

SSEN Transmission Cambushinnie 400kV Substation Environmental Appraisal

April 2025





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LIST OF ABBREVIATIONS

AAWT	Annual Average Weekday Traffic
ACM	Asbestos Containing Materials
AD	Anno Domini
AIL	Abnormal Indivisible Loads
AIS	Air Insulated Switchgear
AOD	Above Ordnance Datum
AQMA	Air Quality Management Area
ASNW	Ancient semi-natural woodland
ASTI	Accelerated Strategic Transmission Investment
ATU	Allyl thiourea
AWI	Ancient Woodland Inventory
BAP	Biodiversity Action Plan
BBPP	Breeding Birds Protection Plan
BCT	Bat Conservation Trust
BESS	Battery Energy Storage System
BGL	Below Ground Level
BGS	British Geological Survey
BMP	Biosecurity Management Plan
BPP	Badger Protection Plan
BNG	Biodiversity Net Gain
BNL	Basic Noise Level
BoCC	Birds of Conservation Concern
BPM	Best Practicable Means
BS	British Standard
BSI	British Standards Institution
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CaCO ³	Calcium Carbonate
CAR	Controlled Activity Regulation
CAT	Carbon Asset Database
CCRA	Climate Change Risk Assessment
CDG	Carriage of Dangerous Goods
CH4	Methane
CIEEM	Chartered Institute of Ecology and Environmental Management



ClfA	Chartered Institute for Archaeologists
СО	Carbon Monoxide
CTMP	Construction Traffic Management Plan
DESNZ	Department for Energy Security and Net Zero Standards
DfT	Department for Transport
DTM	Digital Terrain Model
EA	Environmental Appraisal
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
ESDAL	Electronic Service Delivery for Abnormal Loads
EMF	Electromagnetic Field
EQS	Environmental Quality Standards
ESO	Electricity System Operator
EU	European Union
GBR2	General Binding Rule 2
GCR	Geological Conservation Review
GDL	Gardens and Designed Landscapes
GHG	Greenhouse Gas
GI	Ground Investigation
GIS	Geographic Information System
GLTA	Ground Level Tree Assessment
GPP	Guidance on Pollution Prevention
GT	Grid Transformer
GVLIA	Guidelines for Landscape and Visual Impact Assessment
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HEPS	Historic Environment Policy for Scotland
HER	Historic Environment Record
HES	Historic Environment Scotland
HGV	Heavy Goods Vehicle
HND	Holistic Network Design
HRA	Habitat Regulations Assessment
HV	High voltage
ICC	In-Combination Climate Change Impact Assessment
ICE	Inventory of Carbon and Energy
IEMA	Institute of Environmental Management and Assessment



INNS	Invasive and Non-Native Species
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
JNCC	Joint Nature Conservation Committee
kV	Kilovolt
LB	Listed Building
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Area
LCT	Landscape Character Type
LDP	Local Development Plan
LEP	Long Established Plantation
LGV	Light Goods Vehicle
LHMP	Landscape and Habitat Management Plan
LLA	Local Landscape Area
LNCS	Local Nature Conservation Site
LVA	Landscape and Visual Appraisal
MP	Measurement Position
MIC	Maximum Instantaneous Charge
MTBE	Methyl-tert-butyl-ether
MW	Megawatt
NESO	National Energy System Operator
NGESO	National Grid Energy System Operator
NS	NatureScot
NSR	Noise Sensitive Receptor
NBN	National Biodiversity Network
ND	National Developments
ND3	National Development 3
NFI	National Forest Inventory
NGR	National Grid Reference
NMPi	National Marine Plan interactive
NPF4	National Planning Framework 4 (Scotland)
NPS	National Policy Statement
NRFA	National River Flow Archive
NRPB	National Radiological Protection Board
NVC	National Vegetation Classification



NWSS	Native Woodland Survey of Scotland
O2	Oxygen
OHL	Overhead Line
OS	Ordnance Survey
PAC	Pre-Application Consultation
PAH	Polycyclic Aromatic Hydrocarbons
PAN	Planning Advice Note
PAS	Publicly Available Standard
PDSA	Pre-Desk Study Assessment
PEA	Preliminary Ecological Appraisal
PKC	Perth and Kinross Council
PKLDP2	Perth and Kinross Local Development Plan 2
PLHRA	Peat Landslide Hazard and Risk Assessment
PMP	Peat Management Plan
PPE	Personal Protective Equipment
PPG	Pollution Prevention Guidelines
PPV	Peak Particle Velocity
PRF	Potential Roost Feature
PWS	Private Water Supply
RBMP	River Basin Management Plans
RCP	Representative Concentration Pathway
RPA	Root Protection Area
RSPB	Royal Society for the Protection of Birds
SAC	Special Areas of Conservation
SBL	Scottish Biodiversity List
SBTi	Science-based Target initiatives
SEPA	Scottish Environment Protection Agency
SGT	Super Grid Transformer
SHE	Scottish Hydro Electric
SM	Scheduled Monument
SPA	Special Protection Area
SPP	Species Protection Plan
SSEN	Scottish and Southern Electricity Networks
SSSI	Sites of Special Scientific Interest
STGO	Special Types General Order



SUDS	Sustainable Urban Drainage Systems
SVOC	Semi Volatile Organic Compound
SWMP	Site Waste Management Plan
ТА	Technical Assessment
TPH	Total Petroleum Hydrocarbons
UGC	Underground Cable
UK	United Kingdom
UKCP18	UK Climate Projection 2018
UKHab	UK Habitat Classification
UKFS	UK Forestry Strategy
UNDRR	United Nations Office for Disaster Risk Reduction
UXO	Unexploded Ordnance
VOC	Volatile Organic Compounds
VP	Vantage Point
WCA	Wildlife and Country Act
WF	Water Feature
WFD	Water Framework Directive
WHS	World Heritage Site
WWII	World War Two
Zol	Zone of Influence

ZTV Zone of Theoretical Visibility



1. INTRODUCTION AND PROJECT NEED

1.1 Overview of the Proposed Development

- 1.1.1This Environmental Appraisal (EA) has been prepared by AECOM, (hereinafter referred to as "the Consultant") on behalf of Scottish Hydro Electric Transmission plc ("the Applicant"). The Applicant, operating and known as Scottish and Southern Electricity Networks Transmission (SSEN Transmission), own, operate and develop the high voltage electricity transmission system in the north of Scotland and remote islands. In this EA, 'the Applicant' and 'SSEN Transmission' are used interchangeably unless the context requires otherwise. This EA has been prepared to accompany an application for planning permission under the Town and Country Planning (Scotland) Act 1997 (the "1997 Act")¹.
- 1.1.2The application seeks planning permission under the 1997 Act to construct and operate electricity infrastructure and upgrade and extend the existing access tracks to enable the construction and operation of the Cambushinnie 400 Kilovolt (kV) substation, approximately 400 m southwest of the existing Braco West Substation. This is hereafter referred to as "the Proposed Development". An Environmental Impact Assessment (EIA) Screening Opinion in respect of the Proposed Development was requested from the planning authority, Perth and Kinross Council (PKC). This was returned in February 2024 and stated that the Proposed Development does not qualify as EIA development (Reference 23/02147/SCRN, Appendix P EIA Screening Opinion).
- 1.1.3SSEN Transmission is voluntarily submitting this EA as a matter of good practice to support its application for planning permission. The EA evaluates whether any specific environmental risks are likely to occur resulting from the Proposed Development and identifies any mitigation recommended to avoid or minimise any associated environmental risks.
- 1.1.4This chapter gives an overview and explains the need for the Proposed Development. It sets out the needs case in the context of materially relevant national policy within National Planning Framework 4² (NPF4), the Electricity System Operator's (ESO) Pathway to 2030 Holistic Network Design³, the British Energy Security Strategy⁴ and the Accelerated Strategic Transmission Investment (ASTI) framework⁵.
- 1.1.5SSEN Transmission is proposing to upgrade the existing Beauly-Denny 275kV circuit to operate at 400kV to mirror the ratings of the existing 400kV circuit which already operates at that voltage. This upgrade does not require any works to be done to the existing overhead line (OHL) infrastructure, other than new tie-ins from the existing OHL into the proposed new substation, but requires alterations to existing substations at Beauly, Fasnakyle, Fort Augustus, Tummel, Errochty, Kinardochy and Braco West which connect

08/Accelerated % 20 Strategic % 20 Transmission % 20 Investment % 20 Guidance % 20 And % 20 Submission % 20 Requirements % 20 Document.pdf

¹ Scottish Government (1997) The Town and County Planning (Scotland) Act 1997, Edinburgh: Scottish Government.

² Scottish Government, 2023. National Planning Framework 4. Edinburgh: Scottish Government.

³ National Grid ESO, 2022. Pathway to 2030 [online]. [Accessed 02 July 2024]. Available from:

https://www.nationalgrideso.com/document/262676/download

⁴ HM Government, 2022. British Energy Security Strategy [online]. [Accessed 02 July 2024]. Available from:

https://assets.publishing.service.gov.uk/media/626112c0e90e07168e3fdba3/british-energy-security-strategy-web-accessible.pdf

⁵ Ofgem, 2023. Accelerated Strategic Transmission Investment Guidance And Submission Requirements Document [online] [Accessed 02 July 2024]. Available from: https://www.ofgem.gov.uk/sites/default/files/2023-



onto the existing OHL. Works are required at each of the substations with differing scopes and requirements, and therefore consenting types and timescales.

- 1.1.6The Proposed Development would be expected to become operational in 2029, subject to outage and commissioning sequences and would likely require regular monitoring and maintenance throughout its lifespan.
- 1.1.7It is anticipated that the Proposed Development would be operational in perpetuity. The design life of the individual components of the Proposed Development is considered to be approximately 45 years or more. These will be maintained or replaced as part of a regular maintenance and monitoring regime. Due to the nature of the Proposed Development, in that it would support the ongoing transmission of electricity in the wider area, it is treated as permanent and as such environmental effects arising from decommissioning are not considered in this EA.

1.2 National Significance

- 1.2.1In July 2022, National Grid Energy System Operator, the (NGESO⁶), published the Pathway to 2030 Holistic Network Design (HND), setting out the blueprint for the onshore and offshore electricity transmission network infrastructure required to enable the forecasted growth in renewable electricity across Great Britain, including the UK and Scottish Government's 2030 offshore wind targets of 50GW and 11GW, respectively. This confirms the need for significant and strategic increase in the capacity of the onshore electricity transmission infrastructure to deliver 2030 targets and a pathway to net zero. The need for these reinforcements is underlined within the British Energy Security Strategy (April 2022), which recognised the significant impact on the cost of living from rising gas prices and sets out a plan to increase the supply of electricity from zero-carbon British sources to deliver affordable, clean and secure power in the long term.
- 1.2.2SSEN Transmission holds a licence under the Electricity Act 1989 (the "1989 Act") for the transmission of electricity in the north of Scotland and has a statutory duty under section 9 of the 1989 Act to develop and maintain an efficient, co-ordinated, and economical electrical transmission system in its licence area. Where there is a requirement to extend, upgrade or reinforce its transmission network, SSEN Transmission's aim is to provide an environmentally aware, technically feasible and economically viable solution which would cause the least disturbance to the environment and to people who use it.

1.3 National Developments

- 1.3.1NPF4 identifies 18 National Developments (ND) described as: "significant developments of national importance that will help to deliver the spatial strategy". Developments proposed as National Developments are acknowledged as projects expected to provide substantive support to the economy of Scotland in terms of direct and indirect employment and business investment, with wider economic benefits. It adds that: "Their designation means that the principle for development does not need to be agreed in later consenting processes, providing more certainty for communities, businesses and investors".
- 1.3.20f particular relevance to the Proposed Development, NPF4 states that regarding National Development 3 (ND3), "Strategic Renewable Electricity Generation and Transmission

⁶ he National Grid Energy System Operator (NGESO) roles and responsibilities for system planning were transferred to National Energy System Operator (NESO) in October 2024 following acquisition by the UK Government, and hereafter, will be referred to as NESO.



Infrastructure...supports renewable electricity generation, repowering, and expansion of the electricity grid. A large and rapid increase in electricity generation from renewable sources will be essential for Scotland to meet its net zero emissions targets. Certain types of renewable electricity generation will also be required, which will include energy storage technology and capacity, to provide the vital services, including flexible response, that a zero carbon network will require. Generation is for domestic consumption as well as for export to the UK and beyond, with new capacity helping to decarbonise heat, transport and industrial energy demand."

1.3.3It goes on to state that "[t]he electricity transmission grid will need substantial reinforcement including the addition of new infrastructure to connect and transmit the output from new on and offshore capacity to consumers in Scotland, the rest of the UK and beyond. Delivery of this national development will be informed by market, policy and regulatory developments and decisions."

1.4 Designation and Classification

- 1.4.1The location for ND3 is set out as being <u>"All of Scotland"</u> and the description of need is that "[a]dditional electricity generation from renewables and electricity transmission capacity of scale is fundamental to achieving a net zero economy and supports improved network resilience in rural and island areas."
- 1.4.2The designation and classes of development which would qualify as ND3, are "(a) on and off shore electricity generation, including electricity storage, from renewables exceeding 50 megawatts capacity; (b) new and/or replacement upgraded on and offshore high voltage electricity transmission lines, cables and interconnectors of 132kV or more; and (c) new and/or upgraded Infrastructure directly supporting on and offshore high voltage electricity lines, cables and interconnectors including converter stations, switching stations and substations."

1.5 Statement of Need

- 1.5.1In addition to being designated as a National Development, the Proposed Development is explicitly supported by NPF4 under the provisions set out in Policy 11(a)(ii) (Energy).
- 1.5.2The NESO's Pathway to 2030 HND identified the requirement to reinforce the onshore corridors between Beauly and Peterhead, Beauly and Spittal in Caithness, and an offshore subsea cable between Spittal and Peterhead as well as the need to upgrade the 275kV Beauly-Denny circuit. It outlined that these reinforcements would provide the capacity required to take power from large-scale onshore and offshore renewable generation (mainly wind farms) to the northeast mainland of Scotland. From there, it could be transported to demand centres in England via a subsea cable. The Proposed Development is required to enable these connections.
- 1.5.3In December 2022, the independent energy regulator for Great Britain, the Office of Gas and Electricity Markets (Ofgem), approved the need for the upgrade of the existing Beauly-Denny 275kV circuit as part of the ASTI framework as a Great Britain wide programme of investments. Ofgem's decision approved all of SSEN Transmission's Pathway to 2030



projects, which includes the Proposed Development. It also set out the regulatory framework under which these projects will be taken forward.

1.5.4The Proposed Development, alongside several other major network upgrades planned in the north of Scotland, is therefore part of a Great Britain wide programme of works that are required to meet UK and Scottish Government energy targets. There is a clear expectation from Government and the energy regulator, Ofgem, that these projects will be delivered by 2030. More specifically, these projects are needed to deliver Government 2030 renewable energy targets set out in the British Energy Security Strategy⁴.



2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Introduction

2.1.1This chapter provides a description of the Proposed Development, including details of the key components and information regarding the construction, operation and maintenance of the Proposed Development. This description is also used as the basis for the technical assessments as reported in **Chapters 4 – 12**.

2.2 The Site Selection Process

- 2.2.1This section describes the site selection process, including consideration of reasonable alternatives assessed by the Applicant. It discusses the main reasons for selecting the site for the Proposed Development, and the design and layout options that have been considered. Detail on site selection is provided in the Design and Access Statement submitted by the Applicant as part of the wider planning application.
- 2.2.2The following stages are described in this section, along with their respective outcomes:
 - Development considerations and design solutions;
 - The approach to the site selection process;
 - A summary of the outcomes of each site selection stage including the alternative sites considered and consultation responses, where relevant; and
 - How alternatives have been considered through the EA process.

Development Considerations

- 2.2.3SSEN Transmission has obligations under section 9 of the Electricity Act 1989 ("the 1989 Act") to 'develop and maintain an efficient, co-ordinated and economical system of electricity transmission'.
- 2.2.4As a transmission licence holder under the 1989 Act, when formulating relevant proposals, the Applicant has a statutory duty under paragraph 3 of Schedule 9 to the 1989 Act to:

"have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest"; and

"do what [it] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects".



- 2.2.5Furthermore, the requirements of the Construction (Design and Management) Regulations 2015⁷ (CDM Regulations) require that the Proposed Development design aims to minimise hazards and reduce risks during construction.
- 2.2.6Taking account of these obligations, SSEN Transmission has considered technical, economic and environmental factors in evaluating reasonable alternatives for the Proposed Development.

Approach to Site Selection

- 2.2.7Internal guidance for the selection of new electricity transmission substation sites has been developed by SSEN Transmission. This guidance provides a framework to ensure environmental, technical, and economic considerations are consistently and robustly identified and appraised at each stage of the site selection process. In line with the guidance, the principal site selection stages for the Proposed Development were:
 - Stage 0: Strategic Options Assessment;
 - Stage 1: Initial Site Screening;
 - Stage 2: Detailed Site Selection; and
 - Post Site Selection Activities: Consenting Process.
- 2.2.8Each stage is an iterative process and involves an increasing level of detail and resolution, bringing cost, technical and environmental considerations together in a way which seeks to achieve the best balance at each stage.
- 2.2.9Site location options were identified for the project following desk-based review and site walkovers, giving due consideration to the principles set out in the SSEN Transmission guidance.
- 2.2.10The method of identifying a preferred site (hereafter referred to as the "Preferred Site") involved the following four key tasks:
 - Identification of the baseline situation;
 - Identification of feasible site options;
 - Environmental, technical and economic comparative assessment of site options; and
 - Identification of a Preferred Site to take to external consultation.
- 2.2.11For Stage 2: Detailed Site Selection, all criteria within the respective categories (engineering, environmental and cost) were assigned RAG (Red, Amber, Green) ratings against a pre-defined list of descriptors and thresholds. The principle of the rating key is shown below in **Table 2-1**.

⁷ The Construction (Design and Management) Regulations 2015. Available at: http://www.legislation.gov.uk/uksi/2015/51/contents/made [Accessed July 2024].



Table 2-1 RAG Rating Key

Performance	Comparative Appraisal
Most preferred	Low potential for the development to be constrained.
	Intermediate potential for the development to be constrained.
Least preferred	High potential for the development to be constrained.

- 2.2.12The substation site selection process also took into consideration the required connections that the Proposed Development will facilitate. As such, the site selection process also considered the potential impact of the associated connections back to the existing Braco West substation and the connection into the existing Beauly Denny OHL.
- 2.2.13Following the identification of a Preferred Site, stakeholder consultation was undertaken to present the site options and the rationale for, and approach to, the selection of the Preferred Site. Feedback from stakeholders (including statutory, non-statutory and the wider public) on the sites was reviewed and, where feasible, amendments or further analysis was undertaken to address concerns or alternatives put forward. Following the completion of the consultation process, a Preferred Site to be taken forward to the consenting process was selected.
- 2.2.14Site selection was conducted to identify of the most appropriate location to site the Proposed Development. The site selection process has followed formal internal guidance to enable a consistent and rigorous selection process. The site selection process has three key stages, each increasing in detail and definition. Technical, environmental, and cost considerations are brought together in a way which seeks the best balance in accordance with SSEN Transmission's Network Operator's Licence and the 1989 Act. This staged process leads to the identification of a finalised proposed substation site, which will be taken forward for planning.

Stage 0: Strategic Options Assessment

- 2.2.15The initial stage is to establish the need for the project as outlined in **Section 1.5** and to select the preferred strategic option to deliver it.
- 2.2.16A strategic options assessment has been undertaken by SSEN Transmission. The outcome of this assessment identified the following key requirements for the new site:
 - Proximity to the existing Braco West Substation in order to tie back into it. This was set at 5 km for an effective search area, taking account of the local topographical and physical constraints;
 - Proximity to the existing Beauly-Denny OHL to minimise the amount of new OHL or cabling required to connect to the network;
 - In areas which do not contain environmental designations and minimise impacts on local communities and environmental receptors;
 - A large enough site to accommodate the initial estimated platform size of 380m x 315m, and;



- Additional capacity to accommodate future connections.
- 2.2.17The outcome of the strategic options assessment informed the identification of six sites to take forward as part of Stage 1: Initial Screening Stage.

Stage 1: Initial Site Screening

- 2.2.18This stage identifies technically feasible, economically viable and environmentally acceptable site options within a defined area. The search area may vary depending on terrain, other infrastructure, designated areas and features and connection options. The aim is to identify several potential sites which are initially assessed for suitability and to identify which can be shortlisted for further assessment.
- 2.2.19Six site options (Site Options 1-5a as shown on Figure 2-1, Appendix A Figures) were evaluated in detail using a combination of site walkovers and desktop study to identify options to progress to Stage 2 analysis. In line with SSEN Transmission's internal site selection guidance and using the Red, Amber, Green (RAG) matrix, three site options were discounted from further assessment (Site Options 4, 5, and 5a). This was based on proximity to designated areas, visual impact, ecological constraints, and connectivity to existing and future infrastructure around the Braco West Substation, when compared to the three shortlisted sites (Site Options 1, 2, and 3), as shown in Figure 2-1, Appendix A Figures.



2.2.20The appraisal of site options involved the systematic consideration against the topic areas noted in **Table 2-2** below.

Environmental			
Natural Heritage	Designations		
	Protected Species		
	Habitats		
	Ornithology		
	Hydrology / Geology		
Cultural Heritage	Designations		
	Cultural Heritage Assets		
Landscape and Visual	Designations		
	Landscape Character		
	Visual		
Land Use	Agriculture		
	Woodland / Forestry		
	Recreation		
Planning	Policy		
	Proposals		
Engineering			
Connectivity	Existing circuits / network		
	Future development possibilities		
	Interface with SSE Distribution and Generation		
	DNO connection		
Footprint Requirements	Technology		
	Adjacent land use		
	Adjacent land use Space availability		
Hazards	Adjacent land use Space availability Unique Hazards		
Hazards	Adjacent land use Space availability Unique Hazards Existing utilities		
Hazards Ground Conditions	Adjacent land use Space availability Unique Hazards Existing utilities Topography		
Hazards Ground Conditions	Adjacent land use Space availability Unique Hazards Existing utilities Topography Geology		
Hazards Ground Conditions Environmental Conditions	Adjacent land use Space availability Unique Hazards Existing utilities Topography Geology Elevation		
Hazards Ground Conditions Environmental Conditions	Adjacent land use Space availability Unique Hazards Existing utilities Topography Geology Elevation Salt pollution (salinity)		
Hazards Ground Conditions Environmental Conditions	Adjacent land use Space availability Unique Hazards Existing utilities Topography Geology Elevation Salt pollution (salinity) Flooding		
Hazards Ground Conditions Environmental Conditions	Adjacent land useSpace availabilityUnique HazardsExisting utilitiesTopographyGeologyElevationSalt pollution (salinity)FloodingCarbon footprint		

Table 2-2 Topic Areas



Environmental			
	Contaminated Land		
	Noise (proximity to dwellings / residential properties)		
Construction Access	Substation access road		
	Transformer delivery route		
Operation and Maintenance	Access		
Cost			
Capital			
Operational			

Stage 2 Detailed Site Selection

- 2.2.21The following part of this section summarises the site options appraised during Stage 2 of the site selection process. A summary of the site options identified and appraised is set out, together with the main environmental and technical constraints identified during the appraisal. Confirmation of the Preferred Site taken to consultation, and confirmation of the Preferred Site following consultation is provided.
- 2.2.22As described in **Section 2.2.19**, a total of three individual site options were shortlisted (Site Options 1, 2 and 3) from Stage 1 and taken forward to Stage 2.

Detailed Site Selection Appraisal Overview

- 2.2.23The Stage 2 options are summarised below:
 - Site Option 1: Located on a mixture of felled woodland and existing commercial forestry approximately 250 m southeast of the existing Braco West Substation and approximately 3.5 km west of Braco village.
 - Site Option 2: Located on existing commercial forestry approximately 300 m southwest of the existing Braco West Substation and approximately 3.9 km west of Braco village
 - Site Option 3: Located on a mixture of felled woodland and existing commercial forestry approximately 400 m west of the existing Braco West Substation and 4.2 km west of Braco village.
- 2.2.24**Table 2-3** below provides a summary of the key differentiating factors between each of the site options.

Table 2-3 Summary of RAG Ratings

Category	Site 1	Site 2	Site 3
Environment / Consenting			
Natural Heritage:			
Designations			
Protected Species			
Habitats			
Ornithology			
Hydrology / Geology			



Category	Site 1	Site 2	Site 3
Cultural Heritage:			
Designations			
Cultural Heritage Assets			
Landscape and Visual:			
Designations			
Landscape Character			
Visual			
Land Use:			
Agriculture			
Woodland / Forestry			
Recreation			
Planning:			
Policy			
Proposals			
	Engineering		
Connectivity:			
Existing Circuits/Networks			
Future Development			
Possibilities			
Interface with SSEN			
Distribution and Generation			
DNO Connection			
Footprint Requirements:			
lechnology			
Adjacent Land Use			
Space Availability			
Hazards:			
Unique Hazards			
Existing Utilities			
Ground Conditions:			
Topography			
Geology			
Environmental Conditions:			
Elevation			
Salt Pollution			
Flooding			
SF6			
Contaminated Land			
Noise			
Construction Access:			
Substation Access Road (from			
public road)			
Transformer Delivery Route			



Category	Site 1	Site 2	Site 3
Operation and Maintenance:			
Access			
Cost			
Capital			
Operational			

Reporting of Options Appraisal and Consultation

- 2.2.25The appraisal of Options was set out in the Consultation Document⁸ in August 2023. The Consultation Document provides a summary of project need, the option process that had been undertaken and a description of all site options appraised.
- 2.2.26The Consultation Document sought comments from stakeholders and members of the public on the optioneering studies undertaken, and the rationale for and approach to the selection of the Preferred Site. The different stakeholder groups included:
 - Statutory consultees;
 - Non-statutory consultees;
 - Community members and local organisations; and
 - Landowners and occupiers.
- 2.2.27A range of responses were received from stakeholders, key themes included the project need, technology choice, environmental impacts and the socio-economic impact of the project. A public consultation event was held on 22 August 2023 at Braco Hall (3:30pm-7:30pm) this provided information on the detailed site selection process and welcomed input from the local community and all interested parties on the appraisal of Options. The consultation feedback period followed this event and was open from 22 August until 3 October 2023.
- 2.2.28Comments received as part of this consultation period were documented in The Report on Consultation⁹ published in February 2024. Overall, the outcome confirmed Site Option 2 as the Preferred Site. However, feedback provided from local residents suggested that Site Option 3 would be preferable, as it is located further away, on the top of the hill and that the site would be less visible within the wider landscape, resulting in potentially reduced landscape and visual impacts. In response, Ground Investigation (GI) works were carried out in November 2023 at both Site Options 2 and 3 to understand the suitability of ground conditions. The presence of widespread peat at Site Option 3, compared with limited peat deposits at Site Option 2, confirmed that Site Option 3 would have significant environmental and engineering constraints relating to the excavation of deep peat. This would be likely to significantly increase the biodiversity and carbon impacts of the project.

⁸ SSEN (2023). Site Selection Consultation Document – Braco West.

⁹ SSEN (2024). Braco West Substation – Report on Consultation.



Therefore, Site Option 2 was retained as the Preferred Site following the consultation period.

2.3 The Proposed Development Site

2.3.1As illustrated in the Site Location Plan (Figure 2-2, Appendix A Figures), the Preferred Site for the Proposed Development (hereafter referred to as the Site) is located approximately 680 m southwest of Braco village at its nearest point and encompasses the existing Braco West Substation.

2.4 Proposed Development Components

- 2.4.1The Proposed Development components are illustrated in **Figures 2-3a-c, Appendix A Figures,** and will comprise the following elements:
 - Temporary construction compound (including a temporary potable water borehole for welfare during construction, with expected volume extracted of less than 10m³ per day) and laydown area;
 - Substation platform of approximately 410 m x 220 m with associated earthworks;
 - Two 400/132kV transformers, a new 400kV double busbar and ancillary equipment;
 - A new control building (approximately 24 m x 49 m) with a maximum height of 7 m above the finished surface level;
 - Existing access track upgrades between the B8033 and existing Braco West Substation;
 - Construction of new access track from the existing Braco West Substation to the proposed Cambushinnie substation platform;
 - Upgrades to the existing Cambushinnie Hill track;
 - Construction of new access track from the northwestern edge of the proposed Cambushinnie substation platform to the Sustainable Drainage System (SUDS) basin;
 - Permanent drainage systems including a SUDS basin;
 - One permanent borehole for site water supply located on approach to the main access gate of the proposed Cambushinnie substation (expected volume extracted of less than 10m3 per day);
 - Landscaping and biodiversity enhancements; and
 - Palisade perimeter fence of maximum height of 4 m above the finished surface level.



2.4.2 Section 2.6 of this EA details associated developments that fall within separate and different consents to the Proposed Development described above. These elements in conjunction with the Proposed Development describe the 'Project'.

400kV Substation

2.4.3The proposed substation at Cambushinnie would comprise of a 400kV outdoor Air Insulated Switchgear (AIS) to support the upgrade of the Beauly-Denny OHL to a 400kV double circuit.

Site Drainage and Water Management

- 2.4.4The Proposed Development would include the construction of a new SUDS basin and swales designed to manage surface water runoff from the Site.
- 2.4.5A compensatory open water habitat would also be created following best practice guidelines¹⁰¹¹. The compensatory open water habitat would be located approximately 50 m northeast of the proposed SUDS basin and would be within a peatland restoration area and as such would be surrounded by an area of peatland seeding. The SUDS basin and compensatory open water habitat are illustrated on **Figure 2**, **Appendix F Landscape and Habitat Management Plan**.

2.5 Existing Access Track Extension & Upgrades

2.5.1As part of the Proposed Development, upgrades to existing access tracks and the extension of access tracks would be required within the Site. The details of the extension and upgrades are described in the following subsections.

Track Extension and Upgrades – from Braco West Substation around the proposed Cambushinnie substation to SUDS basin (see Figure 2-3b, Appendix A)

- 2.5.2The track extension and upgrades required from the Braco West Substation around the proposed Cambushinnie substation to the SUDs basin will be approximately 2.2 km in length. The works would consist of the following ('Sections' A to C are defined on Figure 2-3b, Appendix A):
 - Section A: Construction of new access track between the Braco West Substation and the construction compound area access.
 - Section B: Upgrades to the Cambushinnie Hill track including widening to accommodate the required swept path for abnormal loads and resurfacing of the existing track.
 - Section C: Construction of new access track between the northwestern edge of the proposed Cambushinnie substation platform and the SUDS basin.
- 2.5.3Surfacing and resurfacing for the track extension and upgrades would use Type 1 crushed stone surface treatment with a geogrid placed below if required. The approach to the new

¹⁰Freshwater habitats (2024) Constructing ponds. [Online] Available at: https://freshwaterhabitats.b-cdn.net/app/uploads/2022/11/constructing-ponds.pdf [Accessed: 31 July 2024]

¹¹ Freshwater habitats (2024) [Online] *Managing ponds after creation*. Available at: https://freshwaterhabitats.b-cdn.net/app/uploads/2022/11/managing-ponds-after-creation.pdf [Accessed: 31 July 2024]



substation in Section C will have a section of bound surfacing. All tracks would be constructed to a minimum width of 6.5 m.

2.5.4This is hereafter referred to as the 'track extension and upgrades'.

Existing Access Track Upgrades – B8033 to Braco West Substation (see Figure 2-3c, Appendix A)

- 2.5.5The existing access track would be upgraded between the B8033 and the existing Braco West Substation along approximately 3.6 km. The existing access track would be widened to accommodate the required swept path for abnormal loads and resurfaced. These works are hereafter referred to as the 'proposed existing access track upgrades'.
- 2.5.6Resurfacing for the proposed existing access track upgrades would use the same material and be built to the same width as the track extension and upgrades as outlined in **Section** 2.5.3.

2.6 Associated Development

- 2.6.1The associated developments do not fall under the remit of the Proposed Development and are described in the developments for consideration in the cumulative appraisal in Table 13-1. Where appropriate, the cumulative effects are assessed in Chapters 4-12 and summarised in Chapter 13 of this EA Report.
 - OHL tie-in from the Proposed Development to the existing Beauly Denny OHL consent will be sought by the Applicant under section 37 of the 1989 Act;
 - an underground cable (UGC) linking the existing Braco West Substation to the proposed substation – the Applicant will exercise permitted development rights under the Town and Country Planning (General Permitted Development) (Scotland) Order 1992 (TCP GPDO) class 40(1)(a);
 - a new haul road that facilitates the delivery of abnormal loads (including transformer) and during substation construction bypasses the need to route associated traffic through Braco village – the Applicant will progress this under a separate planning application under the Town and Country Planning (Scotland) Act 1997. The construction of the haul road will connect the A822 and B8033 roads with the western extent of the haul road connecting the B8033 to the existing access track.

2.7 Construction

2.7.1The main construction elements associated with the Proposed Development are as follows:

- Establishment of a temporary construction compound;
- Establishment of suitable laydown areas for materials;
- Existing access track upgrades from the B8033 to the existing Braco West Substation;
- Construction of a new access track from the existing Braco West Substation to the proposed Cambushinnie substation platform;
- Upgrades to the existing Cambushinnie Hill track;
- Construction of a new access track from the northwestern edge of the proposed Cambushinnie substation platform to the SUDS basin;
- Ground works to achieve a level area at the Site (including a cut-fill exercise, tree felling and stump removal);



- Delivery of components and materials to the Site;
- Installation of transformers and associated equipment;
- Remedial works to reinstate the immediate vicinity, and any ground disturbed to preexisting condition; and
- Inspections and commissioning.

Construction Compound

- 2.7.2A temporary site construction compound would be required during construction, located within the Site as presented in Figure 2-3b, Appendix A Figures. This would provide office and welfare facilities for site staff, parking, laydown areas, and holding and servicing space for construction plant. It is anticipated this would cover an area of approximately 200 m x 100 m.
- 2.7.3Temporary working areas will be required at several locations as presented in **Figure 2-3c**, **Appendix A Figures** along the existing access track upgrades between the B8033 and the existing Braco West Substation.

Delivery of Structures and Materials

2.7.4Materials would be delivered to the construction compound. Pre-mixed concrete would be delivered to the Site. Hardcore and earthworks materials for the construction of the Proposed Development would be a combination of site won, through cutting of the existing surface to construct the platforms and locally imported materials. Site won materials would be prioritised over imported materials to reduce the impact on local roads and the environment.

Construction Programme

2.7.5It is anticipated that construction of the Proposed Development would take approximately four years, although detailed programming of the works would be the responsibility of the Principal Contractor in agreement with SSEN Transmission.

Construction Hours of Work

2.7.6Construction activities would in general be undertaken during daytime periods. Working hours proposed are 07:00 to 19:00 Monday to Friday, 08:00 to 13:00 Saturday and no working on Sunday or bank holidays unless in exceptional circumstances. During the commissioning phase of the Proposed Development, there may be a requirement for 24 hours a day, seven days a week working and potential for out of hours working. Working hours are subject to approval from Perth and Kinross Council (PKC).

Construction Traffic

- 2.7.7The A822 would be the route used by construction traffic between the A9 trunk road and the rural roads in the vicinity of the Site access. The associated haul road development outlined in Section 2.6.1 would be used for construction vehicles between the B8033 and A822 to access the Site.
- 2.7.8A Construction Traffic Management Plan (CTMP) would be prepared by the Principal Contractor prior to any works commencing, in consultation with PKC and Transport Scotland, as required. The CTMP would describe all mitigation and signage measures that are proposed on the public road network. A Framework CTMP is provided in **Appendix J**



Transport Statement. Further detail on the anticipated traffic movements associated with construction of the Proposed Development, and an assessment of the likely effects and suggested mitigation measures, is provided in **Chapter 9**.

Reinstatement

2.7.9Following commissioning of the Proposed Development, all temporary construction areas would be reinstated. Reinstatement would form part of the contract obligations for the Principal Contractor and would include the removal of all temporary Site works.

Landscape Mitigation Measures and Biodiversity Enhancement

2.7.10Additional landscape mitigation measures, and new planting requirements for the purposes of visual screening and/ or to help assimilate the Proposed Development into the surrounding landscape would be considered with regard to existing planting plans, including native woodland planting and peatland seeding. Such measures would also seek to provide habitat, biodiversity, and opportunities for ecological enhancement. A landscape and habitat management plan is presented in Appendix F Landscape and Habitat Management Plan.

2.8 **Operations and Maintenance**

Operational Infrastructure

- 2.8.1A need for permanent operational facilities has been identified to support operational requirements.
 - Lighting it is proposed that substation equipment would be lit using LED luminaires. The use of LEDs directed within the substation together with the use of presence sensors would ensure that the substation would only be lit when required for maintenance or repair works. LEDs typically feature no ultraviolet (UV) content which is known to adversely impact upon the behaviour of insects and bats. The proposed average light level of 6 lux would prevent any adverse impacts on the rural environment of the existing surrounding areas. Access tracks would also not be lit under normal operation, maintaining locally dark roadways. Full details on lighting are proposed in the Lighting Mitigation Strategy submitted with the planning application.
 - Permanent Access it is anticipated that operations and maintenance vehicle access to the Site would be via the existing public road network and the proposed existing access track upgrades.
 - Security fencing a 4 m high palisade fence would be installed around the substation
 platform and in addition standard post and wire deer fence or appropriate alternative
 deer protection measures would be employed to ensure the successful establishment of
 tree / shrub planting where deemed to be appropriate within the Site.



Staff

2.8.2Staff attendance would be on an ad hoc basis for maintenance and fault repairs only.

Maintenance Programme

2.8.3Regular inspections of equipment would be undertaken to identify any deterioration of components, and these parts would be replaced where needed.

2.9 Mitigation Proposals

- 2.9.1Mitigation measures are measures which reduce the potential adverse effects of a proposal. There are two types of mitigation which are considered within this EA:
 - Embedded Mitigation: This relates to measures that are adopted as part of the design and are an inherent part of the Proposed Development (i.e. do not require additional action, including assessment to be taken). This also includes mitigation measures that will be implemented as a result of following construction good practice.
 - Additional Mitigation: This relates to measures which have been identified during the assessment of effects in Chapters 4 – 11 and would be implemented by SSEN Transmission in order to minimise the likely significant effects.

Embedded Mitigation

- 2.9.2The layout and design of the Proposed Development has specifically considered the potential impacts on sensitive receptors and features of the surrounding environment. The iterative design process has sought to minimise the potential permanent effects of the Proposed Development on landscape, visual, protected species, habitats, trees, and noise receptors.
- 2.9.3Design environmental embedded mitigation measures for the Proposed Development are listed in **Table 2-4** below.



Mitigation Reference	Mitigation Title	Description
EM1	Lighting requirements	Proposed buildings would not be illuminated at night during normal operation. Floodlights would be installed but would only be used in the event of a fault or any maintenance being undertaken during the hours of darkness; or during the overrun of planned works; or when sensor activated as security lighting for night-time access. The access track would not be lit under normal operation. As far as possible, works should be carried out in daylight to minimise the risk of disturbing protected or notable nocturnal species. If any temporary artificial lighting is required for construction works, this should be strongly directional and directed only on to the works area, and be turned off when not required, to minimise light spill and adverse effects on nocturnal wildlife. Working hours are proposed to be between 07:00 to 19:00 Monday to Friday and 08:00 to 13:00 on Saturdays. There would be no working on Sunday or bank holidays unless in exceptional circumstances and agreed with PKC.
EM2	Delivery and sourcing of structures and materials.	Materials would be a mix of site won and locally sourced materials. Concrete would be delivered to site pre-mixed. Hardcore and earthworks materials for the construction of the Proposed Development would be a combination of site won, through cutting of the existing surface to construct the Proposed Development and locally imported materials. Site won materials would be prioritised over imported materials to reduce the impact on local roads and the environment.
EM3	Screening of Proposed Development	 All landscape and visual mitigation are embedded and covered in detail in Chapter 4 Landscape Character and Visual , and Appendix F Landscape and Habitat Management Plan. Key embedded mitigation measures relevant to landscape and visual impacts include: Siting of the substation infrastructure within a relatively visually contained location, within existing plantation forestry and adjacent to the existing Braco West Substation and OHL, therefore limiting potential for landscape fragmentation and visual impacts; Incorporating earthworks and native woodland planting around the proposed substation to provide screening and aid landscape integration; and Targeted peatland restoration within suitable areas, providing habitat creation and reflecting the landscape context.
EM4	Security Fencing	A 4 m high palisade fence would be installed around platforms and in addition a standard post and wire deer fence would be installed around areas of tree / shrub planting where appropriate.
EM5	Construction Environmental	Mitigation measures would be implemented through the use of a full CEMP prior to commencement of works controlled

Table 2-4 Design Environmental Embedded Mitigation Measures



Mitigation Reference	Mitigation Title	Description
	Management Plan (CEMP) and General Environmental Management Plans (GEMPs).	by way of a planning condition which will cover all the receptors associated with the Proposed Development. The adoption of the applicable GEMPs would reduce the probability of a pollution incident occurring and reduce the magnitude of any incident due to a combination of good site environmental management procedures, including minimising storage of soil volumes, soil management, staff training, availability of contingency equipment and emergency plans. The relevant GEMPs can be found in Appendix O GEMPs and SPPs .
EM6	СТМР	 A CTMP would operate throughout the duration of the construction programme. Appendix J Transport Statement contains a Framework CTMP. The requirement for a detailed CTMP including the following is expected to be controlled by way of a planning condition, and provided once a Principal Contractor is appointed: Site entry/exit arrangements from public roads; Traffic routeing plans – defining the routes to be taken by heavy goods vehicles (HGVs) to the Site avoiding sensitive locations; Construction traffic hours and delivery times; Strategy for traffic management and measures for informing construction traffic of local access routes, road restrictions (statutory limits: width, height, axle loading and gross weight), timing restrictions (if applicable) and where access is prohibited; Measures to protect the public highway (e.g. wheel wash facilities); Measures for the monitoring of the CTMP to ensure compliance from construction drivers and appropriate actions in the event of non-compliance; and Mechanism for responding to traffic management issues arising during the works (including concerns raised from the public) including a joint consultation approach with relevant road authorities.
EM7	Biodiversity Net Gain (BNG)	A BNG assessment has been undertaken for the Proposed Development. A BNG Report (Appendix E Biodiversity Net Gain Report) and Landscape and Habitat Management Plan (Appendix F Landscape and Habitat Management Plan) have been prepared as part of the measures necessary to achieve SSEN Transmission's target BNG figures. The Landscape and Habitat Management Plan (LHMP) details specific requirements for enhancement measures (e.g. blanket bog restoration, woodland creation/enhancement).
EM8	Reinstatement	Following commissioning of the Proposed Development, all temporary construction areas would be reinstated. Reinstatement would form part of the contract obligations for the principal contractor and would include the removal of all temporary access tracks and work sites.



Mitigation Reference	Mitigation Title	Description	
EM9	Noise	A Noise Management Plan will be prepared by the Principal Contractor with recommendations related to noise and vibration for the construction phase of the Proposed Development. The Principal Contractor will apply best practicable means (BPM) and adhere to the Applicant's CEMP and GEMPs.	
EM10	Noise – Blasting Plan	 The following good practice measures would be employed to reduce potential vibration and air overpressure from blasting works which can be ensured through the production and management of Construction Blasting Plan to be agreed with PKC: Care would be taken with the development of faces, and with trial blasts, as anomalous vibration levels might be produced when there is no free face to relieve the energy produced; Appropriate burden would be ensured to avoid over- or under-confinement of the charge; Accurate drilling and setting out would be undertaken; Charge levels would be appropriate; Exposed detonating cords would not be used; Stemming with appropriate material such as sized gravel or stone chippings would be undertaken; Decking charges/in hole delays/delay detonation would be used to ensure smaller maximum instantaneous charges (MICs); A series of groundborne vibration measurements and air overpressure measurements would be undertaken to check compliance with appropriate criteria (adopted from BS 5228-2244); Each charge would be individually designed to maximise efficiency and reduce energy loss through vibration and air overpressure; The use of surface detonating cords and secondary blasting would be avoided wherever possible; The areas of heave and the total charges would be minimised; Blasting in adverse weather conditions would be avoided (i.e. wind in the direction of sensitive receptors); Blasting would be undertaken only within the (less-sensitive) hours of 10:00 and 12:00 and 14:00 and 16:00 on Mondays to Fridays, and 10:00 and 12:00 on Saturdays; and Local residents would be informed in advance of the proposed times of blasting works, along with details of the good practice mitigation measures that are in place, to ensure good relations and appropriate reassurance. 	



Construction Good Practice

- 2.9.4Construction good practice includes standard construction practices, legislative requirements, and published guidance from statutory bodies which is expected to be implemented during construction of the Proposed Development.
- 2.9.5A CEMP will be implemented during the construction period. The requirement for a CEMP would be expected to be included as a condition attached to the planning permission for the Proposed Development. This will include site-specific and best practice construction management measures including measures to manage risks associated with construction of the Proposed Development to the environment and human health including those associated with the following:
 - Noise and vibration;
 - Dust and air pollution;
 - Surface and groundwater;
 - Ecology and ornithology;
 - Cultural heritage;
 - Traffic and Transport;
 - Lighting strategy;
 - Waste (construction); and
 - Operation and management of the Site (including construction compounds).
 - 2.9.6The CEMP will incorporate SSEN Transmission's GEMPs and Species Protection Plans (SPPs) (**Appendix O GEMPs and SPPs**) which are applied as a standard requirement to all construction sites and practices.
 - 2.9.7The CEMP will be submitted prior to commencement of construction activities to the Scottish Environment Protection Agency (SEPA) and PKC (and/or to any other person or body that may be specified in the consent for the Proposed Development) for approval and will form part of the contractor documents between the Applicant, and the appointed Principal Contractor.

Operational Residues and Emissions

- 2.9.8Due to the nature of the Proposed Development, operational residues and emissions would be very limited. No operational emissions are expected to air, soil or water (with the exceptions of small amounts of foul drainage from welfare facilities). Waste would be limited to that generated from maintenance activities and staff welfare facilities.
- 2.9.9Noise emissions from the Proposed Development would likely to be minimal and limited to that generated from existing maintenance and operational activities.
- 2.9.10No significant emissions would be likely from electric and magnetic fields following compliance with regulations and legislation and the regular maintenance of equipment.



3. METHODOLOGY

3.1 Introduction

- 3.1.1This chapter sets out the approach that has been adopted in undertaking the EA of the Proposed Development, including reference to legal requirements, best practice, and assessment parameters.
- 3.1.2A detailed overview of the guidance and methodology adopted for each technical study is provided within the respective technical chapters of this EA (**Chapters 4 12**).

