unacceptable impacts to the use of these threat radar systems. The Scoping response has only considered the potential for the proposed turbines to be visible to threat radar locations; it has not considered the operational impact significance and hence, once considered fully, it may determine that the impacts are manageable without mitigation.

13.6.7 The MoD is a user of NATS radar services, and it has raised an objection to the anticipated impacts to the NATS Great Dun Fell radar in both its direct response and within the NATS response as a NATS client. In addressing the impacts to the Great Dun Fell radar, the interests of both NATS and the MoD would be met.

NATS

13.6.8 The majority of the turbines are fully screened from all NATS radar. The westernmost turbines (T09, T10 and T11) have partial visibility to the primary radar at Great Dun Fell, with this visibility being sufficient to generate impacts. NATS has determined that the anticipated impacts are not acceptable, with mitigation being required before NATS is able to remove its objection to the Proposed Development. The applicant has accepted the impacts and the requirement to mitigate them.

13.7 Mitigation

Eskdalemuir Seismological Array

13.7.1 The MoD is working with the Scottish Government and the UK wind industry to enable additional development within the safeguarded area.

13.7.2 The Scottish Government recognises that the safeguarded area has a very high potential for wind energy and how the array is acting as a barrier to deployment at present. It is pro-actively working with the MoD and the wind industry to address the current constraint. It has established a working group which, in turn, has commissioned work to inform the group, with a view to changing policy to enable development within the safeguarded zone. The Eskdalemuir Working Group (EWG), first formed in 2004, was reformed in 2018 to find an enduring solution to unlock renewable potential in the area through collaboratively working with MoD, industry groups and developers. Potential enabling policy changes have been identified. In the minutes of the EWG meeting of 07 April 2022, the Scottish Government confirmed that publication of the final Onshore Wind Policy Statement is due by the end of 2022 and the intention remains that an energy policy, which seeks to maximise the deployment of renewables within the safeguarded zone, will be included in the final document.

13.7.3 Whilst the timescales are currently unclear, there is a strong prospect that changes to policy will enable the Proposed Development to be considered for consent. It is relevant to note that, at a range of approximately 34 km from the array centre, the potential noise contribution from the Proposed Development, is very low against the energy contribution it will make.

Spadeadam Deadwater Fell ATC Radar

13.7.4 The applicant recognises the potential for three turbines to generate impacts to the ATC radar at Spadeadam Deadwater Fell and the requirement to mitigate these impacts.

13.7.5 There are a number of potential routes to mitigation, both technical and operational. A new radar was installed at Spadeadam Deadwater Fell in 2022, and is due to go into service before the end of 2022. The new radar is a Thales Star NG, which Thales state has an in-built capability to mitigate the impacts of wind turbines. Whilst the radar is approved for military use, the wind turbine mitigation aspect of its performance has yet to be trailed and assessed by the MoD. Trials to assess the mitigation performance of the Star NG radar are anticipated, offering the potential for mitigation without any additional hardware or software installation. In the event the mitigation performance of the Star NG is not found to be adequate for the Proposed Development, alternative technical solutions are available, though also as yet not approved by the MoD.

13.7.6 The applicant will continue to explore all routes to mitigation and engage fully with the MoD to identify acceptable solutions and agree an appropriate Radar Mitigation Scheme.

Threat Radar

13.7.7 At the time of submission, DIO had not completed an operational assessment of the potential impacts to threat radar. Whilst the proposed turbines would be visible to threat radar when located the Wigg Knowe, Monkside and Larriston Fell sites, other proposed wind developments have had visibility to threat radar sites, but not attracted an objection at full submission. Hence the need for mitigation has not been established. In the event of an objection, the applicant will work with the MOD to identify and assess all potential mitigation measures.

NATS Great Dun Fell Radar

13.7.8 A technical mitigation solution has been agreed with NATS. This would remove the impacts affecting both NATS services and the MoD. The applicant would enter a contract for the mitigation with NATS directly. This would enable both NATS and the MoD to remove their objection to the NATS Great Dun Fell radar impacts, conditional upon the approved Radar Mitigation Scheme being implemented before turbine construction.

Aviation Obstruction Lighting

13.7.9 There is a statutory requirement to light the Proposed Development because the turbines exceed 150 m in height. However, because of the nature of the area, light pollution from aviation obstacle lighting is of concern to local communities. In balancing these two requirements, it is considered appropriate to implement a reduced lighting scheme, with not all turbines being lit. This can be acceptable to CAA where the night-time use of the airspace is only very rarely low flying VFR (Visual Flight Rules) traffic with no night vision goggles (NVGs).

13.7.10 A cardinal lighting scheme was proposed for consultation in May 2022. Stakeholder feedback has confirmed this is acceptable, with the final approval of the CAA outstanding at the time of submission.

13.7.11 In this case, six turbines are proposed to have nacelle mounted medium-intensity steady red (2000 candela) obstacle lights, operating from dusk until dawn. This would include the most elevated turbine, i.e., the turbine with the most elevated turbine tip, which in the case of the Proposed Development is T11. In addition, it is proposed that T01, T03, T08, T09 and T12 would be lit in order to define the geographical footprint of the Proposed Development.

Lighting Specification

13.7.12 The specification of the lighting is provided below:

- medium intensity steady red (2000 candela) lights on the nacelles of turbines T01, T03, T08, T09, T11 and T12 (six in total);
- a second 2000 candela light on the nacelles of the above turbines to act as alternates in the event of a failure of the main light;
- the lights on these turbines to be capable of being dimmed to 10% of peak intensity when the visibility as measured at the Proposed Development exceeds 5 km; and
- infra-red lights to MoD specification installed on the nacelles of all perimeter turbines, that is all turbines except T04, T05 and T13.

13.7.13 The CAA, together with the UK Wind Sector, is exploring the future use of Aircraft Detection Lighting Systems (ADLS). This can reduce the time that obstacle lights are on. The lights are triggered by the presence of any aircraft within a defined area around the development, otherwise remaining off. Such systems are unable to be used within the current regulatory environment, with anticipated changes offering the potential alongside UK airspace modernisation. Whilst the Proposed Development is unable to specify ADLS, the timescale to implementation may allow for the use of ADLS and its use would be reviewed at the time of implementation.

13.8 Summary of Effects

13.8.1 The MoD has raised concerns in relation to potential impacts to Eskdalemuir Seismological Array, Spadeadam Deadwater Fell ATC radar, Great Dun Fell radar which provides data to Warton Aerodrome and to Threat radar. It has also requested that, in order to address low flying impacts, aviation safety lighting should be fitted in accordance with the Air Navigation Order 2016.

13.8.2 The Proposed Development is within the safeguarded zone of the Eskdalemuir Seismological Array and hence, the noise vibrations it would generate would be considered by the MoD. As consented and submitted developments at present exceed the noise budget, the MoD is currently objecting to all applications within the safeguarded area. The Scottish Government confirmed that the intention remains that an energy policy, which seeks to maximise the deployment of renewables within the consultation zone, will be included in the final Onshore Wind Policy Statement due for publication in 2022.

13.8.3 As the Proposed Development is an average distance of 35.6km away from the Eskdalemuir seismic array it would have a relatively low seismic budgetary impact. Based on this mathematical analysis presented in **Technical Appendix 13.1**, the average value for measured data from ‘Phase 4’ work predicts that the Proposed Development would only require a seismic budget in the region of *c*.0.012189 nm. This result and its distance to the array shows the Proposed Development is an efficient use of any available seismic budget.

13.8.4 The Proposed Development has partial visibility to the Spadeadam Deadwater Fell ATC radar, requiring mitigation. There are a number of potential routes to mitigation, both technical and operational. A new Thales Star NG radar is due to go into service before the end of 2022. The equipment manufacturer, Thales, states that the radar has an in-built capability to mitigate the impacts of wind turbines. The wind turbine mitigation aspect of its performance has yet to be trialled and assessed by the MoD; however, trials are anticipated, offering the potential for mitigation without any additional hardware or software installation. Alternative technical solutions are available, although, they are not yet approved by the MoD. The applicant will continue to explore all routes to mitigation and engage fully with the MoD to identify acceptable solutions and agree an appropriate Radar Mitigation Scheme.

13.8.5 Threat radars are deployed to provide surface-to-air missile threat training to aircrew. The proposed turbines may be detected by threat radar when operated at several locations in the wider area. The MoD has yet to consider the technical and operational impacts in detail. Once considered fully, it may consider the impacts as manageable without mitigation, as has been the case for other proposed wind energy developments in the area.

13.8.6 The westernmost turbines, T09, T10 and T11, have partial visibility to the NATS primary radar at Great Dun Fell. Both NATS and the MoD, as a user of NATS radar services, have raised an objection to the anticipated impacts. A technical mitigation solution has been agreed with NATS. This would remove the impacts, otherwise affecting both NATS services and the MoD. The applicant would enter a contract for the mitigation with NATS directly, which would enable both NATS and the MoD to remove their objection, conditional upon the approved Radar Mitigation Scheme being implemented before turbine construction.

13.8.7 A cardinal lighting scheme of six lit turbines is proposed to mitigate both military and civil obstruction risks, requiring final approval from the CAA prior to implementation.

13.8.8 Infra-red lights to MoD specification would be installed on the nacelles of all perimeter turbines.

13.9 References

Civil Aviation Authority (2016), CAP 764: CAA Policy and Guidelines on Wind Turbines.

Civil Aviation Authority (2017), Policy Statement - Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground Level.

Civil Aviation Authority (2021), CAP 393: The Air Navigation Order 2016 (ANO) and Regulations.

Scottish Government (2016), Planning Circular 2/03: Safeguarding of Aerodromes, Technical Sites and Military Explosives Storage Areas.

Scottish Government (2014), Scottish Planning Policy.

Scottish Government (2017), Onshore wind: policy statement.

Scottish Government (2022), EWG Meeting Minutes – 07 April 2022.

14 SOCIO-ECONOMICS, LAND USE AND TOURISM

14.1 Introduction

14.1.1 This section will consider the socio-economic, tourism, recreation and land use effects potentially arising from the Proposed Development. It will identify the baseline socio-economic, tourism and recreation conditions and potential receptors; and how these may be impacted by the Proposed Development. It will also provide an account for any proposed mitigation; and potential residual effects arising once mitigation is considered.

14.2 Scope and Methodology

14.2.1 There are no UK regulations or standards to guide a socio-economic, land use, recreation and tourism impact assessment and, therefore, the assessment has been informed by professional experience and knowledge. Nevertheless, the predicted impacts will refer to guidance provided within 'Environmental Impact Assessment Handbook' published by NatureScot in 2018 (version 5). Reference to other technical assessments, where relevant to the Proposed Development will be made, e.g., landscape and visual assessment, noise, cultural heritage, and traffic and transportation assessment.

Guidance

14.2.2 The following documents have been considered for the assessment of potential effects of the Proposed Development on socio-economics, land-use, recreation and tourism:

- Scottish Government (2020) Towards a Robust, Resilient Wellbeing Economy for Scotland: Report of the Advisory Group on Economic Recovery;
- Scottish Government (2022) Scotland's National Strategy for Economic Transformation;
- Institute of Environmental Management and Assessment (IEMA) (2011) The State of Environmental Impact Assessment in the UK;
- Scottish Government (2018) Economic Action Plan 2019-20;
- Scottish Government (2014) National Planning Framework 3;
- Scottish Government (2021) Draft National Planning Framework 4;
- NatureScot (2018) Environmental Impact Assessment Handbook V5;
- BiGGAR Economics (2017) Wind Farms and Tourism Trends in Scotland;
- BiGGAR Economics (2021) Wind Farms and Tourism Trends in Scotland: Evidence from 44 Wind Farms;
- Scottish Renewables, SNH, SEPA, FCS, HES MSS and AECow (2019) Good Practice During Windfarm Construction;
- Scottish Borders Council (2016) Local Development Plan, Volume 1, Policies;
- Scottish Borders (2013) Economic strategy 2023 and action plan for the Scottish Borders;
- Climate Emergency Response Group (2020) Eight policy packages for Scotland's Green Recovery; and
- Scottish Government (2016) Draft Advice on Net Economic Benefit and Planning.

Study Area

14.2.3 The socio-economic effects will be considered on three different scales: local, regional and national. This is intended to encompass the areas where significant effects, as a result of the Proposed Development, on employment and the economy could occur. The local study area is based on Southdean Community Council area, in the south-east of the Scottish Borders. The regional study area is based on the Scottish Borders Council administrative area, and the national study area is based on Scotland as a whole.

14.2.4 A similar three-tiered approach has been implemented for the study area for tourism. The study area used within the assessment is up to 15 km from the Proposed Development. Tourism receptors, including accommodation, attractions and events will be identified in this study area.

14.2.5 A study area of 5 km from the land within the application boundary has been used to identify recreational receptors. Direct effects have only been assessed for receptors within the application boundary, while recreational impacts occurring outside the application boundary are deemed to be indirect.

14.2.6 The study area for land use covers all the land taken by the Proposed Development either temporarily during construction or permanently during operation.

Baseline Determination

14.2.7 Baseline conditions have been determined using desk-based survey techniques, including publicly available statistics and information. Data sources referred to in undertaking this assessment are referenced in full in this chapter. No specific field survey has been undertaken with regard to potential socio-economic, land use, recreation and tourism effects, although information has been gathered where relevant from surveys undertaken in respect of other disciplines, notably landscape and visual impact.

Scope of Assessment

Effects Assessed in Full

14.2.8 In response to the Scoping Opinion, issued by the ECU on the 27 May 2020, the assessment will consider potential employment and economic effects (direct, indirect and induced), tourism, recreation, land use, and cumulative effects. The assessment is presented in two parts, addressing both the construction phase aspects of the Proposed Development and the longer-term effects once the Proposed Development is constructed and operational.

Effects Scoped Out

14.2.9 As the construction phase of the Proposed Development would be relatively short term (21 months), it is not expected that construction workers from outside the Scottish Borders would have a significant effect on the demand for housing, health or educational services. Effects on demand for such community services have, therefore, been scoped out.

Approach to Assessment of Effects

Economic Effects

14.2.10 Economic output has been measured by estimating capital and operational expenditure within each study area. Additionally, gross value added (GVA[199]) arising from increased employment will be included.

14.2.11 The Proposed Development would also generate a beneficial effect on the local economy as a result of community funding provided by the applicant. In line with standard industry practice, the applicant would provide annual community funding of £5,000 per MW during the operational life of the Proposed Development. The total community funding would be around £390,000 per year, if the Proposed Development were to be consented and constructed. Following the Good Practice Principles for Community Benefit[200] the applicant is committed to the community benefit staying in the local area. In addition, there would be opportunities for the local community to take a share in the ownership of the Proposed Development. However, it must be noted that this will not be factored into the assessment as community benefit funding is not a material consideration in the planning decision.

Employment Effects

14.2.12 The employment effects that are attributable to the Proposed Development are divided into three components:

- **Direct:** the employment and other economic outputs that are directly attributable to the delivery of the Proposed Development. These include any new jobs that are created to manage and supervise the construction and operational phases of the Proposed Development and that are filled by employees of the applicant or the appointed contractor (or subcontracted employees).
- **Indirect:** employment and other outputs created in other companies and organisations that provide services to the Proposed Development (i.e., procurement and other supply chain effects).
- **Induced:** additional jobs and other economic outputs that are created in the wider economy as a result of the spending of employee incomes on locally produced goods and services (i.e., personal vehicle maintenance, food and drink etc) and other ripple effects that occur as a result of direct and indirect effects of the Proposed Development.

Land Use, Recreation, and Tourism Effects

14.2.13 Land use, recreation and tourism effects have been assessed qualitatively with reference to evidence from research and comparable wind farms and using professional experience and judgment.

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[199]Gross value added (GVA) measures the contribution to an economy of an individual producer, industry, sector or region.

[200] Scottish Government (2019), Community benefits from onshore renewable energy developments.

Available at: https://www.gov.scot/publications/scottish-government-good-practice-principles-community-benefits-onshore-renewable-energy-developments/ [accessed March 2022].

Effects Evaluation Methodology

14.2.14 The significance of the socio-economic, land use, recreation and tourism effects resulting from the Proposed Development have been assessed by combining the magnitude of impact and the sensitivity of receptor.

Sensitivity of Receptor

14.2.15 There are no published standards that define receptor sensitivity relating to socio-economic, land use, recreation and tourism assessment. As a general rule, the sensitivity of each receptor, or receptor group, is based on its importance or scale and the ability of the baseline to absorb, or be influenced, by the identified effects. For example, a receptor (such as a public footpath or a supply chain business) is considered less sensitive if there are alternatives with capacity within the study area. In assigning receptor sensitivity, consideration has been given to the following:

- the importance of the receptor e.g. local, regional and national;
- the availability of comparable alternatives;
- the ease at which the resource could be replaced;
- the capacity of the resource to accommodate the identified impacts over a period of time; and
- the level of usage and nature of users (e.g. sensitive groups such as people with disabilities).

14.2.16 Based upon professional judgement and experience on other large-scale projects, four levels of sensitivity are used: high; medium; low; and negligible. These are defined in Error! Reference source not found..

14.2.17 In considering the sensitivity of a receptor it is important to remember that, in the case of socio-economic, land use, recreation and tourism assessment, the sensitivity is often subjective and different receptors have differing sensitivities depending on matters, such as the economic profile of the local area, perception of the type of development and attitude to the potential benefits of a development. This assessment is based on the assumption of a worst case which assumes there is a negative perception of the Proposed Development.

Table 14.1: Socio-economic Sensitivity Criteria

Sensitivity	Description
High	The receptor: • has little or no capacity to absorb change without fundamentally altering its present character; or • is of high socio-economic, land use, recreational, or tourism value; or • is of national or international importance; or • is accorded priority in national policy; or • has no alternatives with available capacity within its study area; or • is a destination in its own right (as regards tourism and visitor attractions).
Medium	The receptor:

	• has moderate capacity to absorb change without fundamentally altering its present character; or • has a moderate socio-economic, land use, recreational or tourism value; or • is of regional importance; or • is accorded priority in local policy; or • has some alternatives with available capacity within its study area; or • is a destination for people already visiting the area (as regards tourism and visitor attractions); or • forms a cluster of low sensitivity receptors.
Low	The receptor: • is tolerant of change without detriment to its character; or • is of low socio-economic, land use, recreational or tourism value; or • is of local importance; or • is accorded low priority in policy; or • has a choice of alternatives with available capacity within its study area; or • is an incidental destination for people already visiting the area (as regards tourism and visitor attractions.
Negligible	The receptor is resistant to change and is of low socio-economic, land use, recreational or tourism value or there is a wide choice of alternatives with available capacity within its study area.

Magnitude of Impact

14.2.18 There are no published standards that define thresholds of magnitude for socio-economic, land use, recreation or tourism impacts. In order to aid clear and robust identification of significant effects, specific and targeted criteria for defining the magnitude of impacts have been developed for this assessment based on experience on other similar projects. The following four levels of magnitude have been adopted using professional judgement: high; medium; low and negligible. These impacts can be beneficial, adverse or neutral. Criteria for each of these levels of magnitude for each receptor group are set out in Error! Reference source not found..

Table 14.2: Magnitude of Impact

Receptor Group	High	Medium	Low	Negligible
Economy	An impact that would dominate over baseline economic conditions by >10 %.	An impact that would be expected to result in a moderate change to baseline economic conditions by >5 %.	An impact that would be expected to result in a perceptible difference from baseline economic conditions by >0.5 %.	An impact that would not be expected to result in a measurable variation from baseline economic conditions.

Receptor Group	High	Medium	Low	Negligible
Employment	An impact that would dominate over baseline labour market conditions and/or would affect a large proportion (>10 %) of the existing resident workforce.	An impact that would be expected to result in a moderate change to baseline labour market conditions and/or would affect a moderate proportion (>5 %) of the existing resident workforce.	An impact that would be expected to result in a perceptible difference from baseline labour market conditions and/or would affect a small proportion (>0.5 %) of the existing resident workforce.	An impact that would not be expected to result in a measurable variation from baseline labour market conditions.
Tourism and visitor economy	An impact that would dominate over baseline tourism and visitor economy conditions.	An impact that would be expected to result in a moderate change to baseline tourism and visitor economy conditions.	An impact that would be expected to result in a perceptible difference to baseline tourism and visitor economy conditions.	An impact that would not be expected to result in a measurable variation from baseline tourism and visitor economy conditions.
Tourism and visitor receptors	An impact that would be expected to cause a major restriction of access to or availability of tourism and visitor assets in the study area or would result in a major change to existing patterns of use.	An impact that would be expected to have a moderate restriction of access to or availability of tourism and visitor assets in the study area or would result in a moderate change to existing patterns of use.	An impact that would be expected to have a small restriction of access to or availability of tourism and visitor assets in the study area or would result in a small change to existing patterns of use.	An impact that would be unlikely to result in a noticeable difference to tourism and visitor assets in the study area.
Land use	An impact that would lead to a major restriction on the operation of a receptor, e.g. forestry business, or complete	An impact that would lead to a moderate to major restriction on the operation of the receptor.	An impact that would lead to a minor restriction on the operation of the receptor.	An impact that would lead to a negligible restriction on the use of the receptor.

Receptor Group	High	Medium	Low	Negligible
	closure of receptor.			
Cumulative	An impact that would lead to a major change to baseline conditions through interactions with other projects.	An impact that would lead to a moderate change to baseline conditions through interactions with other projects.	An impact that would lead to a minor change to baseline conditions through interactions with other projects.	An impact that would lead to a negligible change to baseline conditions through interactions with other projects.

