



RWE Renewables UK Swindon Ltd.

Pen March Wind Farm EIA

Environmental Statement (Volume 2)

Project no. 663044

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RWE Renewables UK Swindon Ltd.

Pen March Wind Farm EIA: Environmental Statement (Volume 2) Chapters 1-4, July 2023

663044-1 (00)

PREFACE

RWE Renewables UK Swindon Ltd (the ‘Applicant’) is proposing to develop Pen March Wind Farm (the ‘Proposed Scheme’) which would be located north of the A465 Heads of the Valleys road, north-west of the small town of Rhymney and north-east of Merthyr Tydfil. The Proposed Scheme comprises the construction, operation, and decommissioning of up to six wind turbines with a maximum blade tip height of up to 180 m and associated infrastructure.

RSK Environment Limited has been commissioned by the Applicant to undertake an Environmental Impact Assessment (EIA) of the Proposed Scheme. This Environmental Statement (ES) reports the findings of environmental assessments undertaken during the development of the Proposed Scheme.

The ES is presented in four volumes:

- Volume 1 – Non-Technical Summary
- Volume 2 – Written Statement
- Volume 3 – Supporting Figures and Plans
- Volume 4 – Supporting Technical Appendices

A copy of the ES is available at the Planning and Environment Decision Wales (PEDW) website <https://www.gov.wales/planning-and-environment-decisions-wales> and is also available to view on the Applicants project website <https://penmarch.co.uk/>.

Hard copies of the Environmental Statement are subject to a charge of £2000 and are available on written request by emailing penmarch@rwe.com or writing to:

- **RWE Renewables**, Baglan Bay Innovation Centre, Central Avenue, Baglan Energy Park, SA12 7AX

Hard copies of the Non-Technical Summary are available free of charge. A digital USB version of the ES can be obtained subject to a charge of £20.

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/>

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GLOSSARY

Abnormal Indivisible Load	Any load which cannot be broken down into smaller loads for the purposes of transportation, without undue expense or risk of damage.
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.
Annex I project	See 'Schedule 1 project'.
Annex II project	See 'Schedule 2 project'.
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.
Archaeological interest	There will be archaeological interest in a heritage asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
Assessment	Process by which information about effects of a proposed plan, project or intervention is collected, assessed and used to inform decision making.
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.
Best Available Techniques	The available techniques which are the best for preventing or minimising emissions and impacts on the environment.
Biodiversity	The biological diversity of the earth's living resources. The total range of variability among systems and organisms at the following levels of organisation: bioregional, landscape, ecosystem, habitats, communities, species, populations, individuals, genes, and the structural and functional relationships within and between these different levels.
Catchment	Drainage/basin area within which precipitation drains into a river system and eventually into the sea.
Climate change	Large scale, long term shift in the Earth's weather patterns or average temperature.

Committed development	Development projects that are either under construction or have valid planning permissions/consents.
Combined effects	The interaction and combination of different residual (post-mitigation) environmental effects of the Proposed Scheme affecting the same Receptor. For example, visual and noise effects during construction affecting the same residential dwelling.
Competent authority	Authority responsible for determining the application for consent, permission, licence or other authorisation to proceed with a development.
Construction Environmental Management Plan	Document setting out methods to avoid, minimise and mitigate Impact on the environment and surrounding area and the protocols to be followed in implementing these measures in accordance with environmental commitments during the construction phase.
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 scheme 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 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 effects	The effects of the Proposed Scheme in cumulation with other existing development and/or approved development.
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).
Development of National Significance	A development of national significance (DNS) is a type of planning application for a large infrastructure project in Wales.
Discharge consent	Statutory document issued by Natural Resources Wales setting limits and conditions on the discharge of an effluent into controlled waters.
Do-minimum scenario	Also known as the '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.
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.
Enhancement	Measure that 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	A systematic means of assessing the significance of effects from the Proposed Scheme, undertaken in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations).
Environmental information	Information that must be taken into account by the decision maker (the competent authority) before granting authorisation in any case where the EIA process applies. It includes the environmental statement, 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.
Environmental Statement	A statement prepared in accordance with the EIA Regulations that includes the information that is reasonably required to assess the likely effects of a development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably be required to compile.
European site	An area of land subject to protection through European legislation, including Special Area of Conservation (SAC) and Special Protection Area (SPA).
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.
Geographical Information System	A system that captures, stores, analyses, manages, and presents data linked to location. It links spatial information to a digital database.
Greenhouse Gases	Gases that absorb and emit reflected solar radiation which result in the warming of the Earth's atmosphere. It is absorbed and emitted at specific wavelengths within the spectrum of infrared radiation emitted by the earth's surface, the atmosphere, and clouds. The six main GHGs whose emissions are human caused are: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbon, and sulphur hexafluoride. In combination, these GHG emissions are commonly expressed in terms of 'carbon dioxide equivalents' (CO ₂ e) according to their relative global warming potential. For this reason, the shorthand 'carbon' may be used to refer to GHGs.

Ground Investigation	The physical investigation stage of the Geotechnical Survey of which Geophysical Surveys may be one element. Comprised of targeted investigations including both intrusive and non-intrusive techniques to prove ground conditions, determine soil / rock parameters and identify hazards associated with the ground conditions to inform a proposed development.
Groundwater	Groundwater is the store of water present beneath Earth's surface in rock and soil pore spaces and in the fractures of rock formations.
Groundwater Dependent Terrestrial Ecosystems	Wetlands such as springs, flushes and fens which are fed by groundwater rather than rainfall or surface runoff. They are particularly sensitive to hydrological and ecological changes caused by development.
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna.
Habitats Regulations	The Conservation of Habitats and Species Regulations 2017 (as amended) which covers the terrestrial environment.
Habitats Regulations Assessment	A Habitats Regulations Assessment (HRA) refers to the stages of assessment carried out by the competent authority in accordance with Habitats Regulations and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) to determine if a project may affect the protected features of a European site and European offshore marine site, before deciding whether to undertake, permit or authorise it.
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.
Impact	Change that is caused by an action; for example, land clearing (action) during construction that results in habitat loss (impact).
Invertebrates	Animals without backbones.
Land drainage	The disposal of rainwater, achieved by a combination of watercourses of various types.
Land Use	The purpose for which land is used, based on broad categories of functional land cover, such as urban and infrastructure use and the different types of agricultural and forestry.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation, and physical processes.
Likely Significant Effect	The significance of an environmental effect is typically a function of the 'value' or 'sensitivity' of the Receptor and the 'magnitude' or 'scale' of the Impact. Combining the environmental value of the resource or receptor with the magnitude of change produces a significance of effect category. The definition of a significant effect for each environmental topic will be contained within their respective chapters of the Environmental Statement.
Local Development Plan	The set of documents and plans that sets out the Local Planning Authority's policies and proposals for the development and use of land in their area.

Mean (high/low) water	Highest/lowest average level water reaches during a tidal cycle.
Method statement	Document that sets out intended working or survey practices.
Mitigation	Measures intended to avoid, reduce or compensate for 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.
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 Environmental Statement.
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 and Environment Decisions Wales	Body responsible for managing casework with regard to developments of national significance in Wales.
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 Team	Specialist technical consultant and advisors to deliver the Proposed Scheme

Proposed scheme	The development for which planning permission is sought. In this instance, this includes: • Up to six three-bladed horizontal axis wind turbines up to 180 m to blade tip height. Each turbine has an internal transformer and aviation lighting. • Wind turbine foundations and hardstanding areas which will include crane hardstanding areas and laydown/storage areas. • An electrical and control building compound with battery storage facilities. • New site access off the Common Road and associated bell mouth junction. • On-site access tracks, passing places, and turning heads. • Two gas pipeline crossings, one water main crossing and three watercourse crossings. • Underground power cables (and fibre optic communication cables) linking the wind turbines and the on-site electrical compound and control building. • A main temporary construction and storage compound with associated laydown areas near to the Site entrance. • Construction working areas associated with turbine locations and access tracks which will be restored after construction is complete. • Off-site works to enable the movement of abnormal loads during construction (such as the creation of a new slip track from A465 and temporary modifications to street furniture etc). • Habitat Management Area.
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 and flora with the potential to be affected by a project.
Residual Effect	Effects arising from the Proposed Scheme that cannot be mitigated following 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 to the sea.
Schedule 1 project	Plans or projects listed in Annex I of the EIA Directive and Schedule 1 of the EIA Regulations.
Schedule 2 project	Plans or projects listed in Annex II of the EIA Directive and 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 Statement 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 of effect	Measure of the importance of the environmental effect, defined by either generic significance criteria or criteria specific to the environmental topic.
Special Area of Conservation	Areas of protected habitats and species as defined in the Habitats Directive.
Special Protection Area	Sites classified in accordance with Article 4 of the EC Birds Directive (79/409/EEC) which came into force in April 1979. They are classified for rare and vulnerable birds (as listed on Annex 1 of the Directive), and for regularly occurring migratory Species.
Stakeholder	Organisation or individual with a particular interest in the project.
Source Protection Zone	Areas which show the level of risk to the source of groundwater from contamination. SPZ 1 (Inner zone) is based on a 50 day travel time of pollutant to source with a 50 metres default minimum radius. SPZ2 (outer zone) is based on a 400 day travel time of pollutant to source with 250 or 500 metres minimum radius around the source depending on the amount of water abstracted. SPZ 3 (total catchment) area around a source within which all the groundwater ends up at the abstraction point.
Statutory consultee	Organisations that the competent authority is required to consult by virtue of the EIA Regulations.
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.
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
AERMOD	An atmospheric dispersion model
ALARP	As low as reasonably practicable
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AONB	Area of outstanding natural beauty
AQMA	Air quality management area
BAP	Biodiversity action plan
BAT	Best available techniques
BBNPA	Bannau Brycheiniog National Park Authority formerly Brecon Beacons National Park Authority
bgl	Below ground level
BGS	British Geological Survey
BS	British Standard
CA	Competent authority
CD	Chart datum
CEMP	Construction environmental management plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Centre
CIWEM	Chartered Institute of Water and Environmental Management
CLEA	Contaminated Land Exposure Level
CLVIA	Cumulative landscape and visual impact assessment
COMAH	Control of major accident hazards
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
DMRB	Design Manual for Roads and Bridges
DBEIS	Department for Business, Energy and Industrial Strategy
DNS	Development of National Significance
EC	European Commission
EcIA	Ecological impact assessment
EHO	Environmental health officer
EIA	Environmental impact assessment