3.2 Approach to the Environmental Appraisal

- 3.2.1SSEN Transmission intends to submit an application for planning permission under the 1997 Act for the construction and operation of the Proposed Development. This EA has been produced as a non-statutory assessment to allow appropriate environmental management and mitigation to be identified and implemented, as identified in **Table 2-4** and **Table 14-1**.
- 3.2.2The approach followed in the EA initially identifies topics which require a level of assessment to determine the potential likely direct and indirect environmental effects. This is achieved through a scoping exercise taking into consideration potential sensitive receptors and the nature of the construction and operation of the Proposed Development. 'Scoped out' topics are not considered further in the EA.
- 3.2.3For each topic, the potential for environmental effects on these receptors has been considered and is documented in **Table 3-1** which also indicates whether the topic has been 'scoped in' or 'scoped out' of further assessment.
- 3.2.4For the 'scoped in' topics this EA provides a concise appraisal of the likely direct and indirect environmental risks that the Proposed Development may pose; and makes recommendations for additional mitigation measures as required. This EA has been undertaken using appropriate methodologies and best practice guidelines. Further details on this are provided in the technical chapters.
- 3.2.5**Chapter 14 Summary of Mitigation Measures**, collates the additional mitigation measures recommended in each of the appraisal chapters, which would be taken forward for inclusion in the site-specific CEMP.

3.3 Scope of the Environmental Appraisal

3.3.1Scoping of potential likely effects with regard to the physical impacts of a project provides a basis for ensuring that the assessment of environmental effects is appropriately limited to issues of genuine potential significance. This section includes a brief description of the environmental receptors of potential significance associated with the Proposed



Development which are addressed in detail in the EA Report, and those that are scoped out.

- 3.3.2An initial review of environmental baseline conditions and sensitive receptors has been undertaken. **Figure 3-1a to Figure 3-1d, Appendix A Figures** illustrates the identified environmental constraints located within 5 km of the Proposed Development.
- 3.3.3The following key environmental constraints have been identified within the study area, these include:
 - The Site is located within the Landscape Character Type (LCT) Lowland Hills Tayside, and LCT Broad Valley Lowlands Tayside.
 - The Site is located within a Drinking Water Protected Area for groundwater.
 - Scattered residential and farmstead properties exist around the Site, the closest being 20 m south of the existing access track.
 - The Site is located across agricultural land classes:
 - Class 3.2: "Land capable of average production through yields of barley, oats and grass can be obtained".
 - Class 4.1: "Land capable of producing a narrow range of crops, primarily grassland with short arable breaks of forage crops and cereal".
 - Class 5.3: "Land capable of use as improved grassland. Pasture deteriorates quickly"¹².
 - The Site is approximately 360 m south of an area of Ancient Woodland.
 - There are five known private water supplies (PWS) within 1 km of the Site.
 - The Site is located on a moderately productive 2B class Aquifer.
 - Two tributaries of Crocket Burn are within the Site. Mill Burn is within the site and is crossed by the existing access track. Unnamed watercourses are also located within the Site which drain into the Muckle Burn, which is classified as having a Good Overall condition¹³.
 - Scheduled Monument (SM) (SM3088) a Fort at Grinnan Hill is approximately 770 m northeast of the Site at its closest point.

Scope of this EA

- 3.3.4The scope of this EA has been informed by the Applicant's knowledge of the Site environmental constraints during:
 - Site selection appraisal;
 - Environmental baseline surveys;
 - Pre-application consultation feedback;
 - Stakeholder consultations;
 - EIA Screening Opinion; and
 - An informal scoping exercise completed by EA topic specialists based on professional judgement.



- 3.3.5 **Table 3-1** below provides a summary of the key environmental issues scoped in and scoped out of the environmental appraisal.
- 3.3.6This summary is not intended to all-encompassing and contains only the main points which are considered to be of particular relevance to the context of the technical chapters found in **Chapters 4 12**.



Table 3-1 EA Scoping Review

Торіс	Issues Scoped in	Issues Scoped out
Landscape Character and Visual Impact	 The following potentially significant environmental risks have been scoped into the Landscape and Visual Appraisal: <u>Construction:</u> Temporary physical change to the landscape as a result of introduction of construction compound, laydown or storage areas, access tracks etc. Temporary change to perceptual aspects of the landscape character and/or landscape designations as a result of nearby construction activity, including lighting at night. Temporary disruption or change to views experienced from receptors and at viewpoints as a result of visibility of construction activity, temporary compounds, tracks and associated lighting. <u>Operation:</u> Longer term and/or permanent change to physical components of the landscape, including loss of existing features such as trees or woodland, and introduction of the proposed substation. Change to perceptual aspects of the landscape character and/or landscape designations as a result of introduction of the proposed substation. Longer term and/or permanent change to the composition and nature of views as a result of introduction of the proposed substation. 	Landscape and visual receptors including landscape designations that are located beyond 5 km or where forestry will screen views of the Proposed Development have been excluded from the scope of the Landscape and Visual Appraisal.
Ecology and Nature Conservation	 The following potentially significant environmental risks have been scoped into the Ecology and Nature Conservation Appraisal: Permanent habitat loss (to e.g., the proposed substation platform or permanent access tracks); Temporary habitat loss (to e.g., temporary construction compounds); Habitat degradation as a result of pollution incidents (e.g., fuel or oil spills); 	 The following designated sites have been scoped out of the EA: River Teith Special Area of Conservation (SAC): The Site is approximately 20 km upstream from this SAC. Given the nature of the Proposed Development and the degree of dilution over this distance and pollution controls embedded in the CEMP, there is not likely to be pollution risks for this SAC.



Торіс	Issues Scoped in	Issues Scoped out
	 Permanent or temporary changes to hydrological conditions which may affect vegetation and habitats (e.g., indirect impacts on Groundwater Dependent Terrestrial Ecosystems (GWDTE)); Loss of habitat supporting protected and/or notable species; Creation of barriers to animal movements (e.g., the construction of watercourse crossings could inhibit the movement of otter or fish); Temporary disturbance and/or displacement of species during operation (e.g., the use of permanent lighting could impact upon bat foraging); and, Potential for direct mortality of species during construction (e.g., as a result of increased vehicular traffic, or as a result of a pollution incident). 	 None of the other four SACs within the Zone of Influence (Zol) (i.e., Shelforkie Moss SAC, Upper Strathearn Oakwoods SAC, Kippenrait Glen SAC and Glenartney Juniper Wood SAC), have any conceivable pathway for potential impacts on qualifying habitats because there is no hydrological connectivity (via watercourses or otherwise). Given the distances from the Site at which all of these SACs are located it is highly unlikely that these would be adversely affected by the Proposed Development, including via air pollution. Dust and gaseous air pollution can have an adverse impact on habitats over a distance, but such effects diminish rapidly from source and are generally considered negligible at 200 m. There is no conceivable pathway for potential air pollution impacts on the qualifying habitats of the SACs which are located 5.2 km from the Site at closest. However, the River Teith SAC, Kippenrait Glen SAC, Shelforkie Moss SAC, Upper Strathearn Oakwoods SAC, Glenartney Juniper Wood SAC, as European Sites (and therefore designated for protection under relevant nature and habitats conservation legislation), are subject to the Habitat Regulations Assessment (HRA) process. An 'HRA Screening letter' has been produced as a standalone report and will be submitted to PKC, setting out why likely significant effects are not considered possible and therefore that further HRA is not considered necessary. PKC will need to confirm agreement or otherwise, as the competent authority for HRA matters.
Ornithology	 The following potentially significant environmental risks are scoped into the Ornithology Appraisal: Permanent or temporary loss of habitat which supports important species of birds; 	Given the relative distance from the Site, the following ornithological designated sites identified are scoped out of the Ornithology Appraisal:


Торіс	Issues Scoped in	Issues Scoped out
	 Temporary disturbance and/or displacement of species of birds during construction; Disturbance and/or displacement of species during operation; and Potential for direct mortality of species during construction (e.g., as a result of increased vehicular traffic, or as a result of pollution incident). 	 South Tayside Goose Roosts Special Protection Area (SPA) and RAMSAR site. Approximately 5.7 km east of the Proposed Development. However, note that this SPA, as a European site, is subject to the HRA process. An 'HRA Screening letter' has been produced as a standalone report and will be submitted to PKC, setting out why likely significant effects are not considered possible and therefore that further HRA is not considered necessary. PKC will need to confirm agreement or otherwise, as the competent authority for HRA matters.
Forestry	 The following potentially significant environmental risks are scoped into the Forestry Appraisal: BS5837:2012 survey methodology will be applied to mature highway trees and tree groups along the A822 and B8033. Highway trees provide valuable environmental services such as visual screening and providing a sense of place, embankment stabilisation and regulation of rainfall runoff. They are also subject to some additional constraints (such as around visibility) from forestry and woodlands. They will be subject to an Arboricultural Impact Assessment for the assessment of the associated Haul Road development. Recognised significant adverse effect on forestry typically include: Removal of large area of commercial forest resulting in reduction of shelter to area of the Site, potential minor loss of habitat; Removal or coppicing of trees within Native Woodland Survey of Scotland (NWSS) woodlands; Increased probability of wind throw; Disturbance of ground by machinery; Tree debris/mulch remaining onsite may inhibit recovery of the native ground flora; and Removal of highway and riparian trees and groups may have significant effects on ecological connectivity (addressed principally in Chapter 5 Ecology and Nature Conservation) and reduction in 	 The following forestry features have been scoped out of the EA: Ancient and veteran trees; Detailed forest hydrological assessment; The hectarage of impact to woodland will be identified but assessment of timber volumes and harvesting plans for those areas is scoped out of the EA; Ecological connectivity as a result of tree removal is addressed primarily in Chapter 5 Ecology and Nature Conservation; and Reduction in landscape distinctiveness as a result of tree removal is addressed primarily in Chapter 4 Landscape Character and Visual .



Торіс	Issues Scoped in	Issues Scoped out
	 landscape distinctiveness (addressed principally in Chapter 4 Landscape Character and Visual). The creation of new or enhanced access to woodland or within woodland may have a significant positive effect on timber harvesting and extraction. 	
Cultural Heritage	 The following potentially significant environmental risks are scoped into the Cultural Heritage assessment: Permanent physical impacts on previously unrecorded heritage assets due to construction of the Proposed Development; Permanent physical impacts on previously unrecorded heritage assets due to construction of access track or other infrastructure; and Permanent physical impacts on previously unrecorded heritage assets due to construction of access track or other infrastructure; and Permanent physical impacts on previously unrecorded heritage assets due to construction of temporary construction compounds or other works areas. 	 Based on the fact there are no designated assets within the Site, the nature of the development, the distance between the Site and the assets, and how the setting of specific assets contribute to their significance the following Cultural Heritage risks have been scoped out of the EA: Physical impacts on designated assets; and Impacts on the setting of designated and non-designated assets.
Hydrology, Hydrogeology, Geology and Soils	 The following environmental risks have been scoped into the EA: During the construction and operation phases, excavation, temporary storage, backfilling and compaction of soils during construction and maintenance works represents a potential effect for geology and soils. Disturbance of potentially contaminated soils and perched groundwater and creation of new pathways allowing migration of such contaminants to reach sensitive receptors (including construction workers, site users and the water environment) during construction phase of the Proposed Development. Disturbance and damage to peat soils during the construction phase of the Proposed Development. During the construction and operational phases there are potential adverse effects on the water environment (including Private Water Supplies (PWS), Groundwater Dependent Terrestrial Ecosystems (GWDTEs) and other uses of water). These include: Contamination of groundwater and surface water bodies from fuels, solvents, oil and other construction chemicals from chemical 	A detailed flood risk assessment is being undertaken for the Proposed Development in support of the planning application. Flood risk will be dealt with through the planning process based on the separate assessment carried out as part of the planning application. Therefore, flood risk has been scoped out of this EA report. Environmental risks associated with the operation of the Proposed Development on the water environment have been scoped out of the EA. The operation would not involve any breaking ground and/or excavations, the control of runoff to swales would also limit any downstream effects.



Торіс	Issues Scoped in	Issues Scoped out
	 spillages through runoff to surface water bodies and unnamed watercourses or infiltration to groundwater aquifers; Contamination from high levels of fine sediment in runoff (including the potential wash out of fine sediment from temporary spoil heaps, embankments, and access tracks); and The effects of diffuse urban pollutants in surface water runoff (that may contain metals, hydrocarbons, and inert solids etc.) entering the ground and moving towards a receptor. The potential secondary receptors are GWDTEs and PWS (if close to the works, including the access track). Biodiversity specialists will identify sensitive water habitats along the route. 	
Noise and Vibration	 The following environmental risks have been scoped into the Noise appraisal: Construction noise arising from the Proposed Development has been assessed at selected NSRs within a study area of approximately 2 km from the Site. However, it should be noted that noise propagation predictions over distances greater than 300 m must be treated with caution due to increasing importance of meteorological effects according to BS 5228-13. Construction vibration arising from the Proposed Development has been assessed at NSRs within a study area of approximately 100 m from the Site. Groundborne vibration and air overpressure arising from possible blasting works during the construction phase of the Proposed Development at the nearest NSRs such that the locations with the greatest potential for adverse effects are assessed. Changes in road traffic noise due to construction phase development generated traffic has been assessed for construction traffic routes in the vicinity of the Proposed Development. Operational noise arising from fixed plant associated with the Proposed Development has been assessed at selected NSRs within a study area of approximately 2 km from the Site. 	 The following environmental risks have been scoped out of the Noise appraisal: The operational phase of the Proposed Development is not anticipated to generate vibration, therefore an operational vibrational assessment is scoped out.



Торіс	Issues Scoped in	Issues Scoped out
Climate Change and Carbon	 The following assessments will be carried out in-line with Institute of Environmental Management and Assessment (IEMA) Guidelines¹⁴ as part of the Climate Change appraisal: Lifecycle Greenhouse Gas (GHG) impact assessment; Climate Change Risk Assessment (CCRA); and In-combination climate change impact assessment (ICCI). 	The only environmental risk scoped out of the assessments conducted in-line with IEMA Guidelines ¹⁴ is sea-level as the Proposed Development has been identified as being in an upland location.
Traffic and Transport	 In accordance with IEMA Guidelines 2023¹⁵ the environmental assessment of road traffic will assess the potential significance of effects for the following categories. Severance of communities; Fear and Intimidation; Road user and pedestrian safety; Pedestrian and non-motorised amenity; Pedestrian & non-motorised delay; Road vehicle driver and passenger delay; and Hazardous / Large loads. 	All categories of assessment from IEMA Guidelines 2023 ¹⁵ . are considered.
Land use and Agriculture	N/A	 The following environmental risks have been scoped out of the Land use and Agriculture EA: The proposed substation site and areas of where proposed access tracks are required as part of the Proposed Development would not be located on high quality agricultural land as classified by the Scottish Government's Soil Map. Impacts on agriculture because of the proposed substation footprint have been scoped out of the EA. The access track upgrades are on Class 3.2 and Class 4.1 agricultural land. Impacts on agricultural land as a

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¹⁵ IEMA, 2023. IEMA Guidelines: Environmental Assessment of Traffic and Movement [online]. [Accessed 01 July 2024]. Available from: https://www.iema.net/resources/reading-room/2023/07/12/new-iema-guidance-environmental-assessment-of-traffic-and-movement



Торіс	Issues Scoped in	Issues Scoped out
		 result of upgrades to the existing access track are unlikely to be significant as it will involve marginal losses to land which is not currently used for crop farming. Impacts on commercial forestry and mature woodland are addressed in more detail in Chapter 4 Landscape Character and Visual, Chapter 5 Ecology and Nature Conservation, and Chapter 8 Forestry of this EA and therefore have been scoped out of this chapter.
Socioeconomics, Recreation and Tourism	N/A	The following environmental risks have been scoped out of the Socioeconomics, Recreation and Tourism appraisal:
		Detailed appraisal of the visual and noise impacts of the Proposed Development are addressed in more detail in Chapter 4 Landscape Character and Visual and Chapter 12 Noise & Vibration respectively. Therefore, impacts on these receptors have been scoped out of this chapter.
		Disruption to recreational activities in the area affecting Core Paths BRAC/108 and BRAC/111 is unlikely due to the distance of these from the Proposed Development. Visual and noise impacts are addressed in Chapter 4 Landscape Character and Visual and Chapter 12 Noise & Vibration .
		Analysis of the impacts on commercial forestry caused by the Proposed Development is addressed in more detail in Chapter 8 Forestry . Therefore, analysis of this issue has been scoped out of this chapter.
		Impacts on SMs are assessed further in Chapter 7 Cultural Heritage and visual impacts as a result of the Proposed Development on SMs are assessed in more detail in Chapter 4 Landscape Character and Visual . Therefore, these are scoped out of this chapter.



Торіс	Issues Scoped in	Issues Scoped out
Population and Human Health	N/A	 The entire Population and Human Health appraisal has been scoped out of the EA. Factors impacting on human health that are scoped into the EA are addressed in the following chapters: Chapter 4 Landscape Character and Visual ; Chapter 9 Traffic and Transport; Chapter 11 Climate Change; and Chapter 12 Noise and Vibration. Effects on population and human health from Electromagnetic fields (EMFs) are considered to be unlikely as the Applicant believes that compliance with government policy on levels of exposure to EMFs, which in turn is based on the advice of the government's independent scientific advisers, the National Radiological Protection Board (NRPB) (now part of the Health Protection Agency), ensures the appropriate level of protection for the public from these fields. Effects caused by EMFs are also considered unlikely as no issues with interference have been reported during the operation of the existing Braco West Substation that is located within the Site. Effects from light disturbance are to be mitigated through good construction management and light sensors as detailed in Table 2-4.
Air Quality	N/A	Air Quality has been scoped out of the EA. The Proposed Development is not located within an Air Quality Management Area (AQMA). There is a potential to give rise to some localised and temporary construction related releases associated with dust and construction traffic exhaust emissions. However, the nature of construction activities means these would be localised, short-term and intermittent. Potential effects would be mitigated further through the implementation of



Торіс	Issues Scoped in	Issues Scoped out
		mitigation measures, in particular the CEMP and relevant GEMPs.
	N/A	 The entire Material Assets and Waste appraisal has been scoped out of the EA, including the following environmental risks: The potential effects of land contamination are addressed in detail in Chapter 10 Hydrology, Hydrogeology, Geology and Soils. of this EA, therefore further analysis is scoped out of this chapter. It is also assumed that standard mitigation measures and best practice measures, to be detailed in the CEMP, would be implemented throughout the works.
Major Accidents and Disasters	N/A	 The entire Major Accidents and Disasters appraisal has been scoped out of the EA, including the following environmental risks: Crisis management and continuity plans are in place across the SSE Group. These are tested regularly and are designed for the management of, and recovery from significant energy infrastructure failure events. Where there are material changes in infrastructure (or the management of it) additional plans are developed. Furthermore, the Principal Designer would need to fully assess risks and mitigate as appropriate during the construction stage as part of the requirements of the Construction (Design and Management) Regulations 2015.



3.4 Consultation Undertaken

- 3.4.1This section describes the pre-application consultation and the consultation events that were undertaken to inform the local community of the Proposed Development.
- 3.4.2A pre-application advice request was submitted to PKC on 23 November 2023 (Reference: 23/00023/PREAPM). The response received stated that the following reports/assessments would be required if the Proposed Development was not considered to be an EIA development:
 - Phase 1 Habitat Survey including Protected Species Survey;
 - Tree/Woodland Survey;
 - Transport Assessment/Statement including CTMP;
 - Flood Risk (Surface) including Drainage Assessment;
 - Cultural Heritage Assessment Archaeology;
 - CEMP;
 - Ground Investigation Survey including peatland and groundwater;
 - Noise and Lighting Assessment;
 - Supporting Planning Statement;
 - Design & Access Statement;
 - Landscape and Visual Assessment;
 - Sustainability including Carbon Assessment;
 - Peat Management Plan;
 - Decommissioning Restoration Plan (if required); and
 - Pre-Application Consultation (PAC) Report.
- 3.4.3Subsequently, a request for an EIA Screening Opinion was submitted to PKC in January 2024. This was returned in February 2024 and stated that the Proposed Development does not qualify as EIA development (Reference: 23/02147/SCRN, Appendix P EIA Screening Opinion).
- 3.4.4Further consultation with PKC determined that a CEMP would not be required as part of the planning application due to the outline nature of the CEMP at such a stage and that such information could be included in the EA, with the requirement for a full CEMP prior to commencement of works controlled by way of a planning condition.
- 3.4.5A Proposal of Application Notice was submitted to PKC on 9 February 2024. Following this, two public consultation events were held.
- 3.4.6A pre-application consultation (PAC1) event was held at Braco Village Hall, Braco village on 20 March 2024 (15:00-19:00) this event provided a follow-up to the site selection consultation detailed in Sections 2.2.27 2.2.28 and presented proposals relating to the Proposed Development. A consultation feedback period followed the PAC1 event which was open from 24 March 2024 and to 1 May 2024. The consultation period invited



comments and feedback from members of the public, statutory consultees and other key stakeholders.

- 3.4.7The project team attended an organised Braco and Greenloaning Community Council question and answer session with members of the public at Braco Village Hall on 30 May 2024 (19:30-21:00). This provided an opportunity for interested members of the public to meet and ask the project team questions.
- 3.4.8A second PAC event (PAC2) was held 14 June 2024 (15:30-19:00) at Braco Village Hall, where feedback and issues raised by the public during the consultation feedback period were addressed ahead of future design freeze for the Proposed Development.
- 3.4.9Following consideration of the responses received a further review of key design parameters was completed to address feedback received from the consultation.



3.5 Cumulative Effects

3.5.1There are two aspects to Cumulative Effects, defined as follows:

- In-combination effects: The combined effect of the Proposed Development together with other reasonably foreseeable developments (taking into consideration effects at the Site preparation and earthworks, construction, and operational phases); and
- Effects Interactions: The combined or synergistic effects caused by the combination of a number of effects on a particular receptor (taking into consideration effects at the Site preparation and earthworks, construction and operational phases), which may collectively cause a more significant effect than individually. A theoretical example is the combination of disturbance from dust, noise, vibration, artificial light, human presence and visual intrusion on sensitive fauna (e.g. certain bat species) adjacent to a construction site.
- 3.5.2The potential for cumulative effects will be considered in relation to other approved or proposed developments within the study area relevant to each particular issue. The basis for this is that only these developments have the potential to result in significant cumulative effects in combination with those arising from the Proposed Development. The final list of developments to be considered in the cumulative effects assessment will be frozen one month prior to submission of the planning application to PKC. to allow sufficient time to compile the EA Report.
- 3.5.3A cumulative appraisal has been undertaken considering the developments in-combination with the Proposed Development, this is presented in Chapter 13 Cumulative Developments. The development proposals which will be considered in the cumulative appraisal are outlined in Section 13.1.2 and Table 13-1.

3.6 Assumptions and Limitations

- 3.6.1The key assumptions and limitations applied to the preparation of this EA are set out in this section. Assumptions and limitations specific to certain topics are identified in the appropriate technical chapter.
- 3.6.2A number of design elements still include a level of uncertainty and are indicative for the purpose of the EA. However, these elements will be further defined as the design develops. The EA will define maximum parameters (worst case scenario) when assessing the environmental effects.
- 3.6.3Baseline conditions have been established from a variety of sources, including historical data. Due to the dynamic nature of certain aspects of the environment, this information is subject to change as further information becomes available following field surveys, and as the design progresses. Conditions may change during the construction and operation of the Proposed Development.
- 3.6.4The design, construction and completed stages of the Proposed Development will satisfy (at least) minimum environmental standards, consistent with contemporary legislation, practice, and knowledge.



4. LANDSCAPE CHARACTER AND VISUAL

4.1 Introduction

- 4.1.1This chapter considers the potential for effects on landscape character and visual amenity resulting from the Proposed Development.
- 4.1.2This section contains:
 - Details of the approach and methodology;
 - A description of existing baseline conditions of the Site and surrounding context;
 - A concise appraisal of the direct and indirect impacts on landscape and visual receptors resulting from the Proposed Development; and
 - Recommendations for additional mitigation, where required.
- 4.1.3This chapter is supported by the following figures in Appendix A Figures:
 - Figure 4-1a Zone of Theoretical Visibility;
 - Figure 4-1b Zone of Theoretical Visibility including screening from trees/woodland and buildings;
 - Figure 4-2 Landscape Designations;
 - Figure 4-3 Landscape Character Types;
 - Figure 4-4 Representative Viewpoints; and
 - Figure 4-5 Cumulative Developments.
- 4.1.4This chapter is also supported by a series of visualisations contained in **Appendix C Visualisations**.

4.2 Information Sources

- 4.2.1The following information sources have been used to inform this report:
 - Online mapping, including Ordnance Survey (OS) maps and aerial photography;
 - Scottish Landscape Character Types (LCTs) Map and Descriptions¹⁶; and
 - Relevant local planning and policy documents.

4.3 Methodology

4.3.1The screening process, undertaken in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, has confirmed that the Proposed Development is not considered to constitute EIA development. The scope and

¹⁶ NatureScot. Scottish Landscape Character Types and Descriptions. [Online] available from: Scottish Landscape Character Types Map and Descriptions | NatureScot



approach of the Landscape and Visual Appraisal (LVA) outlined below reflects this status and the nature and scale of the Proposed Development.

- 4.3.2The LVA has been carried out in accordance with the following good practice guidance documents:
 - The Landscape Institute and Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment (GLVIA), Third Edition¹⁷;
 - Landscape Institute (2019) Technical Guidance Note 06/19, Visual Representation of Development Proposals¹⁸; and
 - Landscape Institute (2021) Technical Guidance Note 02/21, Assessing landscape value outside national designations¹⁹.
- 4.3.3GLVIA places a strong emphasis on the importance of professional judgement in identifying and defining the significance of landscape and visual effects. The LVA has been undertaken by Chartered Landscape Architects with experience in the assessment and appraisal of similar projects. Professional judgement has been used in combination with structured methods and criteria to evaluate landscape and visual value and susceptibility, the resulting sensitivity, magnitude, and significance of effect.

Landscape Sensitivity

- 4.3.4Landscape receptors are described as components of the landscape that may be affected by the Proposed Development. These can include overall character and key characteristics, individual elements or features and specific aesthetic or perceptual aspects.
- 4.3.5The sensitivity of the landscape receptor has been derived by combining the value of the landscape (undertaken as part of the baseline study) and the susceptibility to change of the receptor to the specific type of development being considered.
- 4.3.6Landscape value is frequently addressed by reference to international, national, regional, and local designations. Absence of such a designation does not necessarily imply a lack of quality or value. Factors such as accessibility and local scarcity can render areas of nationally unremarkable quality, highly valuable as a local resource.
- 4.3.7The evaluation of landscape value has been informed by Technical Guidance Note 02/21 and undertaken considering the following factors and classified as high, medium, or low with evidence provided as to the basis of the evaluation:
 - Natural heritage Landscape with clear evidence of ecological, geological, geomorphological or physiographic interest which contribute positively to the landscape.
 - Cultural heritage Landscape with clear evidence of archaeological, historical or cultural interest which contribute positively to the landscape.
 - Landscape condition Landscape which is in a good physical state both with regard to individual elements and overall landscape structure.

¹⁷ Landscape Institute and Institute of Environmental Management Assessment, 2013. *Guidelines for Landscape and Visual Impact* Assessment. Third Edition.

¹⁸ Landscape Institute, 2019. Technical Guidance Note 06/19, Visual Representation of Development Proposals [online]. [Accessed 01 July 2024]. Available from: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf

¹⁹ Landscape Institute, 2021. Technical Guidance Note 02/21, Assessing landscape value outside national designations [online]. [Accessed 01 July 2024]. Available from: https://www.landscapeinstitute.org/publication/tgn-02-21-assessing-landscape-value-outside-national-designations/



- Associations Landscape which is connected with notable people, events and the arts.
- Distinctiveness Landscape that has a strong sense of identity.
- Recreational Landscape offering recreational opportunities where experience of landscape is important.
- Perceptual (scenic) Landscape that appeals to the senses, primarily the visual sense.
- Perceptual (wildness and tranquillity) Landscape with a strong perceptual value notably wildness, tranquillity and/or dark skies.
- Functional Landscape which performs a clearly identifiable and valuable function, particularly in the healthy functioning of the landscape.
- 4.3.8Landscape susceptibility relates to the ability of a particular landscape to accommodate the Proposed Development. It is appraised through consideration of the baseline characteristics of the landscape, and in particular, the scale or complexity of a given landscape. The evaluation of landscape susceptibility is defined as high, medium, or low and is supported by a clear explanation.
- 4.3.9The appraisal of sensitivity of the landscape receptor has been made by applying professional judgement to combine and analyse the factors which contribute to the identified value with those which contribute to susceptibility. Landscape sensitivity has been described based on a scale of very high, high, medium, low, or very low. **Table 4-1**, below, outlines indicators that inform landscape value, susceptibility, and sensitivity.

	Higher sensitivity	Lower Sensitivity
Value	A designated landscape (For example National Scenic Area) or a landscape in very good condition, exceptional scenic quality and high recreational opportunities or a high degree of rarity.	 Landscapes containing few if any notable elements / features, of poor condition or containing several detracting features and limited aesthetic qualities. Landscapes which are not formally designated.
Susceptibility	Attributes that make up the character of the landscape which offer very limited opportunities to accommodate change of the type proposed without fundamentally altering key characteristics.	 Attributes that make up the character of the landscape which are tolerant of a large degree of the type of change proposed without fundamentally altering the key characteristics.

Table 4-1 Sensitivity of Landscape Receptors

Visual Sensitivity

4.3.10The sensitivity of visual receptors has been defined through an appraisal of the viewing expectation, or value placed on the view as identified in the baseline study, and its susceptibility to change. The value of the view is an appraisal of the value attached to views and is often informed by the appearance on OS or tourist maps and in guidebooks, literature and art, or identified in policy. Value can also be indicated by the provision of parking or services and signage and interpretation. The nature and composition of the view



and its scenic quality is also an indicator. The value of the view has been classified as high, medium, or low and is supported by evidenced, professional judgements.

- 4.3.11The susceptibility of visual receptors to change has been established as a function of the occupation or activity of people experiencing the view, and the extent to which their attention or interest is focussed on the view and the visual amenity they experience. For example, residents in their home, walkers whose interest may tend to be focused on the landscape or a particular view, or visitors at an attraction where views are an important part of the experience, indicate a higher level of susceptibility. Conversely receptors engaged in outdoor sport where views are not important or receptors at their place of work are considered less susceptible to change.
- 4.3.12As with landscape susceptibility, judgements about the susceptibility of visual receptors have been described as high, medium, or low using consistent and reasoned judgements.
- 4.3.13The appraisal of sensitivity of the visual receptor has been made by applying professional judgement to combine and analyse the factors which contribute to the identified value with those which contribute to susceptibility.
- 4.3.14**Table 4-2**, below outlines indicators that inform landscape value, susceptibility, and sensitivity. Landscape sensitivity has been described based on a scale of very high, high, medium, low, or very low.

	Higher sensitivity		Lower Sensitivity
Value	Views protected by designation, or nationally recognised, or recorded on maps/guidebooks or with cultural associations. Views that have high scenic qualities relating to the content and composition of the view.	—	Views which are not documented or protected with minimal or no cultural associations and no facilities and/or interpretation. Views that exhibit low scenic qualities relating to the content and composition of the view.
Susceptibility	Viewers whose attention or interest is focused on their surroundings and for which views are highly important to their enjoyment.		People whose attention or interest is not focused on their surroundings and where the view is incidental to their enjoyment.

 Table 4-2 Sensitivity of Visual Receptors

Landscape Magnitude of impact

- 4.3.15The landscape magnitude of impact refers to the extent to which the Proposed Development would alter the existing characteristics of the landscape. It is an expression of the size or scale of change to the landscape, the geographical extent of the area influenced, and its duration and reversibility. The variables involved are:
 - the extent of existing landscape elements that would be lost, the proportion of the total extent that this represents and the contribution of that element to the character of the landscape;
 - the extent to which aesthetic or perceptual aspects of the landscape are altered either by removal of existing components of the landscape or by the addition of new components;



- whether the change alters the key characteristics of the landscape that are integral to its distinctive character;
- the geographic area over which the change would be experienced (for example within the application boundary, the immediate setting around that boundary, at the local LCA scale, or on a larger scale influencing broader areas of landscape character);
- the duration of the change (i.e. short term (0-5 years), medium term (5-10 years), or long term (10 years +)), and its reversibility (i.e. whether it is permanent, temporary, or partially reversible); and
- Landscape change can be both direct, through alteration of physical components, or indirect, resulting from changes to perceptual aspects of character and how it is experienced.
- 4.3.16An overall appraisal of the magnitude of landscape effect resulting from Proposed Development on landscape receptors has been made by combining the above judgements using evidence and professional judgement. The levels of landscape magnitude of impact are described as very high, high, medium, low, very low and none as defined in in Table 4-3.

Magnitude	Criteria
Very High	Substantial alteration to the landscape receptor or may impact an extensive area or unique characteristics at a local level. May be longer term, permanent or reversible.
High	Large alteration to the landscape receptor or may impact an extensive area or unique characteristics at a local level. May be longer term, permanent or reversible.
Medium	Partial alteration to the landscape receptor or may impact a wide area or characteristics at a local level. May be medium term, permanent or reversible.
Low	Slight alteration to the landscape receptor or may impact a restricted area and few key characteristics. May be short to medium term, permanent or reversible.
Very Low	Very little, or no perceptible change to key characteristics or setting.
None	No change to the landscape receptor.

Table 4-3 Landscape Magnitude of impact

Visual Magnitude of impact

- 4.3.17Visual magnitude of impact relates to the extent to which the Proposed Development would alter the existing view and is an expression of the size or scale of change in the view, the geographical extent of the area influenced and its duration and reversibility. The variables involved are described below:
 - The scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the Proposed Development;
 - The degree of contrast or integration of any new features or changes in the form, scale, composition and focal points of the view;
 - The nature of the view of Proposed Development in relation to the amount of time over which it would be experienced, and whether views of this would be visible fully, partially or glimpsed;



- The angle of view in relation to the main activity of the receptor, distance of the viewpoint from Proposed Development and the extent of the area over which the changes would be visible; and
- The duration of the change (i.e. short term (0-5 years), medium term (5-10 years), or long term (10 years +), and its reversibility (i.e. whether it is permanent, temporary, or partially reversible).
- 4.3.18An overall appraisal of the magnitude of visual effect resulting from Proposed Development on the visual receptors has been made combining the above judgements using evidence and professional judgement. The levels of visual magnitude of impact are described as very high, high, medium, low, very low and none as defined in the **Table 4-4** below.

Magnitude	Criteria
Very High	A substantial change to the composition of the view or change that may be viewed in the foreground or directly. May be longer term, permanent or reversible.
High	A pronounced change to the composition of the view or change that may be viewed in the foreground or directly. May be longer term, permanent or reversible.
Medium	A noticeable change to the composition of the view or change that may be viewed in the middle ground or indirectly. May be medium term, permanent or reversible.
Low	An unobtrusive change in the composition of the view or change that may be viewed in the background or obliquely. May be short to medium term, permanent or reversible.
Very Low	Very little, or no perceptible change in visual composition.
None	No change to the view.

Table 4-4 Visual Magnitude of impact

Level of Effects

- 4.3.19Determination of the level of landscape and visual effects has been undertaken by employing professional judgement and experience to combine and analyse the magnitude of impact against the identified sensitivity of landscape and visual receptors.
- 4.3.20The landscape appraisal has taken account of direct and indirect changes to existing landscape elements, features, key characteristics and evaluates the extent to which these would be lost or modified, in the context of their importance in determining the existing baseline character.
- 4.3.21The visual appraisal has taken account of the likely changes to the visual composition, including the extent to which new features would distract or screen existing elements in the view or disrupt the scale, structure, or focus of the existing view.
- 4.3.22The level of landscape and visual effects are described with reference to the criteria presented in **Table 4-5** below. It is important to note that the levels of effect represent steps on a sliding scale and as such there is a degree of variation, or tolerance, within each level. Some effects may be towards the lower end of a level and some towards the upper end and so two receptors at the same level may not be directly comparable.



Table 4-5 Level of Effect

Level of Effect	Landscape	Visual
Major Beneficial	Alterations that result in a considerable improvement of the existing landscape resource. Valued characteristic features would be restored or reintroduced.	Alterations that typically result in a pronounced improvement in the existing view.
Moderate Beneficial	Alterations that result in a partial improvement of the existing landscape resource. Valued characteristic features would be largely restored or reintroduced.	Alterations that typically result in a noticeable improvement in the existing view.
Minor Beneficial	Alterations that result in a slight improvement of the existing landscape resource. Characteristic features would be partially restored.	Alterations that typically result in a limited improvement in the existing view.
Negligible Beneficial	Alterations that result in a very slight improvement to the existing landscape resource, not uncharacteristic within the receiving landscape.	Alterations that typically result in a barely perceptible improvement in the existing view.
Neutral	No alteration to any of the components that contribute to the existing landscape resource.	No change to the existing view.
Negligible Adverse	Alterations that result in a very slight deterioration to the existing landscape resource, not uncharacteristic within the receiving landscape.	Alterations that typically result in a barely perceptible deterioration in the existing view.
Minor Adverse	Alterations that result in a slight deterioration of the existing landscape resource. Characteristic features would be partially lost.	Alterations that typically result in a limited deterioration in the existing view.
Moderate Adverse	Alterations that result in a partial deterioration of the existing landscape resource. Valued characteristic features would be largely lost.	Alterations that typically result in a noticeable deterioration in the existing view.
Major Adverse	Alterations that result in a considerable deterioration of the existing landscape resource. Valued characteristic features would be wholly lost.	Alterations that typically result in a pronounced deterioration in the existing view.

Temporal Scope of Appraisal

- 4.3.23Landscape and visual effects can differ from one stage of Proposed Development to the next and change over time as mitigation planting establishes and matures. The LVA therefore considers potential effects of the Proposed Development at each of the following stages:
 - Construction: including consideration of all temporary structures and works areas relating to construction, such as temporary construction compounds, movement of plant and machinery etc.



 Operation: including consideration of potential medium to longer term effects associated with the Proposed Development following completion of the construction phase and associated reinstatement. This stage is intended to represent the potential worst-case operational effects prior to establishment of mitigation planting. Where relevant, the appraisal also considers potential longer-term impacts, at year 15 of operation, to give an indication of the influence of proposed mitigation measures.

4.4 Baseline Environment

Study Area

4.4.1A Study Area of 2 km from the outer edge of the proposed substation site and 1 km from the proposed existing access track upgrades as shown in Figure 4-1, Appendix A Figures has been identified for the LVA. The extent of the Study Area has been informed by desk and site-based review, analysis of the Zone of Theoretical Visibility (ZTV) (Figure 4-1, Appendix A Figures), aerial photography and mapping and application of professional judgement. The Study Area extent has been reviewed and refined during the appraisal processes to ensure the appraisal is focused on the greatest potential landscape and visual effects.

Zone of Theoretical Visibility

- 4.4.2ZTV mapping has been undertaken to establish the theoretical extent of visibility of the Proposed Development. The ZTVs have been used to inform the extent of the Study Area and the identification of landscape and visual receptors. The ZTV maps indicate areas from where it may be possible to view the Proposed Development and are considered as a tool to assist in evaluating the theoretical visibility and not a measure of the visual effect. The approach to ZTV modelling and limitations in their use are outlined below:
 - Figure 4-1 (Appendix A Figures) provides a ZTV based on a bare ground topographical model – OS Terrain 5 Digital Terrain Model (DTM) data which does not take account of the screening effects of vegetation, buildings or other structures. This ZTV therefore represents a theoretical worst case scenario, indicating maximum potential visibility of the Proposed Development;
 - Figure 4-1b (Appendix A Figures) provides a ZTV based on the above DTM but with the addition of existing areas of forestry/ woodland and buildings and is intended to provide a more realistic impression of the potential visibility of the Proposed Development;
 - The ZTVs are calculated on a proposed substation geometry with a finished floor level to be 241 m AOD and a maximum structure height at 13 m above proposed ground level;
 - Some areas of theoretical visibility may comprise buildings, forestry and woodland which don't tend to be visited, and the likelihood of views being experienced is consequently low; and
 - The ZTV maps do not take account of the likely orientation of a viewer, such as the direction of travel and there is no allowance for reduction of visibility with distance, weather, or light.



4.4.3ZTV analysis was undertaken as part of the LVA in parallel with the iterative design process to identify and refine the Proposed Development.

4.5 Sensitive Landscape Receptors

4.5.1Although the Braco Garden and Designed Landscape (GDL) is located outside the 2 km Study Area, a small part is within the 1 km Study Area offset from the proposed existing access track upgrades... The Ochil Hills Local Landscape Area (LLA) is located in close proximity to, but outside, the Study Area. These designated sites are shown on Figure 4-2, Appendix A Figures.

Braco GDL

4.5.2This GDL is located northeast of the Site and is recognised for its architectural and nature conservation merits and is a good example of a small 19th-century landscape showing different elements with park, walled garden, and woodland walks. Intervening topography and woodland would result in very little or no visibility of the Proposed Development from the GDL and as such has not been considered further within the LVA.

Ochil Hills LLA

- 4.5.3This LLA includes the whole of the Ochil Hills range which lies between Strathearn and the Loch Leven Basin. This LLA is comprised of a strong band of hills forming the gateway between Perthshire and Kinross-shire and the setting to both. This is a relatively tranquil area with a strong sense of isolation and extensive areas of heather moorland and bands of broadleaf woodland within glens and lower slopes.
- 4.5.4The LLA is outside the Study Area, and although there is potential for visibility of the Proposed Development, particularly from more elevated open slopes, the separation distance and context of settlement and development in the intervening landscape would limit potential change. On the basis that the Proposed Development would have little or no influence on the perceptual qualities of the LLA it has not been considered further in the LVA.

Landscape Character

- 4.5.5The landscape character of the Study Area ranges from a broad lowland valley in the south and low undulating hills in the north. Pockets of plantation forestry are concentrated along the gradually sloping moorland and rough grazing land in the north. Settlement areas are concentrated south, southeast, and east of the Proposed Development with scattered dwellings and ribbon development along public roads. Existing electrical infrastructure is present within the immediate context of the application site, including overhead transmissions lines (notably the 400kv Beauly- Denny line), wood-pole lines and the existing Braco West Substation.
- 4.5.6The landscape appraisal for the Proposed Development is based on the LCTs defined and described by NatureScot²⁰. The following LCTs are found within the Study Area and immediate context, as indicated on **Figure 4-3**, **Appendix A Figures**:
 - LCT 149: Lowland Hills Central;
 - LCT 150: Lowland Hill Fringes Central;

²⁰ Scottish Landscape Character Types Map and Descriptions | NatureScot



- LCT 380: Lowland Hills Tayside; and
- LCT 384: Broad Valley Lowlands Tayside.
- 4.5.7The following provides a summary of the character and value of each of the LCTs. A description of the defined key characteristics of each LCT are provided on the NatureScot website.

LCT 149: Lowland Hills – Central

- 4.5.8This LCT covers a relatively large area of low rounded hills and gentle slopes centred on Uamh Beag and provides an important backdrop to views from the River Teith valley to the south. A series of burns and streams form faint, but visible, incisions which dissect the hill slopes. This is a large scale and open landscape, with a broadly consistent moorland land cover, locally altered by large blocks of coniferous forestry. The very limited nature of settlement results in a local sense of remoteness and exposure in parts of this landscape, although this is often influenced by the presence of the Braes of Doune Wind Farm which occupies a prominent location on the upper slopes.
- 4.5.9This LCT is not covered by a landscape designation and there are few recreational pursuits, and notable energy development and blocks of plantation forestry. Overall, although this LCT provides a backdrop to the River Teith valley, landscape value is considered to be low.

LCT 150: Lowland Hill Fringes – Central

- 4.5.10This LCT consists of undulating, rolling topography with larger scale hill landforms and pronounced relief forming panoramic views from the hill fringes and valleys. The area has a diversity of land cover from open improved and unimproved pastureland, broadleaf woodlands, coniferous forests and estate landscapes with hedgerows and mixed shelterbelts. There is a concentration of small water bodies including reservoirs and watercourses. Residential development is scattered on lower slopes, with minor roads and estate landscapes which create a distinctive character in the area.
- 4.5.11This LCT is not subject to any designations. Wooded glens and network of lochans offer high quality habitats and sense of isolation, however, the expanse of plantation woodland and associated operations are the dominate land use within the Study Area. Taking this into account, landscape value is considered to be low.

LCT 380: Lowland Hills – Tayside

4.5.12This LCT covers a series of low ridges and hills between Strathallan and Strath Tay, separating the valleys and adjoining nearby uplands. This is a transitional landscape, with pastures on lower slopes, woodland and coniferous plantation on mid slopes and open moorlands higher up. Modern settlements with scattered farmsteads, prehistoric standing



stones and Roman forts provide an indication of the historical and cultural associations. Part of the Braco GDL is located on the fringe of this LCT.

4.5.13This is a transitionary landscape that offers some recreational routes, cultural associations and elements. The expanses of plantation woodland are less valued characteristics, as are the existing OHLs and substation. On balance, landscape value is considered to be low.

LCT 384: Broad Valley Lowlands – Tayside

- 4.5.14This LCT is characterised by broad straths, loosely enclosed by low foothills and hill ridges. Nearby are underdeveloped rivers at low elevations, eskers and dry valleys from glacial deposition. The fields are visually distinctive in their red soils with some enclosed by wire fencing. A decline in trees and hedges has created a more open landscape with clearer visibility to the two main trunk roads. Electrical pylons are large and noticeable features within the landscape. Nearby are large estates include pockets and glens of mature woodland and lochans.
- 4.5.15This LCT is not subject to any landscape designations but includes a range of recreational routes and core paths, where scenic quality is mixed. Landscape pattern is varied and the overall impression of quality is influenced by electrical pylons. Taking this into account, landscape value is considered to be low.

4.6 Sensitive Visual Receptors

- 4.6.1This visual appraisal determines the degree of anticipated change to visual amenity experienced by people (visual receptor) that would occur from the construction and operation of the Proposed Development. Potential visual receptors which may experience views of the Proposed Development include:
 - Nearby settlements and residential properties, including parts of Braco village and a series of isolated farmsteads largely within the south and east of the Study Area;
 - Users of recreational routes such as the local Core Paths network within and near Braco village; and
 - Road users travelling along the A822 and B8033.

Representative Viewpoints

- 4.6.2The visual appraisal is based on representative viewpoints selected to provide a cross section of receptor types, locations and distances from the Proposed Development and focused on receptors with the greatest potential for effects. The final list of viewpoints were selected in consultation with PKC.
- 4.6.3**Table 4-6** below, provides details of the viewpoints, including the receptor type they are representative of and a description of the baseline view. The locations of each viewpoint are shown on **Figure 4-4**, **Appendix A Figures**.