Potential Effects

14.2.19 The level of effects matrix presented in **Table 14.3** provides a guide to how magnitude of impact and sensitivity of receptor were combined, but is not a substitute for professional judgement.

Table 14.3: Level of Effects Matrix

Sensitivity of Receptor	Magnitude of Impact			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

14.2.20 Effects may be positive (beneficial) or negative (adverse), and this would be specified where applicable. Where an effect is classified as major, this is considered to represent a 'significant effect' in terms of the EIA Regulations. Where an effect is classified as moderate, this may be considered to represent a 'significant effect', but should always be subject to professional judgement and interpretation; particularly where the sensitivity or impact magnitude levels are not clear or are borderline between categories, or the impact is intermittent. It should be noted that significant effects need not be unacceptable or irreversible.

Mitigation

14.2.21 The assessment takes account of any environmental principles that are incorporated into the design of the Proposed Development. These include good practice measures with regard to traffic management, control of noise and dust, signage and provisions for maintaining access for walkers. Any additional mitigation measures that would reduce the level of any significant effects are set out and considered prior to assessing residual effects.

Assessment Limitations

14.2.22 Data have been collated from published sources and comparable experience of similar developments. No surveys specific to the Proposed Development and in support of assessment have been completed.

14.2.23 The applicant has endeavoured to thoroughly report the potential local impact of the Proposed Development; however, detailed statistics relating to employment and the local economy were not always available so there are certain effects that are not possible to assess at a local level. As far as practicable, a realistic worst case approach to assessment has been undertaken.

14.2.24 While every effort has been made to ensure that key tourism and recreation facilities in the area have been identified, it is possible that there are a number of small attractions that will not have been identified through the data collection process.

14.2.25 In order to maximise the economic effects associated with the Proposed Development, it would be necessary for local contractors to engage with the opportunities that arise and increase awareness of these opportunities. Based on prior experience of construction of such developments, it is assumed that this would be the case for the purposes of this assessment.

14.3 Consultation Undertaken

14.3.1 Consultation with stakeholders has principally been conducted by way of the request for a formal Scoping Opinion. This, together with additional communication on socio-economic, land use, recreation and tourism issues, is summarised below in **Table 14.4.Error! Reference source not found.** shows the responses received during the consultation process and which have been addressed in this chapter.

Table 14.4: Scoping Responses Regarding Socio-economic, Land Use, Recreation and Tourism Considerations

Consultee	Scoping Consultation Response
Scottish Borders Council (SBC)	SBC would, particularly, wish to be assured that the specific impacts of this development would not have unacceptable effects on established local rural (particularly tourist) businesses and tourism generally.
Denholm & District Community Council	The area is popular with local and visiting walkers and riders and is important to the economy. Localised impacts on recreational routes should consider the overall impact on the area's tourism. The negative effect on property valuations and visitor numbers must be considered for the whole area, and not just in the immediate vicinity.
Hobkirk Community Council	The EIA should include thorough assessment of any negative socio-economic effects.

14.3.2

14.4 Statutory and Planning Context

Requirements of Legislation

The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017

14.4.1 The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 establish in broad terms what is to be considered when determining the effects of development proposals on socio-economics, land use, recreation and tourism. There is no specific legislation available on methods that should be used to assess the socio-economic, land use, recreation and tourism impacts of a proposed renewable energy development.

Electricity Act 1989

14.4.2 Schedule 9 of the Electricity Act states that any application for a generating station must show consideration for the preservation of amenity and the applicant must do what they reasonably can to mitigate for any adverse effects of the Proposed Development. However, Schedule 9 only refers to "*the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest*". There is no mention of socio-economic, land use, recreation or tourism interests.

Climate Change (Emissions Reduction Targets) (Scotland) Act 2019

14.4.3 This act sets out a legally binding target of achieving net zero by 2045 and an interim target of a 75% reduction in baseline emissions by 2030. Although not directly applicable to the assessment of potential socio-economic, recreation and tourism impacts, this act emphasises the importance of a just transition. According to section 35C, the transition to net zero should create work in a way that does not negatively affect the current workforce and economy.

Policy Context

14.4.4 A review of the national and local policy framework in relation to planning, economy, tourism and renewable energy has been undertaken and the relevant policy documents include:

- Scottish Planning Policy (2014) (SPP);
- National Planning Framework 3 (2014) (NPF3);
- National Planning Framework 4 – Consultative Draft (2021) (NPF4);
- Onshore Wind Policy Statement Refresh Consultation;
- Tourism Scotland 2020;
- Scotland Outlook 2030;
- Scotland's National Strategy for Economic Transformation;
- Scotland's Economic Action Plan 2019-20;
- Scottish Energy Strategy;
- Local Development Plan; and

- Adopted Scottish Borders Local Development Plan (2016);and
- Proposed Scottish Borders Local Development Plan (2021).
- Scottish Borders Economic Strategy 2023

14.4.5 Based on the existing and proposed national and local planning policy there is support for onshore wind and recognition of the potential growth developments can deliver within the economy; however, this should be balanced with other national objectives. There is also a clear national objective to grow the Scottish tourism industry and tourism policy identifies four areas as being key to the appeal of Scotland as a tourist destination:

- nature, heritage and activities;
- destination towns and cities;
- events and festivals; and
- business tourism.

14.4.6 National and local economic strategy highlights the need for a just green transition to a low carbon economy. Private investment towards net zero projects is identified as lever for promoting economic development, inclusive growth, jobs and wellbeing.

14.4.7 As part of the determination of onshore wind development planning applications, consideration must be given to the potential beneficial and adverse impacts on the economy, tourism and recreation, and land use.

Scottish Planning Policy (2014) (SPP)

14.4.8 It is clear from SPP that the Scottish Government is committed to developing further renewable energy projects and paragraph 153 of SPP advises that:

14.4.9"*Efficient supply of low carbon and low cost heat and generation of heat and electricity from renewable energy sources are vital to reducing greenhouse gas emissions and can create significant opportunities for communities. Renewable energy also presents a significant opportunity for associated development, investment and growth of the supply chain"* (Page 36).

14.4.10 Paragraph 80 states that:

14.4.11 *"Where it is necessary to use good quality land for development, the layout and design should minimise the amount of such land that is required. Development on prime agricultural land, or land of lesser quality that is locally important should not be permitted except where it is essential:*

14.4.12 *….to meet an established need, for example for essential infrastructure, where no other suitable site is available; or…*

14.4.13 *for the generation for energy from a renewable source or the extraction of minerals where this accords with other policy objectives and there is secure provision for restoration to return the land to its former status.*"

14.4.14 SPP Paragraph 29 requires that policies and decisions should, amongst other matters, give "*due weight to net economic benefit*".

14.4.15 SPP Paragraph 169 requires that the planning system supports the transformational change to a low carbon economy, consistent with national objectives and targets. Considerations in respect of proposals for onshore wind that are relevant to this assessment include:

- net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities;
- the scale of contribution to renewable energy generation targets;
- public access, including impact on long distance walking and cycling routes and scenic routes identified in the national planning policy framework (NPF); and
- impacts on tourism and recreation.

14.4.16 Paragraph 79 also requires that the planning system promotes economic activity and diversification including, where appropriate, sustainable development linked to renewable energy developments.

National Planning Framework 3 (2014) (NPF3)

14.4.17 NPF3 is the spatial expression of the Government's Economic Strategy and sets out a long-term vision for where development and investment are needed across Scotland to support sustainable and inclusive growth. NPF3 aims "*to share the benefits of growth by encouraging economic activity and investment across all of Scotland's communities, whilst protecting our natural and cultural assets*".

14.4.18 NPF3 states that in order to help make Scotland a low carbon place, the spatial strategy suggests: "…*to retain the benefits of renewable energy development in Scotland by supporting investment at key sites across the country*."

14.4.19 A sustainable, economically active rural area, which attracts investment and supports vibrant, growing communities, is said to be essential to the Government's vision. NPF3 indicates that the future of the renewables sector in Scotland will be key to bringing new employment to Scotland's remote areas and that rural communities will benefit from well-planned renewable energy development.

14.4.20 NPF3 also sets out that development of a national long-distance walking and cycling network will link key outdoor tourism locations across the country and will be an important tourism asset in its own right; as such, it is identified as a National Development. National Cycle Network Route 1 (NCN1) bounds the north of the turbine area. It is also proposed that local communities can benefit from creation of the National Walking and Cycling network by connecting it with the local core path network. There is a Heritage Path bounding the north of the turbine area and directly connected to NCN1. Potential impacts to these routes have been considered.

National Planning Framework 4 – Consultative Draft (2021) (NPF4)

14.4.21 The draft NPF4 was published by the Scottish Government in 2021, this follows the November 2020 Position Statement which aimed to inform further discussions and was not itself a document setting out policy. Draft NPF4 highlights onshore wind as a development priority. **Table 14.5** provides an overview of the key draft policies most relevant to the Proposed Development.

14.4.22 The framework also provides policies that encourage the sustainable development and economic growth of rural areas. The main strategy is to increase the population of rural Scotland and the Islands by building low carbon rural communities and promoting local jobs and businesses.

14.4.23 Table 14.5: Draft NPF4 policy most relevant to the Proposed Development

Policy Reference	Title	Relevant Policy Summary
Policy 19	Green Energy	Development proposals for all forms of renewable energy and low-carbon fuels, together with enabling works such as transmission and distribution infrastructure, and energy storage such as battery storage, should be supported in principle. Development proposals for wind farms in National Parks and National Scenic Areas should not be supported. Outwith National Parks and National Scenic Areas and recognising the sensitivity of any other national or international designations, development proposals for new wind farms should be supported unless the impacts identified (including cumulative effects), are unacceptable. To inform this, site specific assessments including where applicable Environmental Impact Assessments (EIA) and Landscape and Visual Impact Assessments (LVIA) are required. Areas identified for wind farms should be suitable for use in perpetuity. Consents may be time-limited but wind farms should nevertheless be sited and designed to ensure impacts are minimised and to protect an acceptable level of amenity for adjacent communities. Specific considerations will vary relative to the scale of the proposal and area characteristics but development proposals for renewable energy developments must take into account: • net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities; • the scale of contribution to renewable energy generation targets; • effect on greenhouse gas emissions reduction targets; • cumulative impacts – taking into account the cumulative impact of existing and consented energy development; • impacts on communities and individual dwellings, including visual impact, residential amenity, noise and shadow flicker; • landscape and visual impacts, including effects on wild land; • effects on the natural heritage, including birds; • impacts on carbon rich soils; • public access, including impact on long distance walking and cycling routes and scenic routes; • impacts on historic environment assets, including scheduled monuments, listed buildings and their settings; • impacts on tourism and recreation; • impacts on aviation and defence interests including seismological recording; • impacts on telecommunications and broadcasting installations, particularly ensuring that transmission links are not compromised;

Policy Reference	Title	Relevant Policy Summary
		• impacts on road traffic and on adjacent trunk roads; • effects on hydrology, the water environment and flood risk; • the need for conditions relating to the decommissioning of developments, including ancillary infrastructure, and • site restoration, opportunities for energy storage; and • the need for a robust planning obligation to ensure that operators achieve site restoration.

Onshore Wind Policy Statement Refresh Consultation

14.4.24 The Scottish Government published the consultation on the Onshore Wind Policy Statement (OWPS) Refresh in October 2021 where they are seeking views on their ambition to secure an additional 8-12 GW of installed onshore wind capacity by 2030. While it is only at consultative draft stage, it demonstrates the Scottish Government's ongoing commitment to onshore wind and recognition that this decade is key for the delivery of onshore wind if the 2030 renewable energy and carbon reduction targets are to be met.

14.4.25 In relation to economic benefits, the Scottish Government has included in its objectives to significantly increase local content in energy projects located in Scotland. Furthermore, in terms of tourism opportunities, the Scottish Government believes there are opportunities for more wind farm developments to provide outdoor recreation activities.

Tourism Scotland 2020

14.4.26 The Tourism Scotland 2020[201] strategy advises that tourism is one of Scotland's key economic contributors. It identifies four groups of assets that contribute to the tourist appeal of Scotland. These are:

- nature, heritage and activities;
- destination towns and cities;
- events and festivals; and
- business tourism.

14.4.27 The document sets an aspiration to increase annual visitor spend in Scotland by £1 billion by 2020 from the baseline in 2011 (at 2011 prices). It identifies the need to develop market opportunities associated with the assets listed above. Key performance indicators associated with this goal to measure progress include:

- grow visitor-spend by £1 billion from £4.5 billion to £5.5 billion by 2020;
- increase the advocacy score for Scotland from 25%;
- increase the average visitor-spend from £358.56;
- increase the total tourism employment figures from 185,100; and
- increase total tourism turnover from £6.2 billion.

[201] Tourism Leadership Group and the Scottish Tourism Alliance (2012), *Tourism Scotland 2020.*

14.4.28 The strategy was reviewed in 2016[202] (Scottish Tourism Alliance, 2016) at the mid-term point of the policy with further priorities being identified to achieve the targets for 2020 set in 2012, including:

- strengthen digital capabilities;
- strengthen industry leadership;
- enhance the quality of the visitor experience;
- influence investment, specifically flight access & transport connectivity, built infrastructure, digital connectivity; and
- business growth finance.

Scotland Outlook 2030

14.4.29 Scotland Outlook 2030 sets the vision of the future of tourism in Scotland, the strategy focuses on four core priorities:

- People;
- Places;
- Diverse businesses; and
- Experiences.

14.4.30 The vision also concentrates on investment, training, accessibility and sustainability.

Scotland's National Strategy for Economic Transformation

14.4.31 Scotland's National Strategy for Economic Transformation (2022) sets out the priorities for Scotland's economy as well as the actions needed to maximise the opportunities of the next decade to achieve the Scottish Government's vision of a wellbeing economy.

14.4.32 The Strategy's vision is structured on three economic ambitions comprising:

- **Fairer economy**: Ensuring that work pays for everyone through better wages and fair work, reducing poverty and improving life chances;
- **Wealthier economy**: driving an increase in productivity by building an internationally competitive economy founded on entrepreneurship and innovation; and
- **Greener Economy**: demonstrating global leadership in delivering a just transition to a net zero, nature-positive economy and rebuilding natural capital.

14.4.33 To achieve the listed economic ambitions, the strategy is underpinned by five key transformational programmes of action that can drive improvements in Scotland's economy. The programmes of action, as listed in the strategy, comprise:

- Entrepreneurial people and culture;
- New market opportunities;
- Productive business and regions;
- Skilled Workforce; and
- A Fairer and more equal society.

[202] Scottish Tourism Alliance (2016), *Tourism Scotland 2020 Mid-term review.*

14.4.34 The strategy is aligned with the National Performance Framework including existing plans targeted at specific aspects of the economy (e.g. Net Zero and Environmental Strategies) and regional and sectoral strategies.

Scotland's Economic Action Plan 2019-20

14.4.35 The Scottish Government's Economic Action Plan 2019-20 (2019) sets out how it plans to make Scotland a leader in technological and social innovations. It aims to deliver higher productivity and greater competitiveness, while transitioning to a carbon neutral economy through measures that support business, and encouraging investment, innovation and upskilling.

14.4.36 At the heart of this strategy is inclusive growth, combining increased prosperity with greater equity, which requires getting the fundamentals right. These include:

- investment: boosting private and public investment and delivering world-class infrastructure;
- enterprise: ensuring a competitive business environment;
- international: growing exports and attracting international investment;
- innovation: supporting world-leading innovation;
- skills: providing a highly skilled workforce;
- place: supporting thriving places;
- people: ensuring a sustainable working population where everyone can participate in and benefit from increased prosperity; and
- sustainability: seizing the economic opportunities in the low carbon transition.

14.4.37 An update to the 2018 Climate Change Plan, Update to the Climate Change Plan 2018-2032 Securing a Green Recovery on a Path to Net Zero (2020), was published by the Scottish Government in December 2020 and includes targets for economic development, inclusive growth, jobs and wellbeing. These include, but are not limited to:

- Encourage private investment towards net zero projects;
- Mobilise public sector procurement spending to support a green recovery and wider climate and circular economy ambitions; and
- Infrastructure investment.

Scottish Energy Strategy

14.4.38 In December 2017, the Scottish Government published the Scottish Energy Strategy[203], which sets out the Government's vision for Scotland's energy future.

14.4.39 In 2016, 54.4% of all electricity in Scotland was generated renewably, with a target of producing 100% from renewable sources by 2020. This increased to 73.9% in 2018. The overall share of energy consumption, which includes heat and transport, produced by renewables was 19.8%[204]. By 2030, the Scottish Government wants the proportion of all energy, including heat and transport, supplied from renewable sources to increase to 50%.

[203] Scottish Government, (2017), *Scottish Energy Strategy.*

[204] Scottish Government, (2019) *Scotland's Economic Action Plan 2019-20.*

14.4.40 The Scottish Government has also highlighted that renewables present an economic opportunity as an expanding market which will continue to support Scottish economic growth. The Scottish Government will continue to support businesses in this sector.

14.4.41 Additionally, the Scottish Government has emphasised the importance of communities benefitting from renewable energy generation, including through community benefit funds and shared ownership/community investment.

Local Development Plan

Adopted Scottish Borders Local Development Plan (2016)

14.4.42 The Scottish Borders Local Development plan was adopted on 12 May 2016 and sets out policies on development and land use within the Scottish Borders. The document set the following objectives for the strategic economic development of the region:

- Improvement of the socio-economic performance of the region; and
- Development of renewable energy infrastructure, including wind farms.

14.4.43 Supplementary Guidance for Renewable Energy alongside the adopted Scottish Borders Proposed Local Development Plan (2016) states that in considering proposals for on-shore wind developments the Council will have regard to considerations including, but not limited to:

- impacts on important recreational assets, tourist attractions and recreational routes, such as core paths;
- the scale and nature of any potential economic impacts and/or benefits for local businesses, employment and supply chain opportunities; and
- effects on industries such as tourism and recreation.

Proposed Scottish Borders Local Development Plan (2021)

14.4.44 As well as setting out planning policy for the whole region, the Proposed Local Development Plan seeks to promote and investigate ways to address climate change issues and adaption in order to seek a low carbon economy by promoting regeneration projects across the Region and encouraging the diversification of the rural economy and land uses.

Scottish Borders Economic Strategy 2023

14.4.45 The Scottish Borders Economic Strategy 2023 sets several economic development objectives for the region, these include:

- increasing employment;
- raising business competitiveness; and
- promoting a low carbon economy.

14.4.46 The plan highlights that the renewables industry sector could benefit from the creation of conditions for business to compete. This includes encouraging entrepreneurs and investment, as well as promoting training and employment in the sector.

14.4.47

14.5 Existing Socio-economic Environment

Overview

14.5.1 The site is located in the Scottish Borders, within a large area of commercial forestry in the Wauchope Forest. There are few settlements near the site with the nearest being Chesters, approximately 3.3 km to the north, and Bonchester Bridge, approximately 5.2 km to the north-west along the A6088. The nearest group of properties is located at Southdean, approximately 2.1 km to the north. The nearest individual properties are Dykeraw Farmhouse and Dykeraw Farm Cottage, approximately 1.7 km to the north, and Lustruther, approximately 2.1 km to the north.

Demographics, Employment and Economy

14.5.2 The Scottish Borders has been chosen as the study area due to both it being the jurisdiction within which the site is located and it being the smallest area that there is employment and economic data available for.

14.5.3 The population of the Scottish Borders was 115,200 in 2021, of which 58.4% are aged between 16 and 64.

14.5.4 The proportion of the population that is economically active in the Scottish Borders is 81.0%, which is slightly higher than the Scottish and UK averages (77.1% and 78.6% respectively). Error! Reference source not found. shows the rates for unemployment and gross weekly earnings by place of work in the Scottish Borders area and in the whole of Scotland.

Table 14.6: Economic Activity, Unemployment and Weekly Pay July 2021 – July 2022

	Scottish Borders	Scotland
Economic Activity Rate (aged 16 – 64)	81.0%	77.1%
Employment Rate (aged 16 – 64)	74.4%	74.4%
Unemployment Rate (aged 16 – 64)	3.4%	3.4%
Earnings by place of work – Gross Weekly Pay (Full Time)	£552.10	£622.00

Source: ONS, Labour Market Profile Scottish Borders

14.5.5 The Scottish Borders rank within the 10 least deprived Local Authorities in Scotland according to the Scottish Index of Multiple Deprivation (SIMD) 2020[205]. The Denholm and Hermitage datazone in which the site is located has a rank of 3892 out of 6,976[206].

14.5.6 The industries present in the Scottish Borders are summarised in Error! Reference source not found., the data exclude self-employed, government-supported trainees and HM Forces and farm-based agriculture. Of particular relevance to the development, construction and operation of the Proposed Development are: professional, scientific and technical services (5.6%), which is lower than the national average (6.5%), construction (7.5%), which is higher the national average (6.1%); and electricity, gas, steam and air conditioning supply (0.3%), which is marginally lower than the national average (0.7%). In relation to the potential for indirect and induced impacts resulting from the spend in the local area by workers employed by the Proposed Development, 6.2% of the labour force are employed in accommodation and food service activities which is less than the national average (7.6%).