EPR	Environmental Permit Regulations
EPS	European protected species
EQS	Environmental Quality Standards
ES	Environmental Statement
EU	European Union
EUETS	European Union Emissions Trading Scheme
FRA	Flood risk assessment
GIS	Geographic information system
GPS	Global positioning system
HER	Heritage Environment Record
HGV	Heavy goods vehicle
HIA	Health impact assessment
HRA	Habitats Regulations assessment
HSC	Hazardous substance consent
HSE	Health and Safety Executive
ICA	Important Curlew Area
IEMA	Institute of Environmental Management and Assessment
IPPC	Integrated pollution prevention and control
JNCC	Joint Nature Conservation Committee
km	Kilometre
LCA	Landscape character area
LAQM	Local air quality management
LBAP	Local biodiversity action plan
LGV	Light goods vehicle
LI	Landscape Institute
LPA	Local planning authority
LTP	Local transport plan
LUP	Land use planning
LVIA	Landscape and visual impact assessment
NCA	National Character Area
NNR	National nature reserve
NO _x	Oxides of nitrogen
NPS	National Policy Statement
NRW	Natural Resources Wales
NTS	Non-technical summary
NVC	National Vegetation Classification

OS	Ordnance Survey
PINS	Planning Inspectorate
PEDW	Planning and Environment Decisions Wales
PM ₁₀	Particulate matter (with an aerodynamic diameter below 10 µm)
PPC	Pollution prevention and control
PPS	Planning Policy Statement (now superseded by the NPPF)
RCS	River corridor survey
RHS	River habitat survey
RIGS	Regionally important geological and geomorphological site
RPG	Regional planning guidance
RSPB	Royal Society for the Protection of Birds
SAC	Special area of conservation
SINC	Site of importance for nature conservation
SM	Scheduled monument
SoCC	Statement of community consultation
SPA	Special protection area
SPD	Supplementary planning documents
SPZ	Source protection zone
SSSI	Site of special scientific interest
SuDS	Sustainable drainage system
TA	Transport assessment
TCPA	Town and Country Planning Act
TIA	Traffic impact assessment
TMP	Traffic management plan
TPO	Tree preservation order
TRICS	Trip Rate Information Computer System
UK	United Kingdom
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 Scheme

- 1.1.1 RWE Renewables UK Swindon Ltd. (hereafter ‘the Applicant’) is proposing to construct and operate Pen March Wind Farm (hereafter ‘the Proposed Scheme’) which would be located north of the A465 Heads of the Valleys road, north-west of the small town of Rhymney and north-east of Merthyr Tydfil. The Site location is shown on **Figure 1.1 (Volume 3)**.
- 1.1.2 The Planning (Wales) Act 2015 and the Developments of National Significance (Wales) Regulations 2016 (as amended) and subsequent regulations, provides the statutory basis for a Development of National Significance (DNS). Any proposal to construct or operate a power generation scheme with a capacity over 10 mega-watts (MW) falls under the DNS system and requires Welsh Ministers’ consent.
- 1.1.3 The Proposed Scheme comprises the construction and operation of up to six wind turbines and associated infrastructure. The Proposed Scheme is classed as a DNS as the combined installed capacity of the power generating elements will be greater than 10 MW. The Applicant is therefore seeking to secure full planning permission for the Proposed Scheme by way of an application made pursuant to section 62D of the Town and Country Planning Act 1990 and subsequent regulations including the Developments of National Significance (Wales) Regulations 2016 (as amended). The application will be made to Welsh Government by submitting an application to Planning Environment Decisions Wales (PEDW).
- 1.1.4 The Proposed Scheme exceeds the threshold for onshore wind developments set out in Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (as amended) (the ‘EIA regulations’). In addition, the Proposed Scheme could potentially result in ‘significant’ environmental effects according to the EIA Regulations, therefore the Proposed Scheme is classified as an EIA development and an Environmental Statement (ES) is required.
- 1.1.5 The site of the Proposed Scheme is located within both Caerphilly County Borough Council (CCBC) and Merthyr Tydfil County Borough Council (MTCBC). The Site borders Bannau Brycheiniog National Park (BBNP) formerly Brecon Beacons National Park to the north. The majority of the Site is registered as Common Land and makes up part of Common Land Unit 38 Gelligaer and Merthyr Common as shown on **Figure 1.2 (Volume 3)**. The DNS application is accompanied by applications for consent to deregister and offer exchange Common Land and consent to carry out restricted works on Common Land (pursuant to sections 16 and 38 of the Commons Act 2006 respectively).

1.2 Environmental impact assessment (EIA)

Introduction

1.2.1 The term ‘environmental impact assessment’ describes a procedure that must be followed for certain types of projects before they can be given ‘development consent’. The procedure is a means of drawing together, in a systematic way, an assessment of a project’s likely significant environmental effects. This helps to ensure that the importance of the predicted effects and the scope for reducing them are properly understood by the public and the relevant competent authority before it makes its decision.

1.2.2 The aim of EIA is to:

“protect the environment by ensuring that a local planning authority when deciding whether to grant planning permission for a project, which is likely to have significant effects on the environment, does so in the full knowledge of the likely significant effects, and takes this into account in the decision making process” and “ensure that the public are given early and effective opportunities to participate in the decision-making procedures.” (Ref 1-1)

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, were prescribed within European Council Directive 85/337/EEC (termed the ‘EIA Directive’). Several subsequent EIA Directives have been published, the latest of which is Directive 2014/52/EU, which was translated into UK law in May 2017.

1.2.4 The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (hereafter ‘the EIA Regulations’) transpose the requirements of the EIA Directive into UK statute and apply where planning consent is being sought for developments under the Town and Country Planning Act 1990.

1.2.5 Screening procedures exist within the EIA Regulations to determine whether a development proposal qualifies for EIA. As noted in Section 1.1, the Proposed Scheme is considered EIA Development for the purposes of the EIA Regulations and an ES will form part of the Application.

1.2.6 In accordance with Regulation 33 of the EIA Regulations, the Applicant made a formal request for a scoping direction to Welsh Government on 22 May 2020 (**Technical Appendix 1.1, Volume 4**). A formal Scoping Direction was subsequently received from Welsh Ministers on 17 July 2020 (**Technical Appendix 1.2, Volume 4**). Further details on the 2020 Scoping Direction and how it has informed this ES are provided in **Chapter 4: EIA Process**.

Environmental Statement (ES)

1.2.7 It is a requirement of the EIA Regulations that an ES be prepared to describe the likely significant effects of a Proposed Scheme on the environment.

- 1.2.8 This ES accompanies the Application and reports the formal process and outcomes of the EIA undertaken for the Proposed Scheme. Its purpose is to present the Proposed Scheme and its predicted environmental effects in a concise, objective and non-promotional manner in order to provide the Welsh Ministers, statutory consultees, interested bodies, and the general public with sufficient information to assess its likely environmental effects.
- 1.2.9 The findings of the EIA are presented in this ES which has been prepared in accordance with the EIA Regulations. The ES is provided in four parts:
- Volume 1 – Non-Technical Summary
 - Volume 2 – Written Statement
 - Volume 3 – Supporting Figures and Plans
 - Volume 4 – Supporting Technical Appendices
- 1.2.10 Schedule 4 of the EIA Regulations provide details of the information required for inclusion in an ES. **Table 1.1** summarises the requirements and where the information can be located within the ES.

Table 1.1: Location of required information within the ES

Required Information		Location within the ES
1	Description of the development, including in particular:	
	(a) a description of the location of the development	Chapter 3: Proposed Scheme
	(b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases.	Chapter 3: Proposed Scheme
	(c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used.	Chapter 3: Proposed Scheme
	(d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.	Chapter 3: Proposed Scheme and Technical Chapters 5-13
2	A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	Chapter 2: Site Selection and Design Evolution

Required Information		Location within the ES
3	A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort based on the availability of environmental information and scientific knowledge.	Chapter 3: Proposed Scheme, Chapter 4: EIA Process, and Technical Chapters 5-13
4	A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	Technical Chapters 5-13
5	A description of the likely significant effects of the development on the environment resulting from, inter alia:	
	a. The construction and existence of the development, including, where relevant, demolition works.	Technical Chapters 5-13
	b. The use of natural resources - land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources.	Technical Chapters 5-13
	c. The emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste.	Technical Chapters 5-13
	d. The risks to human health, cultural heritage or the environment (for example due to accidents or disasters).	Technical Chapters 5-13
	e. The cumulation of effects with other existing and/or approved projects, considering any existing environmental problems relating to areas of environmental importance likely to be affected or the use of natural resources.	Chapter 13: Cumulative Effects
	f. The impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.	Chapter 12: Other EIA Topics
	g. The technologies and the substances used.	Technical Chapters 5-13

Required Information		Location within the ES
6	A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	Technical Chapters 5-13
7	A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases	Chapter 3: Proposed Scheme, Chapter 4: EIA Process, and Technical Chapters 5-13
8	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. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU(3) of the European Parliament and of the Council or Council Directive 2009/71/Euratom(4) or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met.	Chapter 3: Proposed Scheme and Chapter 4: EIA Process
9	A non-technical summary of the information provided under paragraphs 1 to 8	Volume 1: Non-Technical Summary
10	A reference list detailing the sources used for the descriptions and assessments included in the ES.	All chapters (where relevant)

1.3 Competent Experts

- 1.3.1 In line with Regulation 18(5)(a) – (b) of the EIA Regulations, the ES and technical assessments which inform it have been undertaken by a suitably qualified project team.
- 1.3.2 RSK Environment Ltd (RSK) is responsible for the coordination, compilation and procedural review of the ES. RSK is registered under the EIA Quality Mark operated by the Institute of Environmental Management and Assessment (IEMA) which recognises our commitment to excellence in EIA activities. We have continued to maintain our EIA Quality Mark registration, following annual examination by IEMA in relation to our ongoing products, staff, innovation and promotion of EIA within the industry.

1.3.3 The relevant expertise and qualifications of competent experts involved in the preparation of this ES are detailed in **Table 1.2**.

Table 1.2: EIA team responsibilities

Name	Qualifications	Company	Role and expertise
EIA Project Management Team			
Victoria Robinson	BSc (Hons) CEnv. MIEMA	RSK	EIA Project Manager 10 years of working on EIA projects.
EIA technical specialists			
Stuart Cargill	BA (Hons) MLA, CMLI	Optimised Environments	Landscape and visual assessment
George Gibbs	BEng MSc CEng CEnv MIOA MIEnvSc	Noise Consultants	Noise assessment
James Meek	BA(Hons) MCIfA	Heritage Collective	Heritage assessment
Chris Mitchell	BSc (Hons), CEcol, CEnv, MCIEEM	SLR	Ecology assessment
Duncan Watson	BSc (Hons), MSc, CEnv, MCIEEM	SLR	
Michelle Robertson	BSc, MSc, MCIEEM	SLR	Ornithology assessment
Duncan Watson	BSc (Hons), MSc, CEnv, MCIEEM	SLR	
Catherine Isherwood	MA, MSci, MSc, PhD	RSK	Hydrology, Hydrogeology, Peat and Geology
Libby Robinson	PhD, BSc (Hons)	RSK Nature Positive	Carbon and Climate Change
Mike Coleman	Wing Commander Mike Coleman Royal Air Force (RAF) (Retd)	Coleman Aviation Ltd.	Aviation assessment
Aaron Williams	BSc (Hons)	Pager Power	Telecommunications assessment

1.4 References

- **Ref. 1-1:** Planning Practice Guidance (PPG) Online Tool, Paragraphs 032 and 033.