Table 4-6 Representative Viewpoints

ID	Name	Receptor Type	Easting	Northing	Value of the View
1	Core Path BRAC/111/4 (west)	Recreational	280349	710532	
Baseline Description: This viewpoint is representative of recreational users along the Core Path BRAC/11/4. This viewpoint is in an upland area of the Lowland Hills Tayside LCT. This is an elevated location where wide-angle views comprise of open pasture and moorland with pockets of surrounding plantation forestry extending to the mid-ground. The existing Beauly-Denny OHL is a prominent feature extending from mid-ground to the skyline across a wide part of the view. The background view south comprises of a band of plantation forestry interrupted by existing Braco West Substation and OHL towers. This is a typical view across the landscape where OHL towers and forestry are prominent manmade features. Taking this interview.					Low
2	Core Path BRAC/111/4	Recreational	280916	710620	
Baseline Description: This viewpoint is representative of recreational users along the Core Path BRAC/11/4 along an upland area. The viewpoint is located west of the Braco GDL and associated woodland, and gains elevated and expansive views over the surrounding landscape. Foreground views southwest extend across open pasture to sloping forestry across pockets of the mid-ground view. The background comprises of larger expanse of plantation forestry with a range of mature, recently felled and more recently planted blocks. The Beauly-Denny OHL is a noticeable manmade feature in the skyline. Ongoing construction activity and the presence of shipping containers are visible on the skyline directly south and contribute to the wider influence of electrical infrastructure within an otherwise rural view. This is a typical view where although the elevated and expansive nature of views contributes to the quality, the presence of electrical infrastructure and plantation forestry reduce the overall value. Visual value is considered to be low.					Low
3	Core Path BRAC/108/3 along laneway to Tamano Farm	Recreational and Residential	280595	708052	
Baseline Description: This viewpoint is representative of residents and recreational users along the Core Path BRAC/108/3. The viewpoint is captured from the Core Path. The foreground is comprised of undulating grassland pasture interrupted by a low wood pole line. Mid-ground views are comprised of more open pasture with pockets of broadleaf woodland. The residential property (a farm with outbuildings) is well screened by surrounding mature trees and barely visible through breaks in existing mature tree-cover. The background view is comprised of plantation forest ranging from mature, to recently planted and felled on the gently sloping hills. Existing OHL towers are visible on the skyline. Overall, this is a typical view with no special scenic quality and the visual value is considered to be low.					Low
4	Core Path BRAC/104/1	Recreational	282664	707690	
Baseline Description: This viewpoint is representative of views experienced by recreational users along Core Path BRAC/104/1. At this point, an embankment immediately overlooks the Allan River through thickets of scrubland and bushy outcrop on the opposite side of the river. A stockpile of building rubble on the embankment and small shed are visible on the opposite embankment. Expanses of arable grassland can be seen in the middle to long distance with the characteristic gently sloping hills forming the background of view. Plantation forestry and				Low	



ID	Name	Receptor Type	Easting	Northing	Value of the View
OHL towers are perceptible featured on the distant skyline. Views along the naturalistic river corridor contribute to the scenic qualities and are the main focus of views. The electrical infrastructure and plantation are less attractive elements, located in the background of the view northwest. The overall visual composition is typical within this part of the landscape and visual value is considered to be low.					
5	Core Path BRAC/108/3 close to Calzieveg Farm	Recreational and Residential	280891	708798	
Baseline Description: This viewpoint is representative of the views experienced by nearby residential receptors, including at Calzieveg Farm, and recreational users along the Core Path BRAC/108/3. Foreground and mid-ground views extend across gently rising landform comprised of rough grazing pasture alongside a derelict property (to the right of view) and the characteristic gently sloping hills in the background. Surrounding mature tree cover can be seen enclosing the Tamano Farm property in the middle to far distance however views from this viewpoint towards the Proposed Development are screened by the landform. The background view is defined by pockets of woodland and plantation forestry. Upper portions of wind turbines and OHL towers can be seen on the skyline. This is an undesignated view of mixed quality and composition as such visual value is considered to be low.					

4.6.4In addition to the above representative viewpoints, a small number of residential receptors to the south of the Proposed Development are located within the ZTV, indicating potential for visual effects. There are also a small number of properties adjacent to the existing access track, with potential for construction stage impacts.

Ballendall, Knoxfauld and Craighead – scattered residential properties

4.6.5Each of the properties at Ballendall, Knoxfauld and Craighead, are located on the lower slopes of the north side of Strathallan. The main orientation of the dwellings appears to be to the south or southeast where they are likely to gain open expansive views over Strathallan and towards the Ochil Hills. Views to the north and northeast tend to be more restricted by a combination of adjacent farm buildings, rising topography and trees and woodland, although more open views are possible from some of the visitor accommodation at Craighead, one property at Ballendall and parts of some of the residential gardens. Views are not recognised on mapping and are from private dwellings with no public access and as such are considered to be of low value.

Easter Feddal – scattered residential properties

4.6.6Views from this group of properties, including Easter Feddal, Silver Birch Lodge, Gamekeepers Cottage, Crofthead, Whistlebrae, are variable and often at least partially restricted by trees, woodland and forestry. Where outward views are possible, they tend to be of medium range, with some more distant open views possible from some locations. Properties tend to be primarily orientated to the south and east, with views north typically more limited. Views are not recognised on mapping and are from private dwellings with no public access and as such are considered to be of low value.

4.7 Embedded Mitigation

4.7.1Landscape and visual considerations have been important in informing the siting and design of the Proposed Development. This process ensures potential adverse effects are



designed out as far as possible and mitigation measures are embedded within the scheme design, further reducing potential adverse effects. Key embedded mitigation measures relevant to landscape and visual impacts include:

- Siting of the substation infrastructure within a relatively visually contained location, within existing plantation forestry (at different stages of production/ felling) and adjacent to the existing Braco West Substation and OHL, therefore limiting potential for landscape fragmentation and visual impacts;
- Upgrading existing access track to limit the requirement for construction of new tracks;
- Incorporating earthworks and targeted native woodland planting to provide an element of screening and aid landscape integration; and
- Peatland restoration within suitable areas, providing habitat creation and reflecting the landscape context.
- 4.7.2The holistic approach adopted for landscape and visual, forestry, and ecology mitigation is outlined in more detail in Chapter 5 Ecology and Nature Conservation and Appendix F Landscape and Habitat Management Plan.

4.8 Sources of Effect

- 4.8.1Sources of potential landscape and visual effects include the following:
 - Temporary physical change to the landscape as a result of vegetation removals, introduction of construction compounds, buildings and structures, laydown or storage areas, and earthworks.
 - Temporary change to perceptual aspects of landscape character, including the sense of remoteness or tranquillity, as a result of nearby construction activity, including lighting at night.
 - Temporary disruption or change to views experienced from receptors and at viewpoints as a result of visibility of construction activity, temporary compounds, tracks and associated lighting.
 - Long term and / or permanent change to physical components of the landscape, including loss of existing features such as trees or woodland, and introduction of new elements associated with the proposed substation buildings and structures, the proposed existing access track upgrades and the track extension and upgrades.
 - Change to perceptual aspects of the landscape character because of introduction of the Proposed Development into adjacent or nearby landscapes.
 - Longer term and/or permanent change to the composition and nature of views because of the introduction of new buildings and structures associated with the proposed substation, the proposed existing access track upgrades and the track extension and upgrades.

4.9 Appraisal of Landscape Effects

4.9.1Landscape effects relate to physical changes to the fabric of the landscape and/or changes to the way a landscape and its character are perceived as a result of the introduction of the



Proposed Development. The landscape appraisal considers the effect of the Proposed Development on the LCTs found within the Study Area.

LCT 149 Lowland Hills – Central

- 4.9.2Landscape value is low. Factors that reduce susceptibility include the expanses of plantation forestry on steeply sloping topography between this LCT and the Site and the existing context of electrical infrastructure and energy development. Taking this into account susceptibility is low. Combining the identified low value with a low susceptibility, results in a low sensitivity.
- 4.9.3During construction, effects would be limited to the setting and perceptual qualities of this LCT, with no change to physical characteristics. Existing forestry plantation would largely restrict visibility of the Proposed Development from the parts of this LCT found within the Study Area. There would be little or no perceptible change to the quality and impression of character within this LCT. Taking these factors into account, the magnitude of impact would be very low. The low sensitivity of the receptor combined with the very low magnitude of impact would result in a **negligible adverse** effect at construction.
- 4.9.4As is the case for construction, there would be no discernible change to the quality and impression of character within this LCT at operation and in the long-term. As such the magnitude of impact would be very low and the level of effect **negligible adverse** at operation. Proposed mitigation planting is likely to further reduce potential effects on this LCT over time.

LCT 150 – Lowland Hill Fringes - Central

- 4.9.5Landscape value is considered to be low. Factors that reduce susceptibility include the presence of existing wind turbines, OHLs and plantation forestry. Taking this into account susceptibility is low. Combining the identified low value with low susceptibility results in a low sensitivity.
- 4.9.6Construction activities would predominantly be in the neighbouring Lowland Hills Tayside LCT, approximately 1.5km northeast, and therefore would not result in any direct change. ZTV coverage within the Study Area is relatively widespread, however, intervening woodland and topography would restrict the influence of construction activity on the perceptual characteristics of this LCT which primarily relate to a sense of remoteness and isolation. Any potential change would also be experienced in the context of the existing OHL both within this and the neighbouring LCT. There would be no change to the remainder of the identified key characteristics which relate to physical components of the landscape. On balance, the magnitude of impact would be very low and the level of effect negligible adverse at construction.
- 4.9.7At operation, the Proposed Development would slightly increase the influence of electrical infrastructure on the setting of a localised part of this LCT already influenced by the OHL. Overall, effects would be long-term and permanent but would result in very limited change to the quality and impression of the character of this LCT. The magnitude of impact would



be very low and the level of effect **negligible adverse** at operation. Proposed mitigation planting is likely to further reduce potential effects on this LCT over time.

LCT 380: Lowland Hills – Tayside

- 4.9.8Landscape value is judged to be low. The large-scale nature of this LCT coupled with the existing commercial forestry land use and context of existing electrical infrastructure somewhat reduces the susceptibility to change, particularly for development located adjacent to existing infrastructure. On balance susceptibility is considered to be low. Combining the identified low value and low susceptibility results in low sensitivity to change.
- 4.9.9Construction of the Proposed Development would occur within this LCT and as such change would be both direct and indirect. Construction operations would be largely contained within recently felled plantation adjacent to the existing Braco West Substation or associated with the proposed existing access track upgrades. There would be limited loss of established trees and other landscape features. The scale and intensity of construction activities including low level vegetation clearance, the movement of plant, materials, and earthworks would be in contrast with the relative levels of tranquillity and an uncharacteristic addition within the landscape. The overall impression of change would be limited to a small area relative to the LCT as a whole and contained within existing plantation woodland/ forestry land use. Effects would be short-term in duration, and temporary in nature. On balance, most of the key characteristics and the more valued qualities would remain unchanged and therefore the magnitude of impact would be medium. Combining the low sensitivity with the medium magnitude of impact would result in **minor adverse** effect at construction.
- 4.9.10At operation, the majority of the Proposed Development, with the exception of a short section of the proposed existing access track upgrades would be located within this LCT and as such change would be both direct and indirect. Direct change would result from the loss of commercial forestry, much of which has been recently felled and replanted, and the introduction of the Proposed Development. Specifically, the introduction of buildings and outdoor electrical equipment associated with the Proposed Development would locally increase the scale and impression of electrical infrastructure adjacent to the existing Braco West Substation and OHL. The proposed existing access track upgrades and the track extension and upgrades would have some local influence but would be experienced in the context of existing forestry tracks in the vicinity. The extent of potential change would be somewhat reduced by adjacent mature commercial forestry and by topography. The reduction in the sense of tranquillity would be limited and localised to the Site and its immediate context. There would be no physical change to the more valued landscape characteristics within the wider extent of the LCT. Effects would be long-term and permanent although relatively localised. Taking all these factors into account, the magnitude of impact would be medium. The low sensitivity of the receptor combined with the medium magnitude of impact would result in a **minor adverse** effect at operation. The landscape and habitat proposals, in particular peatland restoration and targeted woodland planting, would establish over time and help integrate the Proposed Development into the landscape setting in the longer term.

LCT 384 Broad Valleys Lowlands – Tayside

4.9.11Landscape value is low. This is a relatively large-scale landscape with a variable sense of openness and enclosure. It is influenced by a range of existing settlement and linear



infrastructure which somewhat reduce the susceptibility to change. There is a degree of susceptibility to change of development on the more open elevated slopes out with this LCT, locally reduced by the presence of commercial forestry and electrical infrastructure. On balance, susceptibility to change of the type proposed is medium. Combining low value with medium susceptibility results in low sensitivity.

- 4.9.12During construction, potential change would largely occur out with this LCT and therefore would predominantly be indirect and result from the presence of activities within the neighbouring LCT. Direct change would be limited to localised works associated with the proposed existing access track upgrades. A combination of topography and existing woodland and forestry would limit potential indirect change to relatively localised areas in close proximity to the proposed existing access track upgrades and south of the substation and construction compounds. Overall, effects would be short-term and temporary in nature and the overall scale of change at construction would be very limited and the magnitude of impact would be very low. The low sensitivity of the receptor combined with the very low magnitude of impact would result in a **negligible adverse** effect at construction.
- 4.9.13As is the case for construction, there would be limited perceptible change to the quality and impression of character within this LCT during operation and in the long-term. The substation would be contained within existing forestry plantation, and this combined with intervening landform would limit the impression of change on the setting of this LCT. Direct change would be limited to the proposed existing access track upgrades, with little influence on the landscape character. All key characteristics and more valued elements would remain intact. Effects would be long-term and permanent. On balance, the magnitude of impact would be very low. The low sensitivity of the receptor combined with the very low magnitude of impact would result in a **negligible adverse** effect at operation.

4.10 Appraisal of Visual Effects

4.10.1The following provides an appraisal of potential visual effects on each of the representative viewpoint and visual receptor locations identified in the baseline.

Viewpoint 1 Core Path BRAC/111/4 (west)

- 4.10.2The value of this view is judged to be low. Views of the landscape setting contribute positively to the experience of walkers accessing the core path for recreational purposes and susceptibility is partially moderated by the existing Braco West Substation. On balance visual susceptibility is medium. The combination of the low value and medium susceptibility results in a medium sensitivity.
- 4.10.3During construction, activities would primarily be concentrated in a small part of the background of the view, beyond the existing Braco West Substation. The scale of construction activities would be limited to the movement of taller plant within the Site, works associated with the proposed existing access track upgrades, track extension and upgrades, and the movement of materials. Although this is a wide-angle multidirectional view, construction would be perceptible along the proposed existing access track upgrades and on part of the skyline. Overall, taking account of the short term and temporary nature of change, the magnitude of impact at construction would be low. The medium sensitivity of



the receptor combined with the low magnitude of impact would result in a **minor adverse** effect during construction.

4.10.4During operation, the Proposed Development would be predominantly screened by topography and the existing Braco West Substation such that there would be little or no impression of change from the viewpoint location, beyond the proposed existing access track upgrades. There is potential for slightly greater visibility of the Proposed Development from more elevated sections of the core path to the west. Where visible, the Proposed Development would occupy a small part of the broad expansive views and would not obstruct views to Strathallan or the Ochil Hills beyond. Potential change would also be experienced in the context of the existing Braco West Substation, OHL towers and existing tracks within the same part of the view. Occasional traffic would be perceptible on parts of the proposed existing access track upgrades and the track extension and upgrades immediately north of Braco West Substation but would not be dissimilar to existing levels of movement and activity. On balance, and taking a precautionary approach, the magnitude of impact would be low and when combined with the medium sensitivity of the receptor would result in a **minor adverse** effect during operation.

Viewpoint 2 Core Path BRAC/111/4 (east)

- 4.10.5The value of the view is judged to be low. Similar to viewpoint 1, views of the landscape setting and backdrop contribute positively to the experience of recreational receptors, although the presence of OHLs and commercial forestry somewhat reduces the scenic quality indicating an overall medium susceptibility. The combination of the low value and medium susceptibility results in a medium sensitivity.
- 4.10.6During construction, movement of vehicles and machinery and other construction activities would be visible across a relatively small part of the background view within the break between plantation forestry and the existing OHL towers on the skyline, along part of the proposed existing access track upgrades and along the proposed track extension and track upgrades immediately adjacent to the existing Braco West Substation. The scale and intensity of the majority of construction activities including earthworks, the movement of plant and materials, construction of buildings and structures would appear distant but at odds with the existing visual composition and balance of natural and manmade features. The increase in construction activity would be perceptible but considered a slight change in a limited part of the overall visual composition. Considering this and the short term and temporary nature of change, the magnitude of impact would be low. The medium sensitivity of the receptor combined with the low magnitude of impact would result in a **minor adverse** effect during construction.
- 4.10.7During operation, the Proposed Development would largely be screened from this location as a result of intervening landform and vegetation. Where visible, the Proposed Development would largely be seen beyond or immediately adjacent to the existing Braco West Substation and OHL towers, reducing the impression of change. The proposed existing access track upgrades and a section of the track extension and track upgrades adjacent to the existing Braco West Substation may also be visible but would be seen in the context of existing tracks and have little or no influence on the view. Taking the above into account, the magnitude of impact would be very low. The medium sensitivity of the



receptor combined with the very low magnitude of impact would result in a **negligible adverse** effect at operation.

Viewpoint 3 Core Path BRAC/108/3 along laneway to Tamano Farm

- 4.10.8The value of the view is judged to be low. Views experienced from residential receptors are considered highly important, although this is somewhat tempered by the extent of woodland within which the nearby dwellings are set which limits outward views. Views from recreational users of the landscape also form an important part of the experience. On balance, susceptibility is high. The combination of the low value and high susceptibility results in a medium sensitivity.
- 4.10.9During construction, there are likely to be relatively open views of movement and activity within the site accommodation area and adjacent new substation site from this location and a section of the core path. The movement of plant, earthworks and construction of buildings and electrical infrastructure would occupy a small but noticeable part of the view on the horizon and against the backdrop of the existing OHL towers. Views towards construction activity from the nearby residential properties at Tamano Farm would be more restricted due to screening by foreground trees and woodland. Overall, considering the open nature of views from part of the core path against the short-term and temporary nature of change, the magnitude of impact would be medium. Combining the medium sensitivity with the medium magnitude of impact would result in a moderate adverse effect during construction. A low magnitude of change and minor adverse effect would be experienced from the nearby properties (Tamano) due to increased screening and more limited visibility of construction activity.
- 4.10.10During operation, the Proposed Development would be visible across a small but noticeable part of the view from the viewpoint location and short section of the Core Path travelling north toeards the B8033. The proposed substation structures and associated earthworks would introduce new man made and built elements into a relatively small part of the view, adding to the context of existing electrical infrastructure. Views from the nearby residential properties and other sections of the core path would be more limited due to screening by topography, trees and woodland. Overall, the proposed substation would add to the presence of electrical infrastructure within the local landscape and change the composition of a small part of the view from this location and as such the magnitude of impact would be medium in the initial years after construction. The medium sensitivity of the receptor combined with the medium magnitude of impact would result in a **moderate adverse** effect at operation. As with construction, effects on nearby residential properties (Tamano) at operation would be lower than those experienced from the viewpoint location due to increased screening by foreground trees, with a low magnitude of impact and **minor adverse** effect.
- 4.10.11Following establishment of the proposed landscape mitigation and restoration measures, as detailed in **Appendix F Landscape and Habitat Management Plan**, the extent and nature of potential change would be reduced. Although adjacent forestry planting may provide an element of screening in the future, it is anticipated that structures and elements in the south and west of the proposed substation would remain visible at year 15 and as



such the magnitude of impact would remain within the medium category and level of effect would remain **moderate adverse**.

Viewpoint 4 Core Path BRAC/104/1

- 4.10.12The value of the view is judged to be low. Views along the river corridor are an important part of the experience for recreational users of the Core Path and as such susceptibility is high. The combination of low value and high susceptibility results in a medium sensitivity.
- 4.10.13The existing presence of vegetation and aspect of view would be retained and undisturbed. No construction activity would be visible from this point due to intervening landform and vegetation. There would be no change in views and the resulting magnitude of impact would be none and the level of effect **neutral** during both construction and operation.

Viewpoint 5 Core Path BRAC/108/3 close to Calzieveg Farm

- 4.10.14The value of the view is judged to be low. Views from residential receptors are considered important and as such visual susceptibility is high. The combination of the low value and high susceptibility results in a medium sensitivity.
- 4.10.15The site survey has indicated that there would be no visibility of the Proposed Development from this viewpoint location or from nearby sections of the core path due to screening by a combination of landform and mature vegetation. The ZTV also indicates that there would be no visibility of the Proposed Substation from the nearby residential properties of Calzieveg and Carsemeg or from the unoccupied property at Bentick. There would be no change experienced by these receptors and as such the magnitude of impact would be none and the level of effect at construction and operation would be **neutral**.

Ballendall, Knoxfauld and Craighead - scattered residential properties

- 4.10.16The value of view is judged to be low. Views experienced from residential receptors are considered important and as such the susceptibility to change is high. Considering the low value in combination with the high susceptibility, sensitivity to change is medium.
- 4.10.17During construction, there would be at least partial visibility of construction activity within the temporary construction compound and Site from some of these properties. Where visible, this would add movement and activity into north and northeast facing views, and would not be dissimilar to periodic forestry operations but would be of a greater intensity. Potential change would be temporary in nature and of a short duration and would generally be from the rear of properties and localised parts of gardens, with no impact on the main views from the majority of the properties which tend to be orientated to the south. Change would be relatively distant and would occur in a small part of the overall views available from these properties and associated gardens. On balance, change is anticipated to be relatively limited and/or of a short duration and as such the magnitude of impact would be low. Combining the medium sensitivity with the low magnitude of impact would result in a **minor adverse** effect at construction.
- 4.10.18At operation, the level of movement and activity would be reduced, and the Site accommodation area reinstated such that the extent of the view potentially influenced by the Proposed Development would be reduced. The proposed substation structures would be partially visible where outward north facing views are available from the rear of some properties and from select temporary accommodation and parts of residential gardens.



Farm buildings and vegetation in the foreground screens views from many of the properties, although more open visibility is anticipated from select locations. Where visible, the Proposed Development would add further electrical infrastructure into part of the view which includes existing OHL towers. On balance, although there is potential for relatively open visibility of the Proposed Development from localised parts of the properties it would generally occupy a small part of views available and would not affect the main south facing views from the majority of the properties. Overall, magnitude of impact is anticipated to be low and when combined with the medium sensitivity would result in a **minor adverse** effect at operation.

4.10.19Proposed landscape mitigation, and particularly peatland restoration measures, would help reduce the extent of potential change in a relatively short time period. However, the magnitude of impact and level of effect at year 15 of operation are anticipated to remain in the same categories as at year 1 (low magnitude and **minor adverse** effect from the majority of properties).

Easter Feddal – scattered residential properties

- 4.10.20The value of view is judged to be low. Views experienced from residential receptors are considered important and as such the susceptibility to change is high. Considering the low value in combination with the high susceptibility, sensitivity to change is identified as medium.
- 4.10.21During construction, there is likely to be close range views of movement and activity on the existing access track between the B8033 and the existing Braco West Substation, which is also the access to these properties. Change resulting from construction of the Proposed Development would principally be limited to an increase in vehicular movements and transportation of the substation components and proposed works to upgrade the existing access track. Potential change would be temporary in nature and of short duration. On balance it is considered that the magnitude of impact would be low, and when combined with the medium sensitivity would result in a **minor adverse** level of effect.
- 4.10.22During operation, the number of vehicles using the track to access the Proposed Development would be considerably reduced and not dissimilar to the existing situation and the proposed existing access track upgrades would have integrated into the surroundings and as such magnitude of impact would be very low and the level of effect **negligible adverse**.

4.11 Cumulative Appraisal

4.11.1This section presents an appraisal of potential cumulative effects resulting from the Proposed Development in addition to a number of other similar proposed or consented developments. In line with good practice guidance, including GLVIA²¹, the cumulative appraisal is undertaken on a targeted basis focused on the most significant cumulative effects and those which are likely to influence decision making. Cumulative schemes included within the scope

²¹ Landscape Institute and Institute of Environmental Management Assessment, 2013. *Guidelines for Landscape and Visual Impact Assessment. Third Edition.*



of this appraisal as detailed in **section 13.1.2** and within **Table 13-1** are summarised in **Table 4-7**, below and shown on **Figure 4-5**, **Appendix A Figures**.

Cumulative Development	Planning Reference & Description	Status
Cambushinnie UGC	24/00001/PAN: The implementation of a 32kV UGC to connect the Proposed Cambushinnie substation with the existing Braco West Substation.	Permitted Development – not yet in construction
Cambushinnie OHL tie-in	24/00373/SCRN: Proposed Cambushinnie OHL tie-in; a section 37 application for an OHL element including works such as tower dismantling, installation of conductors, removal of existing tower and ground reinstatement.	Intended for planning
49.9MW energy storage facility	21/00756/FLM: Approximately 50m southeast of the Proposed Development. Comprised of 50 battery storage container units, control building, ancillary equipment, parking, access track, boundary treatments, landscaping, and associated works.	Approved and under construction
49.9MW energy storage facility (compound)	22/02231/FLM: Approximately 100m northeast of the Proposed Development. Formation of a 49.99MW battery energy storage compound.	Approved

Table 4-7 Landscape and Visual Cumulative Developments

- 4.11.2The following two cumulative scenarios have been considered as part of this appraisal:
 - **Cumulative Scenario 1**: The cumulative baseline for this scenario includes cumulative developments which have been consented in addition to existing operational schemes.
 - **Cumulative Scenario 2:** The cumulative baseline for this scenario includes cumulative developments at application stage in addition to existing operational schemes and those which have been consented.
- 4.11.3The appraisal of cumulative magnitude of impact and level of effect involves consideration of the additional change resulting from the Proposed Development at operation to each cumulative baseline scenario. Construction stage cumulative effects have not been considered due to the short duration and temporary nature of potential change, and uncertainty of timing of construction of other identified developments.

Cumulative Landscape Appraisal

- 4.11.4Potential important cumulative effects would occur where the addition of the Proposed Development to the cumulative baseline would increase the prominence of energy infrastructure to the extent that it would become either an influential characteristic or character-defining feature of a landscape.
- 4.11.5As a result of the restricted nature of potential visibility and the limited nature of change resulting from the Proposed Development identified in the LVA, it is considered that there is very limited potential for important cumulative landscape effects on the majority of the landscape receptors found within the Study Area. The cumulative landscape appraisal therefore takes a targeted approach, focusing on LCT 380 Lowland Hills Tayside, within which each of the cumulative schemes and the majority of the Proposed Development would be located. Although the Proposed Development would also result in direct effects



within LCT 384 - Broad Valleys Lowlands – Tayside, these would be limited and localised in nature, related to the proposed existing access track upgrades and as such are not considered to contribute to potential cumulative effects.

LCT 380 - Lowland Hills – Tayside

- 4.11.6Landscape sensitivity would remain low, as for the non-cumulative assessment.
- 4.11.7In scenario 1, the consented battery storage facility (21/00756/FLM) would be located immediately adjacent to the existing Braco West Substation, resulting in a minor increase in the presence of electrical infrastructure within this LCT. The nature and location of this cumulative scheme is such that the cumulative baseline in scenario 1 would be largely similar to the existing conditions. The Proposed Development would add further electrical infrastructure into this LCT. The extent of potential change would be somewhat reduced by adjacent mature commercial forestry and by topography such that any influence on the sense of tranquillity would be limited and localised to the site and its immediate context. Overall, there would be a small increase in the perception of electrical infrastructure, concentrated in a localised part of this LCT, with the majority of the identified key characteristics unaffected. Taking all of this into account the cumulative magnitude of impact would be medium and when combined with a low sensitivity would result in a minor adverse level of cumulative effect for scenario 1.
- 4.11.8In scenario 2, the Cambushinnie UGC would be installed and reinstated such that it would not contribute to a cumulative effect. The Cambushinnie OHL Tie-in would result in minor alterations and a very slight increase in the impression of OHL towers in a limited part of this LCT. The battery storage compound (22/02231/FLM) would have a slightly greater, but still limited influence on the baseline landscape. Taken together, the cumulative schemes would increase the local influence of electrical infrastructure on a small part of this LCT. The addition of the Proposed Development into this cumulative scenario would consolidate the presence of electrical infrastructure within this part of the landscape. Any reduction in the more remote qualities associated within this landscape would be localised and the more valued characteristics of the wider LCT would remain intact. The addition of the substation has the potential to add to the perception of infrastructure within a landscape typically associated with forestry. Taking all of this into account the cumulative magnitude of impact would be medium and when combined with the low sensitivity would result in a minor adverse cumulative effect.
- 4.11.9The landscape and habitat proposals, in particular broadleaf woodland planting, would establish over time and help integrate the Proposed Development into the landscape setting and reducing potential cumulative change in both scenarios 1 and 2 in the longer term.

Cumulative Visual Appraisal

- 4.11.10Potential important cumulative effects would occur where the addition of the Proposed Development to the cumulative baseline would increase the prominence of energy infrastructure to the extent that they would potentially become either an influential characteristic or character-defining feature in views across the landscape.
- 4.11.11As identified in the non-cumulative assessment, above, there would be little or no visibility of the Proposed Development from the majority of the identified representative viewpoints and visual receptors. As a result, there would be very little or no potential for cumulative



effects on receptors at Viewpoint 2 (Core Path BRAC/111/4 (east)), Viewpoint 4 (Core Path BRAC/104/1) and Viewpoint 5 (Core Path BRAC/108/3 close to Calzieveg Farm) and as such they are not considered further in the cumulative assessment. The following section provides an appraisal of potential cumulative visual impacts on the remaining representative viewpoint and receptor locations.

Viewpoint 1 Core Path BRAC/111/4 west

- 4.11.12In scenario 1, the consented battery storage facility (21/00756/FLM) would be visible immediately adjacent to the existing Braco West Substation, adding slightly to the influence of electrical infrastructure in views from this core path.
- 4.11.13The Proposed Development would be predominantly screened from the viewpoint location. However, there is potential for slightly greater visibility of the Proposed Development from more elevated sections of the core path to the west. From these locations the addition of the Proposed Development to scenario 1 would be broadly similar to that set out in the non-cumulative assessment. It would locally add to the presence of electrical infrastructure in the view, but not to the extent where it becomes a defining characteristic. On balance, the magnitude of cumulative impact would be low and when combined with the medium sensitivity would result in a **minor adverse** level of cumulative effect in relation to scenario 1.
- 4.11.14In scenario 2, the Cambushinnie UGC would be installed and reinstated such that it would not contribute to a cumulative effect. The Cambushinnie OHL Tie-in would result in minor alterations and a very slight increase in the impression of OHL towers in a limited part of the view. The battery storage compound (22/02231/FLM) would have a slightly greater influence on the baseline view, increasing the extent of the view affected by electrical infrastructure.
- 4.11.15Where visible, the Proposed Development would add further electrical infrastructure into the view and although it would not increase the extent of the view affected it would add slightly to the overall concentration of development within a small part of the view. The other cumulative schemes, and particularly the combination of the existing Braco West Substation and both the consented and proposed battery storage schemes would have a greater presence and influence on the view, such that the additional change resulting from the Proposed Development would be relatively limited. On balance, the cumulative magnitude of impact would be low and when combined with the medium sensitivity would result in a **minor adverse** level of effect in relation to scenario 2.

4.11.16

Viewpoint 3 Core Path BRAC/108/3 along laneway to Tamano Farm

- 4.11.17In scenario 1, the consented battery storage facility (21/00756/FLM) would be screened from this location and as such there would be no additional cumulative effects.
- 4.11.18In scenario 2, the Cambushinnie UGC would be installed and reinstated and the proposed battery storage compound (22/02231/FLM) would be screened by topography and vegetation such that these schemes would not contribute to a cumulative effect. The Cambushinnie OHL Tie-in would result in minor alterations and a very slight increase in the impression of OHL towers in a limited part of the view. Potential cumulative change



and level of effect resulting from the addition of the Proposed Development would be the same as that identified in the non-cumulative assessment, **moderate adverse**.

Ballendall, Knoxfauld and Craighead - scattered residential properties

- 4.11.19In scenario 1, the consented battery storage facility (21/00756/FLM) would be predominantly screened by outbuildings, topography and vegetation from each of the residential properties such that it would not contribute to a cumulative effect.
- 4.11.20In scenario 2, the Cambushinnie UGC would be installed and reinstated and the proposed battery storage compound (22/02231/FLM) would be screened by topography and vegetation such that these schemes would not contribute to a cumulative effect. The Cambushinnie OHL Tie-in would result in minor alterations and a very slight increase in the impression of OHL towers in a limited part of the views, although would be relatively distant and often at least partially screened. No additional, cumulative effects are anticipated in scenario 2.

Easter Feddal - scattered residential properties

4.11.21In both scenario 1 and 2 each of the cumulative schemes would be predominantly or fully screened from these properties such that they would not contribute to a cumulative effect. Although there may be a slight increase in the number of vehicles using the existing access track at operation, this is not anticipated to result in any discernible change to views and as such there would be no cumulative visual effects on these properties.

4.12 Recommendations and Mitigation

4.12.1All landscape and visual mitigation measures are embedded and shown on the plan within **Appendix F Landscape and Habitat Management Plan**. Measures primarily include careful siting of the substation, retention of existing trees and woodland, where possible, and incorporation of new woodland planting, seeding and peatland restoration. These measures would contribute to a reduction of potential effects and help the Proposed Development better fit and integrate into the existing landscape and views.

4.13 Summary of Findings

4.13.1**Table 4-8** below provides a summary of the findings of the LVA.

Receptor	Sensitivtity	Constructio n Magnitude of impact	Level of Effect	Operation Magnitude of impact	Level of Effect
LCT 149 Lowland Hills – Central	Low	Very Low	Negligible Adverse	Very Low	Negligible Adverse
LCT 150 – Lowland Hill Fringes - Central	Low	Very Low	Negligible Adverse	Very Low	Negligible Adverse
LCT 380 - Lowland Hills – Tayside	Low	Medium	Minor Adverse	Medium	Minor Adverse

Table 4-8 Summary of Effects



Receptor	Sensitivtity	Constructio n Magnitude of impact	Level of Effect	Operation Magnitude of impact	Level of Effect
LCT 384 Broad Valleys Lowlands – Tayside	Low	Very Low	Negligible Adverse	Very Low	Negligible Adverse
Viewpoint 1 Core Path BRAC/111/4 (west)	Medium	Low	Minor Adverse	Low	Minor Adverse
Viewpoint 2 Core Path BRAC/111/4 (east)	Medium	Low	Minor Adverse	Very Low	Negligible Adverse
Viewpoint 3 Core Path BRAC/108/3 along laneway to Tamano Farm	Medium	Medium	Moderate Adverse	Medium	Moderate Adverse
Viewpoint 4 Core Path BRAC/104/1	Medium	None	Neutral	None	Neutral
Viewpoint 5 Core Path BRAC/108/3 close to Calzieveg Farm	Medium	None	Neutral	None	Neutral
Ballendall, Knoxfauld and Craighead - scattered residential properties	Medium	Low	Minor Adverse	Low	Minor Adverse
Easter Feddal - scattered residential properties	Medium	Low	Minor Adverse	Very Low	Negligible Adverse

Landscape Character

- 4.13.2No impacts are anticipated on the landscape designations identified within or in close proximity to the Study Area. Potential change on the identified LCTs would generally be limited such that the majority would experience **negligible adverse** effects during both construction and operation.
- 4.13.3Slightly greater change is anticipated on the Lowland Hills Tayside LCT, within which the Proposed Development would be located. The increased movement and activity during construction and introduction of new electrical infrastructure at operation is anticipated to


result in a localised and relatively limited change to this LCT. The assessment has therefore identified a **minor adverse** level of effect on this LCT during both construction and operation, and cumulatively with other nearby schemes. There is potential for the effects on this and other LCTs to reduce over time as proposed mitigation measures establish.

Visual Amenity

- 4.13.4The appraisal has identified no change and a **neutral** level of effect on views experienced by receptors at Viewpoint 4 (Core Path BRAC/104/1) and Viewpoint 5 (Core Path BRAC/108/3 close to Calzieveg Farm) at both construction and operation as a result of screening by intervening landform and vegetation.
- 4.13.5A minor adverse level of effect is identified at construction and operation for Viewpoint 1 (Core Path BRAC/111/4 west) and scattered residential properties to the south of the Proposed Development, including Ballendall, Knoxfauld and Craighead. A minor adverse level of effect at construction is also identified for Viewpoint 2 (Core Path BRAC/111/4 east) and scattered properties along the existing access track between the B8033 and existing Braco West Substation, including Easter Feddal, Silver Birch Lodge, Gamekeepers Cottage, Crofthead, Whistlebrae. Effects on these properties and Viewpoint 2 are anticipated to reduce to negligible adverse at operation.
- 4.13.6A greater level of effect of moderate adverse is anticipated for receptors at Viewpoint 3 (Core Path BRAC/108/3 along laneway to Tamano Farm) during both construction and operation (year 1, year 15 and cumulatively) due to greater potential visibility of the proposed substation. Effects on the nearby residential properties at Tamano Farm are anticipated to be lower (minor adverse) than those at the viewpoint due to increased screening from foreground vegetation.



5. ECOLOGY AND NATURE CONSERVATION

5.1 Introduction

- 5.1.1This chapter considers the potential effects of the Proposed Development on habitats and species within the Site, and within the wider local area. Evaluation of the existing baseline environment has been made through a combination of desk-based study, field surveys, and consultation. This EA chapter was written with cognisance of the methodology set out in Chartered Institute of Ecology and Environmental Management (CIEEM) (2024)²² guidance.
- 5.1.2Birds are considered separately in Chapter 6 Ornithology.
- 5.1.3This chapter:
 - Describes the key ecological issues associated with construction and operation of the Proposed Development;
 - Presents the desk study/survey methods that were used to generate ecological baseline information;
 - Includes details of consultation undertaken to date to inform the EA;
 - Presents the results of the surveys; and
 - Provides an outline of embedded mitigation, an appraisal of ecological features and potential significant effects, and identifies further mitigation measures and recommendations.
- 5.1.4Throughout this chapter, species are given their common and scientific names when first referred to and their common names only thereafter (except where a common name does not exist or is not well-known, in which case only the scientific name is used, such as for bryophytes). Nomenclature for vascular plants follows Stace (2019)²³ and for bryophytes, Atherton *et al.* (2010)²⁴. All distances are cited as the shortest distance 'as the crow flies', unless otherwise specified.

5.2 Information Sources

- 5.2.1External sources used to inform this chapter are referenced appropriately.
- 5.2.2The chapter draws on the following technical figures (see Appendix A Figures):
 - Figure 5-1 Statutory and Non-statutory designated sites;
 - Figure 5-2 Ancient and native woodland, and peatlands;
 - Figure 5-3 Baseline habitat plan;
 - Figure 5-4 Potential Groundwater Dependent Terrestrial Ecosystems;
 - Figure 5-5 Groundwater Dependent Terrestrial Ecosystems;
 - Figure 5-6 Mammal and other notable species survey results; and
 - Figure 5-7 Great crested newt Habitat Suitability Index survey results.

²³ Stace, C E, 2019. New Flora of the British Isles, 4th edition. C&M Floristics.

²² CIEEM, 2024. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Version 1.3, updated April 2022). Chartered Institute of Ecology and Environmental Management, Winchester.

²⁴ Atherton, I., Bosanquet, S. and Lawley, M., 2010. Mosses and Liverworts of Britain and Ireland – a Field Guide. British Bryological Society, London.



Consultation

- 5.2.3At the time of writing this chapter, consultations have been held regarding the potential ecological impacts of the Proposed Development with the following consultees (note that relevant consultation responses are detailed in **Section 5.2.4** and some of the organisations are yet to respond and are therefore omitted from the summary table below): Perth and Kinross Council (PKC); NatureScot; SEPA; Forestry and Land Scotland; Scottish Forestry; Forth District Salmon Fishery Board; Fisheries Management Scotland; Royal Society for the Protection of Birds (RSPB); Scottish Wildlife Trust; and Scottish Wild Land Group.
- 5.2.4The assessment of impacts on terrestrial ecological features has been informed and influenced by consultation held with several statutory and non-statutory stakeholders. A summary of the consultation responses/recommendations provided by consultees are provided in **Table 5-1**.

Consultee	Summary of Pre-application Response	
SEPA	 SEPA would like to see the detail for the habitat improvement included in the planning proposal. However, there is no peat assessment to date for any of the options, and the landowner has indicated some presence of peat. The carbon and peatland map indicates some Class 5 (peat soil). They stated that it would be useful if consideration of options would also compare the impact on peat as avoidance of development on peat is a requirement of policy 5 of National Planning Framework 4 (NPF4). SEPA note the intention of the applicant to carry out a full peat assessment. SEPA states that the information mentions lime mix may be required for stabilisation nearby Braco West and that it would be useful to have some information about the impact of this on surrounding acidic habitats if present. 	
NatureScot	NatureScot state that there will likely be no significant effect for the qualifying interests of all relevant designated sites.	
Scottish Forestry	Scottish Forestry requested that details of compensatory planting are included within the final development proposals with location, type, and size.	
Forth District Salmon Fishery Board	Forth District Salmon Fishery Board stated that there could be impact on rivers, e.g. from excessive sediments flowing into burns causing damage to riverine ecosystems. They recommended to ensure that the construction site is fully bunded to prevent escape of sediments into the burns and that such mitigation is encapsulated in an environmental management plan. They stated that measures should be in place to deal with severe rainstorm events if construction occurs during the summer. Additionally, where culverts pass under any new roads, they should be designed in such a way as to be passable for migratory fish and other aquatic wildlife at variable flows. A full assessment of potential pollution sources to be conducted, both diffuse from operational use and due to pollution incidents.	
Perth and Kinross Council (PKC)	PKC stated in a pre-application response that PKC will seek to protect and enhance all wildlife and habitats, whether formally designated or not, considering natural processes in the area. Planning permission will not be granted for development likely to have an adverse effect on protected species unless clear evidence can be provided that the ecological impacts can be satisfactorily mitigated.	

Table 5-1 Summary of Consultation



Consultee	Summary of Pre-application Response
	Ecological survey is required in the form of an Ecological Impact Assessment (EcIA). Details of survey requirements are outlined in the PKC Planning for Nature Supplementary Guidance Planning Guidance ²⁵ .
Impact assessments including the impact hierarchy in the form demonstrated in the heath habitats. PKC highlighted in th that possible effects ecology and biodiver woodland; Carsebre Tayside Goose Roos Area of Conservation	Impact assessments are required for habitats, species, and existing trees on site including the impact of new artificial lighting. Evidence of application of the mitigation hierarchy in the form of avoid, reduce, compensate, and enhance must be demonstrated in the submitted EcIA. Particular attention is drawn to peatland and dry heath habitats.
	PKC highlighted in the EIA Screening Opinion (Appendix P EIA Screening Opinion) that possible effects of the Proposed Development where to be considered on: ecology and biodiversity including protected species; ancient / woodland / semi-natural woodland; Carsebreck and Rhynd Lochs Site of Special Scientific Interest; South Tayside Goose Roosts Special Protection Area / Ramsar; Shelforkie Moss Special Area of Conservation; and, Drummond Lochs Site of Special Scientific Interest / Upper Strathern Oakwoods Special Area of Conservation.
	PKC highlighted proposed measures to avoid or prevent significant adverse effects, including a Phase 1 Habitat Survey including Protected Species Survey; Ecological Impact Assessment and Construction Environment Management Plan (CEMP). PKC stated that the Proposed Development is unlikely to have significant effects on the environment and that a full EIA was not necessary.

Desk Study

5.2.5A range of data sources were used for the desk study, as set out in **Table 5-2**.

Data Source	Date Accessed	Data Obtained
Mammal Society Species Hub ²⁶	19 February 2025	Information on protected and important mammals.
Marine Scotland Maps National Marine Plan interactive ²⁷	19 February 2025	Rivers important for migratory fish.
NatureScot – Peatland Action ²⁸	19 February 2025	Information on peat depth measurements collected across Scotland.
NatureScot SiteLink webpage ²⁹	19 February 2025	SAC and Ramsar sites within 10 km of the Site.

Table 5-2 Desk Study Data Sources

²⁵ Perth and Kinross Council (2022). *Planning Guidance - Planning & Biodiversity*. (online) Available at: https://www.pkc.gov.uk/article/21454/Planning-Guidance-Planning-Biodiversity [Accessed 24 November 2024]

²⁶ Mammal Society (2024) *British Mammal Species* (online) Available at: https://mammal.org.uk/british-mammals [19 February 2025Accessed: 19 February 2025]

²⁷ Marine Scotland (2024) National Marine Plan interactive map (online) Available at: https://marinescotland.atkinsgeospatial.com/nmpi/ [19 February 2025Accessed: 19 February 2025]

²⁸ NatureScot (2024) *Peatland Action* (online) Available at: https://www.nature.scot/climate-change/nature-based-solutions/peatland-action/

action-data-research-and-monitoring/peatland-action-open-data [19 February 2025Accessed: 19 February 2025] ²⁹ NatureScot (2024) *SiteLink* (online) Available at: https://sitelink.nature.scot/home [19 February 2025Accessed: 19 February 2025]



Data Source	Date Accessed	Data Obtained
		Sites of Scientific Special Interest (SSSIs) within 2 km of the Site.
Scottish Government webpage ³⁰	19 February 2025	Ancient Woodland Inventory (AWI) for Scotland and Native Woodland Survey of Scotland (NWSS).
National Biodiversity Network (NBN) Atlas Scotland ³¹	19 February 2025	Commercially available records of protected and/or important species within 1km of the Site, made since 2004.
OS 1:25,000 maps and aerial photography ³²	19 February 2025	Aerial imagery to identify potential habitats and connectivity relevant to interpretation of planning policy and potential protected/notable species constraints.
PKC Local Development Plan (LDP) ³³	19 February 2025	Information on local policies regarding the environment.
The PKC follows the Tayside Local Biodiversity Action Plan (LBAP) (2016-2026) ³⁴	19 February 2025	Information on protected or notable species.
Saving Scotland's Red Squirrels ³⁵	19 February 2025	Red squirrel Sciurus vulgaris records.
SEPA Water Classification Hub ³⁶	19 February 2025	Watercourse classification data.