Table 14.7: Employment by Sector for Year 2021

Sector	Scottish Borders (Numbers)	Scottish Borders (%)	Scotland (%)
Human health and social work activities	8,000	20.0	15.9
Wholesale and retail trade; repair of motor vehicles and motorcycles	7,000	17.5	14.4
Manufacturing	4,500	11.2	7.1
Education	3,500	8.8	8.7
Accommodation and food service activities	2,500	6.2	7.6
Professional, scientific and technical activities	2,250	5.6	6.5
Construction	3,000	7.5	6.1
Public administration and defence; compulsory social security	2,000	5.0	6.6
Administrative and support service activities	1,500	3.8	8.0
Arts, entertainment and recreation	1,250	3.1	2.5
Transportation and storage	900	2.2	4.2
Real estate activities	700	1.8	1.5
Information and communication	700	1.8	3.1

[205] SIMD is the Scottish Government's official tool for measuring deprivation across a selected pool of small areas. If an area is identified as 'deprived', this can relate to the local population having a low income as well as restricted access to both resources and opportunities.

[206] 6976 is the least deprived area and 1 the most deprived area.

Sector	Scottish Borders (Numbers)	Scottish Borders (%)	Scotland (%)
Water supply; sewerage, waste management and remediation activities	350	0.9	0.8
Other service activities	700	1.8	1.8
Electricity, gas, steam and air conditioning supply	125	0.3	0.7
Financial and insurance activities	250	0.6	3.1
Mining and quarrying	15	0.0	1.0

14.5.7Source: ONS, Labour Market Profile Scottish Borders[207]

14.5.8 Employment by occupational group in the Scottish Borders is shown in Error! Reference source not found.. Of particular relevance to the development, construction and operation of the Proposed Development are: professional occupations (24%), which is marginally less than the national average (25.3%); associate professional and technical (10.2%), which is lower than the national average (14.8%); skilled trades occupations (14.1%), which is higher than national average (8.7%); process plant and machine operatives (5.4%), which is lower than the national average (6.0%).

Table 14.8: Employment by Occupational Group

Sector	Scottish Borders (Numbers)	Scottish Borders (%)	Scotland (%)
Managers, Directors and Senior Officials	6,500	12.2	8.2
Professional Occupations	12,700	24.0	25.3
Associate Professional & Technical	5,400	10.2	14.8
Administrative & Secretarial	4,300	8.1	9.8
Skilled Trades Occupations	7,500	14.1	8.7
Caring, Leisure and Other Service Occupations	4,600	8.7	8.4
Sales And Customer Service Occupations	4,400	8.3	8.6
Process Plant & Machine Operatives	2,900	5.4	6.0
Elementary Occupations	4,600	8.7	10.0

14.5.9 Error! Reference source not found. shows the size of businesses within the Scottish Borders. There is a marginally greater number of micro businesses (90.6%) in the

[207] NOMIS (2022). Labour Market Profile Scottish Borders. Available at https://www.nomisweb.co.uk/reports/lmp/la/1946157430/report.aspx [accessed November 2022].

Scottish Borders than Scotland (87.8%) and marginally less small (8.2%), medium (1.0%) and large (0.2%) businesses in the Scottish Borders than Scotland (small – 10.2%, medium - 1.6% and large - 0.4%).

Table 14.9: Business Counts

Enterprises	Scottish Borders (Numbers)	Scottish Borders (%)	Scotland (%)
Micro (0 To 9)	4,575	90.6	87.8
Small (10 To 49)	415	8.2	10.2
Medium (50 To 249)	50	1.0	1.6
Large (250+)	10	0.2	0.4

14.5.10 The socio-economic baseline indicates there is capacity in the local labour market to contribute to the project work force and supply chain. This is supported by BiGGAR Economics 2013 report to the Scottish Borders on the 'Economic Impact of Wind Energy in the Scottish Borders', which found that as of 2013 onshore wind had contributed £10.8 million GVA and 115 local jobs to the Scottish Borders and predicted this could rise to £33.3 million GVA and 325 local jobs by 2020 depending on the number of consented onshore wind developments and whether the local businesses succeeded in increasing their market share. Based on this analysis, the assumptions relating to the construction and operational expenditure within the Scottish Borders for the Proposed Development have been based on average values outlined in the RenewableUK (2015) study.

Tourism

14.5.11 Consultation of the data published by VisitScotland in 2020[208] indicated that the number of visitors to Scotland, from the UK, in 2019 increased by 17% from 2018, with a total spend of £3.20 bn (2019). However, overseas visitors in 2019 declined by 7% from 2018, with an overall spend of £27.39 bn (2019). The 2019 data for the Scottish Borders indicate a decrease in domestic visitors of around -9%, while international visitors increased by 13%, with a total overall spend of £9 million. In 2019, before the Covid-19 pandemic, the sector employed over 200,000 people nationwide, being one of the major employers and contributed 2.9% to Scotland's GVA. In 2017 the tourism sector in the Scottish Borders supported 4,100 jobs, around 2.3% of tourism jobs of Scotland as a whole.

Facilities and Attractions

14.5.12 The main tourist facilities closest to the Proposed Development are located in Jedburgh, around 13.8 km north of the Proposed Development. Within the tourism study area (15 km from the turbine area) there are 24 accommodation businesses, as detailed by the VisitScotland website summarised as follows:

- 5 Guest Houses;
- 5 Hotels;

[208] VisitScotland, (2020), *Insight Department: Key Facts on Tourism in Scotland 2019.*

- 4 Bed and Breakfast, and
- 2 Camping and caravan sites.

14.5.13 These businesses are shown on **Figure 14.1**. None of the accommodation businesses identified are considered to be of more than local value and their sensitivity is low.

14.5.14 The assessment of tourism and recreational effects considers receptors within 15 km of the turbine area, but for the more remote parts of the study area any effects are expected to be restricted to visual effects during the operation phase. Consequently, the receptors addressed in this Chapter are restricted to those close to the turbine area (within approximately 5 km), and those more distant receptors up to 15 km (**Figure 14.1**).

14.5.15 Formal tourist destinations and outdoor recreational areas within approximately 15 km include, as listed on VisitScotland and Trip Advisor:

- Jedburgh Abbey Attraction;
- Jedburgh Castle jail and museum;
- Mary Queen of Scots Visitor Centre
- Ferniehirst Castle;
- Langlee Park;
- Hawick & Wilton Cricket Club;
- Miller's Knowes Recreation Ground;
- Hawick Golf Club; and
- Ruberslaw Wild Woods Camping & Glamping.

14.5.16 The receptors listed above are considered likely to draw visitors from a wide area and as such are considered of regional importance and medium sensitivity in socio-economic, land use, recreation and tourism' terms.

14.5.17 Shops and other tourism assets, such as restaurants, tend to be clustered in settlements such as Hawick. Such groups of receptors can be considered to be of medium sensitivity.

10.1.1 Informal tourism and recreational assets relate to walking routes and open spaces which are not commercial in nature. The turbine area is located within a remote setting with limited recreation opportunity within the immediate area and few informally recognised tourist attractions within the 5 km study area.

14.5.18

Recreation

14.5.19 No National Cycle Network is present within the recreational study area.

14.5.20 There are two designated core paths within the 5 km study area, on the north of the Proposed Development between Rue du Chateau camping site, Bonchester Hill, and Bonchester Bridge. Several designated core paths are located within the 15 km study area, with the majority in the proximity of Hawick and Jedburgh. The nearest core paths to the Proposed Development that fall withing the 5 km study area, are listed in **Error! Reference source not found.**. All core paths in the vicinity of the study area illustrated on **Figure 14.1**.

Table 14.10: Identified Core Paths

Route ID	Length	Approximate Distance to the Proposed Development
1393	3.1 km	3.1 km to the north-west
1394	1.97 km	3.7 km to the north-west

14.5.21 There are two Heritage Paths present within the 5 km study area. These are listed in Error! Reference source not found. are illustrated on **Figure 14.1**.

Table 14.11: Identified Heritage Paths

Name	Description	Details
Wheel Causeway	A designated medieval road, starting at B6357 Cleuch Head (NT 593 101). As illustrated on Figure 14.1, section of this route passes within the western part of the application boundary and continues south, where it passes Myredykes border and ends at Deadwater (NY 607 979).	Recently planted forestry areas cover the line of the Wheel Causeway, making it necessary for users to divert onto forestry tracks. Maintaining the old line could be difficult for visitors, as parts of the route are obstructed by stumps and brash, and an extended area of quarrying (athwart the route at NT 608 064).
Carter Route (Carterhouse Farm to Carter Fell)	Starting from Carterhouse (NT 665 076) and ending at Carter Fell (NT 655 028), this path runs north to south approximately 2 km on the east of the application boundary. Previously known as the Carter Route as the track crosses Carter Fell, this cross-border route dates back to at least the 16th century.	It is highlighted in ScotWays website that; forestry has affected this route and some of the forest roads can no longer be described even as footpaths.

Events

14.5.22 Neither the turbine area nor the Wauchope Forest has been used to host any events, so direct impacts on events has been scoped out of this assessment. No events were identified on the Visit Scotland and Scotland Info websites within the 15 km tourism study area; therefore, no indirect effects on events are predicted.

14.5.23 Areas within the application boundary and 5 km study area are currently being used for deer stalking.

Land Use

14.5.24 The land is currently used for commercial forestry, deer stalking, and surrounding land uses include rough grazing for sheep. The Proposed Development area covers 917 ha.

14.5.25 No public roads are located within the Proposed Development site. Access would be taken from the private track leading from the A6088 to Wauchope Forest. Current access to the Proposed Development is by private commercial forestry tracks.

14.5.26 There are no residential properties within 1 km of the turbine infrastructure. There are no buildings within the site.

Public Attitude to Renewable Energy Development

14.5.27 The potential for impact on tourism is closely linked to public perception of those visiting an area. This section provides an overview of studies undertaken to assess public perception of wind farm development across the UK.

14.5.28 In 2011, as part of their policy update, VisitScotland commissioned research to learn more about UK consumer attitudes to wind farms. The survey was largely attitudinal based and according to the results, wind farms do not have any significant impacts on the levels of tourism with evidence such as 52% of the study respondents disagreeing that wind farm spoil the look of the UK/Scottish countryside.

14.5.29 Based on this research, VisitScotland published a Position Statement in 2014 which stated:

"VisitScotland understands and supports the drive for renewable energy and recognises the economic potential of Scotland's vast resource, including the opportunities for wind farm development… There is a mutually supportive relationship between renewable energy developments and sustainable tourism."

14.5.30 A Department of Energy and Climate Change (DECC) survey on public attitudes showed that in March 2014, 80% of the British public said they supported using renewable energy for electricity, heat and fuel in the UK.

14.5.31 More recently, the Public Attitudes Tracker, published by the Department for Business in 2018, Energy and Industrial Strategy (BEIS)[209] showed a record 76% of people support the development of onshore wind compared to a previous 74% from the start of 2017. The advance in onshore wind development in Scotland has also been accompanied by an interest in understanding how the impacts of wind farm developments affect local house prices. In recent years, there has been considerable research looking at measurable effects on whether or not house prices are adversely impacted by onshore wind farm development. RenewableUK and the Centre for Economics and Business Research (2014)[210] concluded that no adverse impacts were found on house prices from a range of wind farm cases across England and Wales and there was, in fact, a slight beneficial influence on house prices from the cases analysed.

14.5.32 A few studies have been conducted around the impact of wind turbines on house prices[211,212], which have not been conclusive. However, it must be noted there is no consistent evidence of adverse impacts overall.

14.5.33 The applicant has sought to raise awareness of the Proposed Development within the local community and have encouraged members of the public to engage with the project. The public consultation procedure is detailed in **Chapter 3: Consultation**. Engagement

[209] Department for Business, Energy & Industrial Strategy, (2019) *BEIS Public Attitudes Tracker, December 2018 Survey (Wave 28)* Questions on Clean Growth, Renewable Energy, Shale Gas, Condensing Boilers, Heat Networks, Renewable Heating Systems, Heat Usage in the Home and Installing or Replacing Heating Systems.

[210] RenewableUK, (2014) *The effect of wind farms on house prices.*

[211] ClimateXChange (2016), *Impact of wind turbines on house prices in Scotland.*

[212] Gibbons, S. (2015), Gone with the Wind: Valuing the Visual Impacts of Wind Turbines through House Prices. *Journal of Environmental Economics and Management* 72, doi: 10.1016/j.jeem.2015.04.006.

with and responses to public consultation are documented in the Statement of Community Consultation (SoCC) that forms a supporting document to the Section 36 application.

14.6 Predicted Impacts

Construction Phase Impacts

14.6.1 During the 21 month construction phase of the Proposed Development there would be economic effects resulting from expenditure on items such as site preparation (including forestry services), access roads, purchase and delivery of materials, plant, equipment and components. Based on experience at other wind farm developments in Scotland, it is predicted there would be a peak onsite workforce of 50 workers. Some of these workers would be sourced from the local and regional labour market within the Scottish Borders Council area, and many more would be sourced from Scotland as a whole. The remainder of this section sets out to quantify the likely benefits to local and national jobs and the economy based on the proportion of construction expenditure that would take place within the local, regional and national economy.

Supply Chain

14.6.2 In terms of potential supply chain benefits, the Proposed Development provides opportunities for the involvement of local, regional and Scottish suppliers in a range of activities, including research and development, design, project management, civil engineering, component fabrication / manufacture, installation and maintenance. There is expertise in all of these areas in the wider region, although a full wind energy supply chain covering all aspects of wind turbine component manufacture has not yet been developed within the region or indeed within Scotland as a whole. In Scotland there are currently several wind turbine component manufacturing plants in Fife, and in the Highlands.

14.6.3 The key consideration in this context is that with an increasing number of wind farm schemes either operational, under development or having gained consent in Scotland, the commercial viability, and job prospects amongst Scottish supply chain firms has improved. Cluster benefits in the industry increase where firms are supported by the spending of other firms within the renewables sector. The net effect is to increase business and employment opportunities within Scotland's renewable energy sector, boosting the performance of regional and national economies.

14.6.4 In addition, during the construction process, there would be opportunities where those employed could develop skills that would be of benefit to the local economy and to local businesses in the longer term. Further, employment generated through the Proposed Development would contribute to diversifying the local economy and help support the retention in the area of the working age population.

14.6.5 The Capital Expenditure (CAPEX) for the construction and development of the Proposed Development were estimated using research undertaken by BiGGAR Economics on behalf of RenewableUK (2015)[213].

14.6.6 On the basis of this methodology, for the Proposed Development with up to 13 turbines with a combined generating capacity in the order of 78 MW, the construction and development costs has been estimated to be up to £114.6 million[214]. The cost of battery storage has not been included because it is a newer technology with limited use in the UK so there is not sufficient research into the related expenditure.

14.6.7 This expenditure is split into four main categories of contract:

- development and planning;
- turbines;
- balance of plant (construction costs excluding turbine supply); and
- grid connection.

14.6.8 A 2015 study found that approximately 10% of CAPEX was on development and planning, and around 64% was on the turbines (RenewableUK, 2015)[215]; however, developments in the sector, and the transition towards larger turbines, has changed the breakdown of CAPEX. BVG Associates (2017)[216] estimated that turbine related contracts accounted for the majority of CAPEX, followed by balance of plant, development and planning and grid connection. The values in Error! Reference source not found., are higher than those used in the RenewableUK (2015)[217] and the BVG Associates (2017)[218] reports, to take into account a larger proportion of CAPEX expenditure on turbine related contracts (70.0%), followed by balance of plant (20.5%), development and planning (4.4%) and grid connection (5.1%).

Table 14.12: Estimated Development and Construction Expenditure by Type

Item	Description	Cost (£millions)	% of Expenditure
Development and Planning	The processes up to the point of financial close or placing firm orders to proceed with construction, and project management costs incurred by the applicant. Includes project design,	5	4.4

[213] RenewableUK, (2015), *Onshore Wind: Economic Impacts in 2014.*

[214] Based on the sum of development (£150,216) and construction costs (£1,318,875) (i.e., the capital expenditure) per MW, multiplied by 78 MW (i.e., the capacity of the wind turbine element of the Proposed Development).

[215] RenewableUK, (2015), *Onshore Wind: Economic Impacts in 2014.*

[216] BVG Associates, (2017), *Economic Benefits from Onshore Wind farms.*

[217] RenewableUK, (2015), *Onshore Wind: Economic Impacts in 2014.*

[218] BVG Associates, (2017), *Economic Benefits from Onshore Wind farms.*

Item	Description	Cost (£millions)	% of Expenditure
	environmental studies, legal agreements, project funding and planning permissions.		
Turbines	The activity by wind turbine manufacturers and their suppliers, covering nacelle component manufacture and assembly and blade and tower manufacture.	80.2	70
Balance of Plant	Includes civil and project management, roads, substation buildings, turbine foundations and hardstandings, landscaping/ forestry/ fencing, and mechanical and electrical installation.	23.5	20.5
Grid Connection	Includes engineering services, construction, electrical components, and industrial equipment and machinery.	5.8	5.1
Total		**114.6**	**100%**

14.6.9* Totals may not add up due to rounding.

14.6.10 The economic impact of the construction and development phase was estimated for the Scottish Borders, and Scotland as a whole (estimating the CAPEX by study area). To do this, it was necessary to estimate the proportion of each type of contract that might be secured in each of the study areas. The assumptions were based on the weighted development and construction costs from the RenewableUK (2015)[219] research and analysis of the industries and professions in the Scottish Borders conducted as part of the Teviot Wind Farm EIA. For development, the percentage of spend within the local area (i.e., Scottish Borders) is predicted to be 13% and for Scotland it is predicted to be

[219] RenewableUK, (2015), *Onshore Wind: Economic Impacts in 2014*

59%. For construction, the percentage of spend within the Scottish Borders is predicted to be 12% and for Scotland it is predicted to be 36%.

14.6.11 To estimate the expenditure for each contract in each of the study areas these percentages were applied to the estimated size of each component contract.

14.6.12 On this basis, it was estimated that the Scottish Borders could secure contracts worth up to £11.3 million. Scotland was estimated to be able to receive contracts worth up to £36.9 million. The estimated value of contract type by study area are shown in Error! Reference source not found..

Table 14.13: Estimated Development and Construction Expenditure by Study Area and Contract Type

Item	Scottish Borders		Scotland	
	Cost (£millions)	% of item total	Cost (£millions)	% of item total
Development	0.5	10	4.3	86
Turbines	2.4	3	5.6	7
Balance of Plant	6.3	27	21.1	90
Grid Connection	2	35	5.8	100
Total	11.3		36.9	

14.6.13 * Totals may not add up due to rounding.

Gross Employment and Economic Impacts

14.6.14 The contract values potentially awarded in each area would represent an increase in turnover of businesses in these areas. Estimates of the expected direct construction phase employment and economic implications of the Proposed Development have been calculated by applying ratios of turnover per unit of GVA and GVA per employee from the Scottish Annual Business Statistics (2019)[220] to the predicted CAPEX.

14.6.15 Local and National turnover per unit of GVA and GVA per employee ratios have been calculated, as shown in Error! Reference source not found.. The construction ratios have been weighted using the relevant economic sector data for each sub component (turbines, balance of plant and grid connection).

[220] This is the latest dataset available.

Table 14.14: GVA and Turnover per Employee

	Turnover per employee (£)		GVA/Turnover ratio	
	Scottish Borders	Scotland	Scottish Borders	Scotland
Development	230,591	112,037	0.69	0.594
Balance of Plant	162,333	186,958	0.46	0.35
Turbines	156,956	157,456	0.43	0.4
Grid Connection	156,956	157,456	0.43	0.4

14.6.16 Applying the above ratios to the Proposed Development provides an estimate of the likely level of job years and GVA at the local/ regional and national level (**Table 14.15**).

Table 14.15: Estimated Construction Phase Direct Economic Impact of the Proposed Development

	Scottish Borders		Scotland	
	Job years	GVA (£ million)	Job years	GVA (£ million)
Development	2.2	0.3	38.7	2.6
Balance of Plant	14.8	1.1	30	2
Turbines	40.4	2.7	134.3	8.5
Grid Connection	13	0.9	37	2.3
Total	70.5	5	240.1	15.3

14.6.17 * Totals may not add up due to rounding.

Net Employment and Economic Impacts

14.6.18 The job years and GVA values in **Table 14.15** represent the gross employment and economic impacts; however, to understand the potential net effects, it is necessary to take into account of a number of 'additionality' concepts, including leakages[221] and displacement[222].

14.6.19 To account for leakages local commuting data for 2019223, obtained from the Scottish Household Survey (2020), which found that 73.5% of those living in the Scottish Borders also worked in the Scottish Borders; therefore, an estimate of 36.5% as been used for leakages from the local study area. A further 8.1% of people working within the Scottish Borders live elsewhere in Scotland. The place of residence for the remaining 17.9% of people working within the Scottish Borders is not known but for the purposes of this assessment a worst case assumption that they are resident outside Scotland has been made.

14.6.20 The assumption used with regard to displacement is that displacement would be 5% for the local and regional study areas. Higher levels of displacement are assumed at national level (15%).

14.6.21 In addition to considering the effects of leakage and displacement, which act to reduce the value of the project within the local economy, consideration must be given to estimating the additional jobs and economic value that would be created in the local economy through the (positive) indirect and induced effects of subsequent rounds of direct expenditure in the economy. Indirect and induced impacts on employment and GVA were calculated using GVA and employment multiplier values Type I (indirect), and Type II (indirect and induced) published on the Scottish Government 2019 Input-Output[224]. Scottish Borders GVA and employment multipliers were set at 65% of the Scottish level to reflect the lower multiplier effects at local levels. The indirect and induced multipliers are shown in Error! Reference source not found..

[221] Leakage: is the proportion of project outcomes that benefit individuals or organisations located beyond the relevant area of impact. Leakage is generally higher at a local level, although it also varies by the nature of development type.

[222] Displacement is an estimate of the economic activity hosted by the Site that would be diverted from other businesses in the spatial impact area (e.g., Scottish Borders). This again varies by the nature of development type. However, construction projects of relatively limited duration are usually regarded as having very little if any displacement impact.