2 SITE SELECTION AND DESIGN EVOLUTION

2.1 Introduction

- 2.1.1 This chapter outlines the main alternative to the Proposed Scheme that have been considered by the Applicant, together with the principle reasons for proceeding with the Proposed Scheme.
- 2.1.2 Schedule 4(2) of the EIA Regulations states that an Environmental Statement (ES) should include:
- “a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the applicant or appellant which are relevant to the proposed development and its specific characteristics and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.”*
- 2.1.3 This chapter recognises and fulfils this requirement in respect of the Proposed Scheme.
- 2.1.4 The consideration of alternatives and design evolution has been undertaken with the aim of avoiding, preventing, reducing, or, if possible, offsetting likely significant adverse environmental effects (following the mitigation hierarchy), while ensuring operational efficiency of the wind farm, cost effectiveness, and other relevant matters such as existing land use and planning policy. The design of the Proposed Scheme has evolved through engineering design work, in response to consultation feedback, and environmental survey work.

2.2 Alternative Sites / Locations

Introduction

- 2.2.1 The Applicant have a well-established process for selecting sites and identifying land for wind farm development. The overall approach to wind farm site selection is to identify areas of land where the siting of a wind farm would result in minimal environmental effects, be free from overriding technical constraints, and be economically viable. This initial site identification exercise involves:
- A review of current and emerging planning policy (at the National and Local level).
 - Geographical Information System (GIS) constraints analysis, including analysis of wind speed data.
 - A review of suitable site access points and related transportation issues.

Planning Policy Framework Considerations

- 2.2.2 The Proposed Scheme relates to the generation of electricity from renewable energy sources and will be a response to the national energy policy and planning objectives. The Environment (Wales) Act 2016 sets a target to reduce greenhouse gas emissions in Wales by 80 % by 2050. Furthermore, the Welsh Government has declared a climate emergency and in March 2021 the Senedd Cymru approved a net zero target for 2050. Renewable energy is a key component to achieving greenhouse gas emission reduction. In 2017, the Welsh Government announced a target of meeting 70 % of Wales's electricity consumption from renewable electricity sources by 2030 (**Ref. 2-1**).
- 2.2.3 Planning Policy Wales (PPW) (**Ref. 2-2**) details the land use planning policies of the Welsh Government, with the objective to ensure the delivery of sustainable development. PPW identifies that low carbon electricity must become the main source of energy in Wales. PPW also recognises that wind energy forms a key part of meeting renewable energy production due to Wales's considerable wind resource.
- 2.2.4 Future Wales: The National Plan 2040 (**Ref. 2-3**) provides a framework for planning change and development and has development plan status. Policy 17 on renewable and low carbon energy and associated infrastructure and Policy 18 on renewable and low carbon energy developments of national significance, provide the strategic spatial and detailed criteria-based policies for renewable and low carbon energy developments.
- 2.2.5 Policy 17 identifies ten 'Pre-Assessed Areas for Wind Energy'. There is a presumption in favour of large-scale wind energy development in these areas, subject to the criteria in Policy 18. However, the National Plan also notes that "*Outside of these areas a positive policy framework still exists, subject to policy 18*".

GIS Constraints Analysis

- 2.2.6 The GIS constraints analysis involves identifying and mapping environmental, technical, and engineering constraints to wind farm development. Constraints that were considered as part of the site selection exercise for the Proposed Scheme included:
- Aviation interests: Including local licensed aerodromes and visibility to radars, both military and civilian.
 - Landscape designations: Including National Parks and local landscape designations.
 - Ecological designations: Including International designations (e.g. Special Protection Areas), National designations (e.g. Sites of Special Scientific Interest), and Local designations (e.g. Local Nature Reserves).
 - Cultural heritage designations: Including Registered Gardens and Designed Landscapes, Registered Battlefields, World Heritage Sites, Listed Buildings, Conservation Areas and Scheduled Ancient Monuments.
 - The pattern of settlement and land use: With buffers provided around residential properties and settlements.

2.2.7 The predicted wind resource in any given location is an important consideration in identifying potentially suitable wind farm sites. The electricity that can be generated by a wind farm is directly linked to wind speed. Wind speed generally increases with height above ground level. The amount of electricity generated increases disproportionately with increases in wind speed, this in turn affects the carbon emission savings and the commercial viability of a site. Potential wind farm sites are therefore reviewed in relation to a number of publicly available data sources in the first instance, including the NOABL wind speed database. A meteorological mast has been installed on the Site since summer 2020 gathering detailed wind data. This will remain in place for up to five years.

Suitable Access Considerations

2.2.8 Given the size and scale of abnormal indivisible loads (AILs) associated with wind farm development, a site must demonstrate that it is accessible for construction and operational traffic. At an early stage of site development, the Applicant conducts a Route Survey Report (RSR) to help inform the likely issues associated with the development of the site with regards to off-site transport and access for AIL traffic. The report identifies the key issues associated with AIL deliveries and notes any requirement for remedial works, either in form of physical works or as traffic management interventions, will be required to accommodate the predicted loads.

Summary

2.2.9 The site for the Proposed Scheme demonstrated the necessary attributes for the construction and operation of a wind farm development without significant technical or environmental constraints.

2.3 Alternative designs

Introduction

2.3.1 A number of site specific attributes and constraints have been identified during the development of the Proposed Scheme. Such matters have been factored into the design and layout of the Proposed Scheme in order to protect local interests and devise a project that would operate effectively. The key constraints are shown on **Figure 2.2 (Volume 3)**.

2.3.2 The design of the Proposed Scheme has been through a number of design iterations, largely responding to on-going environmental and technical surveys, as well as feedback from statutory and non-statutory consultees. Significant changes to the design of the Proposed Scheme have related to:

- Changes to the wind turbine layout, including; reducing the number of turbines, altering the positioning of the wind turbines (and associated infrastructure including hardstandings and laydown areas), and consideration of the nacelle height and overall height to blade tip.
- Changes to the position of site access tracks.
- Changes to the location of the control building and electrical compound.
- Changes to the site access entry point and route into Site.

2.3.3 As the design has evolved, the Project Team have carefully logged, mapped, and proactively managed (in line with the mitigation hierarchy) any site-specific considerations. The main considerations with regard to facilitating a detailed design assessment are presented in **Table 2.1**.

Table 2.1: List of key considerations which have informed the design process

Area	Criteria	Description
Technical & Engineering	Access & connectivity	- Safe and practical access across the Site during all phase of the development. - Safe and well managed connectivity to local highway network.
	Constructability and timescales	Consideration of: areas of peat, restrictions relating to development on common land, and interfaces with other infrastructure at the Site.
	Health and safety	- Maintaining safe working sites during construction, operation, and decommissioning. - Proximity to other live infrastructure (gas, water, and electricity). - Safe delivery of the Proposed Scheme when interacting with existing land uses.
	Availability, flexibility, and maintenance	- Ongoing engagement with landowners and stakeholders regarding use of the Site. - Ease of maintenance access across the Site.
	Operational efficiency	Turbine separation – maintaining sufficient separation between turbines.
Environmental	Geology and soils	- Peat deposits: Avoiding areas classed as peat in line with NRW guidance (>0.4 m). - Shake hole risk zones: Avoiding high risk shake hole zones.
	Hydrology	Proximity to watercourses and private water supplies: Maintaining 50 m setback.
	Protected habitats	Avoiding priority habitats identified on-site, including those habitats associated with peat deposits.
	Protected species	Avoiding direct/indirect impacts on species protected under Welsh or international law.
	Ornithology	Curlew territories: Maintaining appropriate distance from potential curlew nesting territories.
	Cultural Heritage	- Avoidance of known cultural heritage assets (e.g. Scheduled Monuments) or potential for unknown archaeology. - Increase separation from known above ground heritage assets to reduce impacts on setting.

Area	Criteria	Description
Environmental cont'd.	Landscape character	Landscape considerations concerning the Bannau Brycheiniog National Park (including views to and from the National Park).
	Visual amenity	Proximity to residences: Maintaining sufficient distance from nearby properties of at least 1 km.
	Noise	Proximity to residences: Maintaining sufficient distance from nearby properties of at least 1 km.
	Land use	Consideration of existing use of the Gelligaer and Merthyr Common, north of the A465.
	Access and recreation	Consideration of Public Rights of Way, Public Access to the Gelligaer and Merthyr Common, and non-vehicular users of the Common Road.

Design Evolution

- 2.3.4 The design process took place over a number of months, and the Proposed Scheme has been progressively revised and refined during this time to take account of the information arising from pre-application consultation with stakeholders, and the findings of the EIA. As a result, the design and EIA process has been highly iterative and all aspects of the final design, including the location of the wind turbines, crane hardstandings, the site access, layout of the access tracks, the locations of the control building and electrical compound have been influenced by the technical and environmental considerations outlined in **Table 2.1**.
- 2.3.5 The design of the Proposed Scheme has been optimised to balance the use of land available within the Site and the overall impact of the Proposed Scheme. The Proposed Scheme has gone through 4 principal iterations, detail on the key considerations and amendments are described below. The four principal iterations to the turbine number and locations are presented on **Figure 2.3a (Volume 3)**.

Layout A – (2020)

- 2.3.6 Layout A comprised seven wind turbines up to 180 m tip height. Layout A was developed in advance of the request for an EIA Scoping Direction. Layout A was informed by initial technical and environmental constraints, including a desk-based feasibility study, and was developed prior to any detailed site-specific surveys being completed.
- 2.3.7 This early design included consideration of at least 800 m from residential receptors, as well as consideration of landscape and visual impacts owing to the northern boundary of the Site being contiguous with Bannau Brycheiniog National Park and within Special Landscape Area (SLA) 23, Upper Rhymney Valley, and SLA 33, Nant Morlais and Cwm Taff Fechan.

Layout B (May 2020)

- 2.3.8 Layout B comprised seven wind turbines up to 180 m tip height. Layout B was presented as part of the request for an EIA Scoping Direction. Layout B was informed by early results of on-site surveys and technical specialist consultant inputs. In addition,

the layout was informed by desk top surveys to determine the likelihood of shake holes. A national grid high pressure pipeline was also identified, and avoided, following a detailed utilities search.

Layout C – (December 2020)

2.3.9 Layout C comprised seven wind turbines up to 180 m tip height. Layout C was tested against additional environmental and technical survey work, and consultee comments received as part of the 2020 Scoping Direction. The following design considerations were captured as part of the design process:

- Stage 1 Peat Surveys and comprehensive mapping of hydrological receptors following a hydrological walkover survey.
- Identification of underground archaeological records identified through Historic Environment Records and engagement with the LPA Curator.
- Development of noise contours based on baseline noise monitoring.
- Identification of curlew breeding territories (on-site and in close proximity to the Site).
- Avoidance of priority habitats following Phase 1 Habitat Surveys, peat surveys, and additional National Vegetation Classification (NVS) Surveys.
- Potential interference with Joint Radio Company (JRC) protected link identified through telecommunications consultation.