³⁰ Scottish Government (2024) *webiste* (online) Available at: https://www.data.gov.uk/dataset/c2f57ed9-5601-4864-af5f-a6e73e977f54/ancient-woodland-inventory-scotland1; https://www.data.gov.uk/dataset/da3f8548-a130-4a0d-8ddd-45019adcf1f3/native-woodland-survey-of-scotland-nwss [19 February 2025Accessed: 19 February 2025]

³¹ NBN Atlas Scotland (2024) (online) Available at: https://scotland.nbnatlas.org/ [19 February 2025Accessed: 19 February 2025]

³² Bing Maps (2024) (online) Available at: www.bing.com/maps/ [19 February 2025Accessed: 19 February 2025]

³³ PKC (2019) Local Development Plan (online) Available at: https://www.pkc.gov.uk/ldp2 [19 February 2025Accessed: 19 February 2025]

³⁴ Tayside Biodiversity (2023) Tayside Local Biodiversity Plan (online) Available at: https://www.taysidebiodiversity.co.uk/ [Accessed: February 2024]

³⁵ Saving Scotland's Red Squirrels (online) Available at: https://scottishsquirrels.org.uk/ [19 February 2025Accessed: 19 February 2025]

³⁶ SEPA (2023) *Water Classification Hub* (online) Available at: www.sepa.org.uk/data-visualisation/water-classification-hub/ [19 February 2025Accessed: 19 February 2025]



Ecology Survey

5.2.6A vegetation survey of the Site was conducted broadly following the Phase 1 habitat survey methodology, with habitats classified according to UK Habitat Classification (UKHab), as set out in relevant guidance^{37,38}. Ecology surveys included detailed vegetation surveys, protected mammal surveys, and an assessment of habitat suitability for notable and protected species. Surveys were conducted on 15 January 2024, 18, 19 and 20 March 2024, and 04 April 2024. The survey area included the area within the Site. The survey area extended from 50 m to 500 m beyond the Site (dependent on the specific survey). The field survey methodology is detailed further in **Sections 5.3.7** to **5.3.21**.

5.3 Methodology

Sensitive Ecological Receptors

- 5.3.1Sensitive ecological receptors (also referred to as 'important' ecological features) have the potential to suffer significant adverse environmental effects as a result of the Proposed Development. This chapter aims to assess the likely environmental effects on sensitive ecological receptors and where necessary recommends mitigation to prevent significant residual effects.
- ^{5.3.2}CIEEM's Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland recommend that only those ecological features that are 'important' and that could be significantly impacted by a development require detailed assessment, stating that "*it is not* necessary to carry out detailed assessment of ecological features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable".²²
- 5.3.3Consequently, for the purposes of future desk study, field survey and assessment of effects, 'important' ecological features will be taken to include:
 - Sites designated for nature conservation, including those designated at international, national, and local levels;
 - The qualifying features of SPA, SAC and Ramsar sites within 10 km of the Site (extending to 20 km for sites designated for non-breeding geese species or where direct connectivity exists, e.g., via watercourses), and the notified features of SSSIs within 2 km of the Site (or further if these are directly connected);
 - Woodland listed on the Ancient Woodland Inventory³⁹ (AWI) within 2 km of the Site.
 - Habitats listed on Annex I of the Habitats Directive (Council Directive 92/43/EEC)⁴⁰;
 - Habitats listed on the Scottish Biodiversity List (SBL)⁴¹, which are thus identified as being of principal importance for biodiversity conservation in Scotland;
 - Species listed on Annexes I and II of the Habitats Directive⁴⁰;
 - Species listed on Schedules 2 and 4 of the The Conservation of Habitats and Species Regulations 2017⁴²;

 ³⁷ JNCC (2010) Handbook for phase 1 habitat survey – a technique for environmental audit. Joint Nature Conservation Committee, Peterborough.
 ³⁸ UKHab, 2024. UK Habitat Classification (online) Available from: https://ukhab.org/ [Accessed 01 May 2024].

 ³⁹ Nature Scot (2024). Scotland's Environment Map – Ancient Woodland Inventory. [Online] available from: Map | Scotland's environment web
 ⁴⁰ European Commission (1992) Habitats Directive (Council Directive 92/43/EEC)

 ⁴¹ NatureScot (2020) Scottish Biodiversity List (online) Available at: https://www.nature.scot/doc/scottish-biodiversity-list [Accessed: 01 July 2024]
 ⁴² Gov.uk (2017) The Conservation of Habitats and Species Regulations 2017

- Species listed on Schedule 1, 5 and 8 of the Wildlife and Countryside Act 1981⁴³ (WCA), and badger *Meles meles*;
- Species listed on the Scottish Biodiversity List⁴¹, which are thus identified as being of principal importance for biodiversity conservation in Scotland;
- Invasive non-native species listed on Schedule 9 of the Wildlife and Countryside Act 1981⁴³ (although this does not legally apply in Scotland), those considered to be of European Union (EU) concern under the Invasive Alien Species Regulation (Regulation (EU) 1143/2014)⁴⁴, and additional species commonly considered to be invasive as listed in Annex B of the NatureScot Developing with Nature guidance⁴⁵.
- 5.3.4Other habitats or species that may be rare, scarce, or otherwise notable will be included where deemed appropriate through available information and/or professional judgement.

Desk Study

- 5.3.5A desk study to help establish baseline conditions has been completed. The desk study sought to identify ecological features within the likely Zone of Influence (ZoI) of the Proposed Development that may be affected by its construction and operation. The ZoI is the area(s) over which ecological features may be affected by the biophysical changes caused by the Proposed Development and associated activities²².
- 5.3.6A stratified approach was taken when defining the desk Study Area based on the likely Zol of the Proposed Development. Accordingly, the desk study searched for:
 - SAC or Wetlands of International Importance (Ramsar sites) within 10 km of the Site;
 - SSSI within 2 km of the Site;
 - Locally designated nature conservation sites (e.g. Local Nature Conservation Sites (LNCS) within 2 km of the Site); and,
 - Records of protected and/or notable habitats and species within 1 km of the Site.

Extended Phase 1 Habitat Survey/ UKHab

- 5.3.7The preliminary ecological assessment included a walkover survey of the survey area, broadly following the Phase 1 habitat survey methodology as set out in Joint Nature Conservation Committee (JNCC) guidance³⁷, and defined using the UKHab³⁸, by which standard habitat types are mapped and ecological notes recorded. The survey extended to 50 m from the Proposed Development. Surveys were conducted on 15 January 2024.
- 5.3.8Notes were made for each habitat of dominant, typical, and notable (including invasive nonnative) plant species, and these reflect conditions at the time of survey. The survey for invasive plant species was limited by virtue of a survey date in January, but rectified by other surveys during spring, where further records were made (see Section 5.3.29). Condition of baseline habitats was recorded in the field by the field surveyor using the condition criteria set out for the Statutory biodiversity metric⁴⁶. Habitat suitability for

⁴⁶ GOV.UK, (2023). Statutory biodiversity metric tools and guides. Tools and guides for measuring the biodiversity value of habitat for biodiversity net gain (BNG) (online) Available at: https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides [Accessed 01 July 2024].

⁴³ Gov.uk (1981) Wildlife and Countryside Act 1981

⁴⁴ European Commission (2014) *Invasive Alien Species Regulation (Regulation (EU) 1143/2014)*

⁴⁵ NatureScot, 2020. *Developing with Nature guidance* (online) Available at: https://www.nature.scot/doc/developing-nature-guidance [Accessed 01 July 2024]



important ecological features (such as invertebrates, fish, reptiles, and amphibians) were noted.

National Vegetation Classification (NVC) Survey

- 5.3.9An NVC survey was carried out following published guidelines⁴⁷, in all areas of habitat within the Site with potential to support notable habitats. Surveys were conducted on 4 April 2024. The NVC survey was focussed most greatly on notable habitats identified by the UKHab survey (e.g. Groundwater Dependent Terrestrial Ecosystems (GWDTE))⁴⁸ or habitats listed on the SBL. The survey extended to 250 m from the Proposed Development.
- 5.3. 10The NVC is a phytosociological classification rather than a habitat classification, thus habitats can comprise more than one NVC type and NVC types may occur in more than one habitat. Therefore Figure 5-3, Appendix A Figures is symbolised to show habitats, and the constituent NVC types are shown as labels. The habitat categories used for this purpose follow those of UKHab, with some adaptation if considered useful. Where NVC communities occurred as complex mosaics, more than one NVC type is shown per polygon. Mosaics are shown with NVC codes separated by slashes or brackets. In mosaic polygons, the dominant NVC type is listed first, and subordinate NVC types after, separated by slashes, followed by an indication of the relative percentage of habitat in brackets e.g. 'M15/U5 (80:20)'.

Otter and Water Vole Survey

5.3.11Survey for otter *Lutra lutra* and water vole *Arvicola amphibius* was carried out along all suitable watercourses within the Site. The survey followed guidance in published literature^{49,50}. Surveys were conducted on 18, 19 and 20 March 2024. Evidence of otter searched for included refuges (holts and lie-ups), spraints, footprints, trails, and foraging signs. Spraints were recorded as fresh, recent, or old, according to their apparent age. Evidence of water vole searched for included latrines, droppings, burrows, trails, and foraging evidence. The otter survey extended to 200 m from the Proposed Development in appropriate habitat, and the water vole survey extended to 50 m from the Proposed Development.

Bat Roost and Habitat Suitability

5.3.12In accordance with industry-standard guidelines (Collins, 2023)⁵¹ published by the Bat Conservation Trust (BCT), a ground level tree assessment (GLTA) was carried out to search for trees with potential roost features (PRFs) which could be used by bats within the Site. Surveys were conducted on 18, 19 and 20 March 2024. The survey extended to 30m from the Proposed Development. According to the guidance, PRF identified within trees were assessed as either 'PRF-I', i.e. features suitable only for individual or very small

⁴⁷ Averis et al., 2004. An Illustrated Guide to British Upland Vegetation; Averis, B. and Averis A., 2015. Plant Communities Found In Surveys By Ben And Alison Averis But Not Described In The UK National Vegetation Classification. Unpublished document; British Plant Communities Volume 3 Grassland and Montane Communities. Cambridge University Press, Cambridge.; Rodwell, J.S. (ed.)., 1991a. British Plant Communities Volume 1 Woodlands and Scrub. Cambridge University Press, Cambridge.; Rodwell, J.S. (ed.), 1991b. British Plant Communities Volume 2 Mires and Heaths. Cambridge University Press, Cambridge.

⁴⁸ SEPA, (2017) Land Use Planning System SEPA Guidance Note 31. Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems.

⁴⁹ Chanin, P., 2003. *Monitoring the Otter Lutra lutra*. Conserving Nature 2000 Rivers Monitoring Series No. 10. English Nature, Peterborough.

⁵⁰ Dean, M., Strachan, R., Gow, D. and Andrews, R., 2016. *The Water Vole Mitigation Handbook. Mammal Society Mitigation Guidance Series.* The Mammal Society, London.

⁵¹ Collins, J. (ed.), 2023. Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Edition). Bat Conservation Trust, London.



numbers of bats, or 'PRF-M', i.e. features suitable for use by multiple bats, including a maternity colony.

- 5.3.13PRFs searched for included suitable holes, cracks, or splits in trees. Note that no buildings were assessed for bat roost potential, because either a) no buildings were present or b) access restrictions prevented surveys to buildings, as detailed in Section 5.3.26 below. Where such features existed, searches were made as far as possible for evidence of bat use such as droppings, staining, foraging remains, auditory evidence and the presence of live or dead bats.
- 5.3.14The general suitability of the habitat within the Site was also classified according to the definitions provided in BCT Guidance.

Badger

5.3.15A badger survey was completed within the Site, in accordance with standard guidance^{52,53}. Evidence searched for included setts, spoil heaps, bedding, guard hairs, latrines, footprints, trails, scratch marks, and signs of foraging activity. Surveys were conducted 18, 19 and 20 March 2024. The survey extended to 30 m from the Proposed Development.

Great Crested Newt

5.3.16Field surveys were conducted 18, 19 and 20 March 2024 to assess habitats within the survey area to support great crested newt *Triturus cristatus*, including Habitat Suitability Index calculation for relevant ponds, following English Nature (2001)⁵⁴ and Froglife (2001)⁵⁵ guidance. The survey extended to ponds up to 500 m from the Proposed Development.

Reptiles

5.3.17Field surveys included recording any incidental sightings of reptiles, in addition to the assessment of habitats within the survey area to support reptiles (adder *Vipera berus*,

⁵² Harris, S., Cresswell, P. and Jeffries, D., 1989. Surveying Badgers – An occasional publication of the Mammal Society No. 9. The Mammal Society, London.

⁵³ Scottish Badgers (2018) Surveying for Badgers: Good Practice Guidelines. Version 1 (online). Available at: https://www.scottishbadgers.org.uk/wpcontent/uploads/2020/12/Surveying-for-Badgers-Good-Practice-Guidelines_V1-2020-2455979.pdf [Accessed 01 July 2024].

⁵⁴ English Nature, (2001). *The Great Crested Newt Mitigation Guidelines* (online) Available at:

https://www2.oxfordshire.gov.uk/cms/sites/default/files/folders/documents/environmentandplanning/countryside/protectedspecies/greatcrestednewtmitigati onguidelines.pdf [Accessed 01 July 2024].

⁵⁵ Froglife, (2001) The Great Crested Newt Conservation Handbook (online) Available at: https://www.froglife.org/info-advice/our-publications/greatcrested-newt-conservation-handbook/ [Accessed 01 July 2024].



common lizard *Zootoca vivipara* and slow worm *Anguis fragilis*), following Froglife (1999)⁵⁶ and JNCC (2003)⁵⁷ guidance.

Notable/Important Invertebrates:

5.3.18Field surveys included the assessment of habitats within the survey area to support notable species of invertebrates, both terrestrial and aquatic (including white-clawed crayfish *Austropotamobius pallipes*).

Protected or Notable Plants

5.3.19Field surveys included recording protected or notable plant species and assessing potential for their occurrence.

Other Notable Species

5.3.20Field surveys included recording any incidental sightings of other notable species such as toad *Bufo bufo*, hedgehog *Erinaceus europaeus* and brown hare *Lepus europaeus*. In addition to an assessment of habitats within the survey area to support these notable species mentioned above.

Invasive Non-native Plant Species

5.3.21The survey included recording evidence of the presence of invasive and non-native species (INNS), including but not limited to those of UK concern.

Ecological Appraisal

- 5.3.22The results of the completed field surveys, in combination with the outcomes of the desk study and any consultation with relevant stakeholders, were used to inform the Environmental Appraisal (EA). This was conducted in accordance with the industrystandard guidelines published by CIEEM²².
- 5.3.23The appraisal used the ecological baseline to identify the sensitive ecological receptors that could be affected by the construction or operation of the Proposed Development. Each receptor was assigned a geographic level of importance based on its national and local conservation status and population/assemblage trends and other relevant criteria (including size, naturalness, rarity, and diversity). Details of the Proposed Development were then used to assess if a significant environmental effect is anticipated for each receptor.
- 5.3.24Where appropriate, mitigation measures have been recommended within the EA to remedy any adverse impacts (detailed in Appendix O GEMPs and SPPs)). Measures to enhance local biodiversity are incorporated within the appraisal (further detailed in the Appendix E Biodiversity Net Gain Report and Appendix F Landscape and Habitat Management Plan).
- 5.3.25Enhancement measures that are proportionate to the scale and impacts of the Proposed Development were identified in pursuance of the objectives of NPF4, and a Biodiversity Net

⁵⁶ Froglife, 1999. *Reptile Survey: An introduction to planning, conducting and interpreting surveys for snake and lizard conservation.* Froglife Advice Sheet 10. Froglife, Halesworth.

⁵⁷ Joint Nature Conservation Committee (2003) Herpetofauna Workers Manual (online) Available at: https://hub.jncc.gov.uk/assets/9d7da8c4-9d76-4b65-8263-6b925b3433a4 [Accessed 01 July 2024].



Gain (BNG) assessment has been completed (**Appendix E Biodiversity Net Gain Report**), to ensure that the Proposed Development delivers gains for biodiversity.

Limitations

- 5.3.26Desk study information is dependent on records having been submitted for the area in question. As such, a lack of records for particular habitats or species does not necessarily mean they are absent. Likewise, the presence of records for a habitat or species does not automatically mean that they still occur or are relevant in the context of the Proposed Development.
- 5.3.27Where habitat edges are sharp and coincide with features on base mapping or aerial photography that are considered correct, their placement is based on the accuracy of that data in Geographic Information System (GIS). Otherwise, habitat edges are best estimates as judged in the field. Note also that habitat transitions can be gradual without sharp boundaries. Consequently, habitat mapping and any stated habitat areas are approximate and should be verified by measurement on Site where required for design or construction.
- 5.3.28Baseline conditions are increasingly liable to change with further elapsed time since the field survey. For example, protected species may establish new refuges, or invasive non-native species may further spread. Any conclusions or recommendations in this EA are based on the information collected during the described desk study and field surveys. In line with NatureScot guidance⁵⁸, re-survey is recommended if construction or enabling works would take place more than two years since the date of field survey.
- 5.3.29The weather conditions on the initial day of survey in winter were clear and calm but below freezing. In most cases, the ground layer of habitats was partially obscured by a thick layer of frost. Coupled with the sub-optimal time of year to conduct a vegetation survey, this presented a moderate survey constraint. It was therefore not possible to fully identify all the plant species within a given area. However, this constraint was not to a level at which habitat types could not be accurately classified (to an appropriate level), and as such, it is considered a minor constraint to the assessment. Further to this, additional surveys (including NVC and protected mammal surveys) were conducted within a reasonably good time of year (early spring) to encounter invasive non-native species of plant.
- 5.3.30During these further surveys, incidental records of were made of INNS (e.g. those of giant hogweed *Heracleum mantegazzianum*). The weather conditions were too cold to incidentally encounter reptiles during the initial survey conducted in winter. Subsequent surveys were conducted during optimal weather conditions and survey season.
- 5.3.31The season of NVC survey (early spring/April) was reasonably good for NVC survey, although it should be noted that this is regarded as the earliest period that an NVC survey should be carried out. At this time many species have not yet come into flower, constituting a degree of limitation to species identification. However, considering the communities identified, this seasonal constraint is a minor limitation only.
- 5.3.32There was no access to areas of private dwellings (e.g. the houses and gardens along the proposed existing access track upgrades) during the field survey, because of access permission restrictions. However, these areas cover a small fraction of the Site and it is

⁵⁸ NatureScot (2025). Planning and development: standing advice and guidance (online). Available at: https://www.nature.scot/professionaladvice/planning-and-development/planning-and-development-advice/planning-and-development-standing-advice-and-guidance-documents



highly unlikely that notable habitats are within these areas. It was not considered necessary to inspect the private residencies (or any other building) for bat roost potential as all buildings within the survey were at a suitable distance from the Site to be considered at no risk of disturbance to roosting bats (if bats were present at all).

5.3.33There was no access to the existing Braco West Substation during the field survey due to health and safety concerns. However, the area is entirely artificial surfaces and buildings of little to no biodiversity value.

5.4 Baseline Environment

Statutory Designated Sites

5.4.1There are six statutory designated sites for nature conservation within the possible Zol of the Proposed Development: River Teith SAC; Shelforkie Moss SAC; Kippenrait Glen SAC; Glenartney Juniper Wood SAC; Upper Strathearn Oakwoods SAC; and Carsebreck and Rhynd Lochs SSSI. These are detailed in Table 5-3 below and shown in Figure 5-1, Appendix A Figures. For ornithological statutory designated sites, refer to Chapter 6 - Ornithology.

Site Name	Reason for Designation	Relationship to the Proposed Development
European S	Sites	
River Teith SAC	Atlantic salmon <i>Salmo salar</i> , Brook lamprey <i>Lampetra</i> planeri; River lamprey <i>Lampetra fluviatilis</i> ; and, Sea lamprey <i>Petromyzon</i> <i>marinus</i> .	Located at closest point: 5.2 km southwest of the Site. 30 km downstream of the Site following a hydrological link of unnamed watercourses within the Site flow into the Bullie Burn and Feddal Burn, which ultimately join the Allan Water, which connects to the River Teith SAC. Intervening land is mainly commercial forestry. Therefore, there is a theoretical hydrological link between the Site and the SAC.
Shelforkie Moss SAC	Active raised bog; and, Degraded raised bog.	Located at closest point: 2.2 km of the Site. Intervening land mainly comprises farmland as well as some forestry and Braco village.
Kippenrait Glen SAC	Mixed woodland on base-rich soils associated with rocky slopes.	Located at closest point: 8.3 km south of the Site Over 20 km downstream following Allan Water and some of its tributaries (including the Bullie Burn) flow from the Site to the SAC. Intervening land includes the settlement of Dunblane, major roads and a mix of farmland and commercial forestry.
Glenartney Juniper Wood SAC	Juniper <i>Juniperus communis</i> on heaths or calcareous grasslands.	Located at closest point: 8.7 km north of the Site The River Knaik runs between the Site and SAC but it is in a different river catchment to the SAC and is therefore not hydrologically connected.

Table 5-3 Statutory Locally Designated Nature Conservation Sites



Site Name	Reason for Designation	Relationship to the Proposed Development
		Intervening land includes the Glen Artney Hills.
Upper Strathearn Oakwoods SAC	Western acidic oak woodland.	Located at closest point: Located at closest 9.8 km north of the Site The Machany Water flows between the land between the Site and the SAC, but there is no hydrological connectivity. Intervening land comprises a mix of arable/pastoral farming and forestry.
Sites of Sp	ecial Scientific Interest	
Carsebreck and Rhynd Lochs SSSI	Raised bog; and, Hydromorphological mire range	Located at closest point: 2.2 km of the Site The Allan Water passes through the SSSI, but there is no hydrological connectivity. Intervening land mainly comprises farmland as well as some forestry and Braco village.

Non-statutory Designated Sites

5.4.2There is one non-statutory designated site for nature conservation within the possible Zol of the Proposed Development, Braco Castle Wood LNCS. This is detailed in **Table 5-4** below and shown in **Figure 5-1**, **Appendix A Figures**.

Table 5-4 Statutory Locally Designated Nature	Conservation Sites
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Site Name	Reason for Designation	Relationship to the Proposed Development
Braco Castle Wood LNCS	Braco Pinewood, situated to the designed landscape northwest of Braco castle.	Located at closest point: 2.1 km northeast of the Site Intervening land comprises a mix of arable/pastoral farming. There is no direct hydrological connection between the LNCS and the Site.

Waterbodies

- 5.4.3The Keir Burn, a tributary of the Allan Water, is at the closest point approximately 190 m distant from the proposed existing access track upgrades. The Keir Burn is classified by SEPA under the Water Framework Directive (WFD) as in 'Moderate' overall status and also listed by the Scottish Government's Marine Directorate as a river supporting Atlantic salmon and sea trout *Salmo trutta*. Drainage channels around the existing Braco West Substation are likely to flow into the Bullie Burn, a tributary of the Keir Burn, during suitably wet weather.
- *5.4.4*Minor tributaries of the Muckle Burn are within the area of the Site. In addition, the Crocket Burn, a tributary of Muckle Burn, which merges into the Allan Water downstream, has tributaries flowing within close proximity (around 130 m) of the Site to the southeast of the proposed substation site. Muckle Burn is classified by SEPA under the WFD as in 'Good' overall status and, notably, it achieved a 'High' quality status for Fish and Fish Barrier



parameters. Muckle Burn is listed by the Scottish Government's Marine Directorate as a river supporting Atlantic salmon and sea trout.

- 5.4.5Unnamed watercourses and wet ditches within the Site lead to the Feddal Burn and Bullie Burn / Keir Burn, which ultimately discharge into the Allan Water. Tributaries of the Feddal Burn cross the eastern areas of the proposed existing access track upgrades. Tributaries of the Bullie Burn (and artificial drainage channels) cross the northern parts of the proposed existing access track upgrades and the area of the existing Braco West Substation. The Bullie Burn has been classified by SEPA under the WFD as in 'Moderate' overall status and achieved a 'High' quality status for Fish and Fish Barrier parameters.
- 5.4.6There are eleven open water waterbodies within 500 m of the Site⁵⁹, of which ten are located near the eastern section of the proposed existing access track upgrades, and one is located within the central section of the proposed existing access track upgrades.

Ancient and Native Woodland

- 5.4.7Five areas of long established plantation (LEP) and one area of ancient semi-natural woodland (ASNW) listed on the AWI⁶⁰ occur within 1 km of the Site, as shown on Figure 5-2, Appendix A Figures, however none are within the Site. The ASNW is located around 700 m north of the proposed existing access track upgrades. Areas of LEP are located approximately 300 to 800 m south, north, and east from the proposed existing access track upgrades.
- 5.4.8The NWSS⁶¹ also holds records of eleven woodlands within 1 km of the Site, of which nine are native woodlands and two are nearly native woodland. The closest area of native woodland, identified from the NWSS, is located around 20 m north of the proposed existing access track upgrades n. No NWSS woodlands are within the Site.

Peatland

5.4.9NatureScot⁶² indicates the presence of Class 5 peat soil (dystrophic blanket peat)⁶³ within the area of the proposed substation platform (see Figure 5-2, Appendix A Figures). Within the proposed existing access track upgrades, immediately north of the proposed substation platform, there are data for dystrophic blanket peat of 50 to 100 cm⁶². Peaty gleyed podsols are shown to be under a large part of the proposed substation platform in the south and some sections of the proposed existing access track upgrades, ing access track upgrades, of the type usually associated with heather moorland (and coniferous plantation).

Habitat Overview

5.4.10Habitat survey results are shown on **Figure 5-3**, **Appendix A Figures**. The majority of the habitats within the area of the proposed substation platform are mature, felled or recently

⁵⁹ Great crested newts can use suitable terrestrial habitat up to 500 m from a breeding pond, though there is a notable decrease in great crested newt abundance beyond 250 m from a breeding pond.

⁶⁰ NatureScot (2020) A guide to understanding the Scottish Ancient Woodland Inventory (AWI) (online). Available at: www.nature.scot/doc/guideunderstanding-scottish-ancient-woodland-inventory-awi [Accessed 01 July 2024].

⁶¹ Scottish Forestry, (n.d) *Native Woodland Survey of Scotland (NWSS)* (online) Available at: forestry.gov.scot/forests-environment/biodiversity/native-woodland-survey-of-scotland-nwss [Accessed 01 July 2024].

⁶² NatureScot (2016) Carbon and Peatland 2016 map (online) Available at: https://www.nature.scot/professional-advice/planning-and-

development/planning-and-development-advice/soils/carbon-and-peatland-2016-map [Accessed 07 July 2024].

⁶³ Class 5 is peat soil >50cm but currently without peatland habitats (https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatlandhabitats-development-management). Class 5 peat soils are generally considered less notable than peatlands associated with (for example) pristine blanket bog habitats.



re-stocked Other coniferous woodland dominated by Sitka spruce *Picea sitchensis*. In the northwestern area of the proposed substation platform, within the land under the existing Beauly-Denny 400 kV OHL, is Degraded blanket bog. Southern compartments and those to the extreme northwest of the Site, within the boundary of the Site and beyond, appear to be planted over a degraded bog-type habitat on deep peat. The land around the existing Braco West Substation is Other upland acid grassland dominated by soft-rush *Juncus effusus*, developed from disturbed peatland. Upland heathland is present in a forestry ride in the central southern part of the area of the proposed substation platform, dominated by heather *Calluna vulgaris*. In the southwest of the proposed substation platform are priority minor watercourses, three very small tributaries that are headwaters of a notable watercourse. Similar habitats are present beyond the boundary of the proposed substation platform.

- 5.4.11The proposed existing access track upgrades is approximately 3.40 km in length and leads from the B8033 road to the existing Braco West Substation. A large proportion of the land adjacent to the proposed existing access track upgrades is used for commercial forestry, which is Other coniferous woodland dominated by Sitka spruce in the north and central areas. The land adjacent to the proposed existing access track upgrades in lower and eastern sections are used for the production of Christmas trees (e.g. Nordmann fir *Abies nordmanniana* and Norway spruce *Picea abies*), to rear game birds and cultivate cereal crops. Here the track is also bordered by Mixed and Other broadleaved woodland, Species-poor hedges, Standing open water (artificial waterbodies) and minor watercourses/artificial drainage ditches (including priority habitat), Other neutral grassland, Buildings (private residences), Arable land and grazing pasture (for horses).
- 5.4.12**Table 5-5** shows a list of the habitat types (by UKHab and NVC) identified within the area surveyed, with the notable habitats highlighted.

UKHab Level 3	UKHab Level 4 (SBL ^{6₄} priority habitats in bold)	Constituent NVC types (code and name)	UKHab Level 5 (where applies; Annex I ⁶⁵ habitats in bold underline)
Broadleaved, mixed and yew woodland	w1g Other broadleaved woodland	n/a	n/a
	w1h Other woodland; mixed	n/a	n/a
Coniferous woodland	w2c Other coniferous woodland	n/a	n/a
	w2c 206 Other coniferous woodland - Felled	n/a	n/a

Table 5-5 Recorded habitat and NVC types (SBL priority habitats shown in bold, and Annex I habitats in bold underline)

⁶⁴ The Scottish Biodiversity List is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland.

⁶⁵ Annex I habitats are habitats of European Community interest listed in Annex I of *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna* (the 'Habitats Directive'). In summary, habitats of Community interest are those that: i) are in danger of disappearance in their natural range, ii) have a small natural range, or iii) are outstanding examples of habitats in (for the UK) the Atlantic biogeographic zone. 'Priority Annex I habitat' (shown with an asterisk, e.g. H7130*) means that i) is considered to apply and there is a particular responsibility to conserve it owing to the large proportion of its range within the EU.



UKHab Level 3 (SBL ⁶⁴ priority habitats in bol		Constituent NVC types (code and name)	UKHab Level 5 (where applies; Annex I⁵⁵ habitats in bold underline)
Dense scrub	h3 523 Dense scrub - non-native	n/a	n/a
Hedgerows	h2a Native hedgerow	n/a	h2a6 Other native hedgerow
Bog	f1a Blanket bog	M20	f1a6 - Degraded blanket bog <u>(H7130, non-</u> <u>priority)</u>
		M15*	f1a6 - Degraded blanket bog <u>(H7130, non-</u> <u>priority)</u>
Dwarf shrub heath	h1b Upland heathland	M15d	h1b6 Wet heathland with cross-leaved heath; upland <u>(H4010)</u>
Fen, marsh and swamp	f2c Upland flushes fens and swamps	М6с	n/a
	f2b Purple moor grass and rush pastures	M23b	n/a
Acid grassland	g1b Upland acid grassland	U5	g1b6 Other upland acid grassland
		U4b	g1b6 Other upland acid grassland
		Non-NVC Je	g1b6 Other upland acid grassland
Neutral grassland	g3c Other neutral grassland	MG10	g3c8 <i>Holcus-Juncus</i> neutral grassland
Modified grassland	g4 Modified grassland	Not classified	n/a
Arable and horticulture	c1c Cereal crops	n/a	n/a
Built-up areas and gardens	u1b5 Buildings	n/a	n/a
Built-up areas and gardens	u1b5 Buildings	n/a	n/a
Built-up areas and gardens	u1b5 Buildings	n/a	n/a
Built-up areas and gardens	u1b5 Buildings	n/a	n/a
	u1b6 Other developed land	n/a	n/a
	u1c Artificial unvegetated, unsealed surface	n/a	n/a
Standing open water and canals	r1 48 Standing open water and canals -	n/a	n/a



UKHab Level 3	UKHab Level 4 (SBL ⁶⁴ priority habitats in bold)	Constituent NVC types (code and name)	UKHab Level 5 (where applies; Annex I ⁶⁵ habitats in bold underline)
	freshwater; heavily modified		

Woodland, Scrub, and Hedgerows

- 5.4.13Other coniferous woodland is the most common woodland type within the Site, around the proposed substation platform and adjacent to the proposed existing access track upgrades. Mature stands are dominated by Sitka spruce with little to no other plant species. Semi-mature stands, such as those of the southern areas of the proposed substation platform, are dominated by Sitka spruce, but retains some remnant vegetation underneath, including heather, and the mosses *Pluerozium schreberi, Polytrichum formosum* and *Sphagnum capillifolium*. Stands that have been felled within the last few years have been replanted with Sitka spruce and support common bent *Agrostis capillaris*, wavy hairgrass *Avenella flexuosa*, heather, soft-rush, heath woodrush *Luzula multiflora*, heath bedstraw *Galium saxatile*, moss *Polytrichum formosum* and various pleurocarpous mosses. Stands of Other coniferous woodland bordering the southern 3.4 km of proposed existing access track upgrades are largely newly planted stands of exotic species of tree intended for the Christmas tree economic market (e.g. Nordmann fir and Norway spruce) over a disturbed and species-poor neutral grassland habitat dominated by grasses such as Yorkshire-fog *Holcus lanatus*.
- 5.4.14Plantation woodland pertaining to Other broadleaved woodland and Other mixed broadleaved woodland is present in isolated blocks adjacent to the proposed existing access track upgrades. The block closest to the substation platform area (approximately 1.2 km north-east) is dominated by alder Alnus glutinosa. The semi-mature trees are planted in straight lines over ground flora dominated by neutral grasses such as Yorkshirefog, with frequent soft-rush. A small parcel of alder dominated woodland is north of Crofthead, near a modified body of open water, bordering a ditch that leads to an artificial water body and on the banks / an island associated with the standing water. The ground flora of these woodlands is sparse or neutral grass-dominated. Mixed woodland types were dominated by tree species including sycamore Acer pseudoplatanus, Sitka spruce, beech Fagus sylvatica, pedunculate oak Quercus robur, rowan Sorbus aucuparia, silver birch Betula pendula, and ash Fraxinus excelsior. The ground flora of these woodland types is either sparse due to being in heavy-shade or deep leaf litter or grass-dominated with species such as Yorkshire-fog, common nettle Urtica dioica and cow parsley Anthriscus sylvestris. A small parcel of woodland lies between the B8033 and Modified Grassland in the extreme south of the survey area. This woodland is dominated by sycamore and beech and has a sparse ground flora. On the opposite side of the road is a sycamore hedge with



a ground flora of neutral grasses with a fern species (e.g. *Dryopteris* sp.). All other hedgerows within the survey area are dominated by hawthorn and are species-poor.

- 5.4.15All woodlands within the Site and survey area are of a low degree of naturalness and none are considered Annex I habitats. Therefore, the woodlands described above were non-notable and did not merit inclusion in the NVC survey.
- 5.4.16INNS were identified during field surveys. A stand of snowberry Symphoricarpos albus, a mature hedge of 30 m x 5 m, borders woodland to south of a modified body of open water (TN1, Figure 5-3, Appendix A Figures). Other dense scrub of non-native dogwood Cornus alba is north of Crofthead in a thicket of 50 m x 10 m (TN2) and on an island within standing water (TN3). A mature stand of giant hogweed in a patch of 5 m x 5 m (TN4) and frequent immature plants in an area of 20 m x 5 m (TN5) was present north of residential properties within the southern section of the proposed existing access track upgrades.
- 5.4.17The Tayside Local Biodiversity Action Plan (LBAP) (2016-2026)³⁴ includes Planted coniferous woodlands (especially the woodland edge/glades) as a priority habitat for local conservation. However, Sitka spruce plantation has very low nature conservation value, as normally does other non-native conifer plantation, and would not be considered an LBAP priority. The Other broadleaved / mixed woodland types within the survey area are non-notable woodland, as they lack the semi-natural ground flora associated with priority woodland.

Peat Bog and Associated Habitats

- 5.4.18Degraded bog has developed on former coniferous plantation woodland in the northwestern area of the proposed substation platform, within the land under the existing overhead power line. The habitat has deep furrows and is well-drained by forestry grips, peat depths are variable and likely to be mostly 0.5 to 1 m deep. The habitat has abundant mature swathes of heather over a more or less continuous carpet of *P. schreberi*. Young self-sown Sitka spruce is frequent, with occasional purple moor-grass *Molinia caerulea*, cross-leaved heath *Erica tetralix*, *P. commune*, *Hypnum jutlandicum*, and *P. formosum*. Wetter furrows support a carpet of *Sphagnum fallax* with frequent hare's-tail cottongrass *Eriophorum vaginatum* and *S. capillifolium*. This degraded blanket bog on deep peat supports vegetation corresponding to NVC type M15*. This is a wet heath community. Where wet heath vegetation occurs on deep peat, the habitat is blanket bog, but highly degraded such that there are no bog indicator species and the deep peat is the only factor indicating peat bog. M15* habitats are derived from bog and are not considered to be potential GWDTE.
- 5.4.19A forestry ride to the south of the existing Braco West Substation has abundant hare's tail cottongrass, frequent purple moorgrass, the moss *Polytrichum commune*, heather, and *P. schreberi*, with occasional *S. capillifolium*. This Degraded bog lacks peat-building sphagnum moss, only *S. capillifolium* was recorded, although it should be noted that hare's-tail cottongrass is also a peat-builder. This vegetation corresponds to NVC type M20. This community is prevalent in open ground, outside of the commercial forestry west of the area of the proposed substation platform within the area of and north of the existing Beauly-Denny line. This area is outside of the Proposed Development footprint but was assessed for the presence of GWDTE. The area is subject to moderate grazing intensity from cattle and has a reduced abundance of hare's tail cottongrass and heather, in a short sward, with purple moorgrass and species such as bog asphodel *Narthecium ossifragum*



and rarely occurring cranberry *Vaccinium oxycoccos*, with mosses including *P. formosum*, *S. capillifolium*, *S. fallax*, *P. schreberi* and *Aulacomnium palustre*.

5.4.20Degraded blanket bog is a 'non-priority' Annex I H7130 habitat under the Habitats Directive. The Tayside LBAP (2016-2026)³⁴ includes Blanket bog as a priority habitat for local conservation. All Blanket bog is also SBL Priority habitat. However, the remnants of bog within the Site are heavily affected by forestry operations and/or are subject to ongoing drainage and are not in good condition or of high ecological value.

Heathland

- 5.4.21Wet heathland corresponding to the NVC type M15d is present in a forestry ride in a south-central area of the proposed substation platform, where heather, purple moorgrass, *P. schreberi*, and mat grass *Nardus stricta* are frequent, with locally frequent stands of Yorkshire-fog and soft-rush, and occasional common bent. This type of vegetation is present in a wide forestry ride to the southeast of the proposed substation platform. These habitats are in a mosaic with Other upland acid grassland, corresponding to the NVC type U5 and soft-rush-dominated habitat of the non-NVC type 'Je' (as described in Averis, 2004 & 2015⁶⁶). The Wet heathland habitats have potential to be moderately GWDTE. However, they are heavily impacted by commercial forestry, including by the drainage caused by frequent drainage grips.
- 5.4.22All wet heath is Annex I H4010 habitat under the Habitats Directive. Upland Heathland are SBL habitats. The Tayside LBAP (2016-2026)³⁴ includes Upland Heath as a priority habitat for local conservation. However, such heathland is very common in the upland parts of Scotland, and a small strip of such heathland within a spruce plantation would not be regarded as having high conservation value.

Flushes and Rush Pasture

- 5.4.23The head of a watercourse, to the southeast of the proposed substation platform supports a localised area of rush pasture corresponding to the NVC-type M23b. The habitat is dominated by soft-rush with frequent common sorrel *Rumex acetosa*, occasional marsh thistle *Circium palustre* and creeping buttercup *Ranunculus repens* and Yorkshire-fog. This habitat is likely a moderately GWDTE.
- 5.4.24Rush pastures of the NVC-type M23b are frequent outside of the Proposed Development in localised areas to the north of the proposed substation platform, associated with the Bullie Burn. The head of one area is clearly GWDTE, evidenced by the presence of a spring-like community on a break in the slope. Highly localised spring-like vegetation is dominated by soft-rush with common sorrel and marsh thistle, over a thick carpet of mosses including *Calliergonella cuspidatum*, *Brachythecium rivulare* and *Philonotis fontana*. In addition, in another area an acid flush habitat is present upslope, which corresponds to the potentially highly GWDTE NVC type M6c. This acid flush habitat is dominated by soft-rush and has abundant *S. fallax*, with other mosses including *Kindbergia praelonga* and *P. commune*. The groundwater dependence of many of these habitats is difficult to determine, due to the disturbed nature of the surrounding commercial forestry (with deep ridge and furrow).

⁶⁶ Averis et al., 2004. An Illustrated Guide to British Upland Vegetation; Averis, B. and Averis A., 2015. Plant Communities Found In Surveys By Ben And Alison Averis But Not Described In The UK National Vegetation Classification. Unpublished document.



However, it is assumed that all the rush pastures associated with the slopes of the Bullie Burn are GWDTE.

5.4.25To the southwest of the proposed substation platform, outside of the Site and outside of the commercial forestry, is moderately-grazed undulating land. The area was assessed for the presence of GWDTE. Almost half of the area has flushed grassland / accumulations of surface water that provide conditions to allow the proliferation of locally abundant areas of soft-rush, a tiny proportion of which (approximately 5%) pertains to the NVC type M6c which possesses soft-rush over *S. fallax*. The habitat is highly localised but is considered potentially highly groundwater dependent.

Grassland and Arable

- 5.4.26Other upland acid grassland has developed on an area of disturbed deep peat adjacent to and surrounding the existing Braco West Substation, corresponding broadly to the speciespoor non-NVC Je. The habitat is dominated by soft-rush and has little other species providing vegetative cover. Southern areas of this habitat have frequent Sitka spruce and occasional pleurocarpous mosses. Swards immediately adjacent to the substation and enclosed behind a perimeter fence have abundant pleurocarpous moss and frequent wavy hairgrass, drier slopes support locally frequent heather, and scattered grey willow *Salix cinerea* scrub is throughout. Species-poor soft-rush dominated habitat with frequent wavy hairgrass, are around two of the towers on the existing [Beauly-Denny] 400 kV OHL, beyond the boundary of the Site, and adjacent to the proposed existing access track upgrades in the north.
- 5.4.27Outside of the Site, other upland acid grassland of the NVC type U5 and non-NVC type Je covers undulating land to the southwest of the proposed substation platform outside of the commercial forestry blocks. These grassland habitats generally have frequent mat grass with occasional purple moor-grass and hare's tail cottongrass, wavy hair grass, rarely occurring heath rush and frequent mosses including *P. schreberi, Rhytidiadelphus squarrosus* and *Hylocomium splendens*, with locally abundant soft-rush. Drier and more productive areas within this area corresponding to the NVC-type U4b have an abundance of Yorkshire-fog.
- 5.4.28Other neutral grassland is present in patches between forestry blocks and agricultural land at lower altitudes. These species-poor grasslands are likely to have arisen as a result of land that has undergone past disturbance with the mixing of soil horizons. These habitats are dominated by Yorkshire-fog and have frequent tufted hairgrass.
- 5.4.29Holcus-Juncus Neutral Grassland, corresponding to the NVC type MG10, is adjacent to the proposed existing access track upgrades in the north, adjacent to the central section of the proposed existing access track upgrades and in an open area (planted with Sitka spruce and cut with frequent field drains) to the southeast of the proposed substation platform. The habitat is dominated by Yorkshire-fog and has abundant to frequent soft-rush with creeping buttercup and occasionally common sorrel and marsh thistle. These habitats have potential to be moderately GWDTE.
- 5.4.30Modified grasslands border the proposed existing access track upgrades between the B8033 and existing Braco West substation in fields used for grazing. These species-poor and enriched habitats support Yorkshire-fog, perennial rye grass *Lolium perenne*, creeping



buttercup, white clover *Trifolium repens*, daisy *Bellis perennis* and broadleaved dock *Rumex obtusifolius*.

5.4.31Cereal crops (and associated bare ground) are within fields at lower altitudes, bordering the proposed existing access track upgrades between the B8033 and existing Braco West substation . These fields are bare or dominated by barley *Hordeum vulgare* and have little ecological value.

Other Terrestrial Habitats

5.4.32At the southern end of the proposed existing access track upgrades there are private residences (Buildings) and gardens (Other developed land). The land subject to the proposed existing access track updgrades is the habitat type Artificial unvegetated, unsealed surface.

Aquatic Habitats

- 5.4.33Running water (Priority rivers / streams) are present throughout the area of the southern section of the existing access track upgrades. The largest of which is a modified watercourse that drains a modified body of open water north of Crofthead. The watercourse has a wet width 0.3 m to 1 m and was 0.4 m deep with a moderately fast flow. The watercourse has a vegetated, steeply sloping bank to 2 m high. This watercourse splits and feeds areas of open water to the south. The waterbodies above appear to be directly hydrologically connected to the Allan Water, however all reaches are modified through straightening and bank re-profiling. The three watercourses, tributaries within the south of the Site (and beyond the boundary of the Site), are narrow watercourses less than 0.2 m wide.
- 5.4.34The Tayside LBAP (2016-2026)³⁴ includes Rivers and Burns as a priority habitat for local conservation. Although the watercourses are small, at a of maximum width of 0.2 m to 1 m, and modified, all are considered an SBL Priority habitat, as they are headwaters of notable watercourses: e.g. the Allan Water, or in the case of the watercourses within the Site and beyond the boundary of the Site, headwaters of the Muckle Burn (a notable watercourse).
- 5.4.35There was a single standing open water body identified within the Site, within the area of the proposed substation platform (see TN6, **Figure 5-3, Appendix A Figures**). The pond is approximately 6 m long x 6 m wide. At the time of survey, it was peaty, with dark-coloured water, and was likely to be over a metre deep.
- 5.4.36An artificially modified area of Standing open water is north of Crofthead. A loch has been present in this location since at least 1822⁶⁷, which may have been created as a mill pond. Furthermore, in more recent years, perhaps in the late 20th century, it appears to have been extended in area and further modified to include islands. Two areas of Standing open water, adjacent to the proposed existing access track upgrades between the B8033 and existing Braco West substation northwest of Easter Feddal, also possess wooded islands. These waterbodies do not appear on historic maps, even as late as the 1970s, and are therefore considered to be artificial. They are bordered by species-poor Other neutral grassland and Other broadleaved woodland dominated by alder. Further details of the

⁶⁷ As viewed on historical maps available from the National Library of Scotland (https://maps.nls.uk/os/) [Accessed: 13 May 2024].



waterbodies referred to above and those within 500 m of the Site are presented in **Section 5.4.3** to **5.4.6** above.

GWDTE

- 5.4.37Potential GWDTE identified within 250 m of the site and 100 m of the Site are shown on Figure 5-4 and Figure 5-5, Appendix A Figures. The proposed existing access track upgrades are not shown on these figures as no potential GWDTE have been identified in this area of the Site and survey area. The following NVC vegetation communities were identified, within the area surveyed for the Proposed Development, that are potentially highly or moderately ground water dependent, as defined in relevant guidance⁴⁸:
 - Potentially highly groundwater dependent:
 - M6c
 - M23b
 - Potentially moderately groundwater dependent:
 - M15d
 - MG10
 - The following habitats are unlikely to be groundwater dependent:
 - M15*
- 5.4.38The results of a basic hydrological assessment undertaken in the field revealed that the potential GWDTE within the area surveyed were degraded and/or subject to a significant level of ongoing drainage caused by the local commercial forestry plantation. This is consistent with the assessments made in **Chapter 10 Hydrology**, **Hydrogeology and Soils.**
- 5.4.39Potentially highly GWDTE, of the NVC type M6c and M23b, are present outside of the Site to the north of the Site, associated with the Bullie Burn. The headwater of a watercourse to the southeast of the proposed substation platform supports a localised area of M23b. A degraded M6c-like vegetation is present in highly localised areas to the west of the proposed substation platform. It is assumed that the habitats mentioned above are GWDTE.
- 5.4.40Potentially moderately groundwater dependant GWDTE were identified, including M15d in forestry rides and MG10 associated with (or in close proximity to) commercial forestry. There is no obvious source of groundwater that would likely sustain these ecosystems, rather, the wetness of the gently-sloping peaty ground is probably sustained largely by rainfall. Movement of groundwater through the area is likely to be limited by the unnatural hydrological regime as a result of the forestry plantation (and the associated surface water drainage). Therefore, it is unlikely that the potential GWDTE described above are moderately dependent on groundwater to maintain their condition.
- 5.4.41The blanket bog habitat, NVC type M15* is not considered a GWDTE.