[223] This dataset was used as it is the most recent and is unaffected by the COVID-19 pandemic and, therefore, represents a more realistic baseline.

[224] Scottish Government (2018), *Supply, Use and Input-Output Tables: 1998-2018.*

Table 14.16: Indirect and Induced Multipliers by Study Area and Contract Type

	Type II Employment Multipliers		Type II GVA multiplier	
	Scottish Borders	Scotland	Scottish Borders	Scotland
Development	1.33	1.5	1.33	1.5
Balance of Plant	1.39	1.6	1.39	1.6
Turbines	1.52	1.8	1.59	1.9
Grid Connection	1.52	1.8	1.59	1.9

14.6.22 The net job years and GVA are shown in Error! Reference source not found..

Table 14.16: Estimated Net Construction Phase Employment and Economic Impact of the Proposed Development

	Indirect/induced Jobs		Indirect/induced GVA (£millions)	
	Scottish Borders	Scotland	Scottish Borders	Scotland
Development	2.1	44.8	0.3	3
Balance of Plant	14.7	37	1.1	2.4
Turbines	43.9	186.3	3.1	12.4
Grid Connection	14.2	51.5	1	3.4
Total	74.9	319.7	5.5	21.2

14.6.23 * Totals may not add up due to rounding.

Tourism Impacts

14.6.24 The construction period for the Proposed Development is expected to last approximately 21 months and would benefit the local economy through expenditure on purchases of accommodation, food, drink, fuel, etc. that are needed to sustain the construction workforce. These would be experienced mainly by businesses within the tourism sector, or those that are partly dependent on tourism for their income (e.g. the retail sector).

14.6.25 The positive effects arising during the construction period are expected to more than offset any possible temporary losses to the tourism economy that may occur in the event that tourist visitors were deterred (for example, if holiday accommodation was in use by construction workers and, therefore, not available to tourists) during this phase.

14.6.26 There is a potential indirect impact on recreation caused by visual disturbance during the period of construction, which could affect amenity and enjoyment of nearby walks. The visual impacts of construction effects would be localised and temporary, as the construction works would only be detectable to route users for short periods along the route. More details on the traffic and transportation elements can be found in **Chapter 12: Traffic and Transport**.

Land Use Impacts

14.6.27 Known land-use activities within the Proposed Development area consist of; commercial forestry, deer stalking, and the use of paths for recreational purposes. It is expected that during the construction phase of the Proposed Development, these activities would be temporarily affected. It is acknowledged that heritage paths in close proximity, or overlaying the application boundary, would be affected the most during construction.

14.6.28 The applicant would work with the landowner during the 21 month construction phase to ensure that they are able, wherever possible, to continue activities safely during construction of the Proposed Development. Furthermore, in line with ScotWays consultation response and best practice principles, temporary path diversions would be agreed with the Scottish Borders Council Access Officer, and implemented during the construction phase.

14.6.29 The magnitude of the impact on the land use is considered low as the landowner would be able to partially reinstate the land use of the Proposed Development area after the construction phase. The land-use is considered to be a low sensitivity receptor, as it is not used widely by the public. The Proposed Development would not have any significant effects on land-use receptors in accordance with the EIA Regulations.

Operational Phase Impacts

14.6.30 When the Proposed Development is operational, a team of personnel to provide servicing, maintenance, repairs and other operational support, would be required.

14.6.31 The operation and maintenance impact of the Proposed Development was estimated as the impact that would persist throughout the lifespan of the Proposed Development. The long-term assessments of the operations and maintenance impacts have been assessed over the 35-year period.

Operational Phase Socio-Economic Impacts

14.6.32 Annual expenditure on operations (OPEX) and maintenance was estimated based on analysis undertaken in the 2015 RenewableUK report[225], which stated that the weighted average cost was £59,867 per MW per annum. It was estimated that the annual operations and maintenance expenditure associated with the Proposed Development could be up to £4.7 million (which excludes community benefit funding and nondomestic rates). Over the first 35 years of operational life of the Proposed Development this could amount to approximately £163.4 million. These figures are based only on the wind generation element of the Proposed Development; and does not include the battery storage elements, for which there is no available contemporary analysis. Actual OPEX would likely be higher but information on OPEX for battery storage is not available. The OPEX estimates assessed below represent the worst case scenario.

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[225] RenewableUK, (2015), *Onshore Wind: Economic Impacts in 2014.*

14.6.33 To estimate the economic impact of the operation and maintenance expenditure in each of the study areas, it was first necessary to estimate the proportion of contracts that could be secured in each of these areas. These assumptions were based on the contract proportions reported in the RenewableUK report[226].

14.6.34 On this basis it was estimated that the Scottish Borders could secure 42% of operation and maintenance contracts, worth up to £2 million each year, and that Scotland could secure 58% of contracts, worth up to £2.7 million, as shown in Error! Reference source not found. below.

Table 14.17: Estimated Annual Operation and Maintenance Expenditure by Study Area

Item	Scottish Borders		Scotland	
	Cost (£millions)	% of item total	Cost (£millions)	% of item total
Operation and Maintenance	2	42%	2.7	58%

Gross Employment and Economic Impacts

14.6.35 Similarly, as with the construction phase, the contract values awarded in each of the study areas represent an increase in turnover in those areas. The economic impact of the increase in turnover on GVA and employment was estimated in the same way as the construction expenditure.

14.6.36 Local and National turnover per unit of GVA and GVA per employee ratios have been calculated, as shown in Error! Reference source not found., below.

Table 14.18: Estimated GVA and Turnover per Employee (Operations and Maintenance)

	Turnover per employee (£)		GVA/Turnover ratio	
	Scottish Borders	Scotland	Scottish Borders	Scotland
Operations & Maintenance	201,718	161,601	0.62	0.51

14.6.37 Applying the above assumptions to the Proposed Development provides an estimate of the likely level of employment at the local/ regional and national level, shown in Error! Reference source not found..

[226] *Ibid.*

Table 14.19 Estimated Operations and Maintenance Direct Economic Impact of the Proposed Development

Area	Estimated number of jobs	Estimated GVA (£ millions)
Scottish Borders	9.7	1.2
Scotland	16.8	1.4

<u>Net Employment and Economic Impacts</u>

14.6.38 Similarly to the construction phase, net impacts on employment and GVA for operation and maintenance were calculated using additionality factors, including leakages (same as construction phase), displacement (same as construction phase), and GVA and employment multiplier values Type I (indirect) and Type II (indirect and induced) for the relevant industry sectors published on the Scottish Government 2019 Input-Output[227](as shown in Error! Reference source not found.**)**. Again, Scottish Borders GVA and employment multipliers were set at 65% of the Scottish level, to reflect the lower multiplier effects at local levels.

Table 14.20: Type II Employment and GVA Multipliers by Study Area

	Type II Employment Multipliers		Type II GVA multiplier	
	Scottish Borders	Scotland	Scottish Borders	Scotland
Operation and Maintenance	1.4	1.33	1.61	1.5

Table 14.21: Estimated Operation and Maintenance Indirect and Induced Effects Economic Impact of the Proposed Development

Area	Estimated number of jobs	Estimated GVA (£ millions)
Scottish Borders	9.7	1.2
Scotland	20.9	1.6

14.6.39 Over the 35 year operational period of the Proposed Development it could generate GVA worth a cumulative total of £42 m in the Scottish Borders and £56 m for Scotland as a whole

Tourism Impacts

14.6.40 The most comprehensive study of the potential effects of wind farms on tourism was undertaken by the Moffat Centre at Glasgow Caledonian University in 2008[228] (Glasgow Caledonian University/Moffat Centre, 2008). The study found that, although there may be

[227] Scottish Government (2018), *Supply, Use and Input-Output Tables: 1998-2017.*

[228] Glasgow Caledonian University/Moffat Centre (2008), *Economic impacts of wind farms on Scottish tourism: report.*

minor effects on tourism providers and a small number of visitors may not visit Scotland in the future, the overall effect on tourism expenditure and employment would be very limited. This study is now about 15 years old, although a Scottish Government report confirmed the findings[229], and in that time wind farms have become a more common feature in Scotland. As such, it would be expected that any negative effects on the tourism economy would by then have been apparent.

14.6.41 In 2017, BiGGAR Economics undertook a study into the effects of constructed wind farms on tourism at the national, regional and local level[230].

14.6.42 Tourism employment was considered from 2009 to 2015, a six-year period over which Scotland and almost all local authority areas increased the number of wind farms, while employment in sustainable tourism also grew significantly. The analysis found no correlation between tourism employment and the number of turbines at the national or local authority level.

14.6.43 The study also considered the impact on employment at a smaller level, in data zones up to 15 km from wind farm developments. The wind farms considered were constructed between 2009 and 2015. The study compared employment in 2009, when the wind farms did not exist, and 2015, when they were constructed, to measure the effect of windfarms on local employment. This excluded construction impacts, such as wind farm related employees staying in local accommodation.

14.6.44 At the local authority level in these smaller areas, no link was found between the development of a wind farm and tourism related employment. In 21 out of the 28 areas considered, employment in this sector grew. In 22 of the areas, employment either grew faster or decreased less than the rate for the relevant local authority area as a whole.

14.6.45 Overall, the conclusion of this study was that published national statistics on employment in sustainable tourism demonstrate that there is no relationship between the development of onshore wind farms and tourism employment at the level of the Scottish economy, at the local authority level, nor in the areas immediately surrounding wind farm development.

14.6.46 The findings of this research are in accordance with those of the Scottish Parliament's Economy, Energy and Tourism Committee in 2012 (Scottish Parliament Economy, Energy and Tourism Committee, 2012), when they concluded that there is no robust, empirical evidence of a negative link between wind farm development and tourism.

14.6.47 Overall, there is no research evidence that shows that negative effects on the tourism economy in Scotland as a result of wind farms are likely.

14.6.48 Within that overall context, the following assessment nevertheless considers whether there might be any specific effects on individual tourism assets. This assessment considers whether the Proposed Development could result in changes in the behaviour of tourists that might lead to effects on the tourism economy.

14.6.49 There are no potential direct impacts as there are no tourist attractions within the site so only indirect impacts have been assessed. In that regard, the impact on tourist attractions within 15 km of the turbine area has been considered. Areas of potential indirect impacts considered are the operational traffic associated with the Proposed Development using

[229] ClimateXChange (2012), *The Impact of Wind Farms on Scottish Tourism.*

[230] BiGGAR Economics (2017), *Wind Farms and Tourism Trends in Scotland.*

the local road network and potential visual amenity impacts resulting primarily from the presence of the turbines. Based on a review of the findings of the assessment in **Chapter 12 - Traffic and Transportation**, however, no significant residual impacts are expected due to maintenance vehicles travelling to and from the turbine area as this would be on an occasional basis only. The key potential indirect impacts that affect tourism amenity are, therefore, considered to be visual amenity impacts of the turbines during operation.

14.6.50 For the tourist attractions within the study area, it was considered that the potential visual impacts were not likely to affect the main features of any of the identified attractions, based on the descriptions provided by VisitScotland or their official websites:

- Jedburgh Abbey Attraction;
    - Jedburgh Abbey is a Scheduled Monument (SM13126) meaning that it derives value from its cultural heritage, which could include its setting; however, there is no theoretical visibility from the centre of Jedburgh and it has been scoped out from detailed assessment within **Chapter 7: Cultural Heritage and Archaeology**. Therefore, it is not considered that the Proposed Development has the potential for significant effects on the main features of Jedburgh Abbey Attraction.
- Jedburgh Castle Jail and Museum;
    - The main feature of this receptor is an indoor experience. Regardless, there is no theoretical visibility from the centre of Jedburgh. It is unlikely that the Proposed Development would have a significant effect on this receptor.
- Mary Queen of Scots Visitor Centre
    - The visitor centre comprises an indoor museum and attractive gardens. The tower house is a Category A listed building meaning that it derives value from its cultural heritage, which could include its setting; however, there is no theoretical visibility from the centre of Jedburgh and it has been scoped out from detailed assessment within **Chapter 7: Cultural Heritage and Archaeology**. Therefore, it is not considered that the Proposed Development has the potential for significant effects on the main features of Mary Queen of Scots Visitor Centre.
- Ferniehirst Castle;
    - Ferniehirst Castle is a Category A listed building meaning that it derives value from its cultural heritage, which could include its setting; however, it has been scoped out from detailed assessment within **Chapter 7: Cultural Heritage and Archaeology**. Therefore, it is not considered that the Proposed Development has the potential for significant effects on the main features of Ferniehirst Castle.
- Langlee Park;
    - Langlee Park is a country house offering equestrian activities on an occasional basis. There is no theoretical visibility of the Proposed Development from Langlee Park. It is unlikely that the Proposed Development would have a significant effect on this receptor.
- Hawick and Wilton Cricket Club;
    - There is no theoretical visibility of the Proposed Development from Langlee Park. It is unlikely that the Proposed Development would have a significant effect on this receptor.
- Miller’s Knowes Recreation Ground;

- Miller's Knowes Recreation Ground is a local park offering views to the north-west over Hawick (away from the Proposed Development). There is no theoretical visibility of the Proposed Development from Langlee Park. It is unlikely that the Proposed Development would have a significant effect on this receptor.

- Hawick Golf Club;
  - There is no theoretical visibility of the Proposed Development from Langlee Park. It is unlikely that the Proposed Development would have a significant effect on this receptor.
- Ruberslaw Wild Woods Camping & Glamping
  - There could theoretically be 1-3 blade tips visible (without consideration of the screening effect of vegetation and settlement) from the campsite. VisitScotland describes the campsite as offering the opportunity to *"hide away in our woodland clearings"* so given the screening effect of the woodland in the immediate vicinity it is considered unlikely that the Proposed Development has the potential for significant effects on the main features of Ruberslaw Wild Woods Camping & Glamping.

Recreation Impacts

14.6.51 There are no direct impacts predicted on recreational receptors as the layout of the Proposed Development has avoided all core paths and heritage paths within the site.

14.6.52 There is the potential for indirect effects on recreational amenity[231]. It should be noted that there is a distinction between a visual effect and a recreational amenity effect. Visual effects associated with the Proposed Development may occur at recreation receptor locations when people are looking towards the development and from locations where clear views of the turbines are available. Visual effects can influence recreational amenity; however, only contribute to part of the recreational experience.

14.6.53 The visual effects of the Proposed Development on tourism and recreational resources are assessed in **Chapter 6 Landscape and Visual Assessment**. In relation to the recreational routes included within the 5 km recreational study area (**Figure 14.1**) the potential impacts on recreational amenity are as follows:

- Heritage Paths
  - Wheel Causeway and Carter Route (Carterhouse Farm to Carter Fell) – Chapter 6: Landscape and Visual Impact Assessment considered the potential of recreational routes crossing the commercial plantation. The visual effect on these receptors was assessed as moderate (significant); however, actual visibility will be much less than predicted as the routes are contained within dense forest plantation that foreshortens views and limits opportunities for longer range views, except where routes pass through areas of juvenile or felled plantation. Given that visual effects only contribute to part of the recreational experience and significant visual effects would likely be limited owing to the screening effect of the plantation forestry, it is unlikely that the Proposed Development would have a significant effect on these receptor.
- Core Paths
  - 1393 and 1394 - These form part of the Border's Loop and Bonchester Bridge and Hill Promoted Path. The visual effect on these receptors in

[231] Recreational amenity effects are described as effects that would influence the recreational value (e.g. use or enjoyment of an asset such as a walking route).

this location has been assessed as not significant, with the exception of a limited section of the route from the high ground near Bonchester Hill, which was assessed as having a major-moderate (significant) visual effect; however, this effect would quickly reduce as walkers descend from the high ground. Given that visual effects only contribute to part of the recreational experience and significant visual effects would only be experienced temporarily along the path and only while travelling south in the direction of the Proposed Development, it is unlikely that the Proposed Development would have a significant effect on these receptor.

14.6.54 In relation to the potential impacts on the wider recreational experience. Studies undertaken in respect of other wind farm projects where users have been asked if the presence of turbines would discourage them from using a route have found that the majority would not be deterred. For example, an independent survey of tourists and day-trippers in the area around the proposed Clashindarroch Wind Farm in Aberdeenshire (Gilmorton Rural Development, 2009) found that 84% of respondents did not feel that the proposed wind farm would have an impact on their willingness to revisit the area. The survey also found that there was no difference in the attitude of walkers and other visitors in relation to their willingness to revisit. Furthermore, the magnitude of impact for cyclists and horse riders may be less than for walkers as the speed of travel is likely to be faster and individual views are experienced for a shorter period of time. Even for users who find the presence of a wind farm detracts from their experience, this may simply manifest itself in users choosing not to linger in those sections of the route that have clear views of the wind farm.

14.6.55 It is expected that the Proposed Development would have no indirect effects on the behaviour of visitors/tourists that use paths within the study area. Only a few sections of these would have visibility of the Proposed Development and no significant visual effects are predicted on these receptors, as assessed in **Chapter 6: Landscape and Visual Impact Assessment.**

Cumulative Impacts

14.6.56 There is potential for cumulative impacts to arise in relation to the construction of a number of prospective or consented projects where the construction phases overlap with the Proposed Development. There three wind farms within 15 km of the turbine area, either consented or in the planning process, as set out in Error! Reference source not found. below.

Table 14.22: Wind Farm Development within 10 km of the Turbine Area (as per Cumulative Cut-off Date of 27/08/2021)

Development	Status	Distance
Pines Burn	Consented	5.35 km
Teviot	In Planning	10 km
Windy Edge	Consented	13 km

14.6.57 The greater the capacity of consented and constructed developments in the area, the more likely it is that the local area can benefit from supply chain opportunities.

14.6.58 Cumulative visual effects on outdoor recreational and tourism facilities resulting from the Proposed Development in conjunction with other windfarms in the study area are assessed in **Chapter 6: Landscape and Visual Impact Assessment** of this EIA Report.

With the inclusion of cumulative sites, it is considered that there would be no change to the assessment of the effects on visual amenity which the Proposed Development would bring about. In terms of the totality of cumulative effect on visual amenity, it is not considered that the addition of the Proposed Development would be such as to result in the overall cumulative impact of turbines being dominant or oppressive in views experienced at various points within the area. Therefore, the assessment of recreational impacts above are considered to be relevant when considering cumulative effects (i.e., it is considered that there is no potential for significant cumulative recreational amenity effects).

14.6.59 Concerning land use and given the amount of grassland and forested areas available in the Scottish Borders, wind farms generally have a very small development footprint. It is estimated that the permanent footprint of the Proposed Development following completion of construction would be approximately 67.92 ha of the total land.

14.6.60 No additional cumulative impacts are predicted from the construction and operation of the Proposed Development alongside wind farms within 10 km of the land within the application boundary.

14.7 Assessment of Effects

14.7.1 Based on the discussion of potential impacts in **Section 14.6** above, a commentary on the sensitivity of each receptor, the predicted magnitude of impact and subsequent level of effect is provided in this section.

Construction Phase Effects

Direct Socio-economic Effects

14.7.2 It is expected that during the construction and development phase, the magnitude of direct impact of the Proposed Development would be a Negligible (Beneficial) impact on a receptor of Medium (regional) sensitivity in the study areas of the Scottish Borders, leading to a level of effect of **Negligible (Beneficial)**. For Scotland as a whole, a Negligible (Beneficial) impact is predicted on a receptor of High (national) sensitivity, leading to a level of effect of **Minor (Beneficial).**

Indirect Socio-economic Effects

14.7.3 It is expected that during the construction and development phase, the indirect and induced impacts of the Proposed Development would be Minor (Beneficial) on a receptor of Medium (regional) sensitivity in the Scottish Borders, leading to a level of effect of **Minor (Beneficial)**. For Scotland as a whole, the predicted impact is of a **Negligible (Beneficial)** impact on a receptor of High (national) sensitivity, leading to a level of effect of **Minor (Beneficial)**.

Tourism Effects

14.7.4 The overall magnitude of direct impacts on the tourism economy during the construction are considered to be Negligible on a receptor of Medium (regional) sensitivity, leading to a level of effect of **Negligible (Beneficial)**. Based on the worst case scenario approach adopted by the EIA, it is likely that the benefits to individual businesses would not be negligible, but substantial; however, until such time as contracts are let, it is not possible to identify the magnitude of impact to individual businesses.

14.7.5 Indirect impacts on other off-site resources such as accommodation are unlikely to be affected by the construction of the Proposed Development. Due to the intervening distance of these receptors from the Proposed Development, it is considered that the magnitude of the indirect impacts would be low on receptors of Low (local) sensitivity. Therefore, the level of effect would be **Negligible (Adverse)**.

14.7.6 Local shops, cafes, accommodation providers and hotels often experience an increase in turnover during the construction phase, as they have opportunities to provide additional services to the developer and their contractors. The Proposed Development would result in a short term, Medium (beneficial) impact on receptors of Low (local) sensitivity, resulting in a **Minor (Beneficial) effect**.

Land Use Effects

14.7.7 The magnitude of the impact on the land use during the construction phase is considered Low, as the landowner would be able to partially reinstate the land use of the turbine area after the construction phase to support commercial forestry through keyholing[232]. Since the land is not used or accessed by the public, is considered to be a Low (local) sensitivity receptor in the context of the wider area. Therefore, the level of effect arising from the Proposed Development would be **Negligible (Adverse)**.