Layout D (March 2021)

2.3.10 Layout D comprised six wind turbines up to 180 m tip height. The key design drivers for the development of Layout D included:

- Additional peat surveys to inform the over-arching infrastructure layout, in particular the location of Site access tracks. While the focus was on locating the turbines, cognisance was given throughout to the other infrastructure to ensure that selected turbine locations were also able to be accessed by an access track and there was sufficient opportunity for associated hardstanding within the known constraints.
- Based on the candidate turbine at the time (Nordex N133), landscape and visual testing of rotor lengths, diameters and aviation lighting considerations. The rotor length of the N133 was tested against a shorter rotor diameter to compare the effects of both with regard to the effects from key views. While the tip height was explored at this stage of the design, especially with regard to aviation lighting (required above 150 m) it was considered unviable to reduce tip heights below this level.
- Additional consideration of shake holes in close proximity to Turbine T6 through Geophysical Surveys.
- Two design options for Turbine T1 (1a and 1b) were developed to consider how the turbine may be approached given the proximity to watercourses, peat deposits, and topography.

2.3.11 Alongside the turbine layout, two access routes (orange and blue) were investigated as presented on **Figure 2.3b (Volume 3)**. The western (orange) option was discounted as a result of a high-pressure gas pipeline and overhead cables making the construction working area too constrained. In addition, deeper peat was identified along the western (orange) option. While the selected option was not the preferred

option from a visual perspective, the other constraints and inaccessibility of the orange option meant the blue option was preferred.

- 2.3.12 The location of the control building and electrical compound was mostly driven by the location of the grid connection and to minimise the planned cabling to the Dowlais substation. Proximity to the turbine array to reduce cabling as well as maintaining safe distance from any turbines for safety purposes.

Layout E (August 2021)

- 2.3.13 Layout E comprised six wind turbines up to 180 m tip height. The main design drivers for Layout E related to further advanced survey for peat and included detailed positioning of the wind turbines and associated infrastructure, including an allowance for micro-siting during construction.
- 2.3.14 Further telecommunication consultation with the JRC raised an objection in relation to a protected telemetry link (the location of which was confidential). However, suitable mitigation was agreed with the JRC and the proposed turbine layout remained unchanged. Please refer to **Chapter 12: Other EIA Topics** for further details.

Layout F (August 2022) (Design presented in draft ES for Statutory Consultation)

- 2.3.15 The layout of the Proposed Scheme was developed and optimised in order to provide a visually coherent and balanced layout design, avoiding known constraints where practicable.

Proposed Scheme

- 2.3.16 The infrastructure layout was amended to remove any access tracks and construction works from the Powys County Council administrative area. Refer to **Figure 3.1 (Volume 3)**
- 2.3.17 As identified in **Chapter 3: Proposed Scheme**, the proposed turbine locations and ancillary infrastructure was subject to a maximum micro-siting tolerance of 50 m in any direction within a defined area. Hence any future detailed design work will be within the assessment parameters of the micro-siting allowance such that environmental effects are not likely to be any worse than the assessed design.

2.4 References

- **Ref. 2-1:** Welsh Government. (2017). Energy Generation in Wales 2017. Welsh Government. Available at: <https://www.regen.co.uk/wp-content/uploads/Energy-Generation-in-Wales-2017.pdf>
- **Ref. 2-2:** Welsh Government. (2021a). Planning Policy Wales Edition 11. Welsh Government. Available at: https://www.gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf
- **Ref. 2-3:** Welsh Government. (2021b). Future Wales: The National Plan 2040. Welsh Government. Available at: <https://www.gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf>

3 PROPOSED SCHEME

3.1 Introduction

- 3.1.1 This chapter provides a description of the Site and the Proposed Scheme. It includes a description of how the Proposed Scheme would be constructed, alongside the assumptions used for the basis of assessment where this information is subject to confirmation. The description of the Proposed Scheme aligns with what planning consent is sought for, and, together with the supporting plans, is what the technical assessments are based upon (**Technical Chapters 5-13**).

3.2 The Site

Introduction

- 3.2.1 This section provides an overview of both the Site and the surrounding area. The Site is defined as the area of land considered suitable for development of the Proposed Scheme and is identified on **Figure 1.1 (Volume 3)**. The Site Boundary comprises an area of approximately 459.9 hectares (ha) and is roughly defined by the Bannau Brycheiniog National Park boundary to the north, Nant Tor-gwyn to the west, Nant Pitwellt to the east, and the Common Road to the south.
- 3.2.2 The key spatial boundaries and environmental receptors within the Site and surrounding area are illustrated on **Figure 2.2 (Volume 3)**. Further technical data is provided within the **Technical Chapters 5-13**.

Current Land Use

General

- 3.2.3 The majority of the Site is registered as Common Land and makes up part of Common Land Unit 38 (Gelligaer and Merthyr Common), which also extends to the south of the A465 Heads of the Valleys Road. The Site comprises a broadly sloping area of purple moor grass *Molinia caerulea* dominated grassland, with small scattered areas of dense scrub, exposed rock, dry heath and standing open water habitats.

Population and Settlements

- 3.2.4 The Site is located within the administrative boundary of two local authorities, Caerphilly County Borough Council and Merthyr Tydfil County Borough Council. The Site is located approximately 1 km north-east of Dowlais Top, on the north-eastern fringe of Merthyr Tydfil, and 2 km north-west of Rhymney town centre.
- 3.2.5 There are scattered areas of industrial and residential development to the south, south-east and south-west of the Site. The closest commercial receptor is a trading estate directly adjacent to the south-west boundary, while the closest residential receptor is a farmstead located 200 m south of the Site Boundary, south of the A465 Heads of the Valleys Road.

Topography

- 3.2.6 The Site is located on Pen March, part of the southern slope of Cefn y Ystrad. The Site slopes down from 535 m AOD in the north to approximately 355 m AOD in the south.

Access

- 3.2.7 The Common Road runs along the southern edge of the Site Boundary from which access to the Site can be gained. The Common Road is also known as Old Rhymney Road locally but is referred to as the Common Road throughout the ES. Access to the Common Road can be via the A465 from the west or by the A4060 and A470 from the south. There are two Public Rights of Way (PRoW) located within the Site Boundary and a Bridleway and a National Cycle Network route adjacent to the southern edge of the Site. In addition, the Site is part of CL38 Merthyr and Gelligaer Common and is also open access land therefore it is used by commoners and members of the public.

Environmental Characteristics

- 3.2.8 Key environmental features are set out on **Figure 2.2 (Volume 3)** and summarised below, with further detail available in **Technical Chapters 5-13**.

Statutory landscape designations

- 3.2.9 There are no statutory landscape designations located within the Site Boundary, however, the Bannau Brycheiniog National Park is located adjacent to the northern edge of the Site Boundary.
- 3.2.10 There are four Registered Parks and Gardens located within 10 km of the Site Boundary, including:
- Aberfan: Cemetery, Garden of Remembrance and Former Tip and Slide Area
 - Bedwellty Park, Tredegar
 - Cefn Coed Cemetery & Jewish Burial Ground
 - Cyfarthfa Castle.

Statutory ecological designations

- 3.2.11 There are no statutory ecological designations located within the Site Boundary. The Usk Bat Sites / Safloedd Ystlumod Wysg Special Area of Conservation (SAC), which also has a designation as a Site of Special Scientific Interest (SSSI), lies approximately 8 km to the north-east of the Site Boundary. It is primarily designated for its population of Lesser horseshoe bat *Rhinolophus hipposideros*.
- 3.2.12 The River Usk / Afon Wysg SAC, which also has a designation as a SSSI, lies approximately 9.5 km north of the Site Boundary. It is primarily designated for its population of Sea Lamprey, Brook lamprey, River Lamprey, Twaite shad, Atlantic salmon, Bullhead, and Otter.

- 3.2.13 There are 14 SSSI's located within 10 km of the Site Boundary which are solely (or in part) designated for ecological reasons. The closest being the Cwm Taf Fechan Woodlands SSSI, located approximately 1.6 km from the Site, designated for its mixed deciduous woodland associated with underlying limestone. Further detail on all designations can be found in **Chapter 7: Ecology**.

Statutory designated sites of relevance to geology, hydrogeology, hydrology and soils

- 3.2.14 There are eight SSSI's within 5 km of the Site Boundary which are solely (or in part) designated for geological reasons. The closest being the Lower House Stream Section SSSI, which is also designated as a Geological Conservation Review (GCR) site, located approximately 500 m east of the Site. The Lower House Stream Section SSSI is designated for its exposure of the Middle Shales Formation with abundant fossils. Further detail on all designations can be found in **Chapter 6: Hydrology, Hydrogeology, Geology and Peat**.

Natural Resources

- 3.2.15 The River Rhymney lies immediately east of the Site Boundary. Drainage from the east of the Site is provided by Nant Pitwellt and tributaries. The west of the Site is within the River Taff catchment for which drainage is provided by the Nant Morlais and its tributary the Nant Tor-gwyn. Both catchments drain into the River Severn estuary at Cardiff.
- 3.2.16 The Site is located within Flood Zone A. This means that the Site is considered to be at little to no risk of fluvial or coastal/tidal flooding. However, some areas of the Site are at risk of flooding from surface water and small watercourses.
- 3.2.17 The south of the Site is located above a Secondary A aquifer while the north and west of the Site is above a Principal aquifer.
- 3.2.18 The north-eastern part of the Site is located within one of NRW's Source Protection Zones (SPZ) for public drinking water supply, where it is drawn from the south of the Site. The groundwater of the Site will mimic the natural topography except in areas impacted by mining and in karstic areas of limestone.

Historic Environment

- 3.2.19 There are currently no statutory designations assets located within the Site Boundary. However, a site known as Enclosure south-east of Pitwellt Pond (provisional number GM623), is due to be designated as a scheduled monument.
- 3.2.20 There Historic Environment Desk Based Assessment (HEDBA) which has been completed as part of the Cultural Heritage Impact Assessment (**Chapter 11**) has identified a number of statutory designated heritage assets within 10 km of the Site Boundary, including:
- 102 Scheduled Monuments
 - 322 Listed Buildings
 - 12 Conservation Areas
 - Six Registered Parks and Gardens

- 3.2.21 A number of non-statutory Historic Environment Records (HER) have been identified within the Site Boundary and considered as part of the assessment, please refer to **Chapter 11: Cultural Heritage** for further details.

Future Baseline

- 3.2.22 Schedule 4 of the EIA Regulations requires consideration of the likely evolution of the current baseline in the absence of the Proposed Scheme. Whilst there are considerable limitations to the predictions that can be made about baseline conditions at a future point in time, some topic areas require projections to account for future change, such as traffic growth.
- 3.2.23 Further detail on the future baseline conditions considered in elements of the assessment can be found in **Technical Chapters 5-13**.