Bats

5.4.42The desk study identified two records of soprano pipistrelle bats *Pipistrellus pygmaeus* and one record of unidentified pipistrelle *Pipistrellus sp.* bat within 1 km of the Site. Additionally,



Tayside LBAP⁶⁸ list three bat species in their protected species list: brown long-eared bat *Plecotus auritus,* Natterer's bat *Myotis nattereri,* and Daubenton's bat *Myotis daubentonii.*

5.4.43The Site is connected to the wider landscape by habitats, such as woodland blocks, that are likely to be used by bats for commuting. Whilst some bats are likely to commute and forage along such features, there are no roosting opportunities within the location of the proposed substation platform, given that no PRFs were found during surveys, in addition to the dominance of non-native conifers and lack of other potentially suitable roosting features (such as buildings with potential access features). Consequently, based on the habitats and features and general upland nature of the proposed substation area, and existing access track upgrades, it is concluded that this area has low habitat suitability for bats (for activity such as commuting and foraging), with no roosting potential, in accordance with definitions provided by the BCT⁵¹.

Otter and Water Vole

- 5.4.44The desk study did not identify any records of otter or water vole within 1 km of the Site. Otter is included in the Tayside LBAP (2016-2026)³⁴ protected species list.
- 5.4.45The locations of otter evidence found during field surveys are shown on Figure 5-6, Appendix A Figures. A single otter refuge was identified: a lay-up on a small watercourse, outside of the Site on the southern edge of the Site. The resting site had a single old spraint within it, on a rock. The lay-up is located within a forest ride, under a rocky overhanging bank that is dominated by heather and at the edge of a fast-flowing ditch. The remains of at least six common frogs were found on the bank of an artificial waterbody to the south of the proposed existing access track upgrades most likely to be the feeding remains of otter. All other evidence comprises spraint of a range of ages old and weathered, recent, and fresh. These were found on a tributary of the Crocket Burn (within the vicinity of the lay-up, described above), on the Bullie Burn to the north of the Site, and on Mill Burn and three associated artificial waterbodies in the southern area of the existing access track upgrades is highly unlikely due to the small size of the watercourses, and, in most cases, the poor vegetation cover.
- 5.4.46There are numerous small watercourses and artificial drainage ditches that cross the eastern parts of the proposed existing access track upgrades, that provide limited opportunities for otter. The artificial open waterbodies in the area are likely to provide good feeding opportunities, due to the likely presence of significant fish populations. The watercourses within the Site that are tributaries of the Allan Water constitute moderate suitability otter habitat they are likely to support a population of fish, providing a foraging resource, but the banks have limited potential for otter holts.
- 5.4.47The most suitable watercourses for otter, including for the creation of refuges (lay-ups and holts), are the Keir Burn (north of the Site) and the Bullie Burn and Feddal Burn (beyond the boundary of the Site). The watercourse within the Site in the southeast is sub-optimal for otter holts, being small with very limited foraging opportunities.
- 5.4.48No evidence of water vole was recorded during the field survey. All potential water vole habitat on the Site was assessed as sub-optimal for the species. The minor watercourses

⁶⁸ Tayside Biodiversity Partnership (2016) *Tayside Local Biodiversity Action Plan* (online) Available at: https://www.taysidebiodiversity.co.uk/action-plan/action-plan-new-lbap-2015/ [Accessed 01 July 2024].



(and associated ditches) adjacent to the proposed existing access track upgrades have water vole habitat suitability, but they have shallow water depths and many are likely to be dry for periods of the year. The largest watercourse, associated with an artificial Standing open waterbody north of Crofthead, is sub-optimal due to the potential for strong flows. The narrow watercourses in felled / re-stocked coniferous plantation within the proposed substation area are sub-optimal, as they are likely to become dry and lack lush vegetation for foraging. Furthermore, the previous rotation of conifer plantation within the survey area (which is now largely felled and re-stocked) would have caused intense shading, also unsuitable for this species. However, water vole are known to utilise small upland watercourses, and so their presence here cannot be completely ruled out.

Pine Marten

- 5.4.49The desk study revealed no pine marten *Martes martes* records within 1 km of the Site. No evidence of pine marten was recorded incidentally during the field survey. However, the known distribution of pine marten includes the area of the Site⁶⁹.
- 5.4.50No large, mature, or senescent trees or rock cavities (with suitability for dens) were found to be present during surveys. The felled / re-stocked coniferous plantation offers limited cavities under disturbed tree roots, that are likely to be too exposed to predation and the elements to be suitable for pine marten dens. The habitat suitability for pine marten is very low.
- 5.4.51Given the above, pine marten dens are likely to be absent from the Site, although pine marten individuals could potentially use the Site on a transient basis for foraging (e.g. for berries, small mammals, birds, and birds' eggs).

Red Squirrel

- 5.4.52The desk study identified 32 records of red squirrel *Sciurus vulgaris* within 1 km of the Site. Red squirrel is also included in the protected species list on the Tayside LBAP (2016-2026)³⁴.
- 5.4.53While the Site falls within the general distribution of red squirrel, the landscape in and around the Site is predominantly characterised by commercial plantation woodland blocks that are either dominated by mature Sitka spruce or small trees that are too young to bear cones. This type of habitat possesses sub-optimal conditions for red squirrel as they typically lack a good food source. Red squirrels exhibit a preference for habitats characterised by mature trees, providing shelter and a diverse food source, including nuts and seeds. The proposed existing access track upgrades are adjacent to blocks of broadleaved and mixed woodland that provide a greater source of food for red squirrel and their presence here is more likely.
- 5.4.54Given the above, red squirrel are likely to be largely absent from the areas of the Site with small and immature trees; however, red squirrel are probably at low population densities in other wooded areas of the Site more suitable for red squirrel. These include the woodland

⁶⁹ Saving Britain's Wildlife (2024) Species – Pine Martin (online) Available at: https://www.mammal.org.uk/species-hub/full-species-hub/discovermammals/species-pine-marten/ [Accessed 01 July 2024].



blocks adjacent to the proposed existing access track upgrades, due to the presence of mixed and broadleaved woodland.

Badger

- 5.4.55The desk study identified no badger records within 1 km of the Site. No badger setts or evidence of badger activity were recorded within the survey area.
- 5.4.56The woodland within the area of the proposed substation platform is Sitka spruce plantation (parts of which are newly felled and restocked) which is highly sub-optimal habitat for badger setts. Badgers prefer sloping ground, often with woodland or other cover, with ease of access for digging setts, but do not favour Sitka spruce plantation. Therefore, it is unlikely that badgers will be present within the area of the proposed substation platform.
- 5.4.57The proposed existing access track upgrades is adjacent to agricultural land and deciduous woodlands that are favoured by badger for sett establishment and foraging⁷⁰. The proposed existing access track upgrades is adjacent to agricultural land and mixed woodlands that are suitable for foraging and sett establishment. However, the plantation woodlands on the proposed existing access track upgrades are not long-established and many woodland blocks are subject to ongoing disturbance (e.g. from rearing game birds). Nevertheless, badger are a common and widespread species and their presence on-site cannot be ruled out.

Other mammals

5.4.58 One sighting of brown hare was made during field survey, of an individual at along the Site associated with the proposed existing access track upgrades.

Great crested newt

- 5.4.59The desk study did not reveal any records of great crested newt within the desk study search area and this species is likely to be absent from the 10 km grid squares (NN80, NN81, NN71) where the lowland areas of the Site are located. Great crested newt potentially exists in the 10 km grid square (NN70), which includes the Site. However, only one record was found within NN70. This record is to the southeast of Doune (9.5 km distant from the Site), isolated from the Site by major barriers and is listed on the NBN as 'unconfirmed'.
- 5.4.60Great crested newt Habitat Suitability Index survey results are shown on **Figure 5-7**, **Appendix A Figures** and in **Table 5-6** below.

Pond reference	Distance from Site (m)	Description	HSI score	Pond suitability
WB01	400	Waterbody north of the Keir Burn. Intervening land with a major barrier to movement.	n/a	n/a
WB02	300	Waterbody north of the Keir Burn. Intervening land with a major barrier to movement.	n/a	n/a

 Table 5-6 Great crested newt Habitat Suitability Index survey results

⁷⁰ Rainey, E., Butler, A., Bierman, S. and Roberts, A.M.I., 2009. Scottish Badger Distribution Survey 2006 – 2009: estimating the distribution and density of badger main setts in Scotland. Report prepared by Scottish Badgers and Biomathematics and Statistics Scotland.



Pond reference	Distance from Site (m)	Description	HSI score	Pond suitability
WB03	240	Large artificial pond raised in elevation from WB04 – WB07. Area = 110m x 90m. Never dries. Water Quality – Poor. Shading 50%. Waterfowl – Major impact. Fish population – Likely. Terrestrial habitat for foraging/shelter – Moderate. No macrophytes cover.	0.33	Poor
WB04	360	Large artificial pond with swans and ducks present. Area = 110m x 70m. Never dries. Water Quality – Poor. Shading 15%. Waterfowl – Major impact. Fish population – Likely. Terrestrial habitat for foraging/shelter – Poor. Macrophytes cover – 5%.	0.32	Poor
WB05	430	Large artificial pond with swans and ducks present. Area = 70m x 35m. Never dries. Water Quality – Poor. Shading 40%. Waterfowl – Major impact. Fish population - Likely. Terrestrial habitat for foraging/shelter – Moderate. No macrophytes cover.	0.33	Poor
WB06	450	Large artificial pond with ducks present. Area = 110m x 40m. Never dries. Water Quality – Poor. Shading 0%. Waterfowl – Major impact. Fish population - Likely. Terrestrial habitat for foraging/shelter – Moderate. No macrophytes cover.	0.24	Poor
WB07	480	Same as WB06.	0.31	Poor
WB08	330	Garden pond on private land. No access for survey.	n/a	Unknown
WB09	350	Artificial pond within broadleaved / mixed plantation. Area = 210m x 50m. Never dries. Water quality – Poor. Shading 90%. Water fowl – Major impact. Fish population – Likely. Terrestrial habitat for foraging/shelter – Moderate. Macrophytes cover – 5%.	0.30	Poor
WB10	370	Artificial pond with rocky/silty substrate, scrubby round edges. Area = 45m x 45m. Never dries. Water Quality – Poor. Shading – 70%. Waterfowl -Major impact. Fish population – Possible. Terrestrial habitat for foraging/shelter – Poor. No macrophyte cover.	0.26	Poor
WB11	360	Artificial pond with rocky/silty substrate, inflow pipe at easterly side. Neutral grass. Area = 40m x 20m. Never dries. Water Quality – Poor. Shading – 0%. Waterfowl -Major impact. Fish population – Possible. Terrestrial habitat for foraging/shelter – Poor. No macrophyte cover.	0.26	Poor



Pond reference	Distance from Site (m)	Description	HSI score	Pond suitability
WB12	Within Site (proposed substation platform).	Peaty (acidic) pond, dark coloured likely deep. Duck weed covers 20% of surface with reed sweetgrass and few other emergent / marginal plants. Young conifer plantation to west, track to east then more forestry beyond. Pond Area 6m x 6m. Permanence - Never dries. Water Quality - Good. Shaded 0 - 60%. Waterfowl - Minor. Fish evidence/population - Absent. Terrestrial habitat for foraging/shelter - Moderate. Macrophytes - 5% of surface. Isolated, no other ponds within 1km.	0.39	Poor
WB13	40	Artificial/modified loch within broadleaved plantation. Never dries. Water quality – Poor. Shading 100%. Waterfowl – Major impact. Fish population – Possible. Terrestrial habitat for foraging/shelter – Moderate. No macrophytes cover.	0.26	Poor
WB14	10	Artificial loch adjacent to agricultural fields. Never dries. Area = 280m x 130m. Water quality – Poor. Shading 50%. Waterfowl – Major impact. Fish population – Possible. Terrestrial habitat for foraging/shelter – Moderate. No macrophytes cover.	0.33	Poor
WB15	10	Artificial loch adjacent to agricultural fields. Never dries. Area = 190m x 100m. Water quality – Poor. Shading 50%. Waterfowl – Major impact. Fish population – Possible. Terrestrial habitat for foraging/shelter – Moderate. No macrophytes cover.	0.31	Poor
WB16	80	Small artificial lochan adjacent to broadleaved and coniferous plantation. Area = 25m x 65m. Never dries. Water quality – Poor. Shading 10%. Waterfowl – Major impact. Fish population – Possible. Terrestrial habitat for foraging/shelter – Moderate. No macrophytes cover.	0.24	Poor
WB17	210	Open water associated with the Feddal Burn. Running water unsuitable for great crested newt.	n/a	n/a

5.4.61The Site is within 500 m of seventeen waterbodies (excluding flowing watercourses). Two are north of the Keir Burn (WB01 and WB02, Figure 5-7, Appendix A Figures), which presents a major barrier⁷¹ to movement, and as such if great crested newt is present in those ponds, it is highly unlikely that they could use the Site. Of the waterbodies located south of the B8033 (WB03, WB04, WB05, WB06, WB07), the closest is 240 m distant from the Site entrance (WB03). Woodland edge habitats in the area presents reasonable habitat

⁷¹ The following constitute major barriers to dispersal and are unlikely to be traversed by great crested newts: rivers and larger brooks; main roads such as A-roads, motorways or any other road with high traffic volume (i.e. high traffic volume during the night when great crested newt are more likely to be dispersing/commuting); and major urban infrastructure including extensive areas of hardstanding and buildings and dense networks of minor roads with little green space.



for newt movement, however, the B8033 road presents a barrier. The land adjacent to the Site at this southern end is mostly agricultural fields that are very much sub-optimal for the species.

- 5.4.62Four other waterbodies are over 250 m from the Site, one at a private residence (WB08), an artificial loch to the north of lower end of the proposed existing access track upgrades (WB09), and two associated with artificial drainage that are linked to the Feddal Burn (WB10 and WB11). Great crested newts generally move within 250 m of a breeding pond⁷². Given the intervening land of commercial forestry presents a significant barrier to movement, it is unlikely that any newts that may potentially breed in these ponds would be present on Site.
- 5.4.63Six open waterbodies are within 250 m of the Site, of which only one (a small pond) is within the Site (WB12). Within the small pond in the area of the proposed substation platform, common frog *Rana temporaria* spawn and three palmate newts were observed. Duck weed *Lemna minor* covered approximately 20% of the water's surface with reed sweet-grass *Glyceria maxima* occasional and a few other emergent / marginal species (such as soft-rush). Pond area was 6 by 6 m, it is likely to never dry, water quality was good, the perimeter of the pond was not shaded, impacts from waterfowl were minor, fish are presumed absent and terrestrial habitat was assessed as poor. The surrounding habitat was coniferous plantation. The pond scored a HSI of 0.39 (poor). Although this pond was shown to be suitable for common and widespread amphibians, the upland nature of the Site is generally unsuitable for great crested newt. The small pond is isolated, being 1 km from any other pond.
- 5.4.64Five waterbodies are located outside of the Site, but within 250 m of the Site. These are three modified/artificial Standing open waterbodies near Crofthead and Silverton (WB13, WB15 and WB15 all within 40 m or less of the proposed existing access track upgrades), a large pond northwest of Crofthead (WB16 within 80 m of the Site) and an area of open water on the Feddal Burn (WB17). The terrestrial habitat within the Site and the intervening land is sub-optimal for the species (which prefers a mosaic of rough grassland, scrub, and semi-natural woodland). The three large artificial ponds may be stocked with fish and would therefore be unsuitable for great crested newt. The large pond northwest of Crofthead is bordered by commercial forestry and arable farmland, which is very much sub-optimal for great crested newt and this pond is therefore unlikely to support the species. The open water on the Feddal Burn is of running water and is generally considered unsuitable for the species.
- 5.4.65All open waterbodies surveyed (see **Table 5-1** above) have poor habitat suitability for great crested newt. With the exception of the small, isolated acidic upland pond within the Site, all ponds were assessed as having little to no macrophyte cover, poor water quality and were subject to major impacts from waterfowl. The largest of the lochs are almost certainly stocked for sport fishing, with the other waterbodies possibly or probably supporting fish

⁷² NatureScot, (2020) Standing advice for planning consultations - Great Crested Newts (online) Available at: https://www.nature.scot/doc/standing-adviceplanning-consultations-great-crested-newts [Accessed 01 July 2024]



populations (particularly as all are anticipated to never dry). No optimal quality terrestrial habitat (for foraging or hibernating) is present within close proximity to the waterbodies.

5.4.66Given the above, the overall habitat suitability for great crested newt is poor and this species is considered likely absent from the Site.

Other Amphibians and Reptiles

- 5.4.67The desk study identified no amphibian or reptile records within 1 km of the Site. The following species are listed in the Tayside LBAP: adder *Vipera berus*, slow-worm *Anguis fragilis*, common lizard *Zootoca vivipara*, and common toad.
- 5.4.68During the field survey, one common lizard sighting was recorded in the Site (see Figure 5-6, Appendix A Figures), one sighting of palmate newt *Lissotriton helveticus* within a small upland pond (as described in Section 5.4.63) and one sighting of a pair of common toads adjacent to the proposed existing access track upgrades near to artificial waterbodies (see Figure 5-6, Appendix A Figures). An artificial reptile hibernaculum was identified within the Site from a document⁷³ received 18 December 2024. The location of the hibernaculum is centred on NN 79330 09429 and is approximately 75 m west of the existing Braco West substation.
- 5.4.69The area of the proposed substation platform comprises mainly felled / re-stocked coniferous woodland areas and a small area of heath that offers sub-optimal habitat for reptiles (e.g. common lizard). The field surveys did not reveal any optimal features for refugia or hibernation (e.g. vegetated rock piles, except for the artificial reptile hibernacula described in Section 5.4.60 above) or a varied spatial structure of habitats to provide good basking opportunities for reptiles (e.g. woodland edge, scrubland, and heathland in good condition in a mosaic with bracken).
- 5.4.70Given the above, the habitat suitability for common species of reptiles is considered to be low. Common lizard was found to be present within the area of the Site, but this species is not likely to be at high density, given the poor quality of the habitat.

Terrestrial Invertebrates

- 5.4.71The NBN Atlas desk study did not identify any notable terrestrial invertebrates within 1 km of the Site. There are no designated sites for nature conservation with terrestrial invertebrates as notified features within the potential Zol of the Proposed Development.
- 5.4.72Notable terrestrial invertebrate assemblages are most likely to be associated with high quality species-rich habitats, which are not present at the Site. The Site has limited opportunities for terrestrial invertebrates. The upland habitats (e.g. Degraded bog) are not especially floristically diverse and are also common in the region, and unlikely to support a particularly notable invertebrate assemblage. Mixed and broadleaved woodland plantation provides limited opportunities for notable terrestrial invertebrates (e.g. beetles, butterflies, and moths), but this habitat is not semi-natural or in good condition (e.g. species-rich, semi-

⁷³ EEL909R241216SP Cambushinnie 400kV Substation Preliminary Ecological Assessment (PEA) CIC v1.0



natural ground flora, good structural diversity, and presence of deadwood). Therefore, notable terrestrial invertebrates are not considered to be a significant constraint.

Fish and Aquatic Invertebrates

- 5.4.73The desk study identified one record of lamprey *Lampetra* sp. within 1 km of the Site. No records of aquatic invertebrate were noted during the desk study. Tayside LBAP lists the following nine fish species on their protected species list: Atlantic salmon, river lamprey, sparling/smelt *Osmerus eperlanus*, twaite shad *Alosa fallax*, brown trout, allis shad *Alosa alosa*, Arctic charr *Salvelinus alpinus*, brook lamprey, and sea lamprey. Several small watercourses that cross the proposed existing access track upgrades have a hydrological link to the Allan Water. It is likely that notable fish occur in the Keir Burn and it is possible for notable fish to occur within the small watercourses and/or artificial drainage ditches that cross the proposed existing access track upgrades.
- 5.4.74The Keir Burn has potential to support notable aquatic invertebrates. The other watercourses (and associated open waterbodies) within the Site and wider area are unlikely to support notable aquatic invertebrates due to their small size and modified nature. The remaining minor watercourses within the Site and beyond the boundary of the Site are not of special note or size and are shallow with little or no emergent/marginal vegetation. Given the above, it is considered that notable aquatic invertebrates are unlikely to be a significant constraint.

Invasive Non-native Species

- 5.4.75The desk study identified two records of plant INNS giant hogweed within 1 km of the Site and four records of animal INNS: three records of grey squirrel *Sciurus carolinensis* and a single record of New Zealand flatworm *Arthurdendyus triangulates*.
- 5.4.76The following INNS were identified during field surveys: giant hogweed, dogwood and snowberry. Dense stands of non-native dogwood and snowberry were identified during the field survey. Full details of the extent and location of these INNS are provided in Section
 5.4.16 above.

5.5 Embedded Mitigation

- 5.5.1A range of measures that are standard good practice for a development of this type, and that are required to comply with environmental protection legislation, will be implemented. These are well-developed and have been successfully implemented on infrastructure projects across the country, and there is a high degree of confidence in their success. They can therefore be treated as embedded mitigation.
- 5.5.2A GEMP and/or CEMP (**Appendix O GEMPs and SPPs**) would be prepared and submitted for approval by PKC, in consultation with SEPA and NatureScot where necessary, prior to commencement of construction. The GEMP/CEMP will set out all environmental management measures and the roles and responsibilities of construction personnel, to include:
 - All personnel involved in the construction and operation of the Proposed Development would be made aware of relevant ecological features and the mitigation measures and working procedures that must be adopted. This would be achieved as part of the induction process and/or through Toolbox Talks;



- An Environmental Clerk of Works and Ecological Clerk of Works would be employed for the duration of construction and conduct regular site inspections. The Ecological Clerk of Works would advise on and monitor implementation of mitigation measures and compliance with legislation concerning ecological features;
- The Ecological Clerk of Works or other suitably qualified and experienced ecologist would carry out pre-construction surveys for relevant protected species in suitable habitat, including otter, water vole, badger, red squirrel, and pine marten. In line with NatureScot guidance, the pre-construction surveys would take place no more than three months before commencing works (including facilitating works such as vegetation clearance);
- During all phases of the Proposed Development, pollution prevention measures would be adopted, following SEPA Guidance on Pollution Prevention (GPP) and Pollution Prevention Guidelines (PPG)⁷⁴, including the following:
 - Controls and contingency measures to manage run-off from construction areas and sediment;
 - All oils, lubricants and other chemicals would be stored in appropriate secure containers in suitable storage areas, with spill kits at the storage location and at places across the Site;
 - All refuelling and servicing of vehicles and plant would be carried out in a designated bunded area with an impermeable base, located at least 50 m from any watercourse;
- Works near or at any retained native trees or semi-natural woodland would follow tree protection guidance set out in British Standard 5837:2012⁷⁵;
- Requirements for peat management to ensure construction operations adhere to the mitigation hierarchy set out in the NPF4⁷⁶;
- Implement standard measures to protected mammals during construction, including:
 - ensure excavations are left with a method of escape for any animals that may enter overnight (such as a battered slope sufficient for mammals to walk out), and check them at the start of each working day to ensure no animals are trapped;
 - ensure pipes are capped or otherwise blocked at the end of each working day, or if left for extended periods of time, to ensure no animals become trapped; and
- Lighting as far as possible, carry out works in daylight to minimise the risk of disturbing protected or notable nocturnal species. If any temporary artificial lighting is required for construction works, this should be strongly directional and directed only on to the works area, and be turned off when not required, to minimise light spill and adverse effects on nocturnal wildlife.
- 5.5.3Embedded mitigation measures in relation to sensitive ecological features include:
 - Prioritise avoiding loss or other impacts on peatlands (e.g. bog and heathland habitats). Consideration should be given to a) minimising the impacts on these habitats; and b) compensation by enhancement of other bog and heathland habitats to achieve an overall BNG;

⁷⁴ Natural Resources Wales (NRW), the Northern Ireland Environment Agency (NIEA), the Scottish Environment Protection Agency (SEPA) and the Oil Care Campaign, 2024. *Guidance on Pollution Prevention* (online). Available from: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/ [Accessed 01 July 2024].

⁷⁵ British Standards Institution (2012) BS 5837:2012 Trees in relation to design, demolition and construction. Recommendations

⁷⁶ NatureScot, (2023) Advising on peatland, carbon-rich soils and priority peatland habitats in development management (online) Available at: https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management [Accessed 01 July 2024].



- Avoid deep peat in general deep peat is highly likely to be present in areas of blanket bog;
- All soil stripping/peat excavation and storage to follow a process of soil management to
 ensure the protection of turfs and soil horizons, allowing for successful reinstatement
 and revegetation;
- Loss of woodland and native trees will be minimised, or losses compensated for by planting. Retained native trees and their root zones should be avoided and protected during the works in accordance with standard guidance in British Standard 5837:2012⁷⁵;
- If otter refuges, water vole burrows, pine marten dens, or red squirrel dreys (or other protected breeding / resting sites) are found that would be subject to disturbance or damage, there would be a constraint to the Proposed Development⁷⁷. If this becomes the case, obtain an appropriate license from NatureScot, which will require proportionate mitigation;
- If works will be carried out that directly affect trees or woodland within 5 m of the Site in the non-breeding season or 50 m of the Site in the breeding season⁷⁸, then carry out red squirrel pre-construction surveys⁷⁹ for red squirrel dreys in suitable woodland (to 5 / 50 m); and,
- It is advisable to carry out removal of trees with potential for squirrel dreys or actual squirrel dreys outside of the breeding season. If red squirrel dreys are present, licensing through NatureScot is more difficult in the breeding season, and it is not normally permitted to destroy likely breeding dreys in the breeding season.
- 5.5.4In regard to all other habitats (including potential GWTDE as described in Sections 5.6.13 to 5.6.14 below), there are no significant ecological constraints all other habitats within the Site are common and widespread and are of minimal ecological value.

5.6 Appraisal

Issues Scoped Out

- 5.6.1There is a hydrological link between the Site and the River Teith SAC, however, the Site is over 20 km downstream from the SAC. There is no downstream hydrological link between the Site and the Carsebreck and Rhynd Lochs SSSI. Given a) the nature of the Proposed Development, b) the degree of dilution over 20 km or more to the SAC / no hydrological link to the SSSI, and c) that pollution controls can be expected to be required to be embedded in the CEMP, there is not likely to be any pollution impact within the SAC or the SSSI. Notable fish species associated with the River Teith SAC could theoretically be present within some of the watercourses within the Site and the surrounding area; however, fish will be suitably protected via embedded mitigation measures.
- 5.6.2None of the other four designated sites for nature conservation within the Zol (i.e., Shelforkie Moss SAC, Upper Strathearn Oakwoods SAC, Kippenrait Glen SAC, and Glenartney Juniper Wood SAC), have any conceivable pathway for potential impacts on qualifying habitats because there is no hydrological connectivity (or any other connectivity via watercourses or otherwise). Given the distances from the Site at which all of these SAC are located, it is highly unlikely that these would be adversely affected by the Proposed

⁷⁷ Normal disturbance distance for otter refuges is 30 m, unless severe works such as piling are proposed. Works up to 10 m from water vole burrows are normally possible.

⁷⁸ The red squirrel breeding season is February to September, inclusive.

⁷⁹ Recommended to be conducted in good time to allow for licencing if required (e.g. three months prior to commencement).



Development, including via air pollution. Dust and gaseous air pollution can have an adverse impact on habitats over a distance, but such effects diminish rapidly from source and are generally considered negligible at 200 m⁸⁰. There is no conceivable pathway for potential air pollution impacts on the qualifying habitats of the SAC that are located 5.2 km from the Site at their closest. This distance precludes any effect on habitats from air pollution.

- 5.6.3Consequently, and in view of the nature of the Proposed Development, potential effects on the SAC and SSSI above as a result of the Proposed Development are not possible. Furthermore, as per consultation feedback presented in **Section 5.2.4**, NatureScot stated that there would likely be no significant effects for the qualifying interests of all relevant designated sites. Given the above, the SAC and SSSI are scoped out of assessment.
- 5.6.4Braco Castle Wood LNCS has no possible hydrological link with the Site. Moreover, the LNCS is at a distance from the Site (0.7 km at the closest point) at which no possible air pollution impacts are anticipated. Consequently, and in view of the nature of the Proposed Development, potential effects on the LNCS as a result of the Proposed Development are not possible and it is scoped out of assessment.
- 5.6.5Ancient woodland, listed on the AWI, is present within 1 km of the Site but not within the Site, and it is highly unlikely that there would be any adverse effect on AWI woodlands given the nature of the Proposed Development and the lack of connectivity between the Site and the area of AWI woodlands. NWSS Native Woodland, is present within 1 km of the Site, but outside the Proposed Development footprint. Consequently, and in view of the nature of the Proposed Development, potential effects on the notable woodlands listed on the AWI and NWSS as a result of the Proposed Development are not possible and they are scoped out of assessment.
- 5.6.6As described in **Section 5.4.57**, the waterbodies within 500 m of the Site have poor habitat suitability for great crested newt and the desk study did not indicate this species to be present within the search area. Only one pond (WB12) would be directly impacted by the Proposed Development a small, isolated, upland, acidic pond. Moreover, the vast majority of terrestrial habitats within the Site present little to no opportunities for great crested newt hibernation. These include upland areas of disturbed commercial plantation and an existing hardstanding access track (with only occasional poor quality grassy margins). It is not anticipated that any habitats that present opportunities for great crested newt hibernacula would be subject to disturbance from the Proposed Development. Given the above, great crested newt is considered likely to be absent from the Site and no impacts upon potential breeding ponds or hibernacula are considered possible. Therefore, great crested newt is scoped out of assessment.
- 5.6.7Given the sub-optimal quality of habitat and lack of suitable refugia and resulting likely low frequency of reptile species, they are not considered to represent a major ecological constraint to the Proposed Development and additional survey or mitigation is not warranted. There is no requirement for a licence where development works affect common species of reptiles and, in this case, there is no need for any specific mitigation for their protection. Regardless, the artificial reptile hibernacula described above in Section 5.5.60 should be avoided by works (e.g. no direct impact) or if it is to be impacted, the artificial

⁸⁰ Highways England, (2019) *Design Manual for Roads and Bridges – LA105 Air Quality*. Highways England.



reptile hibernacula would be inspected and dismantled, and re-created (under ECoW supervision) elsewhere outside the Site in summer (Late-May to Mid-September).

Sensitive Ecological Receptors

- 5.6.8The ecological baseline presented in Section 5.4 has been used to identify important ecological features within the potential ZoI of the Proposed Development. The importance (and sensitivity) of a given ecological feature has been determined from information on distribution and status, a review of literature and guidance²², field survey data and professional judgement.
- 5.6.9The only relevant ecological feature considered to be of County importance is ancient and native woodland. County importance is defined in CIEEM Guidance²² and outlined in **Section 5.3.2.**
- 5.6.10Relevant ecological features considered to be of Local importance are:
 - Degraded blanket bog (on deep peat);
 - Upland heathland;
 - Other broadleaved woodland
 - Species-poor hedgerows;
 - GWDTE;
 - Priority rivers/streams;
 - Bats;
 - Otter;
 - Pine marten;
 - Water vole;
 - Red squirrel;
 - Fish; and
 - Aquatic invertebrates.

5.6.11Relevant ecological features considered to be of Site importance are:

- Mixed Broadleaved Woodland;
- Species-poor Hedgerows;
- Other Rivers/Streams; and
- Badger.

In addition to the features of positive ecological importance above, INNS are considered a negative feature of Site importance.

Potential Significant Effects

5.6.12Potential significant impacts and effects from the construction and operation of the Proposed Development on ecological features include the following:

- Permanent habitat loss (to e.g., Degraded bog and heathland at the proposed substation platform, species-poor hedgerows north of Crofthead lost to the proposed existing access track upgrades);
- Temporary habitat loss (to e.g. Other broadleaved woodland lost to temporary track north of Crofthead);
- Habitat degradation as a result of pollution incidents (e.g., fuel or oil spills);



- Permanent or temporary changes to hydrological conditions which may affect vegetation and habitats (e.g., indirect impacts on GWDTE);
- Loss of habitat supporting protected and/or notable species;
- Creation of barriers to animal movements (e.g., the construction of watercourse crossings could inhibit the movement of otter or fish);
- Temporary disturbance and/or displacement of species during construction;
- Disturbance and/or displacement of species during operation (e.g., the use of permanent lighting could impact upon bat foraging);
- Potential for direct mortality of species during construction (e.g., as a result of increased vehicular traffic, or as a result of a pollution incident); and
- Potential for spread of INNS during construction.
- 5.6.13It is anticipated that the potential impacts on ecological features from the Proposed Development could be managed through mitigation and compensation. Opportunities for ecological enhancement measures are available and likely to be sufficient to allow the Proposed Development to meet the objectives of NPF4.

GWDTE

- 5.6.14Potentially highly GWDTE, of the NVC type M6c or M23b, are present to the southeast, southwest and north of the proposed substation platform. Potentially moderately GWDTE were identified but were not considered to be ground water dependent (see Sections 5.4.36 to 5.4.40 above). The hydrological regime of the area is highly modified by the presence of the commercial forestry plantation (and possibly to some extent by the existing Braco West Substation). The GWDTE identified are likely to be subject to ongoing pre-existing impacts, including the presence of frequent forestry drainage grips.
- 5.6.15Potentially highly GWDTE are outside of the Proposed Development footprint (including areas of proposed landscaping and habitat enhancement) and would not be directly impacted. These GWDTE would be unlikely to suffer any potential indirect impacts from the Proposed Development, as there is no proposed construction within the immediate upslope area of these habitats and the intervening land is highly hydrologically modified. Therefore, indirect impacts as a result of a change in hydrological regime are considered to be unlikely. Given the above, no impacts are considered likely to GWDTE as a result of the Proposed Development.

Mammals

5.6.16Protection of bats, otter, pine marten, red squirrel and badger can be suitably achieved by implementing mitigation measures as described in **Sections 5.5.2** to **5.5.3**.

Fish and Aquatic Invertebrates

5.6.17Protection of fish and aquatic invertebrates can be suitably achieved by implementing mitigation measures as described in **Section 5.5.2**.

Invasive Non-native Species

5.6.18 Giant hogweed, dogwood, and snowberry were all identified during field survey. The spread of INNS, which would be a negative impact of Site importance, is possible as a



result of the Proposed Development and as such further mitigation is outlined in **Section 5.7.5** below.

Summary

- 5.6.19The area of the proposed substation platform largely comprises commercial plantation forestry and areas of notable habitats including Degraded blanket bog and an isolated area of Wet heathland. The existing access track upgrades largely comprises hardstanding and is bordered by non-notable habitats.
- 5.6.20GWDTE were identified within the survey area. However, these ecosystems were assessed as being unlikely to be groundwater dependent or they were unlikely to be impacted by the Proposed Development.
- 5.6.21Signs of notable and protected species were found to be present on the Site, the most notable of which was otter. However, no resting or breeding sites were found. Bat suitability for feeding / commuting was found to be Low for the Site as well as for the proposed existing access track upgrades). No trees or buildings with potential to support bat roosts were found during surveys and none are likely to be affected by the Proposed Development. Habitat suitability for water vole, pine marten, red squirrel, and badger were low.
- 5.6.22Notable watercourses were identified within and around the Site with potential to support notable populations of fish (e.g. the Kier Burn). It is possible for notable fish to occur within the small watercourses and/or artificial drainage ditches on the Site.
- 5.6.23 INNS were identified within and around the Site and have the potential to spread as a result of the Proposed Development.

5.7 Recommendations and Mitigation

Designated Sites

5.7.1As noted above, five European sites (SACs) within 10 km of the Site and one SSSI within 2 km of the Site have been scoped out of further assessment. However, the River Teith SAC, Kippenrait Glen SAC, Shelforkie Moss SAC, Upper Strathearn Oakwoods SAC, Glenartney Juniper Wood SAC, as European Sites, are subject to the HRA process. An 'HRA Memorandum' has been produced as a standalone report and will be submitted to PKC, setting out why likely significant effects are not considered possible and therefore that further HRA is not considered necessary. PKC will need to confirm agreement or otherwise, as the competent authority for HRA matters. Non-statutory designated sites have been scoped out of assessment. Therefore, potential impacts and likely significant effects will not require a full HRA. An HRA Memorandum will be submitted as part of the Section 37 planning application.

Other Broadleaved Woodland and Species-poor Hedgerow

5.7.2Species-poor plantation and hedgerows would be impacted by the Proposed Development. Where felling / removal of these habitats is proposed, then the habitats must be replaced on a like-for-like basis as a minimum, as close to the location of impact as possible. Such measures should also be considered for enhancement as described in **Section 5.7.9**, to go


beyond like-for-like compensation by increasing local species diversity, for example by providing better foraging habitat for mammals.

GWDTE

- 5.7.3It is considered unlikely that GWDTE would be impacted by the Proposed Development. However, to minimise potential impacts on GWDTE all works must seek to avoid direct disturbance, where possible. Mitigation must be employed for individual GWDTE (where required) to ensure that hydrological connectivity from upstream groundwater supplies to the downstream GWDTE is maintained (to maintain existing hydrological regimes). Suitable GWDTE mitigation methods in relation to the construction of the track extension and track upgrades include the use of:
 - Permeable track (e.g. coarse aggregate base); and/or
 - Culverts installed at regular intervals.

Fish

5.7.4Fish will be safeguarded by minimising works in or beside all watercourses and open water, and adoption of measures to ensure waterbodies are protected from pollution (by adhering to SEPA Guidance on Pollution Prevention⁸¹). Water crossings must be constructed in accordance with authorisations and Method Statements granted/accepted by SEPA.

Invasive Non-native Species

- 5.7.5It is an offence in Scotland to plant, or otherwise cause to grow, any plant in the wild at a location outside its native range. Appropriate actions (such as avoidance, specific treatment and/or standard best practice) should therefore be integrated into any works which may affect invasive non-native plant species, to manage the risks and avoid potential breaches of legislation. Such actions would be compiled in a Biosecurity Management Plan (BMP) or, at minimum, a Method Statement. These actions would include avoiding disturbance of INNS as far as possible, cleaning of heavy plant, machinery and Personal Protective Equipment (PPE) used in the vicinity of these species, and careful management of any arisings (including potentially contaminated substrate) should they need to be removed. Note that it is best practice, more sustainable and more cost-effective, where feasible, for INNS arisings to be left within existing infested areas, or at least retained onsite, rather than removing material offsite removal to landfill is the least sustainable and often the most expensive option.
- 5.7.6A BMP or Method Statement is likely to be required, as INNS are located near the proposed existing access track upgrades that may be disturbed by works. Production of a BMP would require clarification of the exact locations of species with the potential to become invasive, particularly giant hogweed, snowberry, and dogwood. Establishing this would require a

⁸¹ SEPA (2013) *PPC Technical Guidance Note* (online) Available at: https://www.sepa.org.uk/media/155691/iedtg02_site_and_baseline_report-guidance.pdf



specific walkover survey of localised parts of the Site and should be carried out as a preconstruction survey.

5.7.7There are no specific requirements for the grey squirrel or New Zealand flatworm.

Opportunities for Ecological Enhancement

- 5.7.8BNG will be achieved for the Site (following implementation of compensatory / enhancement habitat measures advised in **Appendix E Biodiversity Net Gain Report**). This would satisfy the requirement for developments to provide 'biodiversity benefits' as stipulated in NPF4⁸².
- 5.7.9Blanket bog restoration will be conducted in suitable locations around the proposed substation platform. Peatland habitats in this area have been badly disturbed by former forestry operations, leaving the land heavily ridged and drained. Restoration of the blanket bog could be met through interventions using recognised best practice techniques⁸³ (e.g. smoothing and/or drainage channel blocking which would likely make use of excess peat won from the area of the proposed substation platform) to bring the water table at/near the bog surface all year, with ongoing maintenance of tree / scrub clearance. Peatland restoration measures are described in Appendix N Peat Management Plan & Peat Landslide Hazard Risk Assessment.
- 5.7.10Broadleaved woodland creation / enhancement will be conducted in suitable areas around the proposed substation platform. Hedgerow creation / enhancement will be as close to the area of loss as possible (potentially off-site, if required). Woody species planting will be appropriate to the locality, with the aim of simulating the canopy of a natural woodland type / native species-rich hedgerow.
- 5.7.11The following enhancement could also be considered that does not contribute towards the calculation of BNG, but can still deliver improvements for biodiversity that would also work towards achievement of 'biodiversity benefits' under NPF4:
 - Use of removed woody material to create log-piles in appropriate retained habitat, as advised by an ecologist, which would function as refuges for the benefit of reptiles, amphibians and invertebrates (e.g. within the vicinity of a SUDS basin).

Documents

- 5.7.12Further specific mitigation measures will be detailed in the following documents:
 - An LHMP has been prepared (**Appendix F Landscape and Habitat Management Plan**) and will be submitted for approval by PKC, in consultation with SEPA and NatureScot where necessary, prior to commencement of construction. The LHMP will detail specific requirements for enhancement measures (e.g. blanket bog restoration, woodland creation/enhancement); and

⁸² National Planning Framework 4 (NPF4) includes the following statements of policy intent: "*To protect, restore and enhance natural assets making best use of nature-based solutions*" and "*To protect biodiversity, reverse biodiversity loss, deliver positive effects from development and strengthen nature networks*". Wherever possible, and proportionate to the scale and nature of the project, the Proposed Development should therefore seek to deliver benefits for biodiversity, in addition to protecting existing biodiversity. NPF4 also states that major development will only be supported where nature networks "*are in a demonstrably better state than without intervention*" using best practice and including future monitoring and management where appropriate.

⁸³ NatureScot, 2020. *Peatland ACTION – Technical Compendium* [Online]. Available from: https://www.nature.scot/doc/peatland-action-technical-compendium [Accessed 01 July 2024].



• A BMP or, at minimum, an INNS Method Statement will be prepared and submitted for approval by PKC prior to commencement of works on the Site. The BMP / Method Statement will detail the mitigation measures required to prevent the spread of INNS.

5.8 Cumulative Effects

- 5.8.1A cumulative appraisal was conducted taking into account the 'scoped in' planning applications as detailed in **Section 13.1.2** and **Table 13-1**, these are listed below;
 - Cambushinnie 400kV OHL tie-in
 - Cambushinnie UGC between the existing Braco West substation and the Proposed Development
 - 21/00756/FLM: 49.9MW energy storage facility
 - 22/02231/FLM: 49.9MW energy storage facility compound
- 5.8.2The developments above are considered to be of importance to the cumulative appraisal concerning important ecological features, as they are developments that are located within the local area to the Proposed Development that could potentially give rise to cumulative effects.
- 5.8.3During the appraisal process, the results of which are described in this chapter, there were no impacts identified that could possibly result in a residual effect⁸⁴ of greater than Negligible effect. Consideration during this cumulative appraisal would only be given to those impacts where a residual effect of significance was concluded for the Proposed Development.
- 5.8.4For all impacts for which it was concluded that there would be No Effect or Negligible Effect, it is considered that the effect of that impact from the Proposed Development in isolation will be so minimal, that it is extremely unlikely that there is any possibility of significant cumulative effects arising from the combined impact(s) of projects in the list above. Similarly, the additive (or multiplicative) action of effect interactions are not anticipated due to the same reasons given above (that all impacts were appraised to be so minimal, they could not possibly give rise to a cumulative effect).
- 5.8.5It is concluded on the basis of the assessment presented above that the Proposed Development will not act cumulatively to give rise to significant adverse effects on ecological features. This relies on the mitigation described in this chapter to avoid or minimise the risk on important ecological features, and on the proposals also doing the same (e.g. managed through project-specific CEMPs).

⁸⁴ As described in CIEEM guidance. CIEEM (2022). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.2 – Updated April 2022. Chartered Institute of Ecology and Environmental Management, Winchester.



6. ORNITHOLOGY

6.1 Introduction

6.1.1This EA chapter considers the potential effects of the Proposed Development on ornithology within the Site and within the wider local area. Evaluation of the existing baseline environment has been made through a combination of desk-based study, field surveys and consultation. This EA was written with cognisance of the methodology set out in CIEEM (2024)²² guidance.

6.1.2This chapter:

- Describes the key ornithological issues associated with construction and operation of the Proposed Development;
- Presents the desk study/survey methods that were used to generate ornithological baseline information;
- Includes details of any consultation undertaken to date to inform the EA;
- Presents the results of the surveys; and
- Provides an outline of embedded mitigation, an appraisal of ornithological features and potential significant effects, and recommends further mitigation measures and recommendations.

6.2 Information Sources

6.2.1The report draws on the following technical figures (see Appendix A Figures):

- Figure 6-1 Statutory Sites; and
- Figure 6-2 Raptor Walkover Survey Results.

Consultation

- 6.2.2At the time of writing , consultation requests had been made regarding potential ornithological impacts of the Proposed Development with the following consultees: PKC; NatureScot; Forestry and Land Scotland; Scottish Forestry; RSPB; Scottish Wildlife Trust; and Scottish Raptor Study Group. However, of the responses received , only PKC and NatureScot responded with information relevant to ornithology. NatureScot responded and stated that there will likely be no significant effect for the qualifying interests of all relevant designated sites.
- 6.2.3On 24 April 2024, PKC and NatureScot were invited to provide comment on the proposed ornithological surveys. On 7 May 2024, PKC responded stating that: "I note the contents of the references used to inform the proposed survey effort but would include reference to Bird Survey Guidelines (2024)⁸⁵ which states as standard it is recommended that six bird survey visits be undertaken as part of a survey for breeding birds. Based on the justification that the habitat is commercial forestry, I think the proposed four visits is acceptable. I would however suggest that any birds observed while carrying out the targeted surveys for goshawk are recorded and reported to inform the planning application. This is for completeness and also that it wouldn't necessarily cause additional time and effort to note

⁸⁵ Bird Survey Guideline (2024) Breeding bird survey methodology. (online) Available at: https://birdsurveyguidelines.org/methods/survey-method/ [Accessed: 29 July 2024].



incidental observations." On 9 May 2024, NatureScot replied directly by email to the above and added (to the email chain with PKC's email) that "We are content with the proposed surveys and have no further comment to make."

Desk Study

6.2.4Several data sources were used for the desk study, as set out in Table 6-1.

Table 6-1 Desk Study Data Sources

Data Source	Date Accessed	Data Obtained
OS 1:25,000 maps and aerial photography ⁸⁶	19 February 2025	Aerial imagery to identify potential habitats and connectivity relevant to interpretation of planning policy and potential protected or notable species constraints.
PKC LDP ⁸⁷	19 February 2025	Information on local policies regarding the environment.
The PKC follows the Tayside LBAP (2016-2026) ⁸⁸	19 February 2025	Information on protected or notable species.
NatureScot SiteLink webpage ⁸⁹	19 February 2025	SPA and Ramsar sites within 10km of the Site. SSSIs within 2km of the Site.
NBN Atlas Scotland ⁹⁰	1 May 2024	Commercially available records of protected and/or important species within 1km of the Site, made since 2000.