Operational Phase Effects

Operational Phase Socio-Economic Effects

14.7.8 In terms of the magnitude of direct effects, it is expected that during the operational phase, for the Scottish Borders a Negligible (Beneficial) direct impact would arise on a receptor of Medium (regional) sensitivity, leading to a level of effect of **Negligible (Beneficial)**. In Scotland as a whole, the predicted magnitude of impact is **Negligible (Beneficial)** on a receptor of High (national) sensitivity, leading to a level of effect of **Negligible (Beneficial)**.

14.7.9 For indirect effects during the operational phase, for the Scottish Borders, a Negligible magnitude of impact is predicted on a receptor of Medium (regional) sensitivity, leading to a level of effect of **Negligible (Beneficial)**. For Scotland as a whole, a **Negligible (Beneficial)** impact is predicted on a receptor of High (national) sensitivity, leading to a level of effect of **Minor (Beneficial)**.

Operational Phase Tourism Effects

14.7.10 Surveys of the public's attitudes to wind farms provide no clear evidence that the presence of wind farms in an area has an adverse impact on local tourism. Local tourist attractions may have a particular sensitivity to visual effects; however, access to tourist facilities would be be unaffected. Within that overall context, the assessment nevertheless considers whether there might be any specific effects on individual tourism assets. This considers whether the Proposed Development could result in changes in the behaviour

[232] Keyholing involves creation of open areas around proposed turbines. These keyhole areas usually remain open during the wind farm lifetime.

of tourists that might lead to effects on the tourism economy. Hence, even where significant visual effects are predicted (see **Chapter 6: Landscape and Visual Assessment**), no adverse effects on the tourism receptors are predicted.

Operational Phase Land Use Effects

14.7.11 For land use, the magnitude of the impact on land use during the operational phase is predicted to be Low. The sensitivity of the receptor is considered to be Low (local); therefore, the level of effect is considered to be **Negligible (Adverse)**.

14.8 Mitigation

14.8.1 There are no mitigation measures proposed in terms of socio-economic, land use, recreation and tourism effects as the effects are predicted to be **Minor/Negligible** beneficial impacts at a local, national and UK level that would be **not significant** in EIA terms.

14.9 Residual Effects

14.9.1 As no additional mitigation is proposed, the residual socio-economic and land use effects are as stated in **Section 14.7** above. No effects that would be considered as significant in EIA terms have been assessed.

14.10 Summary

14.10.1 This assessment has considered data from a diverse range of sources to determine the likely effects of the Proposed Development on the local economy and land use, together with local effects on tourism and recreation assets. The potential effects on the economy and identified assets take account embedded mitigation, such as good practice measures to be adopted in design and construction. All of this has been considered in the context of current employment in the region and regeneration activities, land use, the location of the Proposed Development and its relationship with recreational facilities and tourism attractions.

14.10.2 The overall conclusion of this assessment is that the Proposed Development would lead to overall **minor/negligible beneficial** socio-economic effects to the selected study areas with no adverse effects on recreation or the tourism economy in the selected study areas.

14.10.3 In addition to the assessed effects, the applicant has committed annual community funding of £5,000 per MW during the operational life of the Proposed Development. Based on a total installed capacity of around 100 MW, the total community funding would be around £390,000 per year, which would equate to £13.6 million for a 35-year lifetime.

14.11 References

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15 OTHER ISSUES

15.1 Introduction

15.1.1 This chapter considers the potential effects of the Proposed Development on Shadow Flicker, and Telecommunications and Electromagnetic Interference (EMI).

15.1.2 The chapter includes a description of the assessment methodology that has been adopted, the consultations conducted, relevant policy and legislation, the overall baseline conditions, the impacts and associated mitigation measures. The chapter concludes with a summary on residual effects.

15.2 Shadow Flicker

Introduction

15.2.1 This section of the Chapter considers the potential effects of the Proposed Development on shadow flicker.

15.2.2 Shadow flicker may occur under certain combinations of geographical position and time of day when the sun passes behind the rotors of a wind turbine and casts a shadow over neighbouring properties. Rotating wind turbine blades can cause brightness levels to vary periodically at locations where they obstruct the sun's rays. As the blades rotate, the shadow flicks on and off, an effect known as shadow flicker. The effect is most likely to be an issue inside buildings, where the flicker appears through a window opening. This can result in a nuisance when the shadow is cast over the windows of residential properties. Shadow flicker can be a cause of annoyance at residences near wind turbines if it occurs for a significant period during the year.

Scope and Methodology

15.2.3 The magnitude of the shadow flicker effect varies both spatially and temporally and depends on several environmental conditions coinciding at any particular point in time, including, the position and height of the sun, wind speed and direction, cloudiness, and proximity of the turbine to a sensitive receptor. To undertake a shadow flicker assessment, information on the Proposed Development, the location of potential residential receptors and other parameters are included in a computer model in order to predict and quantify the impact shadow flicker may have on receptors within the vicinity of the Proposed Development.

15.2.4 It is common to use a multiplier of the equivalent of 10 rotor diameters as a maximum separation distance between a turbine and an affected residence, within which significant shadow flicker effects can occur. However, the Scoping response provided to the Energy Consents Unit (ECU) by the Scottish Borders Council (SBC) requested that shadow flicker be assessed for all residential properties within 2 km of each turbine.

15.2.5 Shadows are cast by the sun as it crosses the southern sky; therefore, shadow flicker can hypothetically take place 130º either side of north[233][234] (see **Figure 15.1**). Therefore, these parameters (2 km from each turbine and 130º either side of north) have been considered within the analysis in order to establish the potential for shadow flicker to be experienced at relevant properties.

15.2.6 The locations of residential receptors and the locations and dimensions of turbines comprising the Proposed Development (as indicated in **Chapter 2: Proposed Development**) have been input into a model run on industry standard ReSoft WindFarm Release 5 software. Subsequently, for each residential receptor that falls within the shadow flicker coverage area (listed in **Table 15.2** and illustrated on **Figure 15.1)**, a window centred at 2 m from ground level with 1 m x 1 m dimensions facing directly towards the Proposed Development. A minimum sun elevation of 2 degrees has been considered in the assessment.

15.2.7 The software used predicts the worst case scenario of shadow flicker effects, as it does not take into consideration ambient variables that may reduce these effects. The following variables can reduce shadow flicker effects: wind direction; wind speed (as shadow flicker is not experienced if the blades are not turning); intervening obstacles and cloud cover. Therefore, the results of the assessment, as presented in **Table 15.3,** form a conservative, worst case scenario without factoring in these additional variables.

15.2.8 There is no formal guidance on the amount of shadow flicker that is considered acceptable within the UK. Other European countries do have guidance on shadow flicker; however, these vary from one country to another. Guidance which has been utilised in Northern Ireland[235], Germany[236] and Belgium, suggests shadow flicker should not exceed 30 hours per year with a maximum of 30 minutes per day. For the purposes of this assessment, exceedance of 30 hours per year with a maximum of 30 minutes per day is considered to result in a significant effect which may require mitigation.

Legislation, Policies and Guidance

15.2.9 The SBC Supplementary Guidance (SG)[237] on renewable energy states that the council will support proposals if they do not have an unacceptable impact on the amenity of nearby residence, including from noise and shadow flicker.

15.2.10 The SG, states that if requested by the Council, the developer will be required to produce shadow flicker assessments modelled to take into account all residential properties within 2 km of each proposed turbine. This is based on the *'Review of the Visual, Shadow Flicker and Noise Impacts of Onshore Wind farms'*[238], published by SLR in 2015, suggesting that shadow flicker can be experienced at greater than 10-rotor diameter distance, and that

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[233] Parsons Brinckerhoff (2011), Update of UK Shadow Flicker Evidence Base.

[234] Department for Communities & Local Government (2013), Planning practice guidance for renewable and low carbon energy.

[235] Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy',

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[236] Notes on the Identification and Evaluation of the Optical Emissions of Wind Turbines, States Committee for Pollution Control – Nordrhein-Westfalen (2002), cited in Parsons Brinckerhoff 2011.

[237] https://www.scotborders.gov.uk/downloads/file/2757/renewable_energy_supplementary_guidance

[238] https://www.climatexchange.org.uk/media/1426/final_report_wind_farm_impacts_study_july_2015_issue.pdf

the modelling of those residences within that distance may not capture all homes where people experience shadow flicker effects.

Consultation

15.2.11 Shadow flicker was identified by the Scottish Borders Council as requiring assessment in their response to the EIA Scoping request. This is provided in **Table 15.1.**

Table 15.1: Shadow Flicker Consultee Responses

Consultee	Summary of Consultation	Comment/action taken
SBC	The Council requests assessment for residential properties within 2 km of each turbine. It is not agreed that this should be scoped out of the EIA unless the outcome of an initial study is demonstrated to, and discussed with, SBC.	An initial study confirmed that six residential properties lie within 2 km of the proposed turbines, and a shadow flicker assessment will be included in the EIA Report.

Study Area

15.2.12 Within the 2 km study area established for shadow flicker for the Proposed Development, six residential receptors were identified. These are listed in **Table 15.2** and illustrated on **Figure 15.1**.

Table 15.2: Identified Residential Receptors

Receptor Number	Property Name	Easting	Northing	Distance from closest turbine
1	Brockeilaw Farmhouse	358925	605898	1898 m
2	Brockeilaw Cottage	358925	605906	1894 m
3	Hyndlee Farmhouse	359084	606332	1598 m
4	Hyndlee Cottage	359085	606335	1598 m
5	Dykeraw Farmhouse	363266	608610	1813 m
6	Dykeraw Farm Cottage	363204	608631	1799 m

15.2.13 The identified receptors are part of three different clusters; two to the west of the Proposed Development by the B6357 road, and one to the north comprising Dykeraw Farmhouse and Dykeraw Farm Cottage.

Assessment of Effects and Predicted Impact

15.2.14 In terms of shadow flicker, the geographic orientation of Receptors 1, 2, 3 and 4 to the west of the Proposed Development, in relation to the proposed turbine locations and sun's monthly path, indicate that only turbine T09 could result in shadow flicker effects. Similarly with Receptors 5 and 6 to the north of the Proposed Development, only turbine T07 could result in shadow flicker effects.

15.2.15 According to the geographic orientation of receptors 1 to 4 to the west of the Proposed Development, up to two sides of each building could experience shadow flicker coverage from turbine T09 during the summer months., and subsequently experience shadow flicker effects.

15.2.16 Similarly, according to the geographic orientation of Receptors 5 and 6 to the north of the Proposed Development, up to two sides of each building could experience shadow flicker effects from turbine T07 during the winter months.

15.2.17 It is observed from satellite imagery that several of the identified receptors present an oblique view towards the Proposed Development, however, for the purpose of this assessment and to take into consideration the worst case scenario approach, a direct view is assumed and modelled in the software.

15.2.18 The results of the shadow flicker assessment as a worst case scenario are shown in **Table 15.3** below. This scenario does not take into consideration physical intervening structures or vegetation, nor environmental and weather elements that may hinder shadow flicker effects, such as cloud coverage.

Table 15.3: Shadow Flicker Effects

Receptor Number	Days per Year of Shadow Flicker	Maximum Hours per Day	Mean Hours per Day	Total Hours per Year
1	74	0.39	0.31	23.2
2	75	0.39	0.31	23.1
3	15	0.17	0.11	1.6
4	15	0.17	0.11	1.6
5	30	0.29	0.23	7.0
6	13	0.14	0.12	1.5

15.2.19 Considering a worst case scenario, identified receptors would not receive shadow flicker effects for more than the reference limit of 30 minutes per day and/or 30 hours per year. The predicted impacts are considered **not significant** in EIA terms.

15.2.20 As stated in paragraphs 15.2.7 and 15.2.18, this approach does not factor in wind direction, wind speed, cloud cover and the presence of intervening structures or vegetation; variables which have the potential to reduce the likelihood and duration of shadow flicker effects. Therefore, the actual duration of shadow flicker experienced at the identified receptors, could be significantly lower than the worst case scenario predictions.

Mitigation

15.2.21 Based on the worst case scenario and assessment, no significant negative impacts are expected on the identified shadow flicker receptors, therefore, no mitigation is required.

Residual Effects

15.2.22 Based on the “worst case scenario” shadow flicker assessment, no significant residual effects are predicted.

Assessment Limitations

15.2.23 The desk-based shadow flicker assessment did not incorporate ambient weather data. Therefore, the predicted impacts are expected to be overestimated at this instance.

15.2.24 Site visits were not conducted at the identified receptors. Therefore, intervening physical structures or vegetation that may exist between the Proposed Development and receptors, were not recorded – the software only utilises a bare-earth digital terrain model.

15.3 Telecommunications and Electromagnetic Interference (EMI)

Introduction

15.3.1 Radio waves and microwaves are used in a variety of communications and any large structure has the potential to interfere with their transmission. The magnitude of the impact on a telecommunications receptor is principally dependent upon the size, shape, and materials of construction. Wind turbines are slender, and the rotor is substantially constructed from non-conducting materials (Glass Reinforced Plastic), both of which reduce their potential for causing interference. However, the tower is usually steel, and the rotor blades contain some conductive materials, for lightning conduction, and in some cases structural carbon fibre.

Scope and Methodology

15.3.2 An EMI Survey was undertaken to determine the suitability of the site and any mitigation measures required to overcome any identified potential effects. The EMI assessment was conducted through a combination of consultation with the operators of these systems where possible, with independent impact assessment where this is not possible.

Legislation, Policies and Guidance

15.3.3 Scottish Planning Policy (SPP) indicates that impacts on telecommunications and broadcasting installations should be taken into account by proposals for energy infrastructure.

15.3.4 Planning Advice Note (PAN) 62[239] considers disruption to radio systems caused by large structures due to the obstruction and reflection of signals. It advises that planning permission can be granted for such structures subject to a planning condition that, prior to development, the developers propose measures to maintain the quality of reception by systems potentially affected by the proposal.

[239] https://www.gov.scot/publications/pan-62-radio-telecommunications/

15.3.5 SBC Local Development Plan[240] Policy ED9 is relevant. It states that the assessment of wind energy proposals will include telecommunications and broadcasting installations.

15.3.6 SBC also has supplementary planning guidance (SPG) in relation to renewable energy[241]. The SPG (p47) advises that the siting of wind turbines must take cognisance to radio, television and other communication systems in order to ensure transmission links are not compromised. If turbines are assessed as causing interference to a protected link, discussions with the appropriate operator are required at an early stage to determine if there is a solution through siting, design or other form of mitigation. A planning condition should be attached to any consent to ensure any consequent interference after construction is rectified.

Consultation

15.3.7 Telecommunications operators were consulted, and information requested for telecommunications links in proximity to the turbine area. A summary of consultation undertaken is provided in **Table 15.4**.

Table 15.4: Telecoms and EMI Consultee Responses

Consultee	Summary of Consultation	Comment/Action Taken
BT	The Project indicated should not cause interference to BT's current and presently planned radio network.	No action required.
JRC	This proposal is *cleared* with respect to radio link infrastructure operated by Scottish Power and Scotia Gas Networks However, if any details of the wind farm change, particularly the disposition or scale of any turbine(s), it will be necessary to re-evaluate the proposal.	No action required.

Study Area

15.3.8 The study area for telecommunications and EMI assessment comprised the turbine area. This area forms part of land within the application boundary and is described in detail in **Chapter 2: Proposed Development**.

15.3.9 One telecommunications link was identified that crosses the site. Details are presented in **Table 15.5**. The remaining identified telecommunications links in the vicinity of the Proposed Development have been scoped out, as their exclusion zones are entirely outside of the turbine area.

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240 https://www.scotborders.gov.uk/info/20051/plans_and_guidance/121/local_development_plan [accessed July 2021].

241 https://www.scotborders.gov.uk/downloads/download/659/draft_renewable_energy_supplementary_guidance [accessed July 2021].

Table 15.5: Modelled Telecommunication Links

Operator	Link ID / Ref	Frequency / Fixed Buffer	A End	B End
MBNL	9110566	1 GHz[7]	357599E	368413E
		100m	604073N	610424N

Assessment of Effects

15.3.10 As illustrated on **Figure 15.2**, through the design of the Proposed Development, all turbines have been located outwith the identified link and it's 100 m exclusion zone. Therefore, no impacts are predicted on any telecommunication assets from the Proposed Development.

Summary

15.3.11 As identified through the assessment of effects, no impacts on any identified telecommunications assets are predicted. Therefore, no mitigation is required.

15.4 References

Department for Communities & Local Government (2013), Planning practice guidance for renewable and low carbon energy.

Nordrhein-Westfalen (2002), Notes on the Identification and Evaluation of the Optical Emissions of Wind Turbines, States Committee for Pollution Control, cited in Parsons Brinckerhoff 2011.

Northern Ireland Department of the Environment (2009), *Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy'*, cited in Parsons Brinckerhoff 2011

Parsons Brinckerhoff (2011), Update of UK Shadow Flicker Evidence Base Report prepared for Department of Energy and Climate Change.

Scottish Government (2001), Planning Advice Note 62: Radio telecommunications. Available at: https://www.gov.scot/publications/pan-62-radio-telecommunications/ [accessed July 2022].

The Scottish Borders Council (2018), Supplementary Guidance – Renewable energy.

SLR (2015), Wind Farm Impacts Study Review of the visual, shadow flicker and noise Impacts of onshore wind farms. Available at:

https://www.climatexchange.org.uk/media/1426/final_report_wind_farm_impacts_study_july_2015_issue.pdf [accessed July 2022].

16 CLIMATE CHANGE MITIGATION

16.1 Introduction

16.1.1 In addition to the value wind farms provide in terms of the electricity they produce; wind turbines and other renewable technologies further provide an important mechanism for the reduction of carbon dioxide (CO2), and other greenhouse gas (GHG) emissions into the atmosphere.

16.1.2 Operational wind farms achieve emissions savings by reducing the consumption of fossil fuel generated mains electricity. However, during their manufacture, construction and decommissioning, wind farms can themselves result in the emissions of CO2 gas, particularly in such instances as where natural carbon stores, such as peat, are present and potentially impacted by the development.

16.1.3 For this reason, this chapter provides an approximation of the CO_2 emissions associated with the manufacture, construction and decommissioning of the Proposed Development. It further provides an estimate of the contribution which the Proposed Development would make towards the reduction of emissions, which would otherwise be produced by fossil fuel power generation. This provides an indication of the whole life carbon balance of the Proposed Development, together with an understanding of the emissions 'pay-back' period. Once emissions resulting from the manufacture, construction and decommissioning of the Proposed Development have been paid back (offset) by the Wind Farm, then each subsequent unit of wind generated electricity would displace a unit of conventionally generated electricity, thereby contributing to the overall reduction in emissions into the atmosphere.

16.1.4 The carbon input and output of the Proposed Development has been calculated using the Scottish Government's Carbon Calculator. The calculator input and outputs are detailed in **Technical Appendices 16.1** and **16.2**.

Carbon and Peatland

16.1.5 Wind farm developments in upland areas are often sited on areas of peatland which hold stocks of poorly protected carbon. If disturbed, these stocks have the potential to release carbon into the atmosphere in the form of CO_2. For this reason, this carbon balance assessment must consider the implications of all parts of the Proposed Development which could lead to the release of CO_2 due to the disturbance of peat.

16.1.6 The disturbance of peat has been considered during the design process which has avoided areas of deep peat. The site design process is described in **Chapter 2: Proposed Development** whilst specific details relating to peat depth are included in **Chapter 10: Geology, Hydrogeology, Hydrology and Peat**.

Characteristics of Peatland

16.1.7 The loss of carbon from the carbon fixing potential of vegetation on peatland is small but is calculated for the area from which peat is removed and the area affected by drainage. The carbon stored in the peat itself represents a much larger potential source of carbon loss.

16.1.8 When flooded, peat soils emit lower amounts of CO_2 than when they are drained, as the water-logged conditions slow plant decomposition and the subsequent release of organic-bound carbon back into the atmosphere. In flooded soils, any CO_2 emissions are usually exceeded by plant fixation, so the net exchange of carbon within the atmosphere is negative and soil stocks increase. When soils are aerated, CO_2 emissions usually exceed plant fixation, so the net exchange of carbon within the atmosphere is positive. Methane emissions increase from flooded peat soils, however, due to their small contribution (3 – 5% of peat-related GHG emissions) and shorter atmospheric lifetime, the climatic effects of increased methane flux to the atmosphere do not outweigh the climatic benefits of increased carbon sequestration from flooded soils (Günther et al., 2020)[242].

16.1.9 To calculate the CO_2 emissions attributable to the removal or drainage of the peat, emissions occurring if the soil had remained in situ and undrained are subtracted from the emissions occurring after removal or drainage. The indirect loss of CO_2 uptake (fixation) by plants originally on the surface of the site, but eliminated by construction activity including the destruction of active bog plants and felling, is calculated using site-specific data collected as part of the EIA process and based upon blanket bog.

16.1.10 Emissions due to the indirect, long-term liberation of CO_2 from carbon stored in peat, due to drying and oxidation processes caused by onsite construction, can also be calculated from site-specific data for the Proposed Development. The resultant figure is a reasonable worst case scenario, as peat would be reused onsite to minimise carbon losses for restoration of the renewables project, and for habitat restoration including ditch blocking.

Forestry

16.1.11 The presence of extensive areas of forestry on, and/or in the vicinity of, an onshore wind development has the potential to significantly reduce its wind energy yield. For this reason, common practice has been to clear existing forestry from the surrounding area prior to the construction of the development. This practice often leaves open ground in its wake thus resulting in a loss in the CO_2 sequestration potential of the land.

16.1.12 The amount of carbon released into the atmosphere as a result of felling is dependent upon the type of trees being felled, the age of the crop, the use of the timber and how quickly the stored carbon is released into the atmosphere. Cannell (1999[243], in Nayak et al., 2008) provides estimates for the amounts of carbon sequestered by fast-growth (such as poplar), medium-growth (such as Sitka spruce) and slow-growth (such as beech) trees, as outlined in **Table 16.1**.