3.3 Operational Design

Overview

- 3.3.1 The Proposed Scheme is illustrated on **Figure 3.1 (Volume 3)** and will consist of the following principal components:
- Up to six three-bladed horizontal axis wind turbines up to 180 m to blade tip height. Each turbine has an internal transformer and aviation lighting.
 - Wind turbine foundations and hardstanding areas which will include crane hardstanding areas and laydown/storage areas.
 - An electrical and control building compound with battery storage facilities.
 - New site access from the Common Road and associated bell-mouth junction.
 - On-site access tracks, passing places, and turning heads.
 - Two gas pipeline crossings, one water main crossing and three main watercourse crossings.
 - Underground power cables (and fibre optic communication cables) linking the wind turbines and the on-site electrical compound and control building.
 - A main temporary construction and storage compound with associated laydown areas near to the Site entrance.
 - Construction working areas associated with turbine locations and access tracks which will be restored after construction is complete.
 - Off-site works to enable the movement of abnormal loads during construction (such as the creation of a new slip track from A465 and temporary modifications to street furniture etc).
 - On-site Habitat Management Area.
- 3.3.2 Each of these components and their key features are described in the following sections. Where key features are associated with more than one component of the Proposed Scheme, they are described within the section they are first associated with. Where reference is made to the Proposed Scheme, this includes all components collectively.

Site layout and flexibility

- 3.3.3 Although the design process and evolution seeks to combine environmental and economic requirements, the Applicant would nevertheless seek some flexibility, where necessary, in micro-siting the exact positions of the turbines and routes of on-site access tracks and associated infrastructure. Any repositioning would not encroach into environmentally constrained areas, but could, for example, avoid unrecorded archaeological features which might be revealed during the construction phase.
- 3.3.4 Therefore, the Application includes an allowance for micro-siting of the wind farm infrastructure. If planning permission is granted, the Applicant will commission further investigative surveys to inform the detailed design. A 50 m micro-siting allowance is sought for the wind turbines (with restrictions in place to safeguard constraint buffers as applicable), and all other new elements of the Proposed Scheme.

Wind turbines

- 3.3.5 The wind turbines would be three bladed horizontal axis turbines attached to a nacelle that would house a turbine generator and other operating equipment. The maximum height of wind turbines would be up to 180 m to the tip of the blade in an upright position. An indicative turbine for the Proposed Scheme is shown on **Figure 3.2 (Volume 3)**. Grid references for the proposed turbine locations are identified in **Table 3.1** and their location is shown on **Figure 3.1 (Volume 3)**.

Table 3.1: Proposed turbine locations

Turbine	Easting	Northing
T01	307733	210855
T02	308300	210948
T03	308089	210116
T04	309105	210563
T05	308632	210633
T06	308565	210077

- 3.3.6 Wind turbines begin generating automatically at a wind speed of around 3 to 4 metres per second (m/s) and have a shut-down wind speed of about 25 m/s. Each wind turbine would have a transformer, the transformer's function is to raise the generation voltage from approximately 690 volts to the higher transmission level that is required to transport the electricity into the grid. Depending on the turbine supplier, the transformer may be located inside or outside each turbine. For the purposes of this assessment, it has been assumed that the transformer would sit inside the wind turbine.

- 3.3.7 It is estimated that the average annual generation expected at the Site could be equivalent to the approximate domestic needs of around 24,500 average UK households¹. Based on present day carbon dioxide savings figures, the Pen March Wind Farm will save the emission of around 120,400 tonnes² of carbon dioxide over the course of a year.
- 3.3.8 The exact model of wind turbine to be installed would be selected through a competitive procurement process. In each assessment in the EIA, a worst-case scenario of the turbine dimensions / characteristics has been used to ensure a robust assessment.

Aviation lighting

- 3.3.9 Wind turbines with a height greater than 150 m to blade tip require aviation lighting to comply with Civil Aviation Authority (CAA) requirements in accordance with Article 219 of the UK Air Navigation Order 2016. As such, the Proposed Scheme will need to display visible red lights at night. A detailed Lighting and Marking Plan (LMP) will be agreed with all relevant aviation stakeholders and will set out specific requirements in terms of aviation lighting to be installed on the turbines, as required under CAA (2016) CAP 393, Air Navigation: The Order and the Regulations (2016). The production and approval of a LMP will be a condition of the Application. Measures will be adopted to ensure that the potential for risk of aircraft collision with the Proposed Scheme is minimised.
- 3.3.10 Turbine lighting has been assessed within **Chapter 5: LVIA** and a visual assessment of visible aviation lighting is provided in **Technical Appendix 5.5 (Volume 4)**, which includes two night time viewpoints within the BBNP.

Wind turbine foundations and hardstanding

- 3.3.11 Wind turbine foundations would be designed to accommodate the final choice of turbine and to suit site specific conditions. The foundations of the turbines could be either reinforced concrete gravity structures or piled foundations. The final design would depend on the findings of detailed ground investigation at each turbine location.
- 3.3.12 An illustration of a typical wind turbine foundation is provided on **Figure 3.3 (Volume 3)**. A typical foundation area could have a diameter of 22 m and a depth of 3.5 m. The foundations typically comprise concrete and reinforced steel.

¹ Equivalent homes supplied is based on an annual electricity consumption per home of 3748 kWh. This figure is supported and published by Renewables UK based on the most recent statistics from Department of Business, Energy and Industrial Strategy, showing that annual GB average domestic household consumption is 3748kWh.

² The figure for CO₂ savings depends on which source of electricity generation wind power displaces at any given time during the year. This range reflects CO₂ displacement factors with respect to coal-fired and gas-fired generation. It should be noted that future changes in the power generating mix and fuel costs in the UK may result in changes to these figures over time. Calculations assume emissions of 931g CO₂ / kWh for coal generated electricity and 378g CO₂ / kWh for gas generated electricity, 2016 figures as stated in The Digest of UK Energy Statistics (DUKES) 2018.

3.3.13 A hardstanding would be built adjacent to each wind turbine to accommodate the crane required for construction and is likely to have a footprint in the region of 9000 m², with the depth dependant on the underlying bearing strata. The depth of crane hardstandings is expected to be approximately 1 m. The actual crane pad design and layout would be determined by the wind turbine supplier according to their preferred erection method. A worst-case crane hardstanding design has been considered for the purposes of this assessment and is shown on **Figure 3.4 (Volume 3)**. The crane hardstanding would include laydown areas for the blades which results in a non-regular foundation footprint.

Electrical compound, control building, and battery storage facilities

3.3.14 The electrical compound, control building, and battery storage facilities will measure approximately 100 m by 50 m. A 2.4 m high palisade security fence would be installed around the perimeter of the compound and the compound would be served via a locked access gate.

3.3.15 The location of the electrical compound is shown on **Figure 3.1 (Volume 3)**. An indicative layout of the electrical compound is provided on **Figure 3.5 (Volume 3)**. The electrical compound will include the following elements:

- Electrical compound and control building: The footprint of the building will be up to 20 m by 6 m. The building would contain a range of electrical grid equipment, such as; transformers, a Supervisory Control and Data Acquisition system (SCADA), switchgear, coolers, cabling and other electrical equipment. A spare parts store room, office and welfare facilities will also be located in the control building.
- Approximately 80 permanent containers (in groups of 20) housing energy storage devices. Each container will measure approximately 1.3 m by 1.3 m, and will be 2.8 m in height. There will be 4 inverter skids (combined inverter and transformer) and ancillary equipment associated with the energy storage devices would be located adjacent to each group of containers. An indicative layout is shown in **Figure 3.6 (Volume 3)**.
- Car parking areas for maintenance staff, measuring approximately 15 m by 21 m.
- Four lightning protection masts, measuring up to 15 m in height.
- A single communications mast, measuring up to 15 m in height.

Site Access

3.3.16 Access to the Proposed Scheme will be via a new access junction from the Common Road. The access junction would be designed to accommodate all predicted loads and traffic for all phases of the Proposed Scheme. An indicative junction layout is provided in **Figure 3.13 (Volume 3)**.

Site access tracks

Overview

- 3.3.17 The Site access track layout has been designed to minimise environmental disturbance by avoiding sensitive features and keeping the length of track commensurate with the minimum required for operational safety. The layout of the Site access tracks also takes cognisance of the various identified environmental constraints, in particular, areas of peat (as discussed in **Chapter 2: Site Selection and Design Evolution**).
- 3.3.18 Site tracks would have a typical running width of 5.5 m. Where required, the site tracks will be wider on bends and at junctions to accommodate the ‘swept path’ of Abnormal Indivisible Load (AIL) vehicles. There will be approximately 5.4 km of site tracks constructed, with 12 passing places and 6 permanent turning heads to allow the safe operation of vehicles on-site during the construction phase. An indicative access track cross section is shown on **Figure 3.8 (Volume 3)** and an indicative passing place layout shown on **Figure 3.9 (Volume 3)**.

Watercourse crossings

- 3.3.19 Watercourse and ditch crossings have been avoided in the design of the Site access track layout, where possible. As part of the Proposed Scheme, there will be two watercourse crossings. **Figure 3.10 (Volume 3)** shows an indicative watercourse crossing design, the final design of any watercourse crossings will be agreed with NRW and the LPA.

Gas and water main pipeline crossings

- 3.3.20 Two high pressure gas pipelines have been identified on-site, one operated by National Grid and the other by Wales and West Utilities in addition to a water main operated by Dwr Cymru Welsh Water. These gas pipelines have been factored into the design of the Proposed Scheme and both utility operators have been consulted on the design of the Proposed Scheme. **Figure 3.11 (Volume 3)** shows an indicative gas pipeline crossing, the final design of both pipeline crossings will be agreed with both utility operators.

Electrical cabling

- 3.3.21 The Proposed Scheme will include buried electric cables which will connect the wind turbines to the control building. The majority of the underground power cables would run along the side of the Site access tracks in trenches. The exception to this is a section of electrical cabling running between Turbine T4 and Turbine T5, please refer to **Figure 3.1 (Volume 3)**.
- 3.3.22 In addition, each turbine location may require an earthing cable of up to 80 m alongside the turbine. The trenches would be excavated to a maximum depth of 1.25 m and backfilled. Indicative cable trench arrangements are provided on **Figure 3.7 (Volume 3)**.