Preliminary Ecological Appraisal

6.2.5The Preliminary Ecological Appraisal included a walkover survey of the survey area, broadly following the Phase 1 habitat survey methodology as set out in Joint Nature Conservation Committee (JNCC) guidance³⁷, by which standard habitat types are mapped and ecological notes made. Records of notable birds and an assessment of habitat suitability for birds were made. The survey involved assessing the potential of habitats within the survey area to support breeding, wintering, and migrating birds, either individually notable species or

⁸⁹ NatureScot (2024) SiteLink (online) Available at: https://sitelink.nature.scot/home [Accessed: 01 July 2024]

⁸⁶ Bing Maps (2024) (online) Available at: www.bing.com/maps/ [Accessed: 01 July 2024]

⁸⁷ PKC (2019) Local Development Plan (online) Available at: https://www.pkc.gov.uk/ldp2 [Accessed: 01 July 2024]

⁸⁸ Tayside Biodiversity (2023) Tayside Local Biodiversity Plan (online) Available at: https://www.taysidebiodiversity.co.uk/ [Accessed: 01 July 2024]

⁹⁰ NBN Atlas Scotland (2024) (online) Available at: https://scotland.nbnatlas.org/ [Accessed: 01 July 2024]



assemblages of both common and rarer species. The survey extended to 50 m from the Proposed Development. Surveys were conducted on 15 January 2024. Raptor Survey.

6.2.6A raptor walkover survey was carried out on 19 March 2024, 9 May 2024, 12 June 2024 and 22 July 2024. The survey area included the area within the boundary of the Site. The raptor survey methodology is detailed further in **Sections 6.3.9** and **6.3.10**.

6.3 Methodology

Sensitive Ecological (Ornithological) Receptors

- 6.3.1CIEEM's *Guidelines for EcIA in the UK and Ireland*⁹¹ recommend that only those ecological features that are 'important' and that could be significantly impacted by a development require detailed assessment, stating that "*it is not necessary to carry out detailed assessment of ecological features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable*".
- 6.3.2Consequently, for the purposes of the desk study, field survey and assessment of effects, 'important' ornithological features will be taken to include designated ornithological sites and bird species designated or listed on:
 - Directive 2009/147/EC on the conservation of wild birds (the 'Birds Directive')⁹²;
 - Convention on Wetlands of International Importance ('Ramsar Convention')⁹³;
 - Wildlife and Countryside Act 1981 (the 'WCA')⁹⁴;
 - Species on the Scottish Biodiversity List (SBL)⁹⁵, which are thus identified as being of principal importance for biodiversity conservation in Scotland; and
 - Birds of Conservation Concern (BoCC) Red List⁹⁶.
- 6.3.3Other bird species that may be rare, scarce, or otherwise notable will be included where deemed appropriate through available information and/or professional judgement.
- 6.3.4The Tayside Biodiversity Action Plan (2016-2026)⁶⁸ sets out Action Plans with relevance to ornithological receptors. Bearded tit *Panurus biarmicus* (a priority species) is specifically mentioned in 'Action for Species'. However, bearded tit is of a localised distribution and is a species associated with reed beds not present within, or within close proximity to, the Site. The Upland LBAP refers to upland birds with a specific mention of golden eagle *Aquila chrysaetos*, snow bunting *Plectrophenax nivalis* and scoter *Melanitta nigra*) three species that are not anticipated to be onsite, according to their known distribution. The Farmland LBAP refers to farmland bird species including barn owl *Tyto alba*, tree sparrow *Passer montanus*, grey partridge *Perdix perdix*, linnet *Linaria cannabina*, lapwing *Vanellus vanellus*, corn bunting *Emberiza calandra*, and skylark *Alauda arvensis*. The Woodland LBAP makes reference to woodland bird such as great-spotted woodpecker *Dendrocopos major*, chiffchaff *Phylloscopus collybita* and blackcap *Sylvia atricapilla*. The Water &

⁹¹ CIEEM, 2022. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Version 1.2, updated April 2022). Chartered Institute of Ecology and Environmental Management, Winchester.

⁹² European Union (2009) Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (online) Available at: https://eur-lex.europa.eu/eli/dir/2009/147/oj/eng

⁹³ Convention on Wetlands Secretariat (2024) The List of Wetlands of International Importance (online) Available at:

https://www.ramsar.org/sites/default/files/2023-08/sitelist.pdf

⁹⁴ Gov.uk (1981) Wildlife and Countryside Act 1981

 ⁹⁵ NatureScot (2020) Scottish Biodiversity List (online) Available at: https://www.nature.scot/doc/scottish-biodiversity-list [Accessed: 01 July 2024]
 ⁹⁶ British Trust of Ornithology (2021) Birds of Conservation Concern 5



Wetlands LBAP is relevant to the Proposed Development in that it highlights the importance of SPA and Ramsar sites for migratory birds (see **Section 6.4.1** below).

Desk Study

- 6.3.5A desk study was carried out in February and May 2024 which identified nearby designated sites and commercially available records of notable bird species.
- 6.3.6The desk study sought to identify ornithological features within the likely Zone of Influence (ZoI) of the Proposed Development that could be significantly affected by its construction and operation. As noted in **Section 5.3.6** above, the ZoI is the area(s) over which ecological features may be affected by the biophysical changes caused by the Proposed Development and associated activities⁹⁷.
- 6.3.7A stratified approach was taken when defining the desk Study Area based on the likely Zol of the Proposed Development. Accordingly, the desk study searched for:
 - SPA or Ramsar sites within 10 km of the Site;
 - SSSIs within 2 km of the Site;
 - Locally designated nature conservation sites within 2 km of the Site; and
 - Records of protected and/or important bird species within 1 km of the Site.

Habitat Survey

6.3.8The Preliminary Ecological Assessment included a walkover survey of the survey area (the survey area extended from 50 m beyond the Site), broadly following the Phase 1 habitat survey methodology as set out in JNCC (2010)³⁷. Habitats were classified according to the UKHab⁹⁸ system (see Section 5.3.7 onwards above). The survey was 'extended' to record any evidence of and potential for protected or notable bird species. The survey involved assessing the potential of habitats within the survey area to support breeding, wintering, or migrating birds, either individually notable species or assemblages of both common and rarer species.

Raptor Surveys

- 6.3.9Considering the possible presence of notable raptor species red kite *Milvus milvus* and goshawk *Accipiter gentilis* nesting within or in close proximity to the Site, surveys were carried out to determine the presence of raptors to a suitable distance beyond the Site.
- 6.3.10Surveys comprised a combination of vantage point (VP) watches and walkover survey to search for nests. All raptors seen or heard were recorded by mapping an estimated flightpath of the bird and any relevant details including behaviour, flight height, and flight duration. Walkover surveys were carried out throughout suitable habitat within the 500 m

 ⁹⁷ CIEEM, 2024. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Version 1.3, updated April 2022). Chartered Institute of Ecology and Environmental Management, Winchester.
 ⁹⁸ Putcher, P., Carey, P., Edmande, P., Natan, L., and Tenunak, L. (2020). UK Habitat Classification V1.1 (online). Available at: http://whitehear.

⁹⁸ Butcher, B., Carey, P., Edmonds, R., Norton, L. and Treweek, J., (2020) *UK Habitat Classification V1.1* (online). Available at: http://ukhab.org [Accessed 01 July 2024].



survey area and involved searching for any signs of raptor nests and listening for calls. Survey methodology followed NatureScot (NS) (2017) guidance⁹⁹.

- 6.3.11Records of incidentally encountered other (non-raptor) notable birds (defined in **Section 6.3.2**) were made during surveys.
- 6.3.12No other ornithology survey was carried out or is considered necessary to inform the EA.

Limitations

- 6.3.13The aim of a desk study is to characterise the baseline context of a proposed development and provide valuable background information that may not be captured by field survey alone. Information obtained during the course of a desk study is dependent upon people and organisations having made and submitted records for the area of interest. As such, lack of records for a particular species does not necessarily mean that they do not occur in the Study Area. Likewise, the presence of records for particular species does not automatically mean that these still occur within the area of interest or are relevant to the Proposed Development.
- 6.3.14Access restrictions due to lack of landowner permission to conduct ecology surveys were present to the southwest of the Site during the first two survey visits in March and May. Therefore, surveyors were unable to access up to the 500 m limit for the raptor walkover survey in this location. Given these restrictions, surveys were done at distance, beyond the area immediately west of the commercial forestry plantation. With regard to observing raptor flights, this was not a significant limitation, as the view from the western edge of the forestry area encompassed all of the 500 m buffer. Flight activity around potential nests in this area was easily observed. For subsequent visits in June and July, access restrictions were lifted and closer inspections of woodland with potential raptor nests could proceed as planned.
- 6.3.15During raptor walkover surveys, access permissions were restricted for vehicles. Surveyors were required to park in Braco village and walk 30 minutes to the Site. Surveyors then needed one and a half hours to walk to the existing Braco West Substation. Without access to vehicles, the maximum additional distance surveyors walked in a day was 11 km (further to the 3 to 5 km of walking off-track within the Site). Consequently, surveyors were unable to conduct surveys from static VPs for more than an hour at a time, as opposed to the two or three hours of survey time intended. In addition, surveyors were unable to use telescopes for the survey, as the additional weight of the equipment was not viable on such a long walkover due to health and safety concerns. However, the use of binoculars (instead of a telescope) was adequate for observing raptors at the minimum 500 m distance required. Ultimately, the results of the ornithological surveys were adequate to inform this EA. The lack of access to vehicles is therefore considered to be a minor constraint to the survey.
- 6.3.16There was no access to areas of private dwellings (e.g. the houses and gardens on the proposed existing access track upgrades) during the field survey, because of access

⁹⁹ NatureScot, (2017) *Recommended bird survey methods to inform impact assessment of onshore wind farms. Version 2* (online) Available at: https://www.nature.scot/doc/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms [Accessed 01 July 2024].



permission restrictions. However, these areas cover a small fraction of the Site and it is extremely unlikely that private residences provide nesting opportunities for notable raptors.

6.3.17There was no access to the existing Braco West Substation platform during the field survey due to health and safety concerns. However, the area is entirely artificial surfaces and buildings of little to no biodiversity value.

6.4 Baseline Environment

Statutory Designated Sites

6.4.1There are three statutory designated sites for ornithological features within the potential Zol of the Proposed Development: South Tayside Goose Roosts SPA, South Tayside Goose Roosts Ramsar site, and Carsebreck and Rhynd Lochs SSSI. These are detailed in Table
 6-2 below and shown in Figure 6-1, Appendix A Figures

Site Name	Reason(s) for Designation	Relationship to the Proposed Development	
South Tayside Goose Roosts SPA	 The qualifying features are: Non-breeding greylag geese Anser anser and pink-footed geese Anser brachyrhynchus; Breeding wigeon Anas penelope; and The assemblage of non-breeding waterfowl. 	 Two distinct locations are close to the Site; Located at closest: 2.2 km east of the Site 9.1 km north of the Site There are several nearby watercourses, but none directly flow from the Site to the SAC, and there is no other hydrological connectivity. There is no hydrological connection between the Site and the SPA. Intervening land mainly comprises farmland as well as some forestry, Braco village, and associated roads. 	
South Tayside Goose Roosts Ramsar site	The Site incorporates three widely separated component sectors (only two of which are within the Study Area) consisting of seven permanent freshwater lochs, numerous smaller waterbodies, and various wetland habitats, including one of the largest raised bogs in the region. The lochs provide roost sites for internationally important numbers of wintering geese and for nationally important numbers of nesting ducks.	As above for South Tayside Goose Roosts SPA.	
Carsebreck and Rhynd Lochs SSSI	The qualifying features relating to ornithology are:Non-breeding greylag goose; andPink-footed goose.	 Located at closest: 2.2km from the Site, the SSSI boundary is concurrent with the South Tayside Goose Roosts SPA / Ramsar site boundary. 	

Table 6-2 Statutory Locally Designated Nature Conservation Sites



TRANSMISSION

Site Name	Reason(s) for Designation	Relationship to the Proposed Development
		There is no hydrological connection between the Site and the SSSI. Intervening land mainly comprises farmland as well as some forestry and Braco village.

Non-statutory Designated Sites

6.4.2The desk study did not identify any non-statutory designated sites with ornithological interests (e.g. Local Wildlife Sites, RSPB reserves, etc.).

Important Birds

6.4.3The desk study identified 19 records of nine important species of birds within 1 km of the Site, described in the **Table 6-3** below.

Common Name	Binomial Name	No. of Records	Designation*
Cuckoo	Cuculus canorus	1	SBL, BoCC Red List
Greylag goose	Anser anser	4	Schedule 1
Kestrel	Falco tinnunculus	1	SBL, LBAP
Lesser redpoll	Acanthis cabaret	1	SBL, BoCC Red List
Mistle thrush	Turdus viscivorus	2	BoCC Red List
Northern lapwing	Vanellus vanellus	3	SBL, BoCC Red List, LBAP
Siskin	Spinus spinus	4	SBL
Skylark	Alauda arvensis	1	SBL, BoCC Red List, LBAP
Song thrush	Turdus philomelos	2	SBL, LBAP
* Designations are follows: SBL – Birds listed on the Scottish Biodiversity List; Annex I – Birds Listed on			

 Table 6-3 Notable Bird Species Identified in the NBN Atlas Data Search

* Designations are follows: SBL – Birds listed on the Scottish Biodiversity List; Annex I – Birds Listed on Annex I of Birds Directive; LBAP – Species listed on Tayside LBAP; BoCC – Birds of Conservation Concern. Stricter protection is afforded to birds listed on Schedule 1 of the Wildlife and Countryside Act (1981).

- 6.4.4The dense Sitka spruce *Picea sitchensis* woodland within the Site is of no value to the qualifying bird species of South Tayside Goose Roosts SPA (see **Table 6-2**).
- 6.4.5While potential disturbance to birds may arise from both noise and visual stimuli associated with the presence of personnel, machinery, and construction activities, the likelihood of such disturbance from the Site affecting the qualifying birds of South Tayside Goose Roosts SPA / Ramsar site is minimal. This assessment takes into account the substantial 5.5 km distance separating the Site and 2.5 km distance separating the proposed existing access track upgrades from the SPA. In addition to the specific characteristics of the proposed construction. With regard to the qualifying birds of the SPA using functionally-linked habitat within or near the Site itself, none of the areas within the proposed substation and proposed existing access track upgrades or within 1 km provides high quality terrestrial



habitat for any of the qualifying features of the SPA, nor are there any optimal waterbodies for waterfowl to use (e.g. for roosting) within the Site.

- 6.4.6It is highly improbable that the South Tayside Goose Roosts SPA and Ramsar site / Carsebreck and Rhynd Lochs SSSI, would be affected by the Proposed Development. Given the habitats within the Site and that the SPA is located approximately 2.2 km from the Site (at the closest point). Notable species of geese may occasionally use the agricultural fields adjacent to the proposed existing access track upgrades, but the anticipated habitat loss (which is likely to be minimal) and the potential for operational impacts from disturbance (e.g. occasional movements of staff vehicles) preclude any significant impacts. Given the above, it is concluded that significant impacts on the South Tayside Goose Roosts SPA and Ramsar site are unlikely, but further assessment should be made with mitigation proposed (if required) to minimise potential impacts on important birds. To re-iterate, NatureScot responded during pre-application consultation and stated that there will likely be no significant effect for the qualifying interests of all relevant designated sites.
- 6.4.7The Site is likely to support breeding populations of common and widespread birds as well as those listed on the SBL and BoCC Red Lists. The coniferous plantation within the Site is suitable for siskin Spinus spinus, song thrush Turdus philomelos, mistle thrush Turdus viscivorus and lesser redpoll Acanthis cabaret. Common crossbill Loxia curvirostra is a Schedule 1 species that breeds in coniferous woodland including plantation such as that in and adjacent to the Site. Moreover, these species and all other passerines could potentially breed in Other mixed and broadleaved woodlands adjacent to the Site. Skylark Alauda arvensis almost certainly breeds on the open moorland areas. Open areas could also be used by breeding red grouse Lagopus lagopus, golden plover Pluvialis apricaria and curlew Numenius arguata. Kestrel Falco tinnunculus could nest in the plantation and forage over open areas. Swift Apus apus could possibly nest in the residential buildings adjacent to the Site. Almost all the habitats in the Sites are also likely to be used by common nesting birds, including ground nesting species as well as species nesting in the plantation. Herring gull Larus argentatus and black-backed gull Larus fuscus could forage in the area and may congregate on open water, but nesting is unlikely due to the lack of typical habitats associated with these species (e.g. coastal habitats including cliff tops or even flat roofs).
- 6.4.8Regarding the Schedule 1 species kingfisher *Alcedo atthis*, there are no suitably sized watercourses in the vicinity which that are optimal for kingfisher, nor is there any suitable nesting habitat (tall, steep, soft river banks). Kingfisher is unlikely to be present on Site.
- 6.4.9The open habitats within the Site and wider area are of low ecological value and generally of poor suitability for the farmland birds mentioned in the Tayside Farmland LBAP (except for skylark). There appear to be no large trees or buildings present within 500 m of the Site that could support nesting Schedule 1 species barn owl *Tyto alba*. Farmland birds prefer a mosaic of agricultural fields (including damp and low intensity managed meadows / pastures), woodland and scrub, species-rich hedgerows (in good condition) and rough grassland. The upland nature of the area of the Site, dominated by commercial plantation forestry, is generally un-suitable for tree sparrow *Passer montanus*, grey partridge *Perdix perdix*, linnet *Linaria cannabina*, lapwing, and corn bunting *Emberiza calandra*. The



habitats adjacent to the proposed existing access track upgrades provide some limited opportunities for farmland birds.

6.4.10The woodlands within the Site and wider area are non-notable Sitka spruce-dominated commercial plantation and are unlikely to be of great importance to the species mentioned in the Tayside Woodland LBAP.

Raptor Walkover Survey Results

- 6.4.11Goshawk flight lines were recorded in March 2024 to the southwest of the Site (see Figure 6-2, Appendix A Figures). A female goshawk was observed flying close to woodland blocks and landing on trees on two occasions, 240 m and 700 m from the Site. Goshawk were also observed calling from within the woodland, at approximately 700 m. The woodland blocks in this location could offer suitability for goshawk nests, as the trees are tall, over-mature and have a reasonably open canopy caused by former windthrow. On two further occasions the female goshawk was observed soaring high in the same location and flying over woodland edge and away north. During an ecology survey in early April 2024, a goshawk pair (male and female) were incidentally sighted soaring for five minutes at the northwestern edge of the open area to the west of the Site, over 1 km distant to the Site, then the pair flew away north. In May 2024, a one hour VP survey was carried out in the area west of the Site and no goshawk were seen. Further surveys in the general area described above were conducted to identify a potential goshawk nest. During the survey in June, a female goshawk was observed, at closest 1.2 km from the Site, flying from the ground, further away from the Site to a gap in a block of commercial plantation forestry to the west. Considering the goshawk behaviour observed, it is highly unlikely that goshawk is nesting within 500 m of the Site. Regardless, very few nesting opportunities are present within the commercial plantation forestry, which is largely dense Sitka spruce. One potential goshawk nest was noted 850 m from the proposed substation platform. The area is an open woodland of mature Scots pine *Pinus sylvestris* trees. The raptor nest, possibly of buzzard, or potentially goshawk, was within a Scots pine tree 14 m from the ground. The nest was made of twigs and was assessed as being inactive.
- 6.4.12Red kite flight lines were recorded in March 2024 in the central section of the proposed existing access track upgrades (see Figure 6-2, Appendix A Figures). The woodlands in this area are sub-optimal for the creation of raptor nests, due to being commercial forestry of moderate maturity (at best). During an ecology survey in March 2024, incidental records were made of red kite. Two individuals were observed soaring near the Site above the upper and central sections of the proposed existing access track upgrades. In May 2024, four red kite flight lines were recorded, one over the Site, one outside of the Site to the northeast of the site and two in the central area of the proposed existing access track upgrades. For all incidences where red kite were observed, no breeding behaviour was noted. The current understanding is that red kite uses the Site and wider area for foraging only.
- 6.4.13Common buzzard *Buteo buteo* were noted frequently on walkover surveys throughout the survey area (see **Figure 6-2, Appendix A Figures**). Raven *Corvus corax* was noted to the west of the Site.

Incidental Records of Other Notable Birds

6.4.14Other notable birds were recorded during surveys and are shown on **Figure 6-2, Appendix A Figures**. During raptor walkover surveys in March 2024 and May 2024, lapwing (SBL,



BoCC Red List, LBAP) and curlew (SBL, BoCC Red List) were noted flying over agricultural fields adjacent to the central section of the proposed existing access track upgrades and the track extension and track upgrades. Skylark (SBL, BoCC Red List, LBAP) were noted singing west of the Site, adjacent to the upper section and lower section of the proposed existing access track upgrades. Cuckoo Cuculus canorus (SBL, BoCC Red List) were sighted and recorded calling around the site and in the central area of the proposed existing access track upgrades. A displaying tree pipit Anthus trivialis (SBL, BoCC Red List) was noted at the Site. Single birds and flocks of lesser redpoll (SBL, BoCC Red List) were recorded over the Site and the upper section of the proposed existing access track upgrades substation. A single whinchat Saxicola rubetra (BoCC Red List) was observed singing adjacent to the upper section of the proposed existing access track upgrades. A female yellowhammer Emberiza citrinella (SBL, BoCC Red List) was seen on a hedge, and a snipe Gallinago gallinago (BoCC Red List) was adjacent to the central area of the proposed existing access track upgrades. A song thrush (SBL, BoCC Amber list) was heard singing from woodland in the lower area of the proposed existing access track upgrades. Willow warbler Phylloscopus trochilus (BoCC Amber list) was recorded frequently across the survey area singing.

- 6.4.15Great-spotted woodpecker *Dendrocopos major* (an LBAP species) was noted feeding on standing deadwood in the Site. Although not considered to be notable (due to being common and widespread birds in the Scottish uplands although listed as amber on the BoCC), meadow pipit *Anthus pratensis* was frequently observed (but not recorded) in the Site this species will certainly nest in this location.
- 6.4.16Other birds noted during surveys (but not recorded, due to being widespread and common) include: siskin (an SBL species), chiffchaff (an LBAP species), wood pigeon (BoCC Amber List) and wren *Troglodytes troglodytes* (BoCC Amber list). Other common and widespread birds heard / seen during surveys include: blackbird *Turdus merula*, chaffinch *Fringilla coelebs*, robin *Erithacus rubecula*, coal tit *Periparus ater* and blue tit *Cyanistes caeruleus*. The above species were generally heard singing and calling within woodland. A pair of stonechat *Saxicola rubicola* with the male bird singing were noted within the Site. A pair of heron *Ardea cinerea*, and a single heron were noted in the southern area of the proposed existing access track upgrades. Mallard *Anas platyrhynchos* and Canada geese *Branta canadensis* were observed on and near the two artificial waterbodies in the southern section of the proposed existing access track upgrades.

6.5 Embedded Mitigation

6.5.1A range of measures that are standard good practice for development of this type, and which are required to comply with environmental protection legislation, will also be implemented. These are well-developed and have been successfully implemented on infrastructure projects across the country, and there is a high degree of confidence in their success. They can therefore be treated as embedded mitigation.

6.5.2 Mitigation measures to protect sensitive ornithological features include:

- Ideally, undertake all vegetation clearance outside of the breeding bird season, which is generally taken to be between March and August, inclusive;
- Where vegetation clearance must take place during the breeding season, the area must first be checked by a suitably experienced ecologist. A works exclusion zone must be implemented around any active bird's nest; and,



• If breeding birds are present, the Ecological Clerk of Works can provide advice on measures to minimise the risk of disturbance being caused.

6.6 Appraisal

Potential Significant Effects

- 6.6.1The potential significant effects from the construction and operation of the Proposed Development on ornithological features can be categorised as follows:
 - Permanent or temporary loss of habitat which supports important species of birds;
 - Temporary disturbance and/or displacement of species of birds during construction;
 - Disturbance and/or displacement of species during operation; and
 - Potential for direct mortality of species during construction (e.g. as a result of increased vehicular traffic, or as a result of a pollution incident).

Sensitive Receptors

- 6.6.2The ecological baseline presented in **Section 6.4** has been used to identify important ornithological features within the potential ZoI of the Proposed Development. The importance (and sensitivity) of a given ornithological feature has been determined by assessing the distribution and status of species, a review of literature and guidance, field survey data, legal protection / conservation status and professional judgement.
- 6.6.3Ornithological features of International importance comprise South Tayside Goose Roosts SPA and Ramsar site (the boundary of which is concurrent with the Carsebreck and Rhynd Lochs SSSI). Effects are considered highly unlikely from the Proposed Development on the above-described SPA / Ramsar site (and the SSSI). Moreover, as mentioned above in Section 6.2.2, NatureScot responded in consultation and stated there would likely be no significant effect for the qualifying interests of all relevant designated sites.
- 6.6.4Greylag and pink-footed geese associated with the SPA above often use agricultural fields in the region around such SPA, in particular pasture fields, that can then constitute functionally-linked supporting habitat for the relevant geese. However, it is highly unlikely that loss of functionally-linked habitat as a result of the Proposed Development would cause an impact to the SPA. Firstly, there would be no permanent loss of pasture as a result of the Proposed Development. Secondly, there is an abundance of similar or more suitable pasture fields around the SAC. For example, when considering only brighter-green pasture on current aerial imagery in between the A9 (from Greenloaning eastwards to Blackford) and the A822 (from Greenloaning northwards past Braco village to Muir of Orchil), there are approximately 5.4 km² of such pasture, often in large flat fields that geese prefer (for increased safety from ground predators).
- 6.6.5The habitats directly affected by the Proposed Development comprise forestry plantation or small areas of habitat closely associated with it, and therefore of no value to the qualifying birds of South Tayside Roosts SPA. It is possible that greylag and pink-footed geese (and possibly other species, such as curlew) associated with South Tayside Goose Roosts SPA could be disturbed during construction if present in or close to the relevant fields during



construction. However, similarly to the argument made above in **Section 6.6.4**, there is such an abundance of similar and often more suitable pasture fields around the SPA.

- 6.6.6Consequently, there is no likely significant effect from habitat loss or disturbance as a result of the Proposed Development on the South Tayside Goose Roosts SPA (and Ramsar site/Carsebreck and Rhynd Lochs SSSI). Whilst certain other bird species might occur as part of the general qualifying waterbird assemblage and might at times also use pasture fields for foraging (such as curlew), the same arguments apply of negligible habitat impact and plentiful local abundance of such habitat. The other qualifying species (wigeon *Anas penelope*) does not use such pasture anywhere near as often or as distantly from relevant standing waters as geese and is highly unlikely to make any use of the fields adjacent to the Site.
- 6.6.7Effects are considered highly unlikely from the Proposed Development on the SPA / Ramsar site (and SSSI), due to the distance from the Site and that the qualifying species would not use the habitat at or near the Site (outside of the boundary of the SPA). Moreover, as per consultation feedback presented in Section 6.2.2, NatureScot stated that there would likely be no significant effect for the qualifying interests of all relevant designated sites. Therefore, potential impacts and likely significant effects on the SPA are considered highly unlikely.
- 6.6.8Notable farmland bird species, as listed in the Tayside Farmland LBAP (see Section 6.3.4), are unlikely to find the Site, which comprises degraded upland habitats and a hardstanding access track, to be of great importance for nesting or foraging. Land adjacent to the proposed existing access track upgrades is generally of poor quality, with low ecological value and a dearth of nesting opportunities (e.g. plantation woodlands, species-poor hedges and highly managed arable land). See Chapter 5 Ecology and Nature Conservation for details of the habitat types present. Wading birds such as lapwing could potentially nest in open ground adjacent to the Site and skylark almost certainly nests in rough grasslands/young plantation forestry and upland areas within the Site.
- 6.6.9The Woodland LBAP and Water & Wetland LBAP are of little relevance to the Site (Ornithological or otherwise) due to the low degree of naturalness of the woodland and open water on Site. The Upland LBAP lists birds that are highly unlikely to be present on Site and therefore is not relevant.
- 6.6.10Ornithological features of Local importance include common breeding birds (which include important / notable birds listed on the SBL and BoCC Red and Amber lists). These species are only of local importance because they are common and widespread species.
- 6.6.11Loss of breeding sites (e.g. as a result of tree felling) for some species of the general breeding bird assemblage would have a minimal effect because the Site development footprint is small compared to surrounding very extensive habitats of the same types. However, active nests (and their eggs) of all wild birds are protected under the WCA from destruction, damage, or obstruction whilst in use. Schedule 1 species are also protected from disturbance whilst nesting. A Schedule 1 species that could potentially occur in woodlands within the Site is common crossbill, which is common in Scotland and for which



additional measures are not normally taken. The Schedule 1 raptors – goshawk and red kite – may nest within the woodlands within or beyond the boundary of the Site.

Enhancement

6.6.12The likely environmental effects of the Proposed Development on ornithological features are not likely to be significant and can easily be mitigated. Ecological enhancement as per NPF4 objectives for developments would be achieved. Habitat compensation and enhancement measures are outlined in **Chapter 5 Ecology and Nature Conservation**.

6.7 Recommendations and Mitigation

- 6.7.1As noted above, there is one European site designated for ornithological interests within 10 km of the Site. As a European site, the South Tayside Goose Roosts SPA is subject to the HRA process. A 'HRA Memorandum' has been produced as a standalone report and will be submitted to PKC, setting out why likely significant effects are not considered possible and therefore that further HRA is not considered necessary. PKC will need to confirm agreement or otherwise, as the competent authority for HRA matters. Non-statutory designated sites have been scoped out of assessment.
- 6.7.2All wild birds in Great Britain are protected under the WCA. Further protection is given to some rarer species and to species vulnerable to disturbance and / or persecution. This is done through various schedules attached to the WCA, including Schedule 1.
- 6.7.3Therefore, in addition to the embedded mitigation measures outlined in **Section 6.5**, the following further specific mitigation measures are recommended:
 - If raptors are confirmed or suspected of breeding, construction phase mitigation measures would be required, as per those afforded to breeding sites of Schedule 1 species. For goshawk, for example, the recognised disturbance zone is up to 500 m¹⁰⁰. However, goshawk have a moderate level of sensitivity to disturbance and so it is possible that nesting goshawk would habituate to construction disturbance (and almost certainly the operation of the substation) this would depend on a number of factors including: proximity to works; the nature of the works; and, the susceptibility to disturbance of the individual bird(s);
 - For the construction period, a suitably experienced ornithologist would conduct watching briefs of nests, under licence, of active Schedule 1 raptors nests within recognised disturbance zones to the Site; and
 - Where required to safeguard breeding raptors, a suitably experienced ornithologist / Ecological Clerk of Works will set in place a 'no works zone' within the disturbance distance of a suspected or confirm nest (March to August, inclusive). Within this no works zone, all construction work (including felling works or any site movements) will cease for the duration of the nesting period.
- 6.7.4Mitigation measures will be detailed in a Breeding Bird Protection Plan (BBPP). This document will be prepared and submitted for approval by PKC, in consultation with NatureScot where necessary, prior to commencement of construction. The BBPP will detail

¹⁰⁰ Goodship, N.M. and Furness, R.W., (2022) *Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species* (online) NatureScot Research Report 1283. Available at: https://www.nature.scot/doc/naturescot-research-report-1283-disturbance-distances-review-updated-literature-review-disturbance [Accessed 01 July 2024].



the mitigation measures proposed in this document to safeguard breeding birds (including raptors).

6.8 Cumulative effects

- 6.8.1 A cumulative appraisal was conducted taking into account the 'scoped in' planning applications as detailed in **section 13.1.2** and **Table 13-1**, these are listed below;
 - Cambushinnie 400kV OHL tie-in
 - Cambushinnie UGC between the existing Braco West substation and the Proposed Development
 - 21/00756/FLM: 49.9MW energy storage facility
 - 22/02231/FLM: 49.9MW energy storage facility compound
- 6.8.2The developments above are considered to be of importance to the cumulative appraisal concerning important ornithological features, as they are developments that are located within the local area to the Proposed Development that could potentially give rise to cumulative effects.
- 6.8.3During the appraisal process, the results of which are described in this chapter, there were no impacts identified that could possibly result in a residual effect¹⁰¹ of greater than Negligible effect. Consideration during this cumulative appraisal would only be given to those impacts where a residual effect of significance was concluded for the Proposed Development.
- 6.8.4For all impacts for which it was concluded that there would be No Effect or Negligible Effect, it is considered that the effect of that impact from the Proposed Development in isolation will be so minimal, that it is extremely unlikely that there is any possibility of significant cumulative effects arising from the combined impact(s) of projects in the list above. Similarly, the additive (or multiplicative) action of effect interactions are not anticipated due to the same reasons given above (that all impacts were appraised to be so minimal, they could not possibly give rise to a cumulative effect).
- 6.8.5It is concluded on the basis of the assessment presented above that the Proposed Development will not act cumulatively to give rise to significant adverse effects on ecological features. This relies on the mitigation described in this chapter to avoid or minimise the risk on important ornithological features, and on the proposals also doing the same (e.g. managed through project-specific CEMPs).

¹⁰¹ As described in CIEEM guidance. CIEEM (2022). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.2 – Updated April 2022. Chartered Institute of Ecology and Environmental Management, Winchester.



7. CULTURAL HERITAGE

7.1 Introduction

- 7.1.1This chapter assesses the potential effects of the Proposed Development on archaeology and cultural heritage.
- 7.1.2Cultural heritage in this context refers to the above and below-ground archaeological resource, built heritage, the historic landscape, and any other elements which may contribute to the historical and cultural heritage of the area. The aim of this chapter is to provide:
 - A summary of the baseline conditions of the Site;
 - A concise appraisal of the direct and indirect risks posed by the Proposed Development on cultural heritage; and
 - Recommendations for additional mitigation measures as required.

7.2 Information Sources

7.2.1The report draws on the following technical figures (see Appendix A Figures):

- Figure 7-1, Appendix A Figures Heritage Assets within the 1 km Study Area adopted for the baseline study;
- Figure 7-2, Appendix A Figures Proposed Development Layout ;
- Figure 7-3, Heritage Assets within 2 km Study Area Adopted for Setting Impacts;
- Figure 7-4 Zone, Appendix A Figures Zone of Theoretical Visibility Analysis ;
- Appendix B Gazetteer of designated and non-designated assets; and
- Appendix D Site photographs.
- 7.2.2External sources used to inform the baseline and appraisal are referenced appropriately.

Legislation

- 7.2.3The assessment was conducted within the context of the legislative and planning framework designed to protect and conserve heritage resources. There are several statutory instruments and policies governing the approach to cultural heritage. The main pieces of legislation are:
 - Town and Country Planning (Scotland) Act 1997 (as amended by the Planning (Scotland) Act 2019)¹⁰²;
 - The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013 (as amended by the Town and Country Planning (Historic Environment Scotland) Amendment Regulations 2015)¹⁰³;
 - Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997¹⁰⁴;
 - Ancient Monuments and Archaeological Areas Act 1979¹⁰⁵; and

¹⁰² Scottish Government, 1997. *Town and County Planning Act.* Edinburgh: Scottish Government.

¹⁰³ Scottish Government, 2013. *The Town and Country Planning (Development Management Procedure) (Scotland) Regulations*. Edinburgh: Scottish Government.

¹⁰⁴ Scottish Government, 1997. Planning (Listed Buildings and Conservation Areas) (Scotland) Act. Edinburgh: Scottish Government

¹⁰⁵ UK Government, 1979. Ancient Monuments and Archaeological Areas Act. Edinburgh: HMSO.



• Historic Environment Scotland Act 2014¹⁰⁶.

National Planning Policy

7.2.4The principal elements of national policy and guidance comprise:

- National Planning Framework 4 (NPF4)¹⁰⁷;
- Historic Environment Policy for Scotland (HEPS)¹⁰⁸;
- Our Past, Our Future The Strategy for Scotland's Historic environment¹⁰⁹;
- Planning Advice Note (PAN) 2/2011 Planning and Archaeology¹¹⁰;
- PAN 71 Conservation Area Management¹¹¹; and
- The HES 'Managing Change in the Historic Environment' series of guidance notes (particularly *Managing Change in the Historic Environment: Setting*¹¹²).

7.2.5NPF4 represents the latest national planning policy document relevant to the Proposed Development. Policy 7 relates to cultural heritage and key elements of the policy include 'point h' which relates to Scheduled Monuments (SMs) and states:

"h) Development proposals affecting SMs will only be supported where:

- direct impacts on the scheduled monument are avoided;
- significant adverse impacts on the integrity of the setting of a SM are avoided; or
- exceptional circumstances have been demonstrated to justify the impact on a SM and its setting and impacts on the monument or its setting have been minimised."
- 7.2.6Impacts on non-designated assets are covered by 'points n and o':

"n) Enabling development for historic environment assets or places that would otherwise be unacceptable in planning terms, will only be supported when it has been demonstrated that the enabling development proposed is:

- essential to secure the future of an historic environment asset or place which is at risk of serious deterioration or loss; and
- the minimum necessary to secure the restoration, adaptation and longterm future of the historic environment asset or place.

o) Non-designated historic environment assets, places and their setting should be protected and preserved in situ wherever feasible. Where there is potential for nondesignated buried archaeological remains to exist below a site, developers will provide an evaluation of the archaeologic.al resource at an early stage so that

¹⁰⁶ Historic Environment Scotland, 2014. *Historic Environment Scotland Act*. Edinburgh: HMSO.

¹⁰⁷ Scottish Government, 2023. *National Planning Framework 4*. Edinburgh: Scottish Government.

¹⁰⁸ Historic Scotland, 2019. *Historic Environment Policy for Scotland*. Edinburgh: Historic Environment Scotland.

¹⁰⁹ Historic Environment Scotland, 2023. *Our Past, Our Future: The Strategy for Scotland's Historic Environment*. Edinburgh: Historic Environment Scotland.

¹¹⁰ Scottish Government, 2011. *Planning Advice Note 2/11 – Planning and Archaeology*. Edinburgh: Scottish Government.

¹¹¹ Scottish Government, 2004. Planning Advice Note 71 – Conservation Area Management. Edinburgh: Scottish Government.

¹¹² Historic Environment Scotland, 2016. Managing Change in the Historic Environment. Edinburgh: Historic Environment Scotland.

planning authorities can assess impacts. Historic buildings may also have archaeological significance which is not understood and may require assessment.

Where impacts cannot be avoided, they should be minimised. Where it has been demonstrated that avoidance or retention is not possible, excavation, recording, analysis, archiving, publication and activities to provide public benefit may be required through the use of conditions or legal/planning obligations. When new archaeological discoveries are made during the course of development works, they must be reported to the planning authority to enable agreement on appropriate inspection, recording and mitigation measures."

7.2.7Policy 11 relates to energy and as such is also relevant to the Proposed Development. 'Point e' relates to impacts resulting from renewable developments and states:

"e) In addition, project design and mitigation will demonstrate how the following impacts are addressed:

- ii significant landscape and visual impacts, recognising that such impacts are to be expected for some forms of renewable energy. Where impacts are localised and/ or appropriate design mitigation has been applied, they will generally be considered to be acceptable; ... [and]
- vii impacts on historic environment"
- 7.2.8A new strategy entitled 'Our Past, Our Future The Strategy for Scotland's Historic environment' was released in June 2023¹⁰⁹. The three main priorities identified in this document are:
 - Priority 1: Delivering the transition to net zero;
 - Priority 2: Empowering resilient and inclusive communities and places; and
 - Priority 3: Building a wellbeing economy.

Local Planning Policy

- 7.2.9The process of preparing a new Perth and Kinross Local Development Plan (LDP) commenced in 2024, however, until this has been agreed and adopted, the Perth and Kinross LDP 2 ("PKLDP2"), adopted in 2019¹¹³, remains valid. Policies considered relevant to this chapter are:
 - Policy 26a Scheduled Monuments;
 - Policy 26b Archaeology;
 - Policy 27a Listed Buildings;
 - Policy 29 Gardens and Designed Landscapes;
 - Policy 30 Protection, Promotion, and Interpretation of Historic Battlefields; and
 - Policy 31 Other Historic Environment Assets.

¹¹³ Perth and Kinross Council, 2019. *Perth and Kinross Development Plan 2* online]. [Accessed 01 July 2024]. Available from: https://www.pkc.gov.uk/ldp2



Guidance

7.2.10 The assessment has been undertaken following the Chartered Institute for Archaeologists (CIfA) Standards and Guidance for Historic Environment Desk-Based Assessment¹¹⁴.

7.3 Methodology

- 7.3.1As part of this appraisal exercise, a search of relevant data has been undertaken with material collected for a Study Area of 1 km. To enable a holistic approach, this Study Area was based on a combined project development boundary which encompassed the Proposed Development, as well associated development including the OHL, UGC, and new haul road. These sources include:
 - PastMap¹¹⁵;
 - Historic Environment Scotland (HES) website¹¹⁶;
 - Historic mapping on the National Library of Scotland website¹¹⁷;
 - PKC Historic Environment Record (HER) data¹¹⁸; and
 - Other available online sources.
- 7.3.2A search of designated assets of a wider Study Area of approximately 2km has also been undertaken to allow consideration of setting issues.
- 7.3.3All assets are listed in the gazetteers provided in Appendix B Gazetteer. These are also shown on Figure 7-1, Appendix A. Assets are referred to in the text by their HES number, with Scheduled Monuments (SM) and Listed Buildings (LB) identified by their prefixes. Non-designated assets from the Canmore database¹¹⁹ have no prefix, while assets from the PKC HER have the prefix 'MPK'. Assets recorded as part of the walkover survey and documentary research has the prefix 'AECOM'.

Appraisal of Impacts

- 7.3.4While the Proposed Development was deemed not to require a full EIA, the methodology stated within this section has been followed when defining the level of potential impact in **Section 7.6** of this chapter.
- 7.3.5The impact assessment will consider any impacts to the value (significance) of an asset, either physically or through changes to its setting.
- 7.3.6The value (significance) of a heritage asset is determined by professional judgement, guided but not limited to any designated status the asset may hold. The value of an asset is also judged upon a number of different factors including the special characteristics the assets might hold which can include evidential, historical, aesthetic, communal, archaeological, artistic and architectural interests. This value of a heritage asset is assessed primarily in accordance with the guidance set out in NPF4¹⁰⁷ and the HEPS¹⁰⁸. The value (significance)

¹¹⁴ Chartered Institute for Archaeologists, 2020. Standard and guidance for historic environment desk-based assessment [online]. [Accessed 01 July 2024]. Available from: https://www.archaeologists.net/sites/default/files/ClfAS%26GDBA_4.pdf

¹¹⁵ Historic Environment Scotland, n.d. PastMap [online]. [Accessed 01 July 2024]. Available from: https://www.pastmap.org.uk/

¹¹⁶ Historic Environment Scotland, n.d. Home [online]. [Accessed 01 July 2024]. Available from: www.historicenvironment.scot

¹¹⁷ National Library of Scotland, 2024. Map Images [online]. [Accessed 01 July 2024]. Available from: https://maps.nls.uk/

¹¹⁸ Perth and Kinross Heritage Trust, n.d. *Perth and Kinross Historic Environment Record* [online]. [Accessed 01 July 2024]. Available from: https://www.pkht.org.uk/pkher/

¹¹⁹ Canmore, n.d. *Canmore* [online]. [Accessed 01 July 2024]. Available from: https://canmore.org.uk/



is defined by the sum of its heritage interests. Taking these criteria into account, each identified heritage asset can be assigned a level of value (significance) in accordance with a five-point scale as set out in **Table 7-1**.

Table 7-1 Heritage Value (Significance) Criteria

Value (Significance)	Examples
Very High	 World Heritage Sites (WHS); Assets of acknowledged international importance; and Historic landscapes of international sensitivity, whether designated or not.
High	 SMs; Non-designated sites/features of schedulable quality and national importance; Category A Listed Buildings; Gardens and landscape on the Inventory of Designed Landscapes of outstanding archaeological, architectural, or historic interest; and Registered Battlefields.
Medium	 Sites/features that contribute to regional research objectives; Category B and C Listed Buildings; Locally listed or non-designated buildings that can be shown to have special interest in their fabric or historical association; Conservation areas; Historic townscapes or built-up areas with historic integrity in their buildings, or built settings; and Non-designated historic landscapes of regional sensitivity.
Low	 Non-designated sites/features of local importance; Non-designated buildings of modest quality in their fabric or historical association; and Historic landscapes whose sensitivity is limited by poor preservation and/or poor survival of contextual associations or with specific and substantial importance to local interest groups.
Negligible	 Assets with very little or no surviving archaeological interest; Buildings of no architectural or historical note; buildings of an intrusive character; and Landscapes with little or no significant historical interest.

- 7.3.7Having identified the value of the heritage asset, the next stage in the appraisal will be to identify the level and degree of impact to an asset arising from the Proposed Development. Impacts may arise during construction or operation and can be temporary or permanent. Impacts can occur to the physical fabric of the asset or affect its setting.
- 7.3.8When professional judgement is considered, some sites may not fit into the specified category in **Table 7-1**. Each heritage asset will be assessed on an individual basis and take account of regional variations and their individual qualities.
- 7.3.9The level and degree of impact (magnitude of impact) will be assigned with reference to a fourpoint scale as set out in **Table 7-2**. In respect of cultural heritage, an assessment of the level and magnitude of impact is made in consideration of any scheme design mitigation



(embedded mitigation). Where no change to the significance of the asset is caused, this will be stated, and a full assessment will not be carried out for that asset.

Magnitude of Impact	Examples	
High	Total removal or alteration of an asset, such that the physical resource and /or the key components of its setting are totally altered resulting in complete change to an asset's setting and loss of heritage value of the asset.	
Medium	Partial alteration of an asset, such that the heritage value of the resource and/or the key components of its setting are clearly modified.	
Low	Minor alteration of an asset, such that the components of its setting are noticeably different, but the physical characteristics are not affected, and the impact does not result in a noticeable loss of heritage value.	
Negligible	Slight changes to historic elements that hardly affect the setting of an asset and do not result in any loss of value.	

Table 7-2 Magnitude of Impact Criteria

7.3.10 All archaeological work will be undertaken in line with guidance published by the Chartered Institute for Archaeologists¹¹⁴.