Table 16.1: Carbon sequestration potential of fast-, medium- and slow-growing tree species (Cannel, 1999)

	Poplar	Sitka	Beech
Yield class (m3 ha-1 yr-1)	12	16	6

[242] Günther, A., Barthelmes, A., Huth, V., Joosten, H., Jurasinki, G., Koebsch, F. and Couwenberg, J. (2020) Prompt rewetting of drained peatlands reduces climate warming despite methane emissions. Nat Commun 11, 1644. https://doi.org/10.1038/s41467-020-15499-z.

[243] Cannell (1999) Growing trees to sequester carbon in the UK: answers to some common questions. Forestry: An International Journal of Forest Research, 72, 3, p237–247, https://doi.org/10.1093/forestry/72.3.237.

	Poplar	Sitka	Beech
Carbon sequestered, G forest (tCO2 ha-1 yr-1)	26.8	13.2	8.8
Crop rotation, t forest (years)	26	55	92
CO2 sequestered per crop rotation (tCO2 ha-1)	694.66	724.68	808.86

Turbine Manufacture

16.1.13 Emissions arising from the fabrication of the turbines and associated components of the Proposed Development are based on the full life-cycle analysis of a typical turbine and include CO2 emissions resulting from transportation, erection, operation, dismantling and removal of turbines and foundations and transmission grid connection equipment from the existing electricity grid system.

16.1.14 With respect to the turbines, emissions from material production are the dominant source of CO2. Emissions arising from the construction (including transportation of components, quarrying, building foundations, access tracks and hard standing), and commissioning, are also included in the calculations. This assessment has used Nayak et al. (2008, 2010)[244][245] default values for 'turbine life' emissions, calculated with respect to installed capacity.

16.1.15 A number of technical papers (detailed in Nayak et al., 2008, 2010) have reported a wide range of wind farm emissions values; these being between 6 and 34 tCO2 GWh-1.

16.1.16 These emissions are considerable, and so it is essential they are considered in relation to calculating the CO2 payback period of the Proposed Development. However, it should be noted that this may still compare very favourably with the life cycle analysis of other means of non-fossil fuel based power generation, such as nuclear, particularly when the full energy costs of construction, operation, maintenance and decommissioning, uranium mining and transportation as well as long-term waste management are taken into account.

16.2 Scope and Methodology

16.2.1 The assessment of the carbon balance of the Proposed Development is based upon a detailed baseline description of the Proposed Development and its location. All calculations are premised upon site-specific data, where available. Where site-specific data are not available, national/regional information has been used.

16.2.2 The methodology used to calculate CO2 emissions which would result from the Proposed Development is based upon the work of Nayak et al. (2008, 2010) and Smith et al. (2011)[246], which are the basis for the latest version (V1.6.1) of the Scottish Government's

[244] Nayak, D.R., Miller, D., Nolan, A., Smith, P., and Smith, J. (2008, revised 2010), Calculating carbon savings from wind farms on Scottish peat lands: a new approach. Available at: https://www.gov.scot/publications/calculating-carbon-savings-wind-farms-scottish-peat-lands-new-approach/ [accessed September 2021].

[245] Nayak D.R., Miller D., Nolan A., Smith P., and Smith J. (2010), Calculating carbon budgets of wind farms on Scottish peatlands; Mires and Peat (Article 09), 4, 1-23. Available at: http://mires-and-peat.net/pages/volumes/map04/map0409.php [accessed September 2021].

[246] Smith, J.U., Graves, P., Nayak, D.R., Smith, P., Perks, M., Gardiner, B., Miller, D., Nolan, A., Morrice, J., Xenakis, G., Waldron, S., and Drew, S. (2011), Carbon implications of windfarms located on peatlands – Update of the Scottish Government Carbon Calculator tool. Final Report, RERAD Report CR/2010/05.

Carbon Calculator Tool. This tool enables carbon losses and carbon savings to be quantified across the project lifecycle stages (construction, operation and decommissioning/site restoration), and these losses and savings are combined to establish the overall (net) carbon effect of the Proposed Development, as well as its 'carbon payback period'.

16.2.3 The Proposed Development is anticipated to have an operational life of 35 years, after which it would be decommissioned, and the turbines dismantled and removed in accordance with SEPA Guidance (2016)[247] regarding 'Life Extension and Decommissioning of Onshore Windfarms'. Specifically, that is to:

- remove infrastructure unless the potential environmental risks posed by removal (e.g. carbon loss, impacts on the water environment) would outweigh the benefits;
- maximise recovery of materials from removed infrastructure and treat as high up on the waste hierarchy as possible;
- optimise habitat restoration of area affected by infrastructure removal; and
- implement a long-term aftercare programme established to monitor/manage any potential long-term environmental risks.

16.2.4 Turbine foundations would be set down to the depth of suitable bearing strata with an approximate diameter of 25 m (octagonal). Should geotechnical investigations demonstrate that the required bearing capacities are not achievable; a piled foundation design would be adopted using the same overall design footprint. As this requirement is not yet known, it has been assumed, for the purpose of deriving a meaningful result from the application of the calculator, that piling is used.

16.2.5 Results from the above assessment are reported below in accordance with the Institute of Environmental Management and Assessment's Environmental Impact Assessment guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022)[248].

16.3 Consultation Undertaken

16.3.1 A number of responses relating to climate change mitigation were received as part of the Scoping consultation undertaken in February 2022. These responses are summarised below (**Table 16.2**) and have been addressed in the EIA Report as required.

Table 16.2: Scoping responses Received with Regards to Climate Change

Consultee and Date	Summary of Key Issues	Action taken
SEPA, 16/03/2022	SEPA noted the potential disturbance to nearby peatland: Scottish Planning Policy states (Paragraph 205) that "*where peat and other carbon rich soils are*	The design specifications with regards to peat are covered in **Chapter 10: Geology, Hydrogeology, Hydrology and Peat,** and include mitigation

[247] SEPA (2016), Guidance regarding Life Extension and Decommissioning of Onshore Windfarms. Available at: https://www.sepa.org.uk/media/219689/sepa-guidance-regarding-life-extension-and-decommissioning-of-onshore-windfarms.pdf [accessed November 2022].

[248] IEMA (2022), Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance.

Consultee and Date	Summary of Key Issues	Action taken
	present, applicants must assess the likely effects of development on carbon dioxide (CO_2) emissions. Where peatland is drained or otherwise disturbed, there is liable to be a release of CO_2 to the atmosphere. Developments must aim to minimise this release." The planning submission must a) demonstrate how the layout has been designed to minimise disturbance of peat and consequential release of CO_2 and b) outline the preventative/mitigation measures to avoid significant drying or oxidation of peat through, for example, the construction of access tracks, drainage channels, cable trenches, or the storage and re-use of excavated peat. There is often less environmental impact from localised temporary storage and reuse rather than movement to large central peat storage areas. SEPA highlighted numerous pieces of information required in support of the application. Those relevant to carbon/climate change are: • peat depth survey and re-use proposals; • map and table detailing forest removal; and • detail of flood risk assessment.	measures to minimise loss of CO_2 through construction activities. These items are addressed in **Chapter 10: Geology, Hydrogeology, Hydrology and Peat** and **Chapter 17: Forestry**.
Southdean Community Council, 14/03/2022	Southdean Community Council raised issues around the impact of extreme weather events (windstorms) and the potential for them to severely damage the development. Given the lifespan of developments (35 years), these events may become more common depending on climate change.	The risk of climate change on the Proposed Development has been scoped out of this assessment. With regards to wind speeds, UKCP18 states that there are no compelling trends in storminess (as a result of maximum gust speeds) over the last four decades, and wind speed has shown little long-term trend. Future projections show some increase in near surface (10 m height) wind speeds over the UK in the second half of the 21st Century in the winter season, when higher wind speeds are generally experienced. These are

Consultee and Date	Summary of Key Issues	Action taken
	Mention was also made of flood risk associated with the impact on Jed Water.	not expected to impact on the 35 year lifespan of the Proposed Development. Furthermore, wind turbines are designed to withstand extreme conditions associated with exposed locations. Braking mechanisms installed on turbines allow them to be operated only under specific wind speeds and should severe windstorms be experienced then the turbines would be shut down. Flood risk is addressed within **Chapter 10: Geology, Hydrogeology, Hydrology and Peat.**

16.4 Statutory and Planning Context

International Context

The Paris Agreement

16.4.1 The Paris Agreement is a legally binding international treaty which commits Parties to the United Nations Framework Convention on Climate Change to the reduction of GHG emissions, with the view to limiting global average temperature rise to well below 2˚C above pre-industrial levels, whilst *"pursuing efforts to limit the temperature increase to 1.5˚C"*. With this objective in mind, the Agreement is revisited on a five yearly basis to allow Parties to the Convention to evaluate and enhance the level of ambition of their climate action plans, known as nationally determined contributions (NDCs). In the lead up to COP26, which took place in Glasgow in November 2021, Parties to the Convention submitted updated NDCs which aim to deliver enhanced ambition in comparison to those submitted previously.

National Context

The Climate Change (Emissions Reduction Targets) (Scotland) Act (2019)

16.4.2 The Climate Change (Scotland) Act 2009 set a target of reducing GHG emissions by at least 80% by 2050, relative to the baseline year of 1990, with an interim target of reducing GHG emissions by at least 42% by 2020.

16.4.3 In October 2019, this was amended by the Climate Change (Emissions Reductions Targets) (Scotland) Act 2019 which sets a target of net-zero emissions by 2045 (in line with the recommendations of the Committee on Climate Change). The interim targets of the Act are:

- 56% reduction in emissions by 2020;
- 75% reduction in emissions by 2030; and
- 90% reduction in emissions by 2040.

Scottish Climate Change Plan (2018)

16.4.4 The Scottish Climate Change Plan (SCCP, 2018)[249] includes a target of 50% of Scotland's energy needs to be met by renewable energy by 2030. The SCCP also included a goal for 100% of Scotland's electricity to be generated by renewables by 2020.

16.4.5 In December 2021, the Plan was updated in light of the Coronavirus pandemic. Specifically, it provides an approach towards the delivery of an economic recovery that is in keeping with the ambitious targets set out in the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. To achieve this, the Update sets out a number of policies and proposals for each sector, which build upon those contained in the original Plan. With respect to electricity generation, these include to, but are not limited to:

- support the development of a wide range of renewable technologies by addressing current and future challenges, including market and policy barriers;
- support improvements to electricity generation and network asset management, including network charging and access arrangements that encourage the deployment and viability of renewables projects in Scotland;
- publish a revised and updated Energy Strategy, reflecting [the Scottish government's] commitment to net zero and key decisions on the pathways to take us there; and
- a new renewable, all energy consumption target of 50% by 2030, covering electricity, heat and transport.

Scottish Planning Policy (2014)

16.4.6 The Scottish Planning Policy (SPP, 2014)[250] sets out how the Climate Change (Scotland) Act 2009 (as amended) should be delivered on the ground. The SPP states that, "by seizing opportunities to encourage mitigation and adaptation measures, planning can support the transformational change required to meet emission reduction targets and influence climate change" (para 19, SPP, 2014).

16.4.7 The SPP states (para 205) that, "where peat and other carbon rich soils are present, applicants should assess the likely effects of development on carbon dioxide (CO2) emissions. Where peatland is drained or otherwise disturbed, there is liable to be a release of CO2 into the atmosphere. Developments should aim to minimise this release".

Good Practice During Wind Farm Construction, NatureScot et al. (2019)[251]

[249] Scottish Climate Change Plan (2018), Climate Change Plan: third report on proposals and policies 2018-2032 (RPP3). Available at: https://www.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018/pages/3/ [accessed November 2022].

[250] Scottish Planning Policy (2014), Scottish Planning Policy. Available at https://www.gov.scot/publications/scottish-planning-policy/pages/3/ [accessed September 2022].

[251] NatureScot et al. (2019), Good Practice during Wind Farm Construction, Fourth Edition; A joint publication by Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, Forestry Commission Scotland, and Historic Environment Scotland. Available at https://www.nature.scot/doc/guidance-good-practice-during-wind-farm-construction [accessed September 2022].

16.4.8 The SNH, now NatureScot, 'Good Practice During Wind Farm Construction' guidance recognises that one of the key aims of wind farm development is to reduce carbon emissions. However, wind farm developments, through the materials used, during the construction processes employed and the potential emissions from disturbed soils and habitats, do result in carbon emissions.

16.4.9 The guidance recognises that, in some circumstances, the carbon payback of wind farm developments could be significantly affected by the construction methods used and the degree of restoration of the site. The guidance, therefore, seeks to ensure that good practice is adopted to reduce the carbon emissions associated with wind farm development.

16.4.10 The good practice approach to development on peat and carbon savings recommended by this guidance can be summarised as follows:

- conduct a detailed peat survey;
- where possible, position the site infrastructure in areas of shallower peat or design an appropriate engineering solution to avoid and/or minimise excavation of peat (for example floating roads and piling solutions);
- minimise the detriment to peat if excavation cannot be fully avoided;
- avoid or reduce peat displacement from the development of borrow pits;
- excavations should be prevented from drying out or desiccating as far as possible. Consideration should also be given to spraying with water;
- if stockpiling peat, assess the potential loading effects for peat slide risk;
- the peat should be restored as soon as possible after disturbance;
- consider cable trenching operations and timings;
- floating roads should be used in areas of deeper peat;
- minimise plant movements and haul distances in relation to any earthworks activities including peat management; and
- developers should take ancillary opportunities to improve habitats.

Local Context

The Scottish Borders Council Climate Change Route Map (2021)[252]

16.4.11 The Scottish Borders Council (SBC) declared a Climate Emergency in September 2020, and subsequently produced a climate change route map in June 2021, with a plan to achieve net zero GHG emissions by 2045. Energy is identified as a key theme, with both reduction in energy consumption and the increase in renewable sources cited as pathways to reduced GHG emissions. As such, under milestone EC4 they declare that they will *"support development of the whole renewables industry through its planning and economic policies: [such as] wind, wave, and tidal energy, solar, hydro, biomass including potential for circular economy such as farm waste to create biofuel."*

[252] Scottish Borders Council (2021), Our Climate Change Route Map. Available at: https://scottishborders.moderngov.co.uk/documents/s56082/Item%20No.%2012%20-%20Appendix%201%20-%20SB%20CLIMATE%20CHANGE%20ROUTE%20MAP%20FINAL.pdf [accessed November 2022].

The Scottish Borders Council Local Development Plan (2016)[253]

16.4.12 Paragraph 2.18 of the SBC Local Development Plan highlights the increasing provision of onshore wind farms within the area to support the government's pledge for a low carbon economy. One main aim of the Plan is to "integrate climate adaptation requirements such as … sustainable renewable energy production", and Economic Development Policy 9 (Renewable Energy Development) states the Council are *"supportive of a wide range of renewable energy mechanisms including the development of onshore wind farms and turbines"*. However, the Plan also acknowledges that planning applications for wind turbines can be contentious, and that they are investigating the potential landscape capacity for wind farms due to possible adverse and cumulative impacts arising with regards to *"landscape, biodiversity, air quality, water quality, soils and communities".*

16.4.13 Specifically, the Local Development Plan states that all wind energy proposals should use the carbon calculator to consider impacts on carbon-rich soils, and should consider the *"scale of the contribution to renewable energy generation targets, and the effect on greenhouse gas emissions".*

16.5 Existing Environment

16.5.1 Baseline environmental conditions in relation to potential climate change impacts from the Proposed Development include existing carbon stored in the site (such as peat and forestry) that could be impacted by the Proposed Development resulting in CO2 and other GHG emissions.

Peat

16.5.2 The site currently comprises mineral gley soils with noncalcareous gley components in the north of the site, and peaty gleys with dystrophic blanket peats in the south[254]. Some minor areas of brown forest soils and peaty gleyed podzols are present in the west of the site, as well as a small area overlain by peaty podzols, some peaty gleys and peat of the Ettrick association.

16.5.3 The Scottish Government Carbon and Peatland Map 2016 has been consulted to assist the understanding of the carbon-rich soils, deep peat and priority peatland habitat within the site. No class 1 or 2 peat (i.e., that which has highest conservation value) has been identified, and the area is dominated by class 3 peat, primarily to the south-eastern region of the site. Minor areas of class 4 and class 5 peat were identified within the site boundaries, though most of the remaining site area was comprised of class 0 mineral soil, where peatland habitats are typically not found.

16.5.4 Peat depth and peat condition surveys were undertaken in April 2022 for areas of proposed infrastructure. The peat depth surveys and reconnaissance survey confirm that peat within the site is patchy, with most of the site consisting of peaty soils with a depth

[253] Scottish Borders Council (2016), Local Development Plan. Available at https://www.scotborders.gov.uk/info/20051/plans_and_guidance/121/local_development_plan [accessed November 2022].

[254] Scottish Government (2022), Soil Survey of Scotland. Available at Soil Survey of Scotland 1:250 000 scanned maps | Scotland's soils (environment.gov.scot) [Accessed July 2022].

of less than 0.5 m. For further information on the peatland habitat within the site, consult **Chapter 10: Geology, Hydrogeology, Hydrology and Peat.**

Forestry

16.5.5 The Proposed Development lies within Dykeraw Forest, an existing privately owned and managed commercial forestry plantation, located within the wider area of Wauchope Forest, managed by Forestry and Land Scotland (FLS). The plantation contains a range of woodland types and age classes, with the bulk of the plantation consisting of young coniferous second rotation crop.

16.6 Predicted Impacts

16.6.1 The results of the carbon balance assessment carried out for the Proposed Development are presented below for each project stage.

Construction and Decommissioning

16.6.2 **Table 16.3** presents the results of the carbon balance assessment for the manufacture, construction, and decommissioning stages of the Proposed Development. The lack of significant peat on site results in minimal predicted GHG emissions from soil organic matter, although emissions are predicted from the felling of forestry. Total GHG emissions of 155,486 tCO2e are predicted from the manufacture, construction and decommissioning of the Proposed Development.

Table 16.3: Predicted GHG Emissions from Wind Farm Manufacture, Construction and Decommissioning

Source of GHG Emissions/Savings	GHG Emissions (tCO_2e)
Losses due to Turbine Manufacture, Construction and Decommissioning	69,650
Losses due to Back-Up Power Generation	51,656
Losses due to Reduced Carbon Fixing Potential	462
Losses from Soil Organic Matter	- 4,170
Losses due to Dissolved Oxygen Content and Portable Oxygen Content	22
Losses due to Forestry Felling	37,866
Total	**155,486**

16.6.3 Any post-decommissioning site restoration and enhancement work, such as the blocking of drainage ditches to promote re-wetting would be aligned with the outline Habitat Management Plan (see **Technical Appendix 8.5**). These kinds of activities have the potential for carbon savings by promoting the growth of natural carbon stores such as peat. Other management options may become apparent during the more detailed stages of devising the Habitat Management Plan.

16.6.4 The project is committed to undertaking compensatory planting (see **Chapter 17: Forestry**) as required under the Forestry Commission Scotland Control of Woodland

Removal Policy (2009)[255], in order to achieve no net loss of forestry. The location and type of planting will be agreed with NatureScot and Scottish Forestry in due course.

16.6.5 **Table 16.4** shows the total CO2 gains acquired due to the improvement of the site during post-decommissioning (tCO2e). These are predicted to equate to gains of approximately 1,731 tCO2e.

Table 16.4: Total CO_2 Gains Due to Improvement of the Site (tCO_2e)

Improvement	GHG Emissions (tCO2e)
Change in Emissions due to Improvement of Degraded Bogs	0
Change in Emissions due to Improvement of Felled Forestry	- 2,138
Change in Emissions due to Restoration of Peat from Borrow Pits	427
Change in Emissions due to Removal of Drainage from Foundations and Hardstanding	- 19
Total Change in Emissions due to Improvements	**- 1,731**

Operation

16.6.6 The operational stage of the Proposed Development has the greatest potential for emissions savings and, therefore, beneficial climate change impacts. At this stage, GHG emissions from construction activities would have ceased and the operation of the turbines would generate zero-carbon electricity for the remainder of their lifespan. **Table 16.5** presents the annual emissions savings that are predicted for the Proposed Development, as measured against the fossil fuel mix of the grid electricity, having consideration for the capacity factors (load factors) advised by the applicant (40.5%, minimum 39%, maximum 42%).

Table 16.5: Annual Emissions Savings Against Fossil Fuel Electricity Generation Mix

Source of GHG Savings	GHG Savings (tCO2e)		
	Minimum Value	Expected Value	Maximum Value
Capacity Factor	39%	40.5%	42%
Wind Farm Operation	115,119	119,547	123,974
Total CO_2 Savings per Year	**115,119**	**119,547**	**123,974**

Emissions Payback Period

16.6.7 Dividing the net GHG emissions predicted for the manufacture, construction and decommissioning stages (taking into account CO2 gains from improvement of site: 153,755 tCO2e) by the predicted annual carbon savings from wind farm operation

[255] Forestry Commision Scotland (2009), The Scottish Government's Policy on Control of Woodland Removal https://forestry.gov.scot/publications/285-the-scottish-government-s-policy-on-control-of-woodland-removal [accessed November 2022].

(119,547 tCO_2e) gives a predicted emissions payback of 1.3 years, as shown in **Table 16.6**. Therefore, net GHG emissions from the construction and decommissioning are predicted to be offset by emissions savings from the Proposed Development within 1.3 years of it becoming operational.