Operation and management

- 3.3.23 The expected operational life of the Proposed Scheme is 35 years from the date of commissioning. At the end of this period, a decision is made whether to refurbish, remove or replace turbines. If refurbishment or replacement were to be chosen, relevant planning applications will be made.
- 3.3.24 During the operation of the Proposed Scheme, maintenance work will involve visiting the Site regularly to undertake scheduled maintenance and operational checks. Maintenance work would include the following:
- Scheduled routine maintenance and servicing, usually conducted annually, which will involve the undertaking of non-essential repairs on blades, gearboxes and generators.
 - Unplanned maintenance or call outs due for instance to outages or failures.
 - High voltage (HV) and other electrical maintenance.
 - Blade inspections.
 - Any necessary routine civil maintenance of tracks, drainage and buildings.
- 3.3.25 Wind turbines and wind farms are designed to operate largely unattended. Each turbine at the Proposed Scheme would be fitted with an automatic system designed to supervise and control a number of parameters to ensure proper performance (e.g. start-up, shut-down, rotor direction, blade angles etc.) and to monitor condition (e.g. generator temperature). The control system would automatically shut the turbine down should the need arise. The Proposed Scheme itself would have a sophisticated overall SCADA that would continually interrogate each of the turbines and the HV connection.
- 3.3.26 An operator would be employed to operate and maintain the turbines, largely through remote routine interrogation of the SCADA system. The operator would also look after the day-to-day logistical supervision of the Proposed Scheme and would be on-site intermittently.
- 3.3.27 When the Proposed Scheme is decommissioned, this would entail the removal of all of the turbine components, transformers, the electrical compound, control building, and energy storage units. The wind turbine foundations will normally remain in place to avoid the unnecessary intrusion to the ground. The exposed concrete plinth may be removed to a specified depth, but the entire foundation will be graded over with topsoil and replanted appropriately to restore the land to its original conditions

3.4 Construction Design

Introduction

- 3.4.1 This section sets out the key construction activities of the Proposed Scheme. The construction arrangements described in this section provide the basis for the assessment presented in this ES.

Overview of the construction phase

3.4.2 The Proposed Scheme would be constructed over a period of approximately 12 months, anticipated to commence in 2025. Building and commissioning the Proposed Scheme will comprise the following general stages:

- Advance works including:
 - Site investigations further to those already undertaken.
 - Pre-construction environmental surveys (if required).
 - Preliminary mitigation works.
 - Advanced Site access works.
- Civil engineering and ancillary works including:
 - Fencing.
 - Off-site road improvements.
 - Construction/upgrading of main Site access track off the A465.
 - Construction of the temporary construction compound.
 - Construction of all on-site access tracks.
 - Construction of temporary and permanent drainage measures and cable trenches.
 - Laying of electricity and communications cables in trenches.
 - Construction of turbine foundations, crane hardstandings and laydown areas.
 - Construction of control building and electrical compound, along with battery storage facilities.
 - Delivery, installation, testing and commissioning of wind turbines and ancillary equipment.
- Site finalisation works, including restoration.

3.4.3 A construction programme illustrating indicative periods for each of the core construction activities described above is provided in **Table 3.2**.

Table 3.2: Indicative construction programme

Month	1	2	3	4	5	6	7	8	9	10	11	12
Activity												
Mobilisation & Site establishment												
Construction compound set up												
Construct access tracks												
Electrical compound & control building												
Hardstandings & Foundations												
Cabling and electrical works												
Erection of turbines												
Commissioning and testing												
Site restoration and demobilisation												

Environmental management during construction

Construction Environmental Management Plan (CEMP)

- 3.4.4 The environmental management of the construction works for the Proposed Scheme will be delivered through the development of a CEMP. The CEMP will be the means of controlling the construction works and set out monitoring requirements, with the objective of ensuring that the effects of the construction works on people and the natural environment are reduced insofar as reasonably practicable.
- 3.4.5 The aims of the CEMP are to reduce the risk of likely significant negative effects on sensitive receptors because of construction activities, and to minimise disturbance to residents. To support the Application, an Outline CEMP has been prepared and is provided as part of this ES, please see **Technical Appendix 3.1 (Volume 4)**.
- 3.4.6 The Outline CEMP has been submitted with the intention that the refinement and adoption of such a document will be a condition of planning permission, thereby securing the mitigation measures contained within them. The Outline CEMP has been informed based on the information in this ES.
- 3.4.7 Prior to construction commencing, it is anticipated that the Outline CEMP be further developed by the appointed Contractor into a CEMP, which will be a live document on-site for use throughout the construction stage. The CEMP will take account of relevant mitigation detailed within **Technical Chapters 5-13** and any relevant planning conditions, thereby demonstrating the Applicant's commitment to undertaking the construction activities in such a way as to avoid or minimise likely significant environmental effects.

Materials Sourcing and Waste Management

- 3.4.8 Construction of the Proposed Scheme will require a range of materials, details of which are provided in this chapter. Excavated material from the turbine bases and access tracks would be re-used on-site for restoration/reinstatement. On-site concrete batching would not take place and ready mixed concrete will be delivered to Site.
- 3.4.9 A Site Waste Management Plan (SWMP) and Materials Management Plan (MMP) will be developed for implementation during construction. This would outline details of the materials requirements and anticipated waste generation during construction and how the Contractor intends to consider the management of these aspects.

Construction traffic

Introduction

- 3.4.10 During the construction period, the following traffic will require access to the Site:
- Staff transport,
 - Construction equipment and materials, deliveries of machinery and supplies such as concrete and crushed rock.
 - Abnormal loads comprising wind turbine sections and also heavy lift crane(s).

Construction Staff

- 3.4.11 Staff would arrive in non-HGV vehicles. The construction workforce on-site will depend on the activities being undertaken at the time. It has been assumed that there will be a requirement of three staff per turbine during the short peak period of construction. Therefore, the maximum number of staff expected on-site at any one time is likely to be no more than 18 per day.
- 3.4.12 For the purposes of estimating traffic movements, it has been assumed that 40 % of staff would be transported by minibus and 60 % would arrive by car (single car occupancy was assumed as the worst-case at this stage with potentially fewer movements through car sharing). Based on these assumptions, staff transport cars and light vehicles would account for a maximum of 24 vehicle trips (12 inbound trips and 12 outbound trips) per day during the peak period of construction.

Abnormal Indivisible Load Deliveries

- 3.4.13 The wind turbines are broken down into components for transport to the Site. The nacelle, blades and tower sections are classified as AIL due to their weight, length, width and height when loaded.
- 3.4.14 In addition to the turbine deliveries, one high capacity erection crane would be needed to offload a number of components and erect the turbines. The cranes are likely to be mobile cranes with a capacity up to 1,000 tonnes that are escorted by boom and ballast trucks to allow full mobilisation on Site. Smaller erector cranes would also be present to allow the assembly of the main cranes and to ease the overall erection of the turbines.
- 3.4.15 Escort vehicles would accompany the AIL convoys to support the traffic management measures. Up to three vehicles would be deployed and it is assumed that three turbine components would be delivered per convoy.

General Deliveries

- 3.4.16 Throughout the construction phase, general deliveries will be made to the Site by means of HGV. These would include fuel, Site office and staff welfare.

Material Deliveries

- 3.4.17 Various materials will need to be delivered to Site to form the site-based infrastructure. At the outset, HGV deliveries will deliver plant and initial material deliveries to the Site to enable the formation of the Site compound and to delivery construction machinery.
- 3.4.18 Ready-mix concrete will be delivered to the Site for the foundations of the turbines and control building and electrical compound. It is expected to originate at concrete plants located to the east of the Site via the A465 (T) Heads of the Valleys Road. It is expected that the total required volume of concrete will be approximately 10,120 m³, which will result in 4,284 total journeys (2,142 inbound trips and 2,142 outbound trips).
- 3.4.19 100 % of the aggregate material requirements will be imported to the Site from quarries to the south of the Site, via the A470 (T).

3.4.20 The tracks, crane pads and compounds will require geotextile in the foundations. Geotextile will be delivered to Site in rolls. A total of 70 large rolls may be required at Site and would be delivered by HGV.

3.4.21 Cables will connect each turbine to the control building. Up to three cables are to be provided within each cable trench and would be backfilled with cable sand, subsoils and topsoil. The cable materials would be likely sourced from sites along the A470 (T) corridor, to the south of Merthyr Tydfil and would be transported on the A4060 (T) and the Common Road to the Site.

Construction traffic management

3.4.22 A Traffic Management Plan (TMP) will be prepared and agreed with Caerphilly County Borough Council and Merthyr Tydfil County Borough Council in advance of the construction phase.

3.4.23 The TMP will demonstrate compliance with national and local policy guidance and will set out detailed descriptions of actions required by Contractors to meet during the construction process, following these objectives:

- Ensure that movements of people, plant and materials are achieved in a safe, efficient, timely and sustainable manner.
- Ensure that any impact to local communities and the local economy is reduced as far as reasonably practical.
- Ensure that construction traffic levels do not exceed an acceptable level during network peak periods.
- Reduce and control construction vehicle trips where practical.
- Ensure that strategies and mitigation measures are implemented and adhered to through continued monitoring, review, and improvement; and
- Limit the effects of construction traffic on the Local Road Network.

Construction site compounds

3.4.24 The construction site compounds will act as the main interface between the construction work sites and the public highway. Two compounds have been included as part of the Proposed Scheme, please refer to **Figure 3.1 (Volume 3)**.

3.4.25 The main compound is located close to the Site access point and set back approximately 270 m from the Common Road to control all access on to the Site. The compound will measure approximately 50 m by 50 m and includes space for:

- Temporary modular building(s) to be used as a Site office;
- Welfare facilities;
- Parking for construction staff and visitors;
- Reception area;
- Fuelling point or mobile fuel bowser;
- Secure storage areas for tools, materials and plant; and
- Waste storage facilities.

- 3.4.26 The second construction site compound, located in the same footprint as the electrical control building, and battery storage facilities, will act as a satellite compound to the main compound.

Construction working hours

- 3.4.27 The construction working hours for the Proposed Scheme would be 7am to 7pm Monday to Saturday, though noisy activities on Saturdays would be restricted to before 1pm to reduce disturbance to nearby properties.
- 3.4.28 It should be noted that out of necessity due to weather conditions and health and safety requirements, some generally quiet activities, for example, abnormal load deliveries (which are controlled by the Police) and also the lifting of the turbine components, may occur outside the specified hours stated. Delivery of abnormal loads (that is, wind turbine components) to be subject to approval by the Police and the Highways Authorities. Turbine erection may be undertaken during the day or night to maximise good weather windows.

Construction lighting

- 3.4.29 Artificial lighting will be required during the construction phase to ensure safe working conditions, during periods of limited natural light. Examples include vehicle and plant headlights, construction compound lighting, floodlights and mobile lighting units, to be used around specific construction activities. It is intended that the type of lighting would be non-intrusive (e.g. directed down and towards works activity and away from the Site boundary), to minimise impact on local properties and any other environmental considerations.

Construction Site Fencing

- 3.4.30 The electrical compound, control building, and battery storage facilities will be permanently fenced with 2.4 m high palisade fencing. The construction compound will be fenced during the construction phase. Fencing will be kept to a minimum during the construction phase and used for health and safety purposes, security and animal welfare, as and when required.

Security

- 3.4.31 The Site security arrangements for the Proposed Scheme will be in line with the requirements set out within the Construction (Design and Management) Regulations 2015.

3.5 Mitigation

- 3.5.1 Mitigation can be relied on to reduce any potential significant effects from the Proposed Scheme. The sequential steps of the mitigation hierarchy are as follows:
- Avoidance: Take measures to avoid creating impacts from the outset;
 - Minimisation: Measure taken to reduce the duration, intensity and extent of the impact if they cannot be avoided;

- Restoration: Measures taken to improve ecosystems following exposure to unavoidable impacts; and
- Offset: Measure taken to compensate for any residual impacts.