Consultation

- 7.3.11 An initial response to the pre-application submission was received from PKC on 23 November 2023 which noted that some form of archaeological assessment was required, although this response did not contain direct feedback from the PKC Archaeologist. Direct consultation was undertaken with the PKC Archaeologist in April 2024 when HER data was ordered as part of the assessment. This was followed by a Teams meeting on 31 July 2024, where the Proposed Development and the approach relating to separate EA documents for the proposed Substation, Haul Road and UGC Route and OHL was discussed. The PKC Archaeologist agreed that producing one baseline, as described in **Section 7.4.1**, was the best approach for reviewing existing conditions as it allowed the landscape to be examined in a holistic way, which would allow a better assessment of the archaeological potential as well as impacts resulting from the Proposed Development. The PKC Archaeologist noted the large quantities of archaeology that had been recorded through the Strathallan landscape, although also acknowledged that the potential for new archaeological discoveries in most areas of the Site was limited due to previous disturbance from commercial forestry operations.
- 7.3.12 Mitigation would likely consist of avoiding historic landscape features (such as drystone walls, gateposts, etc) where possible to avoid accidental damage. Any sections of drystone wall that would need to be removed for construction would be reinstated. If the wall cannot be reinstated because a permanent access is needed, the wall ends would be 'made good' and finished in a way that would avoid further damage through collapse.
- 7.3.13More detailed mitigation, likely to include archaeological monitoring or 'strip, map, and record', would be required for the associated development works (namely the haul road).



Initial consultation with HES comprised a pre-application response provided on 5 October 2023, when they acknowledged the Proposed Development did not have the potential to result in physical impacts on designated assets. The response also noted that HES considered the potential for impacts on the setting of designated assets to be low due to the distance between the Proposed Development and the nature of the designated assets identified in the surrounding landscape. Further discussion regarding impacts on setting is discussed in **Section 7.6** below.

7.3.14 Follow up consultation was undertaken with HES in May 2024 by email to provide an update on the Proposed Development, and the revised scope of the various elements. During this consultation HES noted that the case officer was changing as the Proposed Development had been deemed non-EIA, and that they would reply once the new case officer had been able to review. A response relating to the associated haul road development was received in June 2024, but no further comments were provided on the impact of the Proposed Development itself on heritage.

7.4 Baseline Environment

Study Area

- 7.4.1This chapter examines the potential effects and impacts on sites of archaeological and cultural heritage interest resulting from the Proposed Development. As outlined in Section 7.3.11, the baseline for this chapter examines the following components (hereafter referred to as the "Combined Project Development Boundary"). This is shown on Figure 7-1, Appendix A Figures:
 - Proposed Development;
 - OHL tie in;
 - UGC route; and
 - Haul road.
- 7.4.2 A detailed baseline of information for the Combined Project Development Boundary was obtained as part of the assessment, with a Study Area of 1 km from the Combined Project Development Boundary (Figure 7-1, Appendix A Figures). The subsequent assessment of potential impacts in this chapter focuses on the Proposed Development only.
- 7.4.3A larger Study Area of 2 km was used for assessing changes to the setting of designated assets. This was focused on 2 km from the Combined Project Development Boundary and is referred to as the 'Wider Study Area'.

Land use and Topography

7.4.4The main focus is on the proposed substation, which is centred on NGR NN 79394 09313 and is located adjacent (southwest) to the existing Braco West Substation, approximately 3.5km west of the Braco village (previously known as Ardoch¹²⁰) in Perth and Kinross (Figure 7-1, Appendix A Figures). Located at approximately 255 m above ordnance datum (AOD), the proposed substation sits on the lower southeast slopes of an area of high ground that overlooks Strathallan and the Allan Water. However, the Proposed Development also includes an upgrade to the existing access track which runs from the existing Braco West

¹²⁰ Smith, R, 2001. *The Making of Scotland*. Edinburgh: Canongate Books Limited.



Substation to a point on the B8033 southwest of Braco village. This existing access track largely passes through a landscape used for commercial forestry.

- 7.4.5While the high ground above the proposed substation rises to over 600 m AOD to the west and north of the Proposed Development, the valley of Strathallan, which is the main focus of settlement and infrastructure (with both the A9 road and the main rail link following the valley), lies between 90 m and 100 m AOD.
- 7.4.6TThe land use of the Site, as well as the immediate surroundings, is dominated by dense commercial forestry that screens the existing Braco West Substation from the surrounding landscape. The wider upland landscape is dominated by rough grazing, while the Strathallan valley is a mixture of improved/semi-improved grazing, as well as arable agriculture.

Designated Assets

- 7.4.7A total of ten designated assets have been identified within the 1km Study Area, including two SMs (SM3088 and SM1601), seven LBs (LB5801, LB5796, LB72, LB5795, LB5797, LBLB1259 and LBN5794), and one GDL Landscape (GDL000067) (see Figure 7-1, Appendix A Figures).
- 7.4.8The majority of the designated assets are located in Braco village near the eastern end of the proposed existing access track upgrades. . The SMs consist of a fort on Grinnan Hill which has been dated to the prehistoric period (SM3088), and the Ardoch Roman military complex north of Braco village (SM1601). Grinnan Fort is located 176 m north of the haul road, and some 3.8 km from the proposed substation platform of the Proposed Development(SM3088), with traces of the ramparts on the north side visible in the woodland that covers the hill. The site of the Grinnan Fort would have originally commanded views over the low-lying ground of the Allan Water to the south and east, although these views have been lost due to the woodland that covers the hill and immediate surroundings. Much of the fort's dominance when viewed from the surrounding area has also been lost due to the expansion of Braco village, and the hill is only visible due to the woodland that covers it.
- 7.4.9The Roman complex of Ardoch is located on the north side of Braco village and includes very well-preserved earthworks associated with several Roman camps and forts occupied over various periods in the first and second century AD (SM1601).
- 7.4.10The Listed Buildings are all post-medieval and consist of the Category B listed Feddal Castle (LB5801) and Ardoch Bridge (LB5796), as well as the Category C listed Wester Ardoch Manse (LB72), Ardoch Free Church Tower (LB5795), Ardoch Parish Church (LB5894), and a number of residences in Braco village (LB5795 and LB51259). Most of these assets are located within Braco village, with only Feddal Castle located outside of the settlement.
- 7.4.11The GDL consists of the western limits of Braco GDL (GDL00067), which is located some 419 m north of the eastern end of the proposed existing access track upgrades, and approximately 1.5km northeast of the proposed substation. The landscape is associated with the Category B listed Braco Castle (LB5804), with both the castle and associated designed landscape dating to the post-medieval period.
- 7.4.12A review of designated assets within 2 km of the Combined Project Development Boundary for the assessment of impacts on setting recorded a further seven LBs (see **Table 3**,



Appendix B Gazetteer). These included assets in the settlement of Greenloaning to the south of the 2 km Study Area (LB5799), as well as Braco Castle (LB5804) and Blackhill Old Toll House to the north (LB5806). While these designated assets were within 2 km of the proposed existing access track upgrades, there were no designated assets within 2 km of the proposed substation.

Non-designated Assets

- 7.4.13A total of 62 non-designated assets were recorded within 1 km of the Combined Project Development Boundary on the Canmore and Perth and Kinross HER, with two assets recorded through a review of online mapping and the Site walkover survey (see **Table 3**, **Appendix B Gazetteer & Figure 7-1**, **Appendix A Figures**). The majority of these assets have been dated to the post-medieval period and relate to settlement activity in Braco village, as well as agricultural activities in the surrounding landscape.
- 7.4.14Previously recorded heritage assets in the 1 km Study Area are discussed by period below.

Prehistoric and Roman (10,000BC to AD400)121

- 7.4.15Limited evidence for prehistoric activity has been recorded within the 1 km Study Area, with a total of five prehistoric assets identified, all of which are near the eastern end of the Study Area and the low-lying land around Braco village. These include the scheduled Grinnan Hill Fort (SM3088) and a cropmark site (MPK688), as well as a number of findspots from around the general Braco area. These finds include a stone axe from Carsemeg (MPK7032), a bronze axehead from the north of Braco village (25237), and a small grouping of bronze objects from the Glassick Farm area (25259; 25264; 25265; 25252).
- 7.4.16While there is no clear evidence of features dating to the early prehistoric period within the Study Area, the finds that have been recorded do suggest a human presence. The stone axe, while not positively dated, is assumed to date to the Neolithic period (MPK7032), and therefore represents the earliest evidence of human activity within the Study Area. Evidence of Bronze Age activity is also limited to find spots with the remaining finds all assumed to date to this period (25237, 25259; 25264; 25265; 25252).
- 7.4.17The earliest evidence for settlement remains is the fort on Grinan Hill (SM3088). The site, which is located in an elevated position at the southern side of Braco village, includes a series of well-preserved ramparts on the northern side where the relatively flat ground means natural defences are limited, while the steep sides of the hill to the west, south, and east form natural defences¹²². While this has not been subject to detailed archaeological investigations, its form would suggest it dates to the Iron Age period¹²³.
- 7.4.18The previously recorded assets would suggest that prehistoric activity in the Study Area was focused on the lower lying land of Strathallan which follows the Allan Water, and aerial photography in the wider Strathallan area has identified a number of cropmarks

¹²¹ Due to the varied nature of the Scottish landscape, and the resulting variations in settlement/land use, there is no agreed chronology at a national level. As such, the dates that have been assigned to the various periods for the baseline study are those set out in the Regional Archaeological Research Framework for Argyll (RARFA) which was produced as part of the Scottish Archaeological Research Framework (ScARF) (Regional | The Scottish Archaeological Research Framework (scarf.scot)

¹²² Christison, D., 1899. 'The Forts, Camps, and Other Field-Works of Perth, Forfar, and Kincardine' in *The Proceedings of the Society of Antiquaries of Scotland.*

¹²³ Christison, D., 1900. The forts, "camps", and other field-works of Perth, Forfar and Kincardine. *Proceedings of the Society of Antiquaries of Scotland* 34, Society of Antiquaries of Scotland, Edinburgh, pp. 43-120



along the lower lying river valley, as well as Strathearn to the northeast of the Study Area¹²⁴. These include cropmarks recorded in the Study Area that have been tentatively dated to the prehistoric period but have not been subject to excavation (MPK688). Most of the remains recorded as cropmarks appear to relate to prehistoric settlement and agricultural activity and include features such as enclosures and possible field systems.

- 7.4.19Evidence for prehistoric activity in the wider upland landscape includes limited settlement remains in the form of possible hut circles, with the nearest being the Cromlix Lodge hut circle approximately 3.3 km to the southwest of the Combined Project Development Boundary. More extensive evidence of burial activity has been noted on the upland fringes, with a number of burial mounds recorded in the wider area. The nearest of these is Cromlix Lodge long cairn approximately 4.1 km to the southwest of the Combined Project Development Boundary, with a greater concentration of burials 10 km to the south of Study Area along the valley of the River Teith between Callander and Dunblane¹²⁴.
- 7.4.20While there is no evidence for prehistoric activity around the Site in the upland section of the Study Area, it seems likely that the area would have been exploited on a seasonal basis, with the archaeological evidence suggesting the main focus of activity was the lower ground near Braco and Strathallan.
- 7.4.21There is extensive evidence of Roman activity in the Study Area, although as with the prehistoric period, this is focused on the low-lying area around Braco village. The main evidence for activity during the Roman period is the extensive Roman fort and associated military works of Ardoch located to the north of Braco village and on the eastern side of the River Knaik (SM1601). Originally assumed to have been constructed in the 1st century AD to support the campaigns of Agricola, the fort was later reoccupied and remodelled in the 2nd century¹²⁵. The site was one of the main forts on the Gask Ridge complex of forts and associated defensive structures and signal stations that ran northeast into Perthshire, and which were linked by a road which roughly follows the A822 towards Crieff. Other Roman Road on the southeast and northeast of Braco village and include the signal stations or towers of Shielhill¹²⁶ and Greenloaning¹²⁷.
- 7.4.22In addition to the main Roman complex north of Braco village, a further non-designated asset has been recorded within the Study Area, this being the find spot of a coin to the northwest of Braco village, and on the western side of the Keir Burn (363221). This is assumed to be a stray loss associated with the general Roman activity recorded in the area.

Early Medieval (AD400 – AD1100)

7.4.23Only a single asset dating to the early medieval period has been recorded within the Study Area, this being a long cist noted in an antiquarian account in the 19th century (MPK671). The location of the asset was noted as Ardoch Roman Fort, or immediately south of the

¹²⁴ Stevenson, J., 1999. "Prehistory" in Omand, D. (ed.), 1999. The Perthshire Book, Edinburgh: Birlinn Limited.

 ¹²⁵ Breeze, D. J., 1973. 'Exacations at Ardoch 1970' *in Proceedings of the Society of Antiquaries of Scotland*, Volume 102: Pages 122-129.
 ¹²⁶ Woolliscroft, D. J. & Hoffmann, B., 1998. 'The Roman Gask System Tower at Shielhill South, Perthshire: Excavations in 1973 and 1996' *in Proceedings of the Society of Antiquaries of Scotland*, Volume 128: Pages 441-460

¹²⁷ Woolliscroft, D. J. & Hoffmann, B., 1987 'The Roman Gask System Tower at Greenloaning, Perth and Kinross' *in Proceedings of the Society of Antiquaries of Scotland*, Volume 127: Pages 563-576.



Roman Fort, and the lack of details relating to the asset (both its location and description) would suggest the dating is tentative and unreliable.

- 7.4.24While there is limited archaeological evidence for early-medieval activity in the Study Area, it seems likely that the better agricultural ground on the fringes of Strathallan continued to be exploited throughout this period. Documentary sources state this area of Perthshire was relatively well settled by the 12th century, with key settlements including Muthill, 8 km to the northeast, Auchterarder, 10 km to the east¹²⁸, and Dunblane, 9 km to the southwest¹²⁹. Accounts do note, however, that the valley bottom of Strathallan was a wet boggy area that was often difficult to traverse¹²⁸, and as a result it seems likely that the areas such as Ardoch (as Braco village was previously known) would have represented prime settlement areas, being slightly elevated.
- 7.4.25There is no evidence for activity in the upland regions of the Study Area during this period, although it is possible that the grazing land on offer in these areas would have been exploited on a seasonal basis as is common in upland areas of Scotland.

Medieval (AD1100 – AD1600)

- 7.4.26As with the early medieval period, there is limited archaeological evidence for activity within the Study Area during the medieval period. Four assets have been recorded within the Study Areas, two of which have been positively dated to the medieval period. These are both findspots and include a gold button (MPK1852) found within Braco village, and pottery (MPK17590) recorded to the north of Braco village within the limits of Ardoch Roman Fort.
- 7.4.27The remaining two assets dating to the medieval period have both been tentatively dated by form and not detailed excavation and could also be post-medieval in date. The first is the site of a possible chapel located within the centre of Ardoch Roman Fort (MPK686), while the second is an area of ridge and furrow cultivation as well as possible shielings (used for transhumance or seasonal pastoral activities) on the Crocket Burn (MPK6625).
- 7.4.28The assets recorded within the Study Area would suggest that some level of settlement activity continued around the Braco area, potentially as a result of its slightly elevated positioning above Strathallan, while the upland area was used for seasonal grazing with some limited arable farming taking place.
- 7.4.29It has been suggested that the Grade B listed Braco Castle (LB5804), approximately 1.5 km north of the Study Area, originally dates to the 16th century¹³⁰. Located to the west side of the River Knaik, and to the northwest of Braco village, the house has been extensively remodelled in the post-medieval period making its original date and form difficult to discern.

Post-Medieval (AD1600 – AD1900)

7.4.30The post-medieval period represents the most visible period when considering previously recorded heritage assets in the Study Area, with a total of 46 non-designated assets and eight designated assets recorded. As with earlier periods, the majority of these are located in Braco village, as well as the lower slopes of ground rising from Strathallan, with assets

¹²⁸ Foster, J., 1999. "Strathearn" in Omand, D. (ed.), 1999. The Perthshire Book. Edinburgh: Birlinn Limited.

¹²⁹ Smith, R., 2001. *The Making of Scotland.* Edinburgh: Canongate Books Limited.

¹³⁰ Tranter, N., 1963. The Fortified House in Scotland: Volume Two – Central Scotland. Edinburgh: Oliver and Boyd.



in Braco village largely linked to settlement and assets on the fringes of Strathallan linked to agriculture.

- 7.4.31Assets within Braco, or Ardoch as it was originally known, include key public buildings such as the parish church (LB5794) and the Free Church tower (LB5795), as well as Ardoch Bridge (LB5796) all of which are listed. Other non-designated assets around Braco include the cemetery (MPK8072), a well record near the centre of the village (MPK8072), and the military road that runs through the settlement (MPK8269). The military road (MPK8269), a result of the unrest caused by the Jacobite rebellions of the first half of the 18th century, is thought to have been one of those built by Caulfield between 1741-42 and was designed to link Stirling, to the southwest, and Crieff, to the northeast¹³¹. It is, however, likely that the road formalised the network of drove roads that connected the cattle trading centre of Crieff to the markets of Edinburgh, Glasgow and England to the south. The modern A822 continues to use the alignment of the military road, although a more recent bridge (MPK17567) now carries the road over the River Knaik to Braco village, by-passing the original bridge which is a Listed Building (LB57967).
- 7.4.32Features recorded in the more upland areas contain evidence for permanent farmsteads on the lower slopes where better ground was available and some level of enclosure was undertaken, while the assets on the higher ground are linked to seasonal grazing. Permanent farmsteads include sites such as Wester Feddal Farmstead (MPK15095), Carsemeg (MPK9768), Crofthead (MPK15055), and Whistlebrae (MPK11733), while evidence of seasonal activities on the uplands include shielings and associated enclosures along the Crocket Burn (MPK6624) and Froskin Burn (MPK6626).
- 7.4.33A review of early cartographic sources provides little information, as most are county-wide and therefore at a scale that does not provide any great detail, although Moll (1732)¹³² does show the castle/tower house at Braco as well as the Roman fort at Ardoch, while the Rutherford survey of military roads undertaken in 1745 shows only settlements such as Drummond (assumed to be Dunblane due to its position on the south side of the River Allan), to the southwest, and Crieff, to the northeast¹³³.
- 7.4.34The first detailed survey of the Study Area identified as part of the current assessment is the General Roy Survey undertaken between 1747 and 1755¹³⁴. This shows the modern settlement of Braco named as Ardoch, focused on the southern side of the Roman Fort at the point where the military road north (the modern A822) crosses the River Knaik. The survey also shows the Roman Fort (SM1601) and the fort on Grinnan Hill (SM3088) as clear earthworks, while the area currently occupied by Braco village is depicted as arable fields. This depiction of arable fields includes the land adjacent to the A822 at the eastern limit of the Study Area, however, an area of land immediately to the southwest of Grinnan

¹³¹ Taylor, W., 1976. *The Military Roads in Scotland*. London: David & Charles.

¹³²National Library of Scotland, n.d. *The South Part of Perth Shire Containing Perth, Strathern, Stormount and Cars of Gourie &c* [online]. [Accessed 24 May 2024]. Available from: https://maps.nls.uk/view/00000293

¹³³ National Library of Scotland, n.d. *An Exact Plan of His Majesty's Great Roads through the Highlands of Scotland* [online]. [Accessed 24 May 2024]. Available from: https://maps.nls.uk/view/74414122

¹³⁴ National Library of Scotland, n.d. *Roy Military Survey of Scotland*, 1747-55 [online]. [Accessed 24 May 2024]. Available from: https://maps.nls.uk/geo/roy/#zoom=14.8&lat=56.26440&lon=-3.90113&layers=0



Hill, and on the line of the Keir Burn, appears to be shown as a pond or area where the water course widens.

- 7.4.35The survey also shows a small grouping of houses on the line of the A822 near the southern limits of modern Braco village, and these appear to relate to a farmstead named as Greenhaugh on late 19th/early 20th century mapping but removed in the second half of the 20th century to make way for new housing (AECOM002).
- 7.4.36The name 'Braco' is assigned to Braco Castle (LB5804) rather than the settlement, and the house is depicted as a large property with associated enclosure and woodland planting surrounding the main house as well as lining the main access route to the property.
- 7.4.37A number of farmsteads and houses that survive in the contemporary landscape are also depicted on the survey, including Middle Feddal (named as *Nether Fedall*) and Wester Feddal (named as *West Fedall*), while a number of unnamed houses or groupings of structures appear to relate to farmsteads such as Silverton (MPK11835), Whistlebrae (MPK11733), and Carsemeg (MPK9768).
- 7.4.38No features are marked on the upland section of the Study Area, with the landscape depicted as grazing or unimproved.
- 7.4.39The First Statistical Account of Scotland provides an overview of the situation within the Parish of Muthill, of which Braco was part, in the late 18th century, and this notes that the landscape of the Study Area largely consisted of poor-quality soils¹³⁵. Braco village (or Ardoch) is not named as a settlement, although the Roman Fort of Ardoch is described, while the bridge crossing the River Knaik is also recorded (LB57967). This may further suggest that the settlement of Braco/Ardoch was, at this time, still small and more of a large farmstead. The author also noted that the fort had been used for pasture grounds, and that the owner had recently erected a wall around the fort to stop locals attempting to plough the earthworks to ensure it was preserved.
- 7.4.40The Second Statistical Account, published in 1845, provides a brief account of the settlement of Ardoch, and notes that the chapel was built in the late 18th century and that a "*thriving village is now rising beside it, named Braco village, from the circumstances that it consists of feus on the estate of Braco*"¹³⁶. The account goes on to note that the population of the village was 384, with facilities including four public houses, a school, and a library, suggesting a settlement that was flourishing by the mid-19th century. Two cattle markets were also held in the village annually, also hinting at the continued importance of pastoral agriculture in the Study Area.
- 7.4.41This depiction of the village is repeated on the First Edition OS plan of 1863 which shows the settlement expanding south from the crossing point of the River Knaik¹³⁷. The OS mapping also shows the prehistoric fort on Grinnan Hill as being separate from the settlement, while the land to the south of the fort (where the haul road is proposed) is occupied by a series of enclosed fields flanking the Keir Burn. This pattern of fields is

¹³⁵ Scott, J., 1793. 'Parish of Muthil' in Sinclair, J. (ed.) The Statistical Account of Scotland, Volume 8: Perth, Edinburgh.

 ¹³⁶ Walker, J., 1845. 'Parish of Muthill' in Gordon, J. (ed.) *The New Statistical Account of Scotland*, Volume 10: Perth.
 ¹³⁷ National Library of Scotland, n.d. *Perthshire, Sheet CXVII* [online]. [Accessed 24 May 2024]. Available from:

https://maps.nls.uk/view/228779812



largely respected by the contemporary field system in this area, and traces of a 'sluice' marked on the OS survey also appear to survive in the watercourse (AECOM001).

- 7.4.42The OS mapping for the Study Area outside of the settlement of Braco depicts a landscape with farmsteads and associated enclosed fields on the lower slopes, giving way to unimproved or semi-improved rough pasture on the high ground near the proposed substation. There are no features marked on the Crocket Burn (MPK6624) and Froskin Burn (MPK6626), also suggesting that transhumance/the use of the shielings had ended in this area by the 1860s.
- 7.4.43Very little had changed in the Study Area by the time of the Second Editon OS survey of the area which was conducted in 1899, with the settlement of Braco largely representing that surveyed in 1863. Likewise, the upland regions of the Study Area had changed very little with the farmsteads focused on the lower slopes and the high ground, where the proposed substation is located, shown as unimproved or semi-improved rough pasture.

Modern (AD1900 – Present)

- 7.4.44Three assets dating to the modern periods have been recorded within the Study Area, all of which are located around Braco. These include a memorial to the men of the village killed in the Great War (MPK18669), the site of a now demolished Second World War pillbox on the south side of Braco (MPK10915), and the golf course (348440).
- 7.4.45The settlement of Braco continued to grow throughout the 20th century, with the village expanding south up the limits of the prehistoric fort on Grinnan Hill, as well as on the lower ground to the east of Grinnan Hill, to take its current form. The Third Statistical Account published in 1979 again records the generally poor agricultural land within the area, and highlights this is a contributing factor to the pattern of many small farms on the fringes of Strathallan. Many of these farmsteads, some of which have been recorded on the mid-18th century Roy survey, still survive in the Study Area and include Silverton (MPK11835), Whistlebrae (MPK11733), and Carsemeg (MPK9768). The farmstead of Greenhaugh also still appears to survive, albeit in a much-reduced form, within the late 20th century housing estate that forms the southeastern limit of Braco (AECOM002).
- 7.4.46In the upland regions of the Study Area, where the proposed substation Site is located, the main change in land use during the 20th century was the introduction of largescale commercial forestry which dominates the landscape. Much of this dates to the second half of the 20th century, with the Forestry Commission originally establishing the woodland in the area in the mid-1970s¹³⁸. These areas of woodland continue to be harvested and replanted across the higher ground in the Study Area, with the only other significant change to the landscape of the Study Area being the introduction of the operational OHL and Braco West substation, that the Proposed Development aims to support, extend, and reinforce.

Walkover Survey

7.4.47A walkover survey was undertaken on 1 February 2024 at the Site. Visits were also undertaken to Braco village, as well as Grinnan Fort (SM3088), Ardoch Fort (SM1601),

¹³⁸ Perth and Kinross Archives, 1974. MS195, Plans 7/1-7/77, Forestry Commission plan of proposed Strathyre Forest, plan dated 20th September 1974.



and parts of Braco GDL (GDL00067) to examine possible impacts on the setting of heritage assets.

- 7.4.48The walkover survey of the Site found the area to have suffered from extensive disturbance from commercial forestry operations, with evidence of recent felling operations, drainage works, and young established trees across parts of the Site.
- 7.4.49No new heritage assets were recorded as part of the walkover survey in the area of the Site.
- 7.4.50A second site visit was undertaken on 23 April 2024 to examine the eastern end of the Combined Project Development Boundary where the haul road passes to the south of Braco village. This noted that the fields through which the haul road passes are largely used for pasture, with no new features recorded in the fields. The survey did however note traces of a possible structure in the channel of the Keir Burn, and these are assumed to relate to 'sluice' features recorded on the First Edition OS mapping of the area (AECOM001).
- 7.4.51A third site visit was undertaken on 1 July 2024 to examine the Combined Project Development between the B8033 and Easter Feddal, and the route of the proposed haul road. This did not identify any previously unrecorded assets.

Archaeological Potential

- 7.4.52While evidence for human activity has been recorded within the Study Area from the prehistoric period onwards, the focus of settlement has been the low-lying area around the Braco village and Strathallan. Activity in the upland section of the Study Area, where the proposed substation would be located, appears to have been limited to pastoral activities from at least the post-medieval period, and probably earlier, with no clear evidence for permanent settlement. However, as large parts of this area have been heavily disturbed by 20th century commercial forestry operations, as well as works linked to the existing Braco West Substation and existing OHL, the archaeological potential for all periods within the area of the proposed substation is considered to be low.
- 7.4.53The alignment of the proposed existing access track upgrades was found to be flanked by commercial forestry or Christmas tree plantations, with some limited areas of arable and pasture. No new heritage assets were recorded as part of the walkover or a review of historic mapping, and the potential for previously unrecorded assets to survive adjacent to the existing track is considered to be low.

7.5 Embedded Mitigation

7.5.1Due to the lack of heritage assets recorded within the Site, as well as the low potential for further archaeological discoveries, no embedded mitigation for cultural heritage is considered appropriate.

7.6 Appraisal

7.6.1The appraisal of potential impacts resulting from the Proposed Development has been divided into the construction and operational phases. These are discussed below.



Construction Phase

7.6.2The construction phase has the potential to result in the following impacts:

- Permanent physical impacts on previously unrecorded heritage assets due to construction of the Proposed Development;
- Permanent physical impacts on previously recorded heritage assets due to construction of access tracks or other infrastructure;
- Permanent physical impacts on previously unrecorded heritage assets due to construction of access tracks or other infrastructure;
- Permanent physical impacts on previously unrecorded heritage assets due to construction of temporary construction compounds or other works areas; and
- Temporary impacts on the setting of designated assets due to the introduction of elements such as machinery and lighting during construction.
- 7.6.3The results of the appraisal have demonstrated that the majority of the Site has been subject to previous ground disturbance, associated with commercial forestry which covers large areas of the upland sections of the Site. Furthermore, the review of previously recorded heritage assets, historic mapping, and the walkover survey, did not identify any heritage assets within the site, and as a result the potential for the discovery of previously unrecorded assets was considered to be low. It is also assumed that human activity in the area of the proposed substation is limited to agricultural activity, and that any assets that might be recorded or identified during works would be of low value.
- 7.6.4A single asset has been recorded in the area of the proposed existing access track upgrades, this being the Mill Burn water course and associated sluice and reservoir (MPK15061). As the asset is of a form that is common in the area, as well as Scotland in general, and as it has been remodelled during the 20th century, it is considered to be of low value. This linear feature passes under the proposed existing access track upgrades which will be subject to widening in a limited number of areas, and any impacts would be limited to a very short section of the watercourse and not to features such as the sluice or reservoir. As such, the magnitude of impact is considered to be negligible.
- 7.6.5The walkover survey and review of historic mapping of the proposed existing access track upgrades did not identify any previously unrecorded heritage assets, and the potential for previously unrecorded assets to be discovered is considered to be low. Based on a review of previously recorded assets in the Study Area, as well as a review of other sources such as historic cartographic sources, it is assumed that human activity in the Site is limited to agricultural activity, and that any assets that might be recorded or identified during works would be of low value. Due to the low archaeological potential, as well as the limited nature of the works (i.e. widening for the proposed existing access track upgrades), the potential for physical impacts, and the magnitude of impact is considered to be negligible.

Operational Phase

7.6.6Due to the nature of the Proposed Development, operational impacts are expected to be limited to impacts on the setting of heritage assets. The proposed substation represents the



key element of above ground infrastructure, and as a result has the greatest potential to result in impacts on the setting of designated assets.

- 7.6.7A review of designated assets within 2 km of the proposed substation did not identify any designated assets, while impacts on the setting of designated assets beyond this distance are unlikely to be significant due to the size of the proposed substation, as well as the general topography of the area. As a result, there are no impacts predicted on the setting of designated heritage assets.
- 7.6.8While a number of designated assets have been identified within 1 km and 2 km of the proposed existing access track upgrade, the scale and nature of the works (i.e. localised widening) is unlikely to alter the setting of designated assets. As a result, significant impacts on the setting of designated and non-designated assets resulting from the track widening are not predicted.

7.7 Recommendations and Mitigation

- 7.7.1Due to the nature of the Proposed Development, as well as the results of the appraisal, the potential for impacts is considered to be negligible. Consultation with the PKC Council Archaeologists noted that archaeological monitoring of the Site is unlikely to be required due to previous disturbance. However, historic features such as drystone walls, gate posts, and dykes should be avoided where possible, and fenced off to avoid accidental damage. If these features cannot be avoided mitigation will be required. This is likely to include reinstating any features that are removed. If sections of drystone wall cannot be reinstated due to the need for a permanent access, end sections of wall should be 'made good' to avoid the risk of sections of wall collapsing.
- 7.7.2Any archaeological works required would be agreed with the PKC Archaeologist and approved in a Written Scheme of Investigation, which would be produced under planning condition.

7.8 Cumulative Effects

- 7.8.1A cumulative appraisal was conducted taking into account the 'scoped in' planning applications as detailed in **Section 13.1.2** and **Table 13-1**, these are listed below;
 - Cambushinnie 400kV OHL tie-in
 - Cambushinnie UGC between the existing Braco West substation and the Proposed Development
 - 21/00756/FLM: 49.9MW energy storage facility
 - 22/02231/FLM: 49.9MW energy storage facility compound
- 7.8.2There are no cumulative effects on Cultural Heritage predicted as the other proposed developments will not result in impacts to heritage assets assessed as part of the current assessment. This includes potential impacts to previously unrecorded heritage assets due to the low archaeological potential resulting from limited settlement activity and previous disturbance from commercial forestry operations.



8. FORESTRY

8.1 Introduction

- 8.1.1This EA chapter considers the potential effects of the Proposed Development on forestry within the Site. The evaluation of the existing baseline environment has been made through a combination of desk-based study, and field surveys.
- 8.1.2Forestry in this context considers commercial and non-commercial woodland. Commercial forests are dynamic and changing through landowner activities and natural events. This would include the changes to, for example, felling programmes and compositional changes that follow from changes to management objectives or response to biotic or abiotic factors. No high sensitivity forestry receptors, such as ancient woodland or mature native woodland, are present within the Site. The environmental services provided by woodlands in relation to habitats and landscape character are recognised within Chapter 5 Ecology and Nature Conservation and Chapter 4 Landscape Character and Visual of this EA and the topics need to be considered together.

8.2 Information Sources

- 8.2.1The report draws on the following technical figures and appendices (see **Appendix A Figures**):
 - Figure 8-1 Forest Land Use Types;
 - Figure 8-2 Proposed Removal of Existing Woodland Areas; and
 - Appendix G Forestry Survey Data.
- 8.2.2Baseline data was derived from Scotland's environmental web¹³⁹ and Scottish Forestry map viewer¹⁴⁰. These digital mapping tools enabled identification of woodland within the National Forest Inventory (NFI). The NFI definition of woodland is a minimum area of 0.5 ha with trees possessing, or with the potential to achieve, tree crown cover of more than 20% of the ground. Within the NFI some woodlands are identified as native woodlands, also identified within the digital mapping tools referred to above. The Native Woodland Survey of Scotland (NWSS) provides a baseline survey of all native woodlands (of minimum 0.5 ha), nearly native woodlands and plantations on ancient woodland sites in Scotland. A further subset of these woodlands is contained within the Ancient Woodland Inventory (AWI) of Scotland, which identifies ancient woodlands. However, the AWI is based on woodlands over 2 ha. NFI, NWSS and AWI are identified within the baseline conditions.
- 8.2.3Walkover surveys of the Site were conducted on 5 and 6 February 2024 with additional walkover surveys and data collection undertaken on 26 and 27 March 2024. This identified forestry areas by species, stocking density and growth stage, including the extent of replanting and natural regeneration within clear felled forest areas of the Site. The surveys

¹³⁹ Scotland's Environment, n.d. *Scotland's Environment* [online]. [Accessed 01 July 2024]. Available from: https://map.environment.gov.scot/sewebmap/#

¹⁴⁰ Scottish Forestry, 2023. *Map Viewer* [online]. [Accessed 01 July 2024]. Available from: https://scottishforestry.maps.arcgis.com/apps/webappviewer/index.html?id=0d6125cfe892439ab0e5d0b74d9acc18



included field notes and provided observations on existing partly windthrown compartments and the risk of further windthrow.

8.2.4A copy of the long-term forestry management plan for Cambushinnie Forest in the period 2017-2027, approved by Scottish Forestry (reference No 16FGS08494) has been made available by the landowner¹⁴¹.

8.3 Methodology

- 8.3.1The initial walkover survey of the Site collected tree and forestry data of species, tree height, stem diameter, canopy spread, physiological and structural condition, and age category.
- 8.3.2An additional walkover survey of the proposed existing access track upgrades which would form part of the Proposed Development assessed the proximity of trees to the route, recording tree species, tree height, diameter of trees at the edge of tree groups and canopy spread toward the proposed existing access track upgrades. The design drawing was plotted against survey records to determine the extent of tree removal works.
- 8.3.3The purpose of the walkover surveys was to identify sensitive receptors within commercial forestry and native woodland. Forestry and woodland areas were surveyed for species, stocking density and growth stage. Growth stage was classed within the following categories:
 - Young regeneration/replanted (before canopy closure);
 - Pole stage and semi-mature (after canopy closure);
 - Early mature/mature; and
 - Open grown trees (semi-natural) and hedgerows.
- 8.3.4The mature category included trees approaching clear-felling stage, before the likely onset of windthrow rather than reflecting an age class.
- 8.3.5Trees were grouped according to forestry sub-compartment or by tree group or linear tree feature and included some hedgerows and individual trees.
- 8.3.6Forestry receptors were identified as having low sensitivity if they were young replanted trees, forestry compartments with windblown trees or commercial forestry approaching felling stage. Attributing low sensitivity to young forestry compartments reflects the fact that the trees are yet to establish their full provision of environmental services. Compensation woodland will deliver trees of comparable growth stage, within an integrated landscape and habitat management plan (Appendix F Landscape and Habitat Management Plan), to provide different environmental services that are tailored to the Proposed Development. Established mid-rotation forestry crops and immature native woodland have medium sensitivity because environmental services are more established. High sensitivity woodlands, such as ancient woodland and mature native woodland, were not identified within the Site.
- 8.3.7A methodology to determine the impact on forestry of the proposed existing access track upgrades presents the worst-case outcome. The area of direct loss of trees, groups and woodlands from track widening, ground works, drainage, and laydown and working areas was analysed using a geographic information system. The design elements of the

¹⁴¹ Scottish Forestry (2017). Forest Management Plan – Cambushinnie Forest 2017-2027. 16FGS08494


proposed existing access track upgrades were mapped onto the forestry survey data and areas of tree loss measured. A further offset, beyond the direct footprint of the proposed existing access track upgrades was then applied to ensure that the roots of any retained trees fell outside all the works required for the proposed existing access track upgrades. A root protection area (RPA) was calculated as a function of the maximum stem diameter of each adjacent tree group or woodland. The radial RPA assumes a 12-fold ratio to stem diameter, following the methodology within BS5837:2012 *Trees in relation to design, demolition and construction*¹⁴². Because the maximum stem diameter was adopted, for example applying data from the largest hedgerow tree to the entire hedgerow of principally smaller trees, the buffer may be an over-estimate, in some locations, hence the description of worst-case effects. The total area of tree removal from the footprint of the proposed existing access track upgrades plus the root protection buffer was calculated and this was further analysed according to growth stage (see **Section 8.3.3**) of the trees affected.

8.3.8The appraisal below identified that impacts were restricted to low sensitivity receptors, which would result in minor or negligible adverse effects regardless of extent of impact. Hence, it was unnecessary to establish thresholds of impact magnitude, for which there is no standardised methodology.

8.4 Baseline Environment

- 8.4.1Access for the Proposed Development is routed alongside significant areas of commercial forestry within Feddal Forest and Cambushinnie Forest, identified within the NFI. The Proposed Development straddles the forest plan boundary of these areas, for which forest plans have provided permission for extensive areas of clear-felling. In the area of the Proposed Development felling licences were granted under the Cambushinnie Forest Plan¹⁴¹ and clear felling has taken place, authorised under the approved plan. This extensive felling has already been undertaken, to meet forest management objectives, and no cumulative effects have been identified. Similarly, adopting a co-ordinated approach to clear windblown trees in compartments that straddle the Site boundary represents good practice and is not a cumulative effect.
- 8.4.2References to woodlands, tree groups and individual trees, within the following description of the baseline environment, follows label identifiers presented in **Figure 8-1, Appendix A**

 $^{^{142}}$ BS5837:2012 Trees in relation to design, demolition and construction



Figures of Forest Land Use Types with explanatory data tabulated in **Appendix G Forestry Survey Data.**

- 8.4.3Similarly, adjoining the proposed existing access track upgrades, areas of clear-fell have been undertaken under the Feddal Forest Plan and further felling approval granted to the Feddal Estate (W34).
- 8.4.4An area of 1.17 ha of wet woodland (G25), consisting of pole stage, immature broadleaf trees, is located between the proposed existing access track upgrades and Bullie Burn.
- 8.4.5The walkover survey has provided additional clarity and has classed tree groups by growth stage. It identified trees within and adjacent to the boundary of the Proposed Development.

8.5 Embedded Mitigation

8.5.1Embedded mitigation is provided by proposed upgrade to an existing access track, that obviates the need for developing new access through parcels of forestry. The proposed existing access track upgrade will enhance access for extraction of harvested timber.

8.6 Appraisal

8.6.1Appraisal of the effects of the Proposed Development on forestry presents potential forestry removal for the substation site, including OHL tie-in, and for access to the site. The Site is located southwest of the existing Braco West Substation, immediately adjacent to the existing Beauly-Denny OHL. The Site is within an area of commercial forestry land, covered by the Cambushinnie Forest Plan. The label identifiers of woodland compartments are derived from the forestry survey (not from the Cambushinnie Forest Plan). The referencing of woodland is presented in Appendix G Forest Survey Data and Figure 8-1, Appendix A Figures. The Proposed Development is principally within areas of restocked and regenerating young conifer trees, established following clearance felling. The woodland survey label, growth stage and area proposed for removal are shown in Table 8-1 and presented in Figure 8-2, Appendix A Figures.

Area survey label	Forest growth stage	Area for removal (ha)
G10	Replanted/Natural Regeneration	0.19
G14	Replanted/Natural Regeneration	<0.01
W9	Replanted/Natural Regeneration	0.29
W2	Replanted/Natural Regeneration	0.10
G32	Replanted/Natural Regeneration	0.00
W1	Replanted/Natural Regeneration	9.26
W11	Semi-Mature/Mature	0.25
G7	Replanted/Natural Regeneration	0.65
W4	Replanted/Natural Regeneration	<0.01
W6	Replanted/Natural Regeneration	11.79
W18	Replanted/Natural Regeneration	2.52

Table 8-1: Proposed removal of forest areas from the substation site



W24	Semi-Mature/Mature	6.19
W8	Semi-Mature/Mature	2.25
W22	Replanted/Natural Regeneration	4.27
W43	Replanted/Natural Regeneration	0.08
W3	Replanted/Natural Regeneration	<0.01
Total		54.97

- 8.6.2The total area of woodland removed at the substation site would be 55 ha. This includes areas affected by works to the overhead line accounted for within this EIA. Forest removal would be compensated for on a like-for-like basis through on-site and off-site planting On-site forest planting would be designed principally to provide screening and peatland restoration is the preferred habitat creation option rather than woodland replanting..
- 8.6.3A compartment of early mature Sitka and Norway spruce (*Picea sitchensis* and *Picea abies*) (W11) has incipient windthrow and the area will be cleared. Good forestry practice would see the compartment felled in the near term regardless of proceeding with the Proposed Development. The boundary of the Proposed Development divides W11 and is illustrated in Figure 8-1, Appendix A Figures. The felling of this compartment should be completed in one stage. This would be coordinated forest management rather than extended management felling, therefore should not result in cumulative effects.
- 8.6.4A compartment of semi-mature/mature Sitka spruce and Lodgepole pine (*Pinus contorta*) (W24) at the southern boundary of the Site has been subject to progressive windthrow, with some of the affected areas having had windthrown trees removed, whilst the issue has persisted leaving other parts containing windthrown trees. New access, adjacent to this forest compartment, would require felling of standing (as well as clearance of windthrown trees) to ensure safety of the access route. The proposed felling is not wholly related to the Proposed Development because harvesting of trees, vulnerable to continuing windthrow, represents good forestry practice. This would also be a coordinated approach to forest management rather than extended management felling or a cumulative effect.
- 8.6.5The associated works for the Proposed Development will involve extending the existing track used between the proposed substation and the existing Braco West Substation.
- 8.6.6The existing access track serves forest compartments and is used for timber transport. Upgrades to access would require small scale forestry felling and removal of occasional trees, that lie outside of the principal compartment boundaries, to accommodate abnormal loads. Pinch points affecting trees identifies removal of H51 (hawthorn, *Crataegus monogyna*), H61 (hawthorn), H70 (dogwood, *Cornus sanguinea* and willow, *Salix* sp.) and T82, an alder (*Alnus glutinosa*) with wound wood at its base. The methodology described in **Section 8.3.7** has determined the worst-case outcome for all tree and forestry removal resulting from the proposed existing access track upgrades. A total of up to 0.57 ha of forestry would be removed for access in addition to forestry removal at the substation site. Of this 0.39 ha is of newly replanted areas or young natural regeneration, which is readily compensated for on a like for like basis. Potential worst-case removal of pole stage and semi-mature trees would be 0.07 ha, the impact of which is negligible. Worst case removal



of individual trees and hedgerows would be 0.11 ha and these effects would be accounted for within ecological enhancement.

8.7 Recommendations and Mitigation

- 8.7.1Forestry effects would be on trees that are intended for clear-felling and newly regenerating, previously clear-felled areas, which are of low sensitivity. The disruption to forestry management is limited to the Proposed Development and no extended management felling would be required. Compensation of equivalent hectarage would provide an opportunity to mitigate the loss. Management objectives would shift from commercial, timber-led forestry to the provision of alternative environmental services. Nonetheless active forestry management will continue and the re-purposing of forestry land away from timber production, at the scale of the Proposed Development, will have a negligible impact on downstream timber processing.
- 8.7.2The detail of the compensation planting is contained within a Landscape and Habitat Management Plan (Appendix F Landscape and Habitat Management Plan) which has been prepared to meet biodiversity and landscaping objectives, focussing particularly on peatland restoration. On-site tree and shrub planting includes 2.85 ha of woodland, 0.23 ha of wet woodland and 1.39 ha of dwarf shrub.
- 8.7.3Further off-site forestry compensation planting proposals will be developed that may provide an opportunity to establish productive conifer species, but proposals will match site location and conditions and be aligned to landowner objectives. The applicant has a compensation planting management strategy document, which establishes a clear commitment to satisfy Scottish Government's Control of Woodland Removal Policy and be compliant with the UK Forestry Standard.
- 8.7.4The on-site woodland includes planting of native broadleaf trees to comprise sessile oak (*Quercus petraea*), downy and silver birches (*Betula pubescens* and *Betula pendula*), rowan (*Sorbus aucuparia*), and an understorey of hawthorn. The woodland areas would provide long-term screening of the Site. Proposals include an area of wet woodland separating peatland restoration and the principal woodland planting. The wet woodland would contain alder, downy birch, goat willow (*Salix caprea*), and grey willow (*Salix cinerea*)
- 8.7.5Trees would be removed from some areas with peat depth greater than 500 mm. This presents an opportunity for peatland restoration, utilising excavated peat from the Proposed Development. The material would be used to block drains, thereby creating a more favourable hydrology for peatland restoration. Detail is provided in Appendix N Peat Management Plan & Peat Landslide Hazard Risk Assessment.



9. TRAFFIC AND TRANSPORT

9.1 Introduction

- 9.1.1This chapter considers the potential for significant traffic and movement environmental effects resulting from the Proposed Development. It considers traffic and transport effects in accordance with IEMA Guidelines¹⁴³: Environmental Assessment of Traffic and Movement¹⁴³.
- 9.1.2The traffic and movement assessment only considers the construction phase of Proposed Development. The operational phase is unlikely to have a material impact on local roads, as only occasional operational and maintenance traffic is expected.
- 9.1.3HGV construction traffic would route to and from the Site via the A822 and the proposed haul road which would be constructed and operational in advance of the Proposed Development construction period. HGV traffic would not route through Braco village and only cross the B8033 on the haul road route to and from the Site. The use of the haul road by Proposed Development construction traffic avoids the need for construction traffic to route via Braco or the B8033.

9.2 Information Sources

- 9.2.1The report draws on the following technical figures and appendices (see **Appendix A Figures**):
 - Figure 9-1 Traffic Survey Locations;
 - Figure 9-2 Roads for Environmental Assessment; and
 - Appendix J Transport Statement.
- 9.2.2A traffic baseline is derived from 2024 survey data. Traffic surveys were conducted during April 2024 on public roads serving the Site. Twelve traffic surveys (eight automatic traffic counters and four junction counts) were undertaken to provide robust data from which a

¹⁴³ IEMA, 2023. *IEMA Guidelines: Environmental Assessment of Traffic and Movement* [online]. [Accessed 01 July 2024]. Available from: https://www.iema.net/resources/reading-room/2023/07/12/new-iema-guidance-environmental-assessment-of-traffic-and-movement



baseline position was established. The location of the traffic surveys is shown in **Figure 9-1 Traffic Survey Locations, Appendix A Figures**.