Table 16.6: Carbon Payback Period of the Proposed Development for a Range of Capacity Factors

	Minimum value	Expected value	Maximum value
Capacity factor	39%	40.5%	42%
Carbon payback time (years)	1.7	1.3	0.9

Net GHG Effect

16.6.8 The Proposed Development is anticipated to have an operational life of 35 years, after which it would be decommissioned, and the turbines dismantled and removed. With this in mind, total CO_2 emissions savings over the assumed lifetime of the Proposed Development is expected to be 4,030,390 tCO_2e (40.5% capacity factor).

16.7 Cumulative Effects

16.7.1 Cumulative effects are defined *as "the incremental effects of an action when added to the effect of past, present and reasonably foreseeable future action. Cumulative effects result from individually minor but collectively significant actions taking place over a period of time"* (European Commission, 2013).

16.7.2 Inter-project effects are the impacts from other planned or potential developments, together with the Proposed Development, which individually may be insignificant, but when considered together could be considered to have a significant cumulative effect.

16.7.3 The Proposed Development has two wind farm developments within a 20 km radius, Pines Burn and Windy Edge, consisting of twelve turbines and nine turbines respectively (see **Chapter 6: Landscape and Visual Assessment** for more details).

16.7.4 The cumulative effects from these existing and potential surrounding wind farm developments would be positive, contributing towards climate change mitigation. Although carbon rich peat would be lost from the area, the nature of the developments sees a total emissions savings from offsetting of fossil fuel mix of grid electricity. Therefore, the GHG savings would outweigh losses from construction, including disturbance and removal of peat and forestry.

16.8 Mitigation

16.8.1 The substantial carbon savings that are predicted from operating the Proposed Development represent, in and of themselves, a method of climate change mitigation. This is one of the key benefits of the Proposed Development.

16.8.2 A key form of embedded mitigation is to avoid construction activities within areas of deep peat (see **Chapter 10: Geology, Hydrogeology, Hydrology and Peat**). The location of turbines and associated infrastructure take cognisance of this, resulting in appropriate positioning in areas of shallow or no peat.

16.8.3 Existing tracks would be used where possible in order to minimise the amount of excavation required. Any new access tracks are anticipated to be constructed using established cut-and-fill construction methods and be designed to maintain or impede drainage through habitats, whichever is most appropriate. Areas of peat would be avoided where possible.

16.8.4 All construction, excavation, and disruptive works in general would be carried out in line with best practise guidance, with restoration and rehabilitation measures carried out following completion of the project.

16.8.5 Construction work would make use of current best practice guidance relating to developments in peat soil areas. A risk management system, such as a geotechnical risk register, would be compiled and maintained at all stages of the project and developed as part of the post-consent detailed design works, and would be updated as new information becomes available.

16.8.6 Drains and culverts would be designed to preserve natural drainage continuity and not to lead to erosion, scouring and the spread of silt.

16.8.7 Excavation of new drains would be avoided where possible.

16.8.8 Construction activities would be restricted during periods of wet weather, particularly for any work occurring within 20 m of a watercourse. Careful track design would ensure that the volume and storage timescale for excavated materials would be minimised as far as practicable during construction works.

16.8.9 Drainage would be designed to separate clean and dirty water and to provide appropriately located and sized silt traps. Upslope cut off ditches would be included in the design to ensure that un-contaminated run-off is diverted away from construction areas.

16.8.10 All works through and adjacent to wetland areas would be supervised by an Environmental Clerk of Works (ECoW).

16.8.11 The Proposed Development is anticipated to have an operational life of 35 years, after which it would be decommissioned, and the turbines dismantled and removed; unless further consent is secured to operate for an additional time period. Decommissioning of the Proposed Development would be undertaken in line with SEPA Guidance (2016) regarding Life Extension and Decommissioning of Onshore Windfarms[256]. Specifically, that is to:

- remove infrastructure unless the potential environmental risks posed by removal (e.g., carbon loss, impacts on the water environment) would outweigh the benefits;
- maximise recovery of materials from removed infrastructure and treat as high up the waste hierarchy as possible;
- optimise habitat restoration of areas affected by infrastructure removal; and

[256] SEPA (2016), Guidance regarding Life Extension and Decommissioning of Onshore Windfarms. Available at: https://www.sepa.org.uk/media/219689/sepa-guidance-regarding-life-extension-and-decommissioning-of-onshore-windfarms.pdf [accessed November 2022].

- establish a long-term aftercare programme to monitor/manage any potential long-term environmental risks.

16.9 Summary of Effects

16.9.1 GHG emissions are predicted to arise from the manufacture, construction and decommissioning activities. In particular, the principal sources of emissions include turbine manufacture and the loss of peat and forestry from the construction of turbines and associated infrastructure.

16.9.2 However, these GHG emissions are predicted to be offset 1.3 years after the Proposed Development becomes operational (against a fossil fuel mix of electricity). The Proposed Development is predicted to deliver total emissions savings of 4,030,390 tCO2e (40.5% capacity factor) over its 35 year operational lifetime.

16.9.3 The overall emissions impact is considered to represent a significant beneficial and long-term climate change effect. Consequently, the Proposed Development contributes towards Scotland's emissions reduction targets as set out in the Climate Change (Emissions Reductions Targets) (Scotland) Act 2019, together with its renewable energy obligations as set out in the Scottish Climate Change Plan.

16.10 References

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17 FORESTRY

17.1 Introduction

17.1.1 This Chapter provides forestry information to support the EIA, including:

- a baseline forestry assessment;
- the effect of the Proposed Development on the forestry plantations;
- information on the areas to be felled and the timber volumes to be removed;
- how the waste will be dealt with to minimise its effect on the environment; and
- mitigation measures in place including Compensatory Planting.

17.1.2 This Chapter is supported by the following figures:

- Figure 17.1: Wind Farm Felling Plan (Turbine Area)
- Figure 17.2: Wind Farm Felling Pan (Access Area)
- Figure 17.3: Wind Farm Restock Plan (Turbine Area)
- Figure 17.4: Wind Farm Restock Plan (Access Area)

17.1.3 This Chapter is supported by the following Technical Appendices:

- Technical Appendix 17.1: Forestry Site Visit
- Technical Appendix 17.2: Timber Volume Assessment
- Technical Appendix 17.3: Baseline Forestry Plans

17.2 Consultation Undertaken

17.2.1 **Table 17.1** summarises the forestry related consultation undertaken in relation to the Proposed Development and how they have been addressed.

Table 17.1: Summary of Consultation

Consultee	Response	Comment
NatureScot	Recommend opportunities to restructure the forest to benefit biodiversity and landscape are proposed in the EIA Report, recognising that the Forest Design Plan currently in place to manage this forest may need to be revised. Would support the principle for any compensatory planting required by Government policy to be onsite.	A wind farm forest restocking plan (**Figures 17.2** and **17.4**) has been produced for the Turbine Area and access area, which has looked to replant areas of temporary felling associated with construction of the Proposed Development. Compensatory planting has been considered in **Section 17.7** of this Chapter.
Scottish Environment Protection Agency (SEPA)	Key-holing must be used wherever possible as large scale felling can result in large amounts of waste material and in a peak release of nutrients which can affect local water supply. Clear felling may be acceptable only in cases where planting took place on deep peat and it is proposed through a habitat management plan to reinstate peat-forming habitats.	Keyhole felling is proposed and felling of additional areas has only been considered where there is a potential windthrow risk. An Outline Peat Management Plan (**Technical Appendix**

Consultee	Response	Comment
	Would expect forestry removal to enable peatland restoration by reinstating forestry to bog habitat where appropriate. Requested that the submission also includes the following: • a) A map demarcating the areas to be subject to different felling techniques. • b) Photography of general timber condition in each of these areas. • c) A table of approximate volumes of timber which will be removed from site and volumes, sizes of chips or brash and depths that will be re-used on site. • d) A plan showing how and where any timber residues will be re-used for ecological benefit within that area, supported by a Habitat Management Plan.	**10.1**) has been prepared, which outlines all proposals for peatland restoration. A wind farm forest felling plan (**Figures 17.1** and **17.3**) has been produced for the Turbine Area and access area. Photographs of the general timber conditions onsite are included in **Technical Appendix 17.1** A timber volume assessment is included in **Table 17.11** of this Chapter and **Technical Appendix 17.2.** An outline habitat management plan is included in **Technical Appendix 8.5**. Best practice measures regarding the management of timber residues in areas of felling (**Figures 17.1** and **17.2**) are included in **Section 17.6**.
Scottish Borders Council	Forestry loss should be compensated for in accordance with the Control of Woodland Removal Policy, Scottish Borders Woodland Strategy (Technical Advice Note 2012) and LDP Policy EP13 Trees, Woodlands and Hedgerows. There are also opportunities to deliver multiple benefits for biodiversity, natural flood management and water quality improvements through an appropriate woodland enhancement scheme. And such proposals should be included as part of a Forestry Chapter within the EIA Report.	Compensatory planting has been considered in **Section 17.7** of this Chapter. An outline habitat management plan, which has considered enhancement proposals for delivering multiple benefits onsite is included in **Technical Appendix 8.5**
Scottish Forestry	The EIA Report should include a stand-alone chapter on 'Woodland management and tree felling'. The chapter should describe the baseline conditions of the forest, including its ownership. This will include information on species composition, age class structure, yield class and other relevant crop information. The chapter should clearly indicate proposed areas of woodland for felling to accommodate new turbines, access roads and other infrastructure. The chapter should describe the changes to the forest structure, the woodland composition and describe the work programme.	Baseline forestry conditions are described in **Section 7.5** of this Chapter and **Technical Appendix 17.1**. The proposed areas of woodland felling for the Turbine Area and access area are included on a plan (**Figures 17.1** and **17.3**) and in **Table 17.11** of this Chapter and **Technical Appendix 17.2**.

Consultee	Response	Comment
	Applicants are therefore advised to prepare a Long Term Forest Plan, alongside their EIA Report. The felling plan should clearly identify which areas are to be felled and when. The restocking plan should show which areas are to be replanted and when during the life of the windfarm. The plan should clearly identify and describe the restocking operations including changes to the species composition, age class structure, timber production and traffic movements. Trees cleared for turbine bases, access roads and any other wind farm related infrastructure must be replaced by replanted onsite or on an alternative site (compensatory planting). The specifics of the proposed mitigation should be included in a Compensatory Planting Plan, appropriately described in the EIA Report.	A wind farm forest restocking plan (**Figures 17.2** and **17.4**) has been produced for the Turbine Area and access area. A timber volume assessment (**Table 17.11** and **Technical Appendix 17.3**) has been completed and used to inform traffic movement calculations. Compensatory planting has been considered in **Section 17.7** of this Chapter.
Southdean Community Council	Wish to see details on compensatory planting.	Compensatory planting has been considered in **Section 17.7** of this Chapter.

17.3 Statutory and Planning Context

Forestry and Land Management (Scotland) Act (2018)

17.3.1 The felling of trees is regulated under the Forestry and Land Management (Scotland) Act 2018, except in cases when woodland removal is associated with wind farm development. In such cases, any significant environmental effects of woodland removal are assessed by the Scottish Government or the Local Authority depending on the capacity of the development. In this case it is the Scottish Government.

National Planning Policy

17.3.2 Trees and woodlands are addressed in the Scottish Planning Policy (June 2014) (SPP), which states the Control of Woodland Removal (CWR) Policy needs to be taken into consideration in relation to any development (Section 218). Policy 6 of the revised draft of the fourth National Planning Framework (November 2022), which would supersede SPP, reiterates that removal of woodland for development would only be supported where it would comply with the national policy on woodland removal (i.e. CWR).

Policy on the Control of Woodland Removal (2009)

17.3.3 The Scottish Government's policy document on CWR Policy and accompanying Implementation Guidance (2019) (Appendix A) provides guidance on the policy and process for managing the implementation of the CWR Policy in respect of forestry removal on development sites. In accordance with the CWR, woodland removal should only be permitted where it would achieve significant and clearly defined additional public benefits.

17.3.4 It is not considered that the Proposed Development would qualify for change of land use without compensatory planting, as it could not contribute significantly to any of the relevant criteria detailed in Appendix C of The Scottish Government's Policy on Control of Woodland Removal.

17.3.5 However, the Proposed Development would meet the acceptability criteria for woodland removal as the change of land use with compensatory planting as it would contribute significantly to "*helping Scotland to adapt to climate change*" by providing facilities appropriate for the development of renewable energy projects and significantly reduce net greenhouse gas emissions.

17.3.6 The guidance also states the following in relation to wind farm developments:

"With regards to windfarm development, trees cleared for turbines bases, access roads and any other wind farm related infrastructure (infrastructure felling) should be considered as part of a planning application (under the Electricity Act 1989 or the Town and Country Planning Act 1997) and the felling should be consented with Compensation Planting requirements".

17.4 Scope and Methodology

17.4.1 Commercial forestry is not regarded as a receptor for EIA purposes. Commercial forests are dynamic and their structure continually undergoes change due to normal felling and restocking by the landowner; natural events, such as windblow, pests or diseases; and external factors, such as a wind farm development. Therefore, this assessment will not consider significance of effect. Potential impacts on other factors, such as biodiversity, resulting from changes to the forestry baseline have been assessed elsewhere in the EIA Report (**Chapter 8: Ecology**, **Chapter 9: Ornithology**, **Chapter 10: Geology, Hydrogeology, Hydrology and Peat**, **Chapter 11: Noise and Vibration**, **Chapter 12: Aviation and Radar** and **Chapter 16 Climate Change Mitigation**).

17.4.2 This assessment will focus on addressing the issues raised by consultees and compliance with the legislative and planning requirements.

17.4.3 The key issues for the assessment of potential impacts on existing forestry crops relating to the Proposed Development are as follows:

- permanent effects which predominantly relate to the permanent removal of trees from the Site to facilitate the Proposed Development; and
- indirect effects, including the potential impact on crops adjoining areas removed for infrastructure construction, which may subsequently become unstable and susceptible to windblow damage.

Guidance

17.4.4 As there are no published criteria, guidance or methodologies in relation to the assessment of effects on forestry. The assessment is therefore based on professional judgement informed by available forestry plans (and supporting information), field work, local management experience and consultation.

17.4.5 The assessment has however taken account of statute, guidance and advice where applicable, including:

- Forestry Commission (1981) Yield Models for Forest Management;

- Forestry Commission (1996) Technical Paper 16: Designing Forest Edges to Improve Wind Stability;
- Forestry Commission (2009) The Scottish Government's Policy on Control of Woodland Removal;
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- Forestry Commission (2017) The UK Forestry Standard – The Government's Approach to Sustainable Forestry;
- Scottish Environment Protection Agency (2014) Land Use Planning System SEPA Guidance Note LUPS-GU27 – Use of Trees Cleared to Facilitate Development on Afforested Land;
- Scottish Forestry Strategy (2019);
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- Scottish Land Use Strategy (2016);
- SEPA (2017) Guidance WST-G-027 version 3 Management of Forestry Waste;
- Scottish Borders Council (2005): Scottish Borders Woodland Strategy; and
- UK Forestry Standard.

Study Area

17.4.6 The Study Area relates to the existing forestry crops within the application boundary (refer to **Figure 2.1**), as any impact on the forestry crops as a result of the Proposed Development will be limited to this geographic area. The Proposed Development is within two commercial plantations. The Turbine Area is within Dykeraw Forest (illustrated on **Figure 17.1)** and the Access Area is within the Letham Area of Wauchope East Forest (**Figure 17.2**). Separate wind farm forestry plans have been prepared for each of the commercial plantations, comprising wind farm felling plans (Turbine Area on **Figure 17.1** and Access Area on **Figure 17.2**) and wind farm restock plans (Turbine Area on **Figure 17.3** and Access Area on **Figure 17.4**), however, the assessment has considered them together as the impact would be on the forestry resource as a whole.

Potential Impacts

Direct Impacts

17.4.6.1.1.1 Wind Protection Zone

17.4.7 A circular ('keyhole') buffer area will be felled for each wind turbine, which is known as a 'Wind Protection Zone'. This is the minimum area required for both turbine efficiency and ecological reasons. The buffer area is based on maintaining a minimum 50 m clearance from the swept path of the rotor and the forestry (based on a worst case maximum height of the forestry): this distance determined by guidance to protect bats[257]. **Table 17.2** shows the variable felling buffers for the Proposed Development based on the differing wind turbine heights.

[257] NatureScot (2021) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. Available online: https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation#Acknowledgements

Table 17.2: Keyhole Felling Buffers for Wind Turbines

Turbine height to blade tip (m)	Felling buffer radius required to achieve statutory 50 m clearance from turbine rotor swept path (m)
230	65
210	91
200	100
180	115

17.4.7.1.1.1 Access Tracks

17.4.8 The precise amount of felling required along the proposed access track will be determined at detailed design stage, post-consent. For the purposes of the calculations of forestry removal along the proposed access track, the width of the access routes has been kept to the minimum required for new track and track upgrades required to facilitate the delivery of abnormal loads and transportation of the construction materials (**Chapter 12: Traffic and Transport**). A swept path analysis was conducted to identify potential areas of oversail and overrun and these have been considered in the identification of potential additional felling areas on bends.

17.4.8.1.1.1 Ancillary Infrastructure

17.4.9 There would be a relatively small amount of felling to provide clear areas for ancillary infrastructure. A 12.5 m buffer has been applied to the proposed borrow pits, crane hardstandings, construction compound and the substation.

Indirect Impacts

17.4.10 Any felling of trees around the proposed turbine locations could increase the risk of windthrow at new forestry edges. It might be required to fell an additional area back to a windfirm edge or more likely the edge of the compartment/sub-compartment boundary. Areas of additional felling are shown outside the wind protection zones and access track and ancillary infrastructure felling buffers on the proposed wind farm felling plans (**Figures 17.1** and **17.2**).

Timber Volume

17.4.11 SEPA guidance[258] states that the best practice for dealing with forest materials at development sites is as follows:

- Professional forester input to quantify the likely volume, markets and economic uses of trees to be exported from the site.
- Developer commitment to employ a professional forester to implement and maximise the removal of timber and forest residue on site.
- Quantify the likely volumes of material for which no economic off-site use can be found.

[258] SEPA (2014) Land Use Planning System, SEPA Guidance Note LUPS-GU27 - Use of Trees Cleared to Facilitate Development on Afforested Land.

- Identify if there are valid uses on site for material for which no economic off-site use can be found.

17.4.12 The method of felling and utilisation at the Proposed Development site would be based on whole tree utilisation. All felled timber and branchwood would be removed from site so as to minimise waste left on site. The method is outlined as follows:

- A conventional harvester and forwarder will be used to fell and extract the timber from all felled areas. A forwarder will then be used to gather the branchwood. It will then be taken to roadside, chipped and loaded into lorries to deliver to customers.
- The round timber is likely to be sent to local timber markets for onward processing with the wood chip element being sold for biomass.

Assessment Methodology

Felling Area

17.4.13 Impacts relating to effects on forestry cover are largely assessed using simple area analysis to gauge the magnitude of any crop removal as a consequence of the Proposed Development.

Timber Volume

17.4.14 In considering yield, where the Sitka spruce in mixture of was the dominant species, the Sitka spruce model was used.

17.4.15 Timber volumes are derived from using Forest Yield (Forest Research PC based yield model software for forest management in Britain) using the age of the tree crops and an average estimated Yield Class of General Yield Class for the relevant species across the felling range.

17.4.16 The data have been derived from the information provided by the forest managers, updated as necessary, and Forestry Commission Yield Models. It is based on a number of assumptions including: accuracy of the yield class data provided by the landowner; assumptions about yield class where no data was provided; and assumptions about the proportions of each species in mixture. No measurements have been made to check yield class accuracy.

17.4.17 The default yield table used has been the Sitka spruce, non-thin, 2 m initial planting spacing model. This species was used as it forms the largest proportion of the conifer crops and due to the growth rates of Sitka spruce represents a worst case scenario. In mixtures, the proportion of the individual species is uncertain and therefore yield class has been adjusted based on an assumption regarding the species proportions.

17.4.18 A conversion factor of 1.08 has been used to convert the net volume into tonnage. This conversion factor was used to determine the number of HGV lorry movements associated with the forestry aspect of the Proposed Development based on an average 25 tonne payload per HGV lorry.

Limitations of the Assessment

17.4.19 Where tree crops are less than 20 years old there are no yield tables available. For the purposes of this assessment, professional judgment has been used to estimate approximate timber volumes for these tree crops. However, in most cases these trees would likely be too young to produce timber and would be put into wood chips. This approach has been taken in order to assess a worst case scenario.

17.4.20 Within the access area, no base data regarding the planting year of the existing compartments was available so professional judgment has been used to estimate approximate timber volumes for areas of felling.

17.5 Existing Environment

Baseline Forest Plans

Dykeraw Forest (Turbine Area)

17.5.1 There are no felling permissions or licenses within the Dykeraw Forest. Forestry operations, including clearfelling and restocking are covered by Management Plan 4886181, which runs from 7/2/2014 until 7/2/2024.

17.5.2 The baseline felling and restocking plans for the Turbine Area are included in **Appendix 17.3** (**17.3.1** and **17.3.2**).

Letham Forest (Access Area)

17.5.3 There are no felling permissions or licenses within Letham Forest. Forestry operations, including clearfelling and restocking are covered by the Wauchope East Forest Design Plan (**Appendix 17.3, 17.3.3**), which was approved on 11/02/2016.

17.5.4 The baseline felling and restocking plans for the Access Area are included in **Appendix 17.3** (**17.3.5** and **17.3.6**).