3.5.2 The Institute of Environmental Management and Assessment's (IEMA) 'Environmental Impact Assessment Guide to Shaping Quality Development' refers to three distinct forms of mitigation:

- Primary mitigation: Modifications to the location or design made during the pre-application phase that are an inherent part of the Proposed Scheme.
- Secondary mitigation: Actions that will require further activity in order to achieve the anticipated outcome. The effectiveness of such measures have been assessed within the ES and appropriate mitigation will be secured by the Application or other suitable mechanism.
- Tertiary: Actions that would occur with or without input from the EIA. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are standard practices used to manage commonly occurring environmental effects. These measures are treated as an inherent part of the Proposed Scheme.

3.5.3 For the purposes of this ES, primary mitigation measures form part of the Proposed Scheme for which consent is sought. **Table 3.3** describes the environmental mitigation measures that are considered to be an inherent part of the Proposed Scheme (i.e. following the design approach adopted to avoid or prevent adverse environmental effects). Please also refer to **Technical Chapters 5 to 13**.

3.5.4 The measures listed in **Table 3.3** should not be confused with additional (secondary and tertiary) mitigation measures proposed in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment, which are described under the 'Additional Mitigation' section within each environmental factor assessment chapter (**Chapters 5 to 13**).

Table 3.3: Primary mitigation that forms part of the Proposed Scheme

Environmental Factor to which the Primary Mitigation Relates	Primary Mitigation Measure and Associated Benefit
Landscape and Visual Hydrology, Hydrogeology, Geology and Peat Ecology Ornithology Noise and Vibration Access, Traffic, and Transport	Minimising potential impacts on receptors at the Site during construction of the Proposed Scheme The environmental management of the construction works for the Proposed Scheme will be delivered following the implementation of a CEMP. The CEMP will be the means of controlling the construction works and set out monitoring requirements, with the objective of ensuring that the effects of the construction works on people and the natural environment are reduced insofar as reasonably practicable. To support the Application, an Outline CEMP has been prepared and is published as part of this ES, please see Technical Appendix 3.1 (Volume 4).

Environmental Factor to which the Primary Mitigation Relates	Primary Mitigation Measure and Associated Benefit
Landscape and Visual Hydrology, Hydrogeology, Geology and Peat Ecology Ornithology Noise and Vibration Access, Traffic, and Transport	Minimising potential impacts on receptors at the Site, local highway network, and surrounding settlements Construction movements associated with the Proposed Scheme will be delivered in line with an agreed TMP. The TMP will demonstrate compliance with national and local policy guidance and will set out detailed descriptions of actions required by Contractors to meet during the construction process. The TMP will: • Ensure that movements of people, plant and materials are achieved in a safe, efficient, timely and sustainable manner. • Ensure that any impact to local communities and the local economy is reduced as far as reasonably practical. • Ensure that construction traffic levels do not exceed an acceptable level during network peak periods. • Reduce and control construction vehicle trips where practical. • Ensure that strategies and mitigation measures are implemented and adhered to through continued monitoring, review, and improvement. • Limit the effects of construction traffic on the Local Road Network.
Aviation	Avoidance of potential impacts on aviation and radar receptors The following measure form part of the Proposed Scheme to avoid potential impacts on aviation and radar receptors: • All structures of more than 91.4 m in height will be charted on aeronautical charts and reported to the Defence Geographic Centre (DGC), which maintains the UK's database of tall structures (Digital Vertical Obstruction File) at least ten weeks prior to construction. • Any temporary obstacles associated with wind farms which are of more than 91.4 m in height are to be alerted to aircrews by means of the Notice to Airmen (NOTAM) system. • Approval and implementation of an LMP, which will set out specific requirements in terms of aviation lighting to be installed on the wind turbines, as required under CAA (2016). CAP 393, Air Navigation: The Order and the Regulations (2016).

Environmental Factor to which the Primary Mitigation Relates	Primary Mitigation Measure and Associated Benefit
Hydrology, Hydrogeology, Geology and Peat Ecology	Minimising impacts on peatland habitats Peatland protection and restoration form key parts of the Welsh Government's Climate Change Plan, promoted and enacted by NRW's National Peatland Action Programme (NPAP). It is therefore important that developments in peatland areas take recognition of the importance of peatland as a habitat and carbon store. The identification and avoidance of peatland habitats at the Site has formed an integral part of the evolving design of the Proposed Scheme. Peat probing across the Site (please refer to Chapter 6: Hydrology, Hydrogeology, Geology and Peat, Technical Appendix 6.1, and Technical Appendix 6.2) has informed a detailed design process that has targeted the avoidance of peat, particularly areas of peat identified as being 40 cm (or greater). In areas where construction in peat is proposed, the Project Team have had to focus on delivering a balanced design which considers other environmental and engineering constraints, including priority habitats, breeding bird territories, and topography. All practical efforts have been made to minimise construction in areas of peat (40 cm or greater). The potential to provide beneficial measures for peatland restoration within the Proposed Scheme is limited as a result of a number of factors. Consultation with Dŵr Cymru Welsh Water (DCWW), which owns the adjacent land to the east of the Site Boundary, has led to the potential for peat and peatland habitat restoration to be undertaken within their land holding. Further details is provided in Chapter 6: Hydrology, Hydrogeology, Geology and Peat and Technical Appendix 6.2 (Volume 4).

Environmental Factor to which the Primary Mitigation Relates	Primary Mitigation Measure and Associated Benefit
Land use Access, Traffic and Transport	Minimising impacts on users of the Gelligaer and Merthyr Common The general public has the right to take air and exercise over the Gelligaer and Merthyr Common due to its status as urban common pursuant to s193 of the Law of Property Act 1925. To reduce impacts on users of the common land, the followings measures have been proposed: • The Applicant will provide 34.72 ha of replacement common land as compensation for any common land being released to construct the Proposed Scheme. • Once the Proposed Scheme has been constructed, the Applicant will grant grazing and access rights over any land which has been 'released' as common land' that is not physically occupied by infrastructure. • Any temporary fencing using during construction of the Proposed Scheme will be kept to a minimum to reduce any severance impacts on the Site. • To ensure that no active grazier using the Site suffers any financial loss due to areas of land being unavailable (for use to be claimed under current or any future support mechanism), the Applicant are proposing to make available an Agricultural and Environmental Support Scheme Shortfall Sum.
Cultural Heritage	Avoidance of known historic assets The baseline assessment of the Site and surrounding area identified any known heritage assets. The baseline work included exploration of historic records, site walkover, and consultation with relevant stakeholders. Through the design evolution of the Proposed Scheme, the Project Team have avoided any direct impacts (as a result of construction activities) on known heritage assets on the Site.
Utilities	Avoidance of potential impact on high pressure gas pipelines Construction of the Proposed Scheme has the potential to directly impact a National Grid high-pressure gas pipeline and Wales and West Utilities high-pressure gas pipeline. Through early engagement with both utility providers, in principle agreement has been reached on methods of crossing each pipeline during the construction of the Proposed Scheme and appropriate separation distances from the wind turbines themselves.

Environmental Factor to which the Primary Mitigation Relates	Primary Mitigation Measure and Associated Benefit
Ecology Ornithology	Minimising impacts on priority habitats The baseline assessment of the Site and immediate surroundings identified priority habitats (under Section 7 of the Environment (Wales) Act 2016). The baseline work, which primarily included detailed Site surveys, identified the presence of; dry heath, wet heath, wet modified bog, fen-basin mire, and acid flush. Through the design evolution of the Proposed Scheme, the Project Team have minimised any direct impacts (as a result of construction activities) on priority habitats. In areas where construction activities impact on priority habitats, the Project Team have had to focus on delivering a balanced design which considers other environmental and engineering constraints, including breeding bird territories and topography. All practical efforts have been made to minimise construction in priority habitat areas.
Ecology Ornithology	Minimising impacts on curlew territories The baseline assessment of the Site and surrounding area identified the presence of unconfirmed/confirmed curlew territories within and outside the Site Boundary. Through the design evolution of the Proposed Scheme, the Project Team have looked to minimise any direct/indirect impacts on curlew. The proposed wind turbines were located away from curlew territories identified during the 2019 and 2020 breeding season surveys as far as possible. Where possible, an 800 m turbine-free buffer was implemented around each territory centre (in accordance with Pearce-Higgins et al. (2009) disturbance/displacement of breeding curlew is unlikely beyond 800 m). In practice, it was not possible to implement an 800 m buffer around all identified curlew territory centres and still retain an economically viable project. As many territories as possible were buffered however, and where an 800 m buffer was not possible, the maximum possible distance between proposed turbines and curlew territory centres was maintained. As presented in Chapter 8: Ornithology, the Applicant is committed to exploring opportunities for providing off-site compensation for the potential disturbance and displacement of breeding curlew during wind farm operation, and additional biodiversity enhancement.

Environmental Factor to which the Primary Mitigation Relates	Primary Mitigation Measure and Associated Benefit
Geology, Hydrogeology, and Peat	Avoiding shakehole risk zones Geophysical Surveys were undertaken to determine the presence of any anomalous sub-surface areas associated with potential shakehole formations in order to inform the design process. The Proposed Scheme has therefore been designed to avoid any shakehole risk zones based on the survey information available.

3.6 Grid Connection

- 3.6.1 The Applicant has received a grid connection offer for the Proposed Scheme from the district network operator, Western Power Distribution (now part of National Grid), including an indicative grid connection method. The point of connection is located at the Dowlais Bulk Supply Point (BSP) Substation, located approximately 500 m south-west of the Site. Please refer to **Figure 3.1 (Volume 3)**.
- 3.6.2 The grid connection will be constructed by Western Power Distribution and will be subject to a separate planning permission, if appropriate. In line with the 2020 Scoping Direction, a high-level assessment of the proposed grid route has been included as part of the ES, please refer to **Technical Appendix 3.2 (Volume 4)**. In line with the grid offer received, it has been assumed that the grid connection will require a 33 kV cable, approximately 1.5 km in length, running underground from the point of connection to the electrical substation.

3.7 Common Land

- 3.7.1 As identified in Section 3.1, the majority of the Site is registered as Common Land and makes up part of Common Land Unit 38 (Gelligaer and Merthyr Common), which also extends to the south of the A465. Members of the public have rights to access the Common for air and exercise under Section 193 of the Law of Property Act 1925.
- 3.7.2 In support of the Application, the Applicant will apply for the following secondary consents:
- Commons Act 2006 (Section 38): Under section 38 of the Commons Act 2006, consent from Welsh Ministers is required to carry out any restricted (temporary) works on common land. Restricted works are any that prevent or impede access to or over the land (e.g. fencing, buildings, structures, ditches, trenches, embankments).
 - Commons Act 2006 (Section 16): Under section 16 of the Commons Act 2006, land registered under the Commons Registration Act 1965 may be deregistered or exchanged. As part of the Proposed Scheme, land will be provided in exchange for the land to be deregistered. This will be of equal size and quality, as required under Section 16 of the Commons Act 2006.

3.7.3 Please see **Chapter 12: Other EIA Topics** for details on the potential impact of the Proposed Scheme on the common land. Further details are also provided in the Common Land Report and associated Secondary Consent Application which will be submitted with the DNS Application.

3.8 References

- IEMA (2015), 'Environmental Impact Assessment Guide to Shaping Quality Development', Available at:
<https://www.iaia.org/pdf/wab/IEMA%20Guidance%20Documents%20EIA%20Guide%20to%20Shaping%20Quality%20Development%20V6.pdf>

4 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

4.1 Introduction

- 4.1.1 This chapter sets out the overall approach to the EIA for the Proposed Scheme. A more detailed overview of the methodology adopted for each environmental topic is provided within each respective topic chapter of this ES. This ES contains the information specified in Schedule 4 of the EIA Regulations as set out in **Table 1.1 of Chapter 1**.

4.2 EIA Scoping

- 4.2.1 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. In accordance with Regulation 33 of the EIA Regulations, the Applicant made a formal request for a scoping direction to Welsh Government on 22 May 2020, please refer to **Technical Appendix 1.1 (Volume 4)**.
- 4.2.2 A formal Scoping Direction was subsequently received from Welsh Ministers in 17 July 2020, please refer to **Technical Appendix 1.2 (Volume 4)**. In preparing this ES, reference has been made to the 2020 Scoping Direction received from Welsh Government (on behalf of Welsh Ministers) and the advice contained within it regarding assessment methodology, topics, and presentation of the ES.
- 4.2.3 In response to the 2020 Scoping Direction, the EIA and this ES includes assessments of the following environmental aspects:
- Landscape and Visual
 - Hydrology, Hydrogeology, Geology, and Peat
 - Ecology and Ornithology
 - Noise
 - Access, Traffic and Transport
 - Cultural Heritage and Archaeology
 - Telecommunications and Utilities
 - Aviation
 - Shadow Flicker
- 4.2.4 The 2020 Scoping Direction concluded that the following environmental aspects could be scoped out of the EIA:
- Socio-economics.
- 4.2.5 The 2020 Scoping Direction also concluded that some environmental elements (within each environmental aspect) did not need to be considered as part of the EIA for the Proposed Scheme and could therefore be scoped out. A summary of topic-specific elements which have been scoped out of the EIA, in line with the 2020 Scoping Direction, can be found in each technical chapter.

- 4.2.6 Following issue of the 2020 Scoping Direction, the scope of the individual topics assessments has been reviewed regularly throughout the EIA process to take account of new published guidance and / or assessment methodologies, stakeholder feedback, new environmental data and ongoing design changes. As required by the EIA Regulations, the EIA has been based on the 2020 Scoping Direction received by Welsh Government. The Applicant is satisfied that the information that supported the request for an EIA Scoping Direction is representative of the Proposed Scheme presented in this ES.

4.3 Consultation

- 4.3.1 In line with Regulation 33(7) of the EIA Regulations, Welsh Government carried out formal consultation with the following bodies as part of the scoping process:
- Merthyr Tydfil County Borough Council (MTCBC);
 - Caerphilly County Borough Council (CCBC);
 - Natural Resources Wales (NRW); and
 - Cadw.
- 4.3.2 The purpose of consultation with statutory and non-statutory consultees is to brief them on the Proposed Scheme, seek feedback on the proposed approach to the assessment, and to obtain baseline data. Technical and procedural consultation has been ongoing and will continue with statutory bodies. A summary of consultation undertaken to date is included in each of the technical chapters of this ES.
- 4.3.3 This draft ES forms part of the current statutory consultation being undertaken by the Applicant and has been developed to help consultees take an informed view of the likely significant environmental effects of the Proposed Scheme. Consultation will be held from 03 November 2022 to 15 December 2022 and gives the opportunity to provide feedback or questions on the ES.

4.4 Spatial scope of assessment

- 4.4.1 The Study Area and approach used to establish baseline conditions for each environmental topic is set out within its respective chapter (see technical **Chapters 5 – 13**). The Study Areas are a function of the nature of the impacts and the locations of potentially affected environmental resources or receptors.

4.5 Temporal scope of assessment

- 4.5.1 The approach to assessment has been to assess the environmental impacts of the Proposed Scheme at key stages in its construction, operation, and eventual decommissioning.

Establishing Baseline Conditions

- 4.5.2 In order to assess the potential impacts and effects of the Proposed Scheme, it is necessary to determine the environmental conditions that currently exist on the Site and in the surrounding area. These are known as the existing baseline conditions. Baseline conditions are determined using the results of Site surveys and investigations or desk-based data searches, or a combination of these, as appropriate. The existing baseline date is 2019-2022 since this is the period in which baseline studies for the EIA have been undertaken.

Establishing Future Baseline Conditions

- 4.5.3 It is also relevant for the EIA to consider future baseline conditions taking account of any planned or likely changes to the existing baseline. This ES includes an outline of the likely evolution of the existing baseline without implementation of the Proposed Scheme based on available information and knowledge.
- 4.5.4 The future baseline conditions are predicted for each assessment scenario considered as part of the EIA. Due to the limitations, necessary assumptions, and lack of evidence associated with the future baseline (for example, it cannot be accurately measured), a detailed consideration of the effects of the Proposed Scheme against the future baseline without the Proposed Scheme would generally not result in a robust assessment. However, consideration has been given, in descriptive terms, within each topic chapter to likely significant effects arising in relation to the future baseline.

Assessment Scenarios

- 4.5.5 The assessment scenarios that are being considered for the purposes of the EIA (and considered in this ES) are as follows:
- Existing baseline (without the Proposed Scheme) – Reported at the time that the baseline data has been collected.
 - Future baseline (without the Proposed Scheme) – For comparison with the construction phase, operational phase, and decommissioning phase as described below.
 - Construction of the Proposed Scheme – The technical chapters (**Chapters 5 -13**) will assess the relevant ‘worst case’ construction scenario and where necessary, the relevant period or ‘peak’ of activity within the construction programme.
 - Operation of the Proposed Scheme - The technical chapters (**Chapters 5-13**) will assess the relevant ‘worst-case’ scenario where necessary.
 - Decommissioning of the Proposed Scheme.

4.6 Consideration of alternatives

- 4.6.1 Regulation 17(3)(d) of the EIA Regulations states that an ES should include:

“A description of the reasonable alternatives studied by the applicant, which are relevant to the Proposed 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”

- 4.6.2 Further detail around the consideration of alternatives is set out in **Chapter 2: Site Selection and Design Evolution**.

4.7 Assessment of Likely Significant Effects

Impact prediction and assessment

- 4.7.1 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 scheme)
 - Indirect [secondary] (e.g. pollution downstream arising from silt deposition during earthworks, or as a result of development required to support a scheme, e.g. nearby road improvements)
 - Short-term/temporary (e.g. dust generated during construction), medium-term (e.g. cutting back of planting which is subsequently allowed to regenerate), and long-term/permanent (e.g. improvement in air quality)
 - 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).
- 4.7.2 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 Scheme and the predicted environmental conditions resulting from its implementation. Each technical chapter of the ES describes the forecasting methods used in the EIA.
- 4.7.3 Impacts have been defined in accordance with accepted terminology and standardised methodologies to predict the magnitude of impact (or change) resulting from the Proposed Scheme.

Environmental effects

- 4.7.4 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.
- 4.7.5 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.

Significance of environmental effects

- 4.7.6 The following criteria will be considered when determining significance:
- Likelihood of occurrence.
 - Geographical extent.
 - Adherence of the proposals to legislation and planning policy.
 - Adherence of the proposals to international, national and local standards.

- Sensitivity of the receiving environment or other receptor.
- Value of the affected resource.
- Whether the effect is temporary or permanent (to be defined within the ES).
- Whether the effect is short, medium, or long-term in duration (to be defined within the ES).
- Whether the effect is reversible or irreversible (to be defined within the ES).
- Inter-relationship between effects (both cumulatively and in terms of potential effect interactions).
- The outputs of stakeholder and public engagement.

4.7.7 The methodology for assessing the significance of an effect will vary between environmental factors but in principle, will be based on the environmental sensitivity (or value / importance) of a receptor and the magnitude of change from baseline conditions. Where topic-specific guidance requires that specific criteria or scales for determining significance are to be used this is outlined in the relevant topic chapter.

4.7.8 In the absence of topic-specific guidance, both the magnitude of change and sensitivity (or value / importance) will be assessed on a scale of high, medium, low, and negligible. The significance of each effect will be assessed against the magnitude of change and the sensitivity (or value / importance) of the receptor or receiving environment.

4.7.9 The following generic significance criteria 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 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.

4.7.10 Only moderate and major effects, which are likely to be factors in deciding whether a development is acceptable, are significant effects. Significance assumes only

incorporated and standard mitigation measures are in place, these being the measures for which delivery and implementation can be secured.

- 4.7.11 The competent authority determining the planning application considers the residual effects (i.e. the post-mitigation effects) as part of the decision-making process.

4.8 Assessment reporting

- 4.8.1 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 scheme.

- **Introduction** introduces the assessment topic under consideration.
- **Statutory and Planning Context** outlines statutes, guidance, policies and plans relevant to the environmental interests forming the focus of the assessment.
- **Consultation Undertaken** summarises the stakeholder engagement including dialogue with statutory consultees and with other stakeholders and where relevant the influence on the EIA.
- **Approach to the Assessment** identifies and describes the scope of the assessment, the methods and criteria adopted, relevant guidance followed, and any assessment limitations, assumptions or difficulties encountered.
- **Existing Environment** describes the features and characteristics associated with the baseline environment.
- **Assessment of Effects** 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 Effects** summarises the nature and significance of residual environmental effects that are predicted to remain, post-implementation of mitigation measures.

4.9 Combined and cumulative effects

- 4.9.1 In accordance with the EIA Regulations, consideration is given to the potential for cumulative and combined effects to arise as a result of the Proposed Scheme. The following types of Cumulative Effects have been considered within the ES:

- **Intra-project combined effects:** The interaction and combination of different residual (post-mitigation) environmental effects of the Proposed Scheme affecting the same Receptor.
- **Inter-project cumulative effects:** The residual (post-mitigation) environmental effects of the Proposed Scheme combining and interacting with the residual environmental effects of committed development/s, including consideration of other parts of the Proposed Scheme, affecting the same Receptor.

- 4.9.2 The approach to the cumulative and combined effect's assessment is presented in **Chapter 13: Cumulative Effects**.

4.10 Assumptions, uncertainties and limitations

- 4.10.1 The EIA was undertaken and the resulting ES has been compiled using the material 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 our 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.
- 4.10.2 We have also carried out our 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, we are 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.
- 4.10.3 This ES 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 will be used to inform the project if relevant.
- 4.10.4 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.
- 4.10.5 The EIA was undertaken during the initial design phase of the Proposed Scheme and therefore some of the technical aspects of the construction and operation have yet to be determined. 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 Proposed Scheme during the detailed design phase are less likely to fall outside of the assumed envelope of the assessment parameters.