Baseline Conditions

17.5.5 Two site assessments of the study area have been undertaken to inspect the existing forestry in the locations where felling would be required for construction and operation of the Proposed Development. First, on the 28th of October 2021 at the Scoping stage, and then on the 26th of April 2022 based on the final design. Baseline data, including site observations and photographs of timber quality, is included in **Technical Appendix 17.1**.

Dykeraw Forest (Turbine Area)

17.5.5.1.1.1 Dykeraw Forest Baseline Planting Year / Age Class Structure

17.5.6 The current age class structure of the woodlands within the Dykeraw Forest is shown in **Table 17.3**.

17.5.7 The majority of the woodlands were planted in the 1970's with a small area established in 1966. The age class structure is therefore relatively even aged with the majority of the crops in the mid to late rotation phase.

Table 17.3: Dykeraw Forest (Turbine Area) Age Class Structure of Current Baseline Forestry Onsite (this does not include open ground)

Age (Yrs)	Area (ha)	Area (%)
0	50.74	0.3
1 - 5	201.06	9.7
6 - 10	270.14	24.6
11 - 20	197.72	33.6
21 - 40	0	0
41 - 60	78.28	25.4
61 +	2.28	6.3
Totals	**802.9**	**100%**

*totals may not add up due to rounding

17.5.7.1.1.1 Dykeraw Forest Baseline Species Composition

17.5.8 The current species composition of the woodlands within Dykeraw Forest is shown in **Table 17.4**. The main species are commercial conifers, principally Sitka spruce, which accounts for approximately 67.3%. Other conifer woodland, covering a wide range of species from Noble fir to Japanese larch, and broadleaves form very small components of the woodlands. Open ground accounts for the second largest component at 16.4%.

Table 17.4: Dykeraw Forest (Turbine Area) Species Composition of Current Forestry Onsite

Species	Area (ha)	Area (%)
Sitka Spruce	649.56	67.3
Other Conifers	70.88	7.3
Broadleaves	27.49	2.8
Open Ground	158.72	16.4
Felled Awaiting Restock	59.14	6.1
Totals	**965.79**	**100%**

*totals may not add up due to rounding

17.5.8.1.1.1 Dykeraw Forest Baseline Felling Plan

17.5.9 The baseline felling plan (**Appendix 17.3, 17.3.1**) has been taken from the approved Forest Plan for Dykeraw Forest and represents the plan, for felling and retention of the current forestry onsite within the temporal scope of the Forest Plan, without the Proposed Development. The baseline felling plan is illustrated in **Table 17.5**.

Table 17.5: Dykeraw Forest (Turbine Area) Baseline Felling Plan

Felling Phase	Area (ha)
Phase 3: 2013 - 2017	197.27
Phase 4: 2018 - 2022	197.11
Phase 5: 2023 - 2027	17.9
Non Intervention	22.71
Retention	10.81
Thinning	68.5
No Felling	288.58
Totals	**802.88**

*totals may not add up due to rounding

**does not include open ground areas so total area is less than area for Dykeraw Forest

17.5.9.1.1.1 Dykeraw Forest Baseline Restocking Plan

17.5.10 The baseline restocking plan for Dykeraw Forest is shown in **Table 17.6**.

Table 17.6: Dykeraw Forest (Turbine Area) Baseline Restocking Plan

Species	Area (ha)	Area (%)
Sitka Spruce	628.49	65.06
Sitka Spruce/Norway Spruce	20	2.07
SSSI	2.19	0.23
Western Hemlock	3.73	0.39
Mixed Broadleaves	27.12	2.81
Mixed Broadleaves/Open Ground	18.85	1.95
Mixed Conifers	27.46	2.84
Birch	1.8	0.19
Norway Spruce	44.18	4.57
Natural Reserve	13.06	1.35
Open Ground	168.43	17.44
Long Term Retention	10.71	1.11
Totals	**965.79**	**100%**

*totals may not add up due to rounding

Letham Forest (Access Area)

17.5.11 Current baseline data are detailed in the Land Management Plan (**Appendix 17.3, 17.3.3**). This provides baseline data for the extent of the whole Wauchope East Forest, which Includes Letham Forest. Each area within Wauchope East Forest, including Letham Forest, has its own felling plan and restocking plan which have been considered where relevant in the baseline description below.

17.5.11.1.1.1 Wauchope Forest East (Including Letham Forest) Baseline Planting Year / Age Class Structure

17.5.12 The current age class structure of the woodlands within Wauchope East Forestry, including Letham Forest, is shown in **Table 17.7**.

17.5.13 The majority of the woodlands were planted in the 1960's with a small area established in 1950's. The age class structure has been relatively even aged with the majority of the crops now moving to 2nd rotation and in their early growing stage (0 to 29 years old).

Table 17.7: Wauchope Forest East (Including Letham Forest (Access Area)) Age Class Structure of Current Baseline Forestry Onsite

Age (Yrs)	Area (ha)	Area (%)
Establishment (0-9)	362.1	8.8
Early Thicket (10-19 years)	701	17
Thicket (20-29 years)	800	19.4
Pole (30-39 years)	104	2.5
Mature (40-60 years)	321	7.8
Over Mature (60 plus years)	223	5.4
Fallow	142.5	3.4
Open	559.1	13.6
Kielderhead SSSI	905	22
Totals	**4117.7**	**100**

*totals may not add up due to rounding

17.5.13.1.1.1 Wauchope Forest East (Including Letham Forest) Baseline Species Composition

17.5.14 The current species composition of the woodlands is shown in **Table 17.8**. The main species are commercial conifers, principally Sitka spruce, which accounts for approximately 42.7%. Other conifer woodland, covering a wide range of species from Noble fir to Japanese larch, and broadleaves form very small components of the woodlands. Open ground accounts for the second largest component at 13.6%.

Table 17.8: Wauchope Forest East (Including Letham Forest (Access Area)) Species Composition of Current Forestry Onsite

Species	Area (ha)	Area (%)
Birch	9.8	0.2
Douglas Fir	6.6	0.2
Larch	91.3	2.2
Mixed Broadleaves	145.1	3.5
Mixed Conifers	2.3	0.1
Norway Spruce	225.2	5.5
Oak	4.6	0.1
Lodgepole Pine	154	3.7
Scots Pine	115.6	2.8
Sitka Spruce	1756.6	42.7
Fallow	142.5	3.5
Open	559.1	13.6
Kielderhead SSSI	905	22.0
Totals	**4117.7**	**100**

*totals may not add up due to rounding

17.5.14.1.1.1 Letham Forest Felling Plan

17.5.15 The baseline felling plan (**Technical Appendix 17.3, 17.3.5**) has been taken from the approved Forest Plan and represents the plan for Letham Forest, for felling and retention of the current forestry onsite within the temporal scope of the Forest Plan, without the Proposed Development. The felling plan is illustrated in **Table 17.9**.

Table 17.9: Letham Forest (Access Area) Baseline Felling Plan

Felling Year	Area (ha)
2021	27.5
2022	23.9
2023	35.5
2024	16.5
2027	37.4
2033	17.8
2036	35.3
2038	18.3
2039	16.2
2043	11
2044	25.3

Felling Year	Area (ha)
2045	39.5
2046	27.1
2047	32.1
2048	22.6
2049	46.2
2050	23.3
2051	48
2052	56
2053	20.3
2054	22.4
2055	90.7
2057	16.8
2058	64.3
2060	84.9
2061	18.1
2062	67.2
2063	16.5
2064	59.6
2065	25.2
2067	40.1
2068	77.6
2069	103
2070	73
2072	29
2073	42.2
2075	68.5
2099	63.4
No felling	1209.1
Totals	**1542.5**

*totals may not add up due to rounding

17.5.15.1.1.1 Wauchope Forest East (Including Letham Forest) Baseline Restocking Plan

17.5.16 The baseline restocking plan for Wauchope Forest East, including Letham Forest, which covers up to 2100, is shown in **Table 17.10**.

Table 17.10: Wauchope Forest East (Including Letham Forest (Access Area)) Baseline Restocking Plan

Species	Area (ha)	Area (%)
Birch	67.2	1.6
Douglas Fir	11.7	0.3
Larch	171.1	4.2
Mixed Broadleaves	173.4	4.2
Mixed Conifers	12.8	0.3
Norway Spruce	216.6	5.3
Oak	12.9	0.3
Lodgepole Pine	130.2	3.2
Scots Pine	192.4	4.7
Sitka Spruce	1447.4	35.2
Fallow	0	0
Open	776.8	18.9
Kielderhead SSSI	905	22
Totals	**4117.7**	**100**

*totals may not add up due to rounding

Timber

17.5.17 The mensuration data for both plantations can be found in **Technical Appendix 17.1**. This includes photographs of the general timber conditions. The quality of the timber is typical for upland plantations of these species and age. Most of the compartments and sub-compartments are reasonably productive.

Windblow Risk

17.5.18 There is a very small amount of windblow throughout the whole study area largely because the plantations are undergoing restructuring through felling and so areas that may have previously blown have been recently cleared.

17.6 Predicted Impacts

Design Considerations

17.6.1 The Scottish Forestry guidance to staff on implementing CWR states that:

"Options to avoid or reduce the need for Compensation Planting should always be fully considered as part of the decision making process. Compensation Planting should be seen as the final option once all other solutions have been exhausted"

17.6.2 In relation to forestry, the key objective of the Proposed Development design has been to minimise the amount of tree felling required. This will ensure compliance with the Scottish Government's Policy on CWR.

17.6.3 All felling for the installation of wind turbines would be based on keyhole felling.

17.6.4 Existing access tracks have been utilised wherever possible but, where it has not been possible to use existing tracks, the shortest possible route has been chosen subject to avoiding watercourses or other environmentally sensitive features.

17.6.5 The location of the temporary turbine layby area was selected because there was evidence of windblow along the forestry edge in that location. As a result, development of the turbine layover area at this location will avoid potential tree felling.

Best Practice Measures

17.6.6 The following measures would be adhered to in relation to potential forestry impacts:

- timber harvesting will be conducted in accordance with the UK Woodland Assurance Standard[259], consideration would be given in regard to leaving forest residues in situ or in 'habitat piles' so long as this does then not create habitat for pest and diseases;
- all forestry plans and operations will fully comply with the UK Forestry Standard (2017); and
- the extraction of the timber produce will be carried out after the access tracks have been installed, so as all the felled trees will be very close to the access tracks, most of the timber extraction will be carried out on the hard road and not over the bare ground. This will avoid/minimise any damage to the soil.

Assessment of Effects

17.6.7 **Figures 17.1** and **17.3** show the felling plan for the Proposed Development. The total felling area would be 81.96 ha.

17.6.8 The total timber volume to be felled is estimated to be 4,606.13 m^3[260]. Using a conversion factor of 1.08 m^3 to a tonne, this equates to 4,264.94 tonnes.

17.6.9 **Table 17.11** disaggregates the felling and timber volumes by infrastructure. A detailed assessment disaggregated by sub-compartment, species, planting year, and yield class is contained in **Technical Appendix 17.2**.

[259] United Kingdom Woodland Assurance Standard (Fourth Edition) (2018)

[260] Trees that are 4 years old and younger have been given a value of 0m^3 per ha due to their juvenile and insignificant size at this age class

Table 17.11: Proposed Development Felling Area and Timber Volume Assessment

Infrastructure	Area (ha)	m^3 total
Turbine Area		
Construction Compound	1.39	29.01
Turbines	34.65	543.99
Hardstandings	18.9	298.69
Borrow Pit Search Areas	6.88	180.22
Access Tracks	3.58	142.90
Substations	3.44	75.78
Additional Felling Areas (mitigate wind blow risk)	9.05	3039.84
Sub-total	**77.79**	**4310.43**
Access Area		
Access Track	0.46	48.54
Additional Felling Areas (mitigate wind blow risk)	3.6	247.16
Sub-total	**4.06**	**295.7**
Total	**81.96**	**4606.13**

*totals may not add up due to rounding

Wind Farm Forest Plans

Dykeraw Forest (Turbine Area)

17.6.9.1.1.1 Wind Farm Felling Plan (Turbine Area)

17.6.10 **Figures 17.1** shows the wind farm felling plan for the Turbine Area. Felling of the forestry for construction of the Proposed Development would be undertaken in 2027 and has therefore been included in the Phase 5 total. The updated felling plan is shown in **Table 17.12**.

Table 17.12: Felling Plan of Wind Farm Forest Plan (Turbine Area)

Felling Phase	Area (ha)
Phase 3: 2013 - 2017	197.27
Phase 4: 2018 - 2022	197.11
Phase 5: 2023 - 2027	95.69
Non Intervention	22.71
Retention	5.21
Thinning	68.5
No Felling	216.31
Totals	**802.88**

*totals may not add up due to rounding

**does not include open ground areas so total area is less than area for Dykeraw Forest

17.6.11 **Table 17.13** compares the baseline felling plan for Dykeraw Forest with the wind farm felling plan.

Table 17.13: Felling Plan Comparison (Turbine Area)

Felling Phase	Baseline Felling Plan	Wind Farm Felling Plan	Variance
	Area (ha)	Area (ha)	Area (ha)
Phase 3: 2013 - 2017	197.27	197.27	0
Phase 4: 2018 - 2022	197.11	197.11	0
Phase 5: 2023 - 2027	17.9	95.69	77.79
Non Intervention	22.71	22.71	0
Retention	10.81	5.21	-5.6
Thinning	68.5	68.5	0
No Felling	288.58	216.31	-72.19
Totals	**802.88**	**802.88**	**N/A**

*totals may not add up due to rounding

**does not include open ground areas so total area is less than area for Dykeraw Forest Wind Farm Restocking Plan (Turbine Area)

17.6.12 **Figure 17.2** shows the wind farm restocking plan (for the Turbine Area) including the areas that are to be replanted and when during the life of the windfarm. Restocking of the Wind Farm Felling Areas outside the Wind Farm Open Ground would be undertaken upon completion of the construction works. The changes to the species composition are shown in **Table 17.14**.

Table 17.14: Wind Farm Restocking Plan (Turbine Area)

Species	Area (ha)	Area (%)
Sitka Spruce	559.65	57.93
Sitka Spruce/Norway Spruce (1/2)	20	2.07
SSSI	2.19	0.23
Western Hemlock	3.73	0.39
Mixed Broadleaves	27.12	2.81
Mixed Broadleaves/Open Ground (90/10)	18.85	1.95
Mixed Conifers	27.46	2.84
Birch	1.8	0.19
Norway Spruce	44.18	4.57
Natural Reserve	18.66	1.93
Open Ground	237.27	24.56
Long Term Retention	5.11	0.53
Totals	**965.79**	**100%**

*totals may not add up due to rounding

17.6.13 **Table 17.15** below compares the baseline and wind farm restocking plans for the Turbine Area.

Table 17.15: Turbine Area Restock Plan Comparison (Turbine Area)

Species	Baseline Restocking Plan		Wind Farm Restocking Plan		Variance	
	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)
Sitka Spruce	628.49	65.06	559.65	57.93	-68.84	-7.13
Sitka Spruce/Norway Spruce	20	2.07	20	2.07	0	0
SSSI	2.19	0.23	2.19	0.23	0	0
Western Hemlock	3.73	0.39	3.73	0.39	0	0
Mixed Broadleaves	27.12	2.81	27.12	2.81	0	0
Mixed Broadleaves/Open Ground	18.85	1.95	18.85	1.95	0	0
Mixed Conifers	27.46	2.84	27.46	2.84	0	0
Birch	1.8	0.19	1.8	0.19	0	0
Norway Spruce	44.18	4.57	44.18	4.57	0	0
Natural Reserve	13.06	1.35	18.66	1.93	5.6	0.58
Open Ground	168.43	17.44	237.27	24.56	68.84	7.12
Long Term Retention	10.71	1.11	5.11	0.53	-5.6	-0.58
Totals	**965.79**	**100%**	**965.79**	**100%**	**N/A**	**N/A**

*totals may not add up due to rounding

17.6.14 **Table 17.16** below shows the changes to the age structure of the forestry in the Turbine Area.

Table 17.16: Age Class Structure of Wind Farm Forest Plan (Turbine Area)

Age (Yrs)	Area (ha)	Area (%)
0	77.79	9.7
1 - 5	99.81	12.4
6 - 10	190	23.7
11 - 20	373.4	46.5
21 - 40	38.7	4.8
41 - 60	9	1.1
61 +	14.4	1.8
Totals	802.88	**100%**

*totals may not add up due to rounding

**does not include open ground areas so total area is less than area for Dykeraw Forest

Letham Forest (Access Area)

17.6.14.1.1.1 Wind Farm Felling Plan (Access Area)

17.6.15 **Figures 17.3** shows the wind farm felling plan (for the Access Area) including the areas to be felled. Felling of the forestry for construction of the Proposed Development would be undertaken in 2027. The updated felling plan is shown in **Table 17.17**.

Table 17.14: Felling Plan of Wind Farm Forest Plan (Access Area)

Felling Year	Area (ha)
2021	27.5
2022	23.9
2023	35.5
2024	16.5
2027	39.8
2033	17.8
2036	35.3
2038	18.3
2039	16.2
2043	11
2044	25.3
2045	39.5
2046	27.1

Felling Year	Area (ha)
2047	32.1
2048	22.6
2049	46.2
2050	23.3
2051	48
2052	56
2053	20.3
2054	22.4
2055	90.7
2057	14.4
2058	64.3
2060	84.9
2061	18.1
2062	67.2
2063	16.5
2064	59.6
2065	25.2
2067	40.1
2068	77.6
2069	103
2070	73
2072	29
2073	42.2
2075	68.5
2099	61.6
No felling	1209.1
Totals	**1542.5**

*Totals may not add up, due to rounding

17.6.16 **Table 17.18** compares the baseline felling plan with the wind farm felling plan.

Table 17.15: Felling Plan Comparison (Access Area)

Felling Year	Baseline Felling Plan	Wind Farm Felling Plan	Variance
	Area (ha)	Area (ha)	Area (ha)
2021	27.5	27.5	
2022	23.9	23.9	
2023	35.5	35.5	
2024	16.5	16.5	
2027	37.4	39.8	4.2
2033	17.8	17.8	
2036	35.3	35.3	
2038	18.3	18.3	
2039	16.2	16.2	
2043	11	11	
2044	25.3	25.3	
2045	39.5	39.5	
2046	27.1	27.1	
2047	32.1	32.1	
2048	22.6	22.6	
2049	46.2	46.2	
2050	23.3	23.3	
2051	48	48	
2052	56	56	
2053	20.3	20.3	
2054	22.4	22.4	
2055	90.7	90.7	
2057	16.8	14.4	-2.4
2058	64.3	64.3	
2060	84.9	84.9	
2061	18.1	18.1	
2062	67.2	67.2	
2063	16.5	16.5	
2064	59.6	59.6	
2065	25.2	25.2	

Felling Year	Baseline Felling Plan	Wind Farm Felling Plan	Variance
	Area (ha)	Area (ha)	Area (ha)
2067	40.1	40.1	
2068	77.6	77.6	
2069	103	103	
2070	73	73	
2072	29	29	
2073	42.2	42.2	
2075	68.5	68.5	
2099	63.4	63.4	-1.8
No felling	1209.1	1207.3	
Totals	**1542.5**	**1542.5**	**N/A**

*Totals may not add, due to rounding

17.6.16.1.1.1 Wind Farm Restocking Plan (Access Area)

17.6.17 **Figure 17.4** illustrates the proposed wind farm restocking plan (for the Access Area). Although 3.6 ha would be replanted, and this would be in line with the intended restock species in the baseline restock plan for Letham Forest (**Technical Appendix 17.3, 17.3.6**), there would still be an area of 0.44 ha that would be kept permanently clear for the Site Access. This would make negligible difference to the long term species composition and age structure of the forestry onsite.

17.7 Mitigation

Restocking

17.7.1 **Figure 17.2** and **Figure 17.4** show the proposed wind farm restocking plans for the Turbine Area (Dykeraw Forest) and Access Area (Letham Forest). Areas within the footprint and associated wind protection zones and access track and ancillary infrastructure felling buffers for the wind turbines, access tracks and ancillary infrastructure would be permanently kept clear of forestry. All felling required outside of these areas would be available for restocking, including:

- areas of additional felling to a compartment boundary or to create a windfirm edge, to facilitate the construction of the Proposed Development; and
- locations of temporary compounds.

Compensatory Planting

17.7.2 The maximum area of land that would be needed for compensatory planting (the SF default position) is an area equivalent to the area being felled and left unplanted, which in this case is estimated to be 81.96 ha. Areas of restocking identified above would account for 14.04 ha of compensatory planting. This would reduce the remaining compensatory planting requirement to 67.92 ha. There is also the potential for more of the compensatory planting requirement to be met onsite through the proposed enrichment planting of the natural reserve areas identified in the Outline Habitat Management Plan (OHMP) (**Technical Appendix 8.5**); however, the exact area of enrichment planting would be subject to further investigation and is still to be determined.

17.7.3 It would not be possible to accommodate all the compensatory planting onsite given the existing forestry coverage; however, indications are that a site could be found nearby.

17.7.4 Once the area for compensatory planting has been chosen, a full specification would be drawn up to include ground preparation, drainage, planting technique, stocking density, species, maintenance and protection. Consultees would be consulted as required during this process.

Outline Habitat Management Plan (OHMP)

17.7.5 As outlined in the OHMP (**Technical Appendix 8.5**) the applicant is proposing to replant an additional felling area (5.6 ha) within the Dykeraw Forest, which currently comprises Sitka spruce that has been affected by windthrow, with broadleaved planting to create riparian woodland habitat. Consideration would also be given to enrichment planting of existing areas of natural reserve, also within Dykeraw Forest.

17.8 References

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