- 9.2.3Department for Transport (DfT) Recorded injury accident data was obtained from Crashmap¹⁴⁴.
- 9.2.4Forecast construction traffic data for the Proposed Development was provided by SSEN Transmission. The construction traffic data provided by SSEN is included within **Appendix J Transport Statement.**

9.3 Methodology

- 9.3.1The assessment methodology follows the IEMA Guidelines 2023¹⁴³. Rule 1 and Rule 2 from the IEMA Guidelines¹⁴³ are used to identify roads to be included in the environmental assessment:
 - Rule 1. Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%).
 - Rule 2. Include any other specifically sensitive areas where traffic flows have increased by 10% or more.
- 9.3.2The IEMA Guidelines¹⁴³ 30% threshold is based on research and experience of the environmental effects of traffic, with less than a 30% increase in traffic generally resulting in imperceptible changes in environmental effects apart from within specifically sensitive areas. The IEMA Guidelines¹⁴³ consider that forecast changes in traffic of less than 10% in specifically sensitive areas creates no discernible environmental effect, hence the second threshold set out in Rule 2.
- 9.3.3For magnitude of change, the IEMA Guidelines¹⁴³ describe those changes in traffic of 30%, 60% and 90% should be considered as 'slight', 'moderate' and 'substantial' respectively.
 Table 9-1 reflects the IEMA Guidelines¹⁴³ to quantify the magnitude of change for Proposed Development traffic.

Magnitude of Change	Change in Traffic Annual Average Weekday Traffic (AAWT)	Description
High	90%+	Alteration to baseline conditions such that post development character or composition of baseline condition fundamentally changed.
Medium	60% - 90%	Alteration to baseline conditions such that post development character or composition of baseline condition materially changed.
Low	30% - 60%	Minor shift from baseline conditions such that post development character or composition of baseline condition remains similar to baseline and not materially changed.

Table 9-1 Magnitude of Change

¹⁴⁴ Crashmap, 2024. *Crashmap* [online]. [Accessed 01 July 2024]. Available from: https://www.crashmap.co.uk/



Negligible Very little change from 0% - 30% O% - 30% Change is barely dis no-change situation	om baseline conditions. stinguishable approximating to
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9.3.4Receptors are locations or land uses categorised by sensitivity or environmental value. Table 9-2 describes the receptor sensitivity adopted for the assessment of Proposed Development traffic.

Table	9-2	Sensitivity	of	Receptors
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Receptor Sensitivity	Description
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of international importance.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value or is of regional importance.
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.
Negligible	The receptor is resistant to change and is of little environmental value.

9.3.5 For the purposes of assessment, receptors are identified as follows in accordance with IEMA Guidelines¹⁴³:

- People at home;
- People at work;
- Sensitive and/ or vulnerable groups (including young age; older age; income; health status; social disadvantage; and access and geographic factors);
- Locations with concentrations of vulnerable users (e.g. hospitals, places of worship, schools);
- Retail areas;
- Recreational areas;
- Tourist attractions;
- Collision clusters and routes with road safety concerns; and
- Junctions and highway links at (or over capacity).
- 9.3.6The Transport Statement (**Appendix J Transport Statement**) provides an assessment of Study Area roads and the sensitivity of the IEMA Guidelines¹⁴³ receptors that may be



present on those roads. **Table 9-3** summarises the sensitivity of Study Area roads as environmental receptors.

Description Sensitivity Road A822 Single carriageway with 30 mph speed limit within Braco village, national speed (North of A822/ limit of 60 mph beyond Braco village. Feddal Road Medium Some frontage within Braco village. Junction) Footways within Braco village, signed walking routes and Roman Fort nearby. A822 Single carriageway with 30 mph speed limit. Significant frontage including (South of A822 / High residences and shops. Footways on both Feddal Road sides of carriageway. Junction) B8033 Feddal Road Single carriageway with 30 mph speed limit. Significant frontage including (Braco village) High residences and primary school. Footways on both sides of carriageway. A822 Single carriageway with national speed limit of 60 mph. No direct frontage. Low (At haul road) Footway on east side of carriageway. A822 Single carriageway with a speed limit of 40 mph within Greenloaning. Limited (North of A9) direct frontage but some residential Low access taken from route. Footways along route through Greenloaning. Millhill Road Single carriageway with speed limit of 40 mph. No direct frontage. Footways on Medium (Between A9 and north side of carriageway. A822) B8033 Single carriageway with a national speed limit of 60 mph. No direct frontage, largely (East of Easter rural in character. No footways. Feddal) Medium Traffic data suggests route is used for recreational cycling so likely to contain vulnerable road users. B8033 Single carriageway with a national speed limit of 60 mph. No direct frontage, largely (West of Craighead) rural in character. No footways. Low Traffic data suggests route is used sparingly for recreational cycling so some vulnerable road users possible. A9 South Dual carriageway trunk road with speed Negligible limit of 70 mph. (DfT Counter 724) A9 North Dual carriageway trunk road with speed

Table 9-3 Study Area Roads Sensitivity of Receptors

Negligible

limit of 70 mph.

(DfT Counter 20730)



9.3.7For traffic generated by the Proposed Development the significance of environmental effect is derived from a combination of the Magnitude of Change and the Sensitivity of Receptor.
 Table 9-4 summarises the approach to deriving the significance of effects. (Note, table shading indicates likely significant effect subject to assessor's professional judgment).

Magnitude of Change	Sensitivity of Receptor						
	Very High	High	Medium	Low	Negligible		
High	Major	Major	Moderate	Moderate	Minor		
Medium	Major	Moderate	Moderate	Minor	Negligible		
Low	Moderate	Moderate	Minor	Negligible	Negligible		
Negligible	Minor	Minor	Negligible	Negligible	Negligible		

Table 9-4 Significance of Effects

9.3.8 The reporting of significance of environmental effects will also include;

- Temporary where the effect occurs for a limited period of time and the change at a defined receptor can be reversed;
- Permanent where the effect represents a long lasting change at a defined receptor which is not reversable;
- Short Term/ Medium Term/ Long Term;
- Direct where the effect is a direct result (or primary effect) of the Proposed Development;
- Indirect a secondary effect which occurs within or between environmental components. This may include effects on the environment which are not a direct result of the Proposed Development, often occurring away from the Proposed Development as a result of a complex interactions with other environmental factors;
- Secondary an induced effect arising from the actions or presence of a project, such as changes to the pattern of future land use or improvements to local road networks;
- Beneficial an effect beneficial to one or more environmental receptors; and
- Adverse a detrimental, or negative, effect on one or more environmental receptors.

9.3.9The potential environmental effects of traffic, transport and access considered in this assessment of the Proposed Development are:

- Severance of communities the perceived division that can occur when it becomes separated by a major traffic route (existing or proposed);
- Fear and intimidation on and by road users the effect on the perceived vulnerability of pedestrian traffic relating to changes in traffic flows and or speed;
- Road user and pedestrian safety the potential for effects on rate and severity of accidents relating to changes in traffic flows;
- Non-motorised amenity broadly defined as the relative pleasantness of a pedestrian or cycle journey. The potential for effects relates to changes in traffic flows;
- Non-motorised user delay the effect on travel time. The potential for effects relates to changes in traffic flow;



- Road vehicle driver and passenger delay the effect on travel time. The potential for effects relates to changes in traffic flow, noting that road and junction vehicle capacity assessments are not part of this assessment; and
- Hazardous/ large loads.
- 9.3.10Consideration is given to large/ hazardous loads in accordance with IEMA Guidelines¹⁴³ as follows. There would be a requirement for two transformers to be transported to the Site. These transformers would be Abnormal Indivisible Loads (AIL) and be transported in accordance with Road Vehicles (Authorisation of Special Types) (General) Order 2003 (STGO). A heavy haulage contractor that specialises in the transport of AIL would be engaged as a requirement of expected planning conditions following consent. The heavy haulage contractor would carry out a preliminary route assessment for the AIL. This would include reviewing the entire route from port of entry (tbc) to site including vehicle swept path analysis and review of road structures on route. Following the preliminary route assessment, the heavy haulage contractor would make recommendations on public road improvements (both temporary and permanent) required to transport the AIL to site. In advance of AIL being transported the heavy haulage contractor would use National Highways Electronic Service Delivery for Abnormal Loads (ESDAL) to comply with all legal requirements for transporting AIL on public roads. ESDAL is used in Scotland and once an application has been submitted to Transport Scotland, they will distribute the details to all affected parties for their comment and approval. Affected parties include Police Scotland and local road authorities. The ESDAL process is then used to ensure all requirements such as escort vehicles (including Police escort vehicles if required) are arranged in compliance with the periods of advanced notice required for specific STGO classes of AIL.
- 9.3.11Once in situ the transformers would require to be filled with oil. The oil would be transported to site by tanker. An appropriate tanker haulage contractor would deliver the oil to site in accordance with The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 ("CDG Regulations"). Regarding oil and the environmental assessment of hazardous loads, IEMA Major Accidents and Disaster in EIA¹⁴⁵,provides guidance on scoping hazardous loads in or out of environment assessments. The IEMA scoping decision process states that if existing design measures or legal requirements, codes and standards adequately control the potential risks associated with hazardous loads then the topic may be scoped out. The transport of oil by tanker on UK roads is commonplace, particularly in rural areas for domestic fuel purposes, and is comprehensively covered in relevant CDG regulations. The number of tanker movements required to fill the transformers with oil is likely to be minimal (estimated four no. 35,000 litre HGV tankers) and as such hazardous loads are scoped out of the assessment.

9.4 Traffic and Movement Baseline

- 9.4.1Vehicle access to the Proposed Development will be via the existing public road network. Study Area roads will include the A9, A822 and B8033 and local roads in the immediate environs of the Proposed Development.
- 9.4.2The A9 forms part of the trunk road network in Scotland, connecting Stirling, Perth and Inverness. In the vicinity of Greenloaning, the A9 is a national speed limit dual carriageway. Northbound traffic exits the A9 at Greenloaning via a slip road which connects to the A822.

¹⁴⁵ IEMA (2020). *Major Accidetns and Disasters in EIA: A Primer.* [Online] [Accessed 14 August 2024] available from: IEMA - IEMA Major Accidents and Disasters in EIA Guide



Southbound traffic exits the A9 at Greenloaning via a right turn filter lane which connects to Millhill Road.

- 9.4.3The A822 routes through Braco village north south between the A9 and Crieff. It is a single carriageway road which is predominantly rural in nature. National speed limits apply to the A822 outside of the urban environs on its route reduced to 30 mph within Braco village and 40mph within Greenloaning. The A822 will be the route used by construction traffic between the A9 trunk road and the proposed haul road.
- 9.4.4The B8033 routes north to south parallel to the A822 and A9 between Braco village and Dunblane. National speed limits of 60 mph apply to the route outside of urban environs on its route which is largely rural in nature. Construction traffic will cross the B8033 at the location of the proposed haul road but will not use the B8033 otherwise.
- 9.4.5Current traffic conditions on Study Area roads were established by surveys undertaken in April 2024. The location, type and results of the traffic surveys are provided in Appendix J Transport Statement. In summary, the following traffic surveys were undertaken, Figure 9-2, Appendix A Figures details the location of these surveys:
 - A822 Four Automatic Traffic Counter surveys and one junction turning count survey;
 - Feddal Road/ B8033 Three Automatic Traffic Counter surveys; and
 - Millhill Road One Automatic Traffic Counter survey and two junction turning count surveys.
- 9.4.6The 2024 traffic data provides information on current vehicle flows as well as speeds, and is used to inform the baseline traffic position for the environmental assessment of traffic and movement. The 2024 traffic data has had a growth factor applied to arrive at a true baseline position for when construction is due to peak in Month 27 of construction. This provides a robust assessment in terms of applying IEMA Guidelines Rule 1 and Rule 2¹⁴³ to determine which roads should be included in the environmental assessment. Table 9-5 shows the results of the 2024 traffic surveys.

		Daily Weekday Traffic (Two-Way)						
Road		Car & Light Goods Vehicle (LGV)	HGV	Total				
	A822 (North of A822 / Feddal Road Junction)	3,846	98	3,944				
	A822 (South of A822 / Feddal Road Junction)	4,111	118	4,229				
	Feddal Road (West of A822 / Feddal Road Junction)	779	17	796				
	A822 (At Haul Road)	4,303	77	4,380				
	A822 (North of A9)	4,192	85	4,277				

Table 9-5 2024 Traffic Survey Data



	Daily Weekday Traffic (Two-Way)					
Road	Car & Light Goods Vehicle (LGV)	HGV	Total			
Millhill Road (Between A9 and A822)	522	12	534			
B8033 (Easter Feddal - Braco)	387	15	402			
B8033 (Craighead)	257	9	266			
A9 South (DfT Counter 724)	27,235	2,877	30,112			
A9 North (DfT Counter 20730)	23,029	3,362	26,391			

- 9.4.7DfT accident data has been sourced (via Crashmap¹⁴⁴) for the five-year period 2018-2022. On Study Area roads this data shows 0 fatal, 0 serious, and one slight injury accidents were reported. The accident occurred in 2021 at the A822/ Millhill Road junction and involved two vehicles, resulting in one casualty. This data is proposed to be taken as the baseline position on injury accidents for the environmental assessment of traffic and movement.
- 9.4.8Vehicle traffic generated by the construction of the Proposed Development may potentially affect other public road traffic as follows: non-motorised traffic including pedestrians, cyclists and core path users, and other vehicular traffic including freight, public transport and emergency service vehicles.

9.5 **Proposed Development Traffic**

- 9.5.1Forecast construction traffic for the Proposed Development was obtained from information provided by the Applicant. The full construction traffic programme is included within Appendix J Transport Statement. The peak month of construction of the substation is forecast to take place in Month 27.
- 9.5.2HGV traffic would route to and from the Site via the A822 and the already constructed haul road. HGV traffic would not route through Braco village, and only cross the B8033 on the haul road route to and from the Site. The use of the haul road by Proposed Development construction traffic avoids the need for construction traffic to route via Braco or the B8033. This access strategy is proposed to minimise potential environmental effects due to pollution and nuisance on Braco and its residents.
- 9.5.3It is forecast that the proposed Development would generate 1,816 HGV movements during Month 27 and 2,760 Car/ LGV movements. Using a flat profile across the peak month of



construction and assuming 22 working days per month, this would result in 83 daily HGV movements and 125 daily Car/ LGV movements.

9.6 Traffic and Movement Appraisal

9.6.1For a robust assessment it is assumed all construction materials will be transported to the Site by road. For assessment purposes no materials, such as aggregate from borrow pits or concrete, are assumed to originate from within the Site. This assumption is made for assessment purposes, materials are likely to be recovered or generated from within the Site.

9.6.2**Table 9-6** IEMA Guidelines Roads to be Included in Environmental Assessment

compares forecast Proposed Development construction traffic against baseline traffic to determine which roads must be included in the environmental assessment in accordance with IEMA Guidelines Rule 1 and Rule 2¹⁴³. Roads to be included in the environmental assessment are marked Yes or No and illustrated in **Figure 9-2**, **Appendix A Figures**.

	Baseline		Propose Develop	Proposed Development		ase	Environmontol	
Road	HGV	All Vehs	HGV	All Vehs	HGV	All Vehs	Assessment	
A822 (North of A822 / Feddal Road Junction)	101	4,074	0	0	0%	0%	No	
A822 (South of A822 / Feddal Road Junction)	122	4,369	0	0	0%	0%	No	
B8033 Feddal Road (Braco village)	18	822	0	0	0%	0%	No	
A822 (At haul road)	80	4,525	84	210	106%	5%	Yes	
A822 (North of A9)	88	4,418	84	210	96%	5%	Yes	
Millhill Road (Between A9 and A822)	12	552	84	210	678%	38%	Yes	
B8033 (Easter Feddal - Braco)	15	415	0	0	0%	0%	No	

Table 9-6 IEMA Guidelines Roads to be Included in Environmental Assessment



	Baseline		Proposed Development		% Increase		Environmentel	
Road	HGV	All Vehs	HGV	All Vehs	HGV	All Vehs	Assessment	
B8033 (Craighead)	9	275	0	0	0%	0%	No	
A9 South (DfT Counter 724)	2,972	31,106	84	210	3%	1%	No	
A9 North (DfT Counter 20730)	3,473	27,262	84	210	2%	1%	No	

- 9.6.3 Table 9-6 IEMA Guidelines Roads to be Included in Environmental Assessment
- 9.6.4shows that three roads require environmental assessment due to meeting IEMA Rule 1 / Rule 2 thresholds. These include the A822 (at the haul road location), A822 (north of the A9 slips), Millhill Road and B8033.
- 9.6.5It should be noted that IEMA Guidelines states caution needs to be observed when dealing with very low baseline flows as roads are unlikely to experience impacts / environmental effects even with high percentage changes in traffic. On many of the minor and unclassified study area roads there are very low baseline flows, and weight should be given to the IEMA caution that environmental effects may not materialise in practice despite the high percentage increases in HGV traffic forecast.

Severance of Communities

9.6.6**Table 9-7** presents the significance of effect on the severance of communities as a result of Proposed Development construction traffic. The significance of effects for severance are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023¹⁴³.

Road	% Change in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At haul road)	5%	Negligible	Medium	Negligible
A822 (North of A9)	5%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	38%	Low	Medium	Minor



- 9.6.7Classifying the significance of effects: prior to mitigation, the likely effect of construction traffic on severance of communities is a direct, temporary, Minor Adverse (Not Significant) effect.
- 9.6.8For severance of communities the significance of effects for all Study Areas roads carrying construction traffic would be negligible or minor. One public road is forecast to have minor significance of effects: Millhill Road.

Fear and Intimidation on and by Road Users

9.6.9**Table 9-8** presents the significance of effect on Fear and Intimidation on and by Road Users as a result of Proposed Development construction traffic. Using IEMA Guidelines¹⁴³ methodology for fear and intimidation magnitude of change, there is no step change in traffic flows from baseline conditions. The significance of effects for are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023¹⁴³.

Road	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At haul road)	Negligible	Medium	Negligible
A822 (North of A9)	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	Negligible	Medium	Negligible

Table 9-8 Fear and Intimidation on and by Road Users Significance of Effect

- 9.6.10Classifying the significance of effects: prior to mitigation, the likely effect of construction traffic for Fear and Intimidation on and by Road Users is a direct, temporary, Negligible (Not Significant) effect.
- 9.6.11For Fear and Intimidation on and by Road Users the significance of effects for all Study Areas roads carrying construction traffic would be negligible.

Road User and Pedestrian Safety

9.6.12 Table 9-9 presents the significance of effect on Road User and Pedestrian Safety as a result of Proposed Development construction traffic. A forecast increase in accidents resulting from the presence of construction traffic on Study Area roads is used to establish a magnitude of change. Appendix J Transport Statement contains the construction traffic accident forecast. The significance of effects for are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023¹⁴³.

Road	Magnitude of	Sensitivity of	Significance
	Change	Receptor	of Effect
A822 (At haul road)	Negligible	Medium	Negligible

Table 9-9 Road User and Pedestrian Safety Significance of Effect



A822 (North of A9)	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	Negligible	Medium	Negligible

- 9.6.13Classifying the significance of effects: prior to mitigation, the likely effect of construction traffic on Road User and Pedestrian Safety is a direct, temporary, Negligible (Not Significant) effect.
- 9.6.14 For Road User and Pedestrian Safety, the significance of effects for all Study Areas roads carrying construction traffic would be negligible.

Non-Motorised User Amenity and Non-Motorised User Delay

9.6.15 Table 9-10 presents the significance of effect on non-motorised user amenity and delay as a result of Proposed Development construction traffic. The magnitude of change for these environmental effects is based on the same 30%, 60% and 90% changes in traffic flow used for severance of communities. The significance of effects for severance are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023¹⁴³.

Road	% Change in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At haul road)	5%	Negligible	Medium	Negligible
A822 (North of A9)	5%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	38%	Low	Medium	Minor

 Table 9-10 Non-Motorised User Amenity and Delay

- 9.6.16 Classifying the significance of effects: prior to mitigation, the likely effect of construction traffic is a direct, temporary, Minor Adverse (Not Significant) effect.
- 9.6.17 For non-motorised user amenity and delay, the significance of effects for all Study Areas roads carrying construction traffic would be negligible or minor. One public road is forecast to have minor significance of effects: Millhill Road.

Road Vehicle and Passenger Delay.

9.6.18**Table 9-11** presents the significance of effect on road vehicle and passenger delay as a result of Proposed Development construction traffic. The magnitude of change for these environmental effects is based on the same 30%, 60% and 90% changes in traffic flow



used for severance of communities. The significance of effects for severance are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023¹⁴³.

Road	% Change in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At haul road)	5%	Negligible	Medium	Negligible
A822 (North of A9)	5%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	38%	Low	Medium	Minor

Table 9-11 Road User and Passenger Delay

- 9.6.19Classifying the significance of effects: prior to mitigation, the likely effect of construction traffic is a direct, temporary, Minor Adverse (Not Significant) effect.
- 9.6.20 For road vehicle and passenger delay the significance of effects for all Study Areas roads carrying construction traffic would be negligible or minor. One public road is forecast to have minor significance of effects; Millhill Road.

9.7 Embedded Mitigation

- 9.7.1Mitigation relating to traffic movements associated with the Proposed Development would be provided by a Construction Traffic Management Plan (CTMP).
- 9.7.2 The CTMP would operate throughout the construction programme. **Appendix J Transport Statement** contains a Framework CTMP. A detailed CTMP including the following is expected to be required by way of a planning condition and provided once a Principal Contractor is appointed:
 - The Site and the entry/ exit arrangements from public roads;
 - Traffic routeing plans defining the routes to be taken by HGVs to the Site avoiding sensitive locations, and routes to be taken by Car/ LGV construction personnel traffic;
 - Construction traffic hours and delivery times;
 - Strategy for traffic management and measures for informing construction traffic of local access routes, road restrictions (statutory limits: width, height, axle loading and gross weight), timing restrictions (if applicable) and where access is prohibited;
 - Measures to protect the public highway (e.g. wheel wash facilities);
 - Measures for the monitoring of the CTMP to ensure compliance from construction drivers and appropriate actions in the event of non-compliance; and
 - Mechanism for responding to traffic management issues arising during the works (including concerns raised from the public) including a joint consultation approach with relevant road authorities.

9.8 Summary

9.8.1Construction traffic forecasts for the Proposed Development presented in this chapter provide a robust basis for the assessment of environmental effects. The assessment assumes that construction traffic for the Proposed Development will route from the A9 to



site via the A822. A proposed haul road connecting the A822 to the Site would avoid the need for construction traffic to route via Braco or along the B8033 for the construction of the Proposed Development.

- 9.8.2Prior to mitigation temporary minor (not significant) environmental effects are forecast for severance, non-motorised user amenity, non-motorised user delay and road vehicle and passenger delay. All other forecast environmental effects associated with traffic and movement are negligible. Mitigation in the form of a CTMP would be delivered most likely by way of planning condition, and subsequently approved by relevant planning, roads and emergency authorities.
- 9.8.3Post-mitigation residual environmental effects associated with Proposed Development construction traffic are forecast to be direct, temporary and Negligible (Not Significant).
 Table 9-12 provides a summary of the potential effects identified in this chapter.

Effect	Receptor	Significance of Effect (Prior to Mitigation)	Mitigation	Residual Effect
Severance	Pedestrian Traffic	Minor	СТМР	Negligible
Fear and Intimidation	Pedestrian & Cycle Traffic	Negligible	СТМР	Negligible
Road User and Pedestrian Safety	All Traffic	Negligible	СТМР	Negligible
Non-Motorised User Amenity	Pedestrian & Cycle Traffic	Minor	СТМР	Negligible
Non-Motorised User Delay	Pedestrian & Cycle Traffic	Minor	СТМР	Negligible
Road Vehicle & Passenger Delay	Vehicle Traffic	Minor	СТМР	Negligible

 Table 9-12 Summary of Environmental Effects

9.9 Cumulative Assessment

- 9.9.1The cumulative assessment considers two developments which are proposed in proximity of the Proposed Substation. Both developments are Battery Energy Storage System (BESS) sites which are anticipated to generate four daily two-way Car/ LGV trips and four daily twoway HGV trips. For the purposes of this assessment, it has been assumed that construction traffic for these developments will follow the same routing for Car/ LGV and HGV traffic as the Proposed Development.
- 9.9.2For the purposes of cumulative assessment, there would also be some overlap in construction programme between the proposed substation and the proposed UGC and OHL works. Construction traffic associated with any overlap in project construction programmes is implicitly included within the construction traffic forecast. The haul road would be complete before any proposed substation construction traffic would be generated,



and no construction traffic overlap would occur between the haul road and proposed substation.

9.9.3**Table 9-13** presents the results of the IEMA Guidelines Rule 1 and Rule 2 assessment for cumulative development traffic.

Table 9-13 IEMA Guidelines Roads to be Included in Environmental Assessment

Deed	Baselin	Baseline D		Cumulative Development		ase	Environmental	
коао	HGV	All Vehs	HGV	All Vehs	HGV	All Vehs	Assessment	
A822 (North of A822 / Feddal Road Junction)	100	4,043	0	0	0%	0%	No	
A822 (South of A822 / Feddal Road Junction)	121	4,335	0	8	0%	1%	No	
B8033 Feddal Road (Braco village)	17	816	0	8	0%	1%	No	
A822 (At haul road)	79	4,490	92	226	116%	5%	Yes	
A822 (North of A9)	87	4,384	92	226	105%	5%	Yes	
Millhill Road (Between A9 and A822)	12	547	92	226	742%	41%	Yes	
B8033 (Easter Feddal - Braco)	15	412	0	0	0%	0%	No	
B8033 (Craighead)	9	273	0	0	0%	0%	No	
A9 South (DfT Counter 724)	2,949	30,865	92	226	3%	1%	No	
A9 North (DfT Counter 20730)	3,446	27,051	92	226	3%	1%	No	

9.9.4**Table 9-13** IEMA Guidelines Roads to be Included in Environmental Assessmentshows that three roads require cumulative environmental assessment due to meeting IEMA Rule 1 /



Rule 2 thresholds. These include the A822 (at the haul road location), A822 (north of the A9 slips) and Millhill Road.

Severance of Communities

9.9.5**Table 9-14** presents the significance of effect on the severance of communities as a result of cumulative development construction traffic. The significance of effects for severance are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023¹⁴³.

Table 9-14 Severance of Communities Significance of Effect

Road	% Increase in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At haul road)	5%	Negligible	Medium	Negligible
A822 (North of A9)	5%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	41%	Low	Medium	Minor

- 9.9.6Classifying the significance of effects: prior to mitigation, the likely effect of cumulative development traffic on severance of communities is a direct, temporary, Minor Adverse (Not Significant) effect.
- 9.9.7For severance of communities the significance of effects for all Study Areas roads carrying cumulative development traffic would be negligible or minor. One public road presents Minor significance of effects: Millhill Road.

Fear and Intimidation on and by Road Users

9.9.8**Table 9-15** presents the significance of effect on Fear and Intimidation on and by Road Users as a result of cumulative development construction traffic. Using IEMA Guidelines¹⁴³ methodology for fear and intimidation magnitude of change, there is no step change in traffic flows from baseline conditions. The significance of effect is based on an assessment of all traffic in accordance with the IEMA Guidelines 2023¹⁴³. The full results of the assessment are included in **Appendix J Transport Statement**.

Road	Magnitude of Change	Sensitivity of Receptor	Significance o	f Effect
A822 (At hau	l road)	Negligible	Medium	Negligible
A822 (North c	of A9)	Negligible	Low	Negligible
Millhill F (Betwee	Road en A9 and A822)	Negligible	Medium	Negligible

Table 9-15 Fear	and Intimidation	on and by Road	Users Significance	e of Effect



- 9.9.9Classifying the significance of effects: prior to mitigation, the likely effect of cumulative development traffic for Fear and Intimidation on and by Road Users is a direct, temporary, Negligible (Not Significant) effect.
- 9.9.10For Fear and Intimidation on and by Road Users the significance of effects for all Study Areas roads carrying cumulative development construction traffic would be negligible.

Road User and Pedestrian Safety

9.9.11Table 9-16 presents the significance of effect on Road User and Pedestrian Safety as a result of Cumulative Development construction traffic. A forecast increase in accidents resulting from the presence of construction traffic on Study Area roads is used to establish a magnitude of change. Appendix J Transport Statement contains the construction traffic accident forecast. The significance of effects are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023¹⁴³.

Road	Magnitude of Change	Sensitivity of Receptor	Significance of	f Effect
A822 (At haul	road)	Negligible	Medium	Negligible
A822 (North o	ıf A9)	Negligible	Low	Negligible
Millhill R (Betwee	Road en A9 and A822)	Negligible	Medium	Negligible

Table 9-16 Road User and Pedestrian Safety Significance of Effect

- 9.9.12Classifying the significance of effects: prior to mitigation, the likely effect of cumulative development traffic on Road User and Pedestrian Safety is a direct, temporary, Negligible (Not Significant) effect.
- 9.9.13 For Road User and Pedestrian Safety the significance of effects for all Study Areas roads carrying cumulative development construction traffic would be negligible.

Non-Motorised User Amenity and Non-Motorised User Delay

9.9.14 Table 9-17 presents the significance of effect on non-motorised user amenity and delay as a result of Cumulative Development construction traffic. The magnitude of change for these environmental effects is based on the same 30%, 60% and 90% changes in traffic flow used for severance of communities. The significance of effects for Non-Motorised User Amenity and Non-Motorised User Delay are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023¹⁴³.

Road	% Increase in	Magnitude of	Sensitivity of	Significance of
	Total Traffic	Change	Receptor	Effect
A822 (At haul road)	5%	Negligible	Medium	Negligible

Table 9-17 Non-Motorised User Amenity and Delay



Road	% Increase in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (North of A9)	5%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	41%	Low	Medium	Minor

- 9.9.15 Classifying the significance of effects: prior to mitigation, the likely effect of cumulative development traffic on non-motorised user amenity and non-motorised user delay is a direct, temporary, Minor Adverse (Not Significant) effect.
- 9.9.16 For non-motorised user amenity and delay, the significance of effects for all Study Areas roads carrying cumulative development construction traffic would be negligible. or minor. One public road presents Minor significance of effects: Millhill Road.

Road Vehicle and Passenger Delay

9.9.17Table 9-18 presents the significance of effects on road vehicle and passenger delay as a result of Cumulative Development construction traffic. The magnitude of change for these environmental effects is based on the same 30%, 60% and 90% changes in traffic flow used for severance of communities. The significance of effects for severance are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023¹⁴³.

Road	% Increase in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At haul road)	5%	Negligible	Medium	Negligible
A822 (North of A9)	5%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	41%	Low	Medium	Minor

Table 9-18	Road	User	and	Passenger	Delay
				i acconigo.	Duray



- 9.9.18 Classifying the significance of effects: prior to mitigation, the likely effect of cumulative development traffic on road user and passenger delay is a direct, temporary, Minor Adverse (Not Significant) effect.
- 9.9.19 For road vehicle and passenger delay the significance of effects for all Study Areas roads carrying cumulative development construction traffic would be negligible or minor. One public road presents Minor significance of effects: Millhill Road.

9.10 Summary of Cumulative Development Effects

- 9.10.1Construction traffic forecasts for cumulative development presented in this chapter provide a robust basis for the assessment of environmental effects. For the purpose of this assessment, it has been assumed that construction traffic for these developments would follow the same routing for Car / LGV and HGV traffic as the Proposed Development.
- 9.10.2Prior to mitigation, temporary minor (not significant) environmental effects are forecast for severance, non-motorised user amenity, non-motorised user delay and road vehicle and passenger delay. Mitigation in the form of a Construction Traffic Management Plan (CTMP) would be conditioned as part of the Section 37 planning consent (see Section 9.6), and subsequently approved by relevant planning, roads, and emergency authorities.
- 9.10.3Post-mitigation residual environmental effects associated with cumulative development construction traffic are forecast to be direct, temporary Negligible (Not Significant). Table
 9-19 provides a summary of the potential effects identified in this chapter.

Effect	Receptor	Significance of Effect (Prior to Mitigation)	Mitigation	Residual Effect
Severance	Pedestrian Traffic	Minor	СТМР	Negligible
Fear and Intimidation	Pedestrian & Cycle Traffic	Negligible	СТМР	Negligible
Road User and Pedestrian Safety	All Traffic	Negligible	СТМР	Negligible
Non-Motorised User Amenity	Pedestrian & Cycle Traffic	Minor	СТМР	Negligible
Non-Motorised User Delay	Pedestrian & Cycle Traffic	Minor	СТМР	Negligible
Road Vehicle & Passenger Delay	Vehicle Traffic	Minor	СТМР	Negligible

Table 9-19 Summary of Environmental effect (Cumulative developments)



10. HYDROLOGY, HYDROGEOLOGY, GEOLOGY AND SOILS

10.1 Introduction

10.1.1This chapter assesses the potential effects relating to Hydrology, Hydrogeology, Geology and Soils (including land contamination) in relation to the construction and operation phases of the Proposed Development. It details each of these items in turn, including a baseline description, followed by the identification of potential impacts on each receptor and, where relevant, identification of measures proposed to mitigate the impact.

10.2 Information Source

- 10.2.1This chapter is supported by Figure 10-1 Surface Water Features, Appendix A Figures.
- 10.2.2The data relating to the Study Areas defined in **10.4.1** used to develop a baseline for soils, geology, land contamination, WFD catchments, watercourses and surrounding areas is summarised here:
 - Groundsure Enviro and Geo Insight (ref. GSIP-2024-14502-17022, 29 January 2024) (Appended as part of desk study in **Appendix H Geo-Environmental Desk Study**)
 - Geo-Environmental Desk Study LT520-Braco West Substation (SSEN, October 2023) (Appended as part of desk study in **Appendix H Geo-Environmental Desk Study**)
 - Geo-Environmental Desk Study Cambushinnie 400kV Substation (AECOM, June 2024) (Appendix H Geo-Environmental Desk Study)
 - Igne Report on Ground Investigation, LT307 Braco West Sites 2 & 3, 26 January 2024) (Appended as part of desk study in Appendix H Geo-Environmental Desk Study)
 - The Mining Remediation Authority Map Viewer (2023)¹⁴⁶
 - British Geological Survey (BGS) mapping (2020)¹⁴⁷
 - National River Flow Archive for surface water flow and rainfall information (2024)¹⁴⁸
 - Met Office (2023)¹⁴⁹
 - Scotland's Aquaculture website (2024)¹⁵⁰
 - Scotland's Environment website (2024)
 - Hydrogeological Map of Scotland (2024)¹⁵¹
 - SEPA Water Classification Hub (2024)¹⁵²

¹⁴⁶ The Mining Remediation Authority, 2023. Interactive Map [online]. [Accessed 16 January 2025]. Available at: Mining Remediation Authority Map <u>Viewer</u>

 $^{^{147}}$ British Geological Survey, 2020. Onshore Geoindex [online]. [Accessed 09 May 2024]. Available at:

https://mapapps2.bgs.ac.uk/coalauthority/home.html.

¹⁴⁸ UK Centre for Ecology and Hydrology, 2024. National River Flow Archive [online]. [Accessed 08 May 2024]. Available at: https://nrfa.ceh.ac.uk/.

¹⁴⁹ Met Office, 2023. UK and regional series [online]. [Accessed 09 May 2024]. Available at: https://www.metoffice.gov.uk/research/climate/maps-anddata/uk-and-regional-series.

¹⁵⁰ Scotland's Aquaculture, 2024. Scotland's Aquaculture [online]. [Accessed 09 May 2024]. Available at:

 $https://aquaculture.scotland.gov.uk/map/map.aspx?postcode=\&layers=AQUA_1, AQUA_6$

¹⁵¹ British Geological Survey, 2024. Hydrogeological Maps of Scotland [online]. [Accessed 09 May 2024]. Available at:

https://www.bgs.ac.uk/datasets/hydrogeological-maps-of-scotland/

¹⁵² SEPA, 2015. Water Classification [online]. [Accessed 09 May 2024]. Available at: https://www.sepa.org.uk/data-visualisation/water-classification-hub/



- SEPA Flood Risk (2024)¹⁵³
- NatureScot (2024)¹⁵⁴
- HES
- Zetica Unexploded Ordnance (UXO) risk map¹⁵⁵
- Zetica Pre-Desk Study Assessment (PDSA) (22 February 2024) (Appended as part of the Geo-Environmental Desk Study in **Appendix H Geo-Environmental Desk Study**)
- UK Radon Map (2024)¹⁵⁶
- UK Topography map (2024)¹⁵⁷
- Scottish Government Energy Infrastructure (Energy Consents Scottish Government) (2024)¹⁵⁸
- Google Earth satellite imagery (Google Earth)¹⁵⁹
- Carbon and Peatland 2016 Map (2024)
- National Soil Map of Scotland (2024)¹⁶⁰
- Email correspondence with the Local Authority (PKC) on potentially contaminated land (received 29 January 2024) (Appended as part of the Geo-Environmental Desk Study in Appendix H Geo-Environmental Desk Study).
- Private Water Supply (PWS) data was received from PKC on 17 January 2024 and from Stirling Council on 31 January 2024 (**Appendix I Private Water Supply Assessment**).
- Information concerning abstractions, discharges and pollution events was received from SEPA on 22 March 2024.

10.2.3Field surveys were also conducted on 15 January and 26 March 2024.

10.3 Methodology

- 10.3.1The general methodology used to assess the potential effects of the Proposed Development on the hydrology, hydrogeology, geology and soils of the Site and the surrounding area is as follows:
 - consultation with SEPA, Stirling Council and PKC to identify any information relating to water abstractions, contaminated land, historical land use and areas of sensitivity;
 - desktop study to obtain baseline and historical data;
 - field surveys undertaken on 15 January and 26 March 2024 to obtain baseline data;
 - identification of the potential effects of the Proposed Development and assessment of their magnitude and potential impact on sensitive receptors; and
 - identification of options for the mitigation of potential effects taking account of the SSEN Transmission GEMPs (Appendix O GEMPs and SPPs).

¹⁵³ SEPA, 2024. Scottish Flood Hazard and Risk Information [online]. [Accessed 09 May 2024]. Available at: https://map.sepa.org.uk/floodmaps/FloodRisk/Search

¹⁵⁴ NatureScot, 2024. Site Link Map Search [online]. [Accessed 09 May 2024]. Available at: https://sitelink.nature.scot/map

¹⁵⁵ Zetica, 2024. UXO Risks Map [online]. [Accessed 09 May 2024]. Available at: https://zeticauxo.com/guidance/risk-maps/

¹⁵⁶ UKradon, 2024. UK maps of radon [online]. [Accessed 09 May 2024]. Available at: https://www.ukradon.org/information/ukmaps

¹⁵⁷ United Kingdom topographic map, 2024. United Kingdom topographic map [online]. [Accessed 09 May 2024]. Available at: https://en-gb.topographic-map.com/map-cgt/United-Kingdom/

¹⁵⁸ Scottish Government, 2024. Energy Infrastructure [online]. [Accessed 09 May 2024]. Available at: https://www.gov.scot/policies/energy-infrastructure/energy-consents/

^{3256.63719952}a,18709751.81607485d,35y,165.58670573h,0t,0r/data=OgMKATA

¹⁶⁰ Nationals Soils Map [Online] [Accessed 09 May 2024]. Available at: https://soils.environment.gov.scot/maps/soil-maps/national-soil-map-of-scotland/



- 10.3.2The significance of the impacts upon the baseline environment will be defined as a function of the sensitivity of receptors and the magnitude of change.
- 10.3.3This assessment will include the impacts of the Proposed Development upon the baseline environment. Particular attention will be paid to the potential hydrological and water quality impacts upon any water supplies within the vicinity of the Site and any aquatic ecological features identified within **Chapter 5 Ecology and Nature Conservation**. The potential water quality impacts through enhanced erosion of disturbed peat will also be considered.
- 10.3.4The Site will be assessed for flood risk in line with Scottish Planning Policy including NPF4². A full flood risk assessment (FRA) has been undertaken for the Proposed Development in support of the planning application.
- 10.3.5A detailed forestry hydrological assessment has been scoped out. This is because the loss of forestry due to the Proposed Development is small, therefore removal of forestry is unlikely to have any significant effects on the hydrology of the catchment.

10.4 Baseline Environment

Study Area

- 10.4.1For the purposes of this assessment of the potential effects relating to Hydrology, Hydrogeology, Geology and Soils (including land contamination) in relation to the construction and operation phases of the Proposed Development, two Study Areas have been defined as follows:
 - A 1 km Study Area has been selected for Hydrology, Hydrogeology, Geology and Soils.
 - A 250 m Study Area has been applied for land contamination (as beyond this distance, impacts to the site from contaminated land sources are unlikely) and is referred to as 'Contaminated Land Risks Study Area'.

Surface Water

- 10.4.2Surface water features (and their attributes) within the Study Area are described in this section. Under the Water Framework Directive (WFD), 'water bodies' are the basic management units, defined as all or part of a river system or aquifer. Water bodies form part of larger 'river basin districts' (RBD), for which River Basin Management Plans (RBMPs) are used to summarise baseline conditions and set broad improvement objectives. This baseline is presented by each water body, noting that some features are present within the catchments of designated WFD water bodies rather than being designated as a WFD water body in their own right.
- 10.4.3As not all the watercourses in the Study Area are named, and some have multiple tributaries, each watercourse has been given a unique reference number. The Proposed Development is situated within the Allan Water Catchment (ID:55). Within that catchment, the Proposed Development is located between the two sub-catchments; of Muckle Burn and Bullie Burn. Each of these sub-catchments have a number of water features associated. These are listed in **Table 10-1**.

Table 10-1 Catchments and Water Features

Sub-Catchment	Water Feature
Muckle Burn	Crocket Burn



	Unnamed watercourses and ditches	
	Froskin Burn	
	Tochie Burn	
Bullie Burn, Keir Burn and Mill Burn	Feddal Burn	
	Unnamed watercourses and ditches	
	Unnamed ponds/lakes	

10.4.4Allan Water (Greenloaning to Dunblane) (ID: 6833), Bullie Burn (ID:4605) and Muckle Burn (ID: 4604) are classed as WFD waterbodies. Allan Water (Greenloaning to Dunblane) has been classified as having good overall status (2022). It has also been designated as heavily modified due to the surrounding agricultural land drainage systems. Bullie Burn has been classed as having a moderate overall status (2022) and Muckle Burn has a Good overall status (2022) (Table 10-2).

Table 10-2 Catchments and Condition

WFD Parameter	Allan Water- Greenloaning to Dunblane (ID: 6833) (2022)	Bullie Burn (ID:4605) (2022)	Muckle Burn (ID: 4604) (2022)
Overall status	Good	Moderate	Good
Pre-HMWB status	Poor	Moderate	Good
Overall ecology	Poor	Moderate	Good
Biological elements	Good	High	High
Fish	Good	High	High
Fish barrier	Good	High	High
Specific Pollutants	Pass	n/a	n/a
Ammonium	Pass	n/a	n/a
Hydromorphology	Poor	Moderate	Good
Morphology	Poor	Moderate	Good
Overall hydrology	Good	High	High
Modelled hydrology	Good	High	High
Hydrology (medium / high flows)	High	High	High
Hydrology (low flows)	High	n/a	High
Water Quality	n/a	High	High

10.4.5Allan Water is a large watercourse which is sourced from a small lochan situated around NN 91354 10193. The river flows roughly west, before it flows south into the River Forth at NS 78670 95998. Flow data from the National River Flow Archive gives a Q95 result of 0.861 m³/s for Allan Water at Kinbuck¹⁶¹. **Plate 10-1 and 10-2** shows the water feature from

¹⁶¹ UK Centre for Ecology & Hydrology, 2024. Allan Water at Kinbuck [online]. [Accessed 09 May 2024]. Available from: https://nrfa.ceh.ac.uk/data/station/meanflow/18001



the Site walkover, the location of **Plate 10-1 and 10-2 is** shown in **Figure 10-1, Appendix A Figures**. It was observed to have sand, gravel and cobbles deposited to the centre around the bridge and along the banks.

Plate 10-1 Allan Water taken at NN 83463 07879 looking downstream.



Plate 10-2 Looking downstream. (Taken on 15 January 2024) (As shown on Figure 10-1)





- 10.4.6Chemistry data was supplied by SEPA on 22 of March 2024. They supplied chemistry data from water samples collected from Allan Water at the Knaik Confluence (NN 83733 07870) between January to September 2019 (total of 9 samples). A summary of the results is shown in **Table 10-3**.
- 10.4.7Overall, Allan Water has a relatively neutral pH and looks to have a good quality level with a high dissolved oxygen (105% on average). Chloride stays well below the Environmental Quality Standard (EQS) of 250 mg/l.
- 10.4.8No data was received on what fish species are contained within Allan Water from SEPA. However, it could be assumed that trout, salmon and sea trout are likely to inhabit the river as suggested by online fishing websites¹⁶².
- 10.4.9Upstream there is the South Tayside Goose Roosts (SPA), Carsebreck and Rhynd Lochs (SSSI) and the Shelforkie Moss (SAC) (NN 85197 08738). These protected areas are situated outside of the Study Area and are upstream of the works and so will not be considered within the appraisal.

 Table 10-3 Chemistry data collected from Allan Water at the Knaik Confluence (NN 83733 07870)

 between January to September 2019 (total of 9 samples)

Parameter	EQS (Annual Average and Non- statutory)	Unit	Average	Max	Min
Alkalinity (as CaCO3)	-	mg/l	66.36	99.80	14.80
Ammoniacal Nitrogen (as N)	-	mg/l	0.05	0.13	0.02
Biochemical Oxygen Demand – Allyl thiourea (ATU) suppressed	-	mg/l	1.56	2.50	1.00
Chloride	250	mg/l	10.16	17.10	3.25
Electrical conductivity (25°C)	-	µS/cm	175.29	265.00	43.30
Nitrate (as N)	-	mg/l	0.62	1.10	0.15
Nitrite (as N)	-	mg/l	0.01	0.01	0.01
Non-ionised ammonia (as N)	-	mg/l	0.00	0.00	0.00
Oxygen – dissolved	-	mg/l	11.78	14.60	10.60

¹⁶² The Forth Rivers Trust, n.d. *Fishing around the Forth* [online]. [Accessed 09 May 2024]. Available from: https://www.fishforth.org/rivers/allan-water/allan-water-angling-improvement-association/



Parameter	EQS (Annual Average and Non- statutory)	Unit	Average	Мах	Min
Oxygen – dissolved - % saturation	-	%	105.61	133.00	94.30
рН	-	pH units	7.76	8.47	6.90
Reactive Phosphorus (as P)	-	mg/l	0.01	0.02	0.01
Sample Temperature	-	°C	10.48	18.40	5.20
Suspended Solids (105°C)	-	mg/l	4.67	7.82	2.00
Total Oxidised Nitrogen (as N)	-	mg/l	0.63	1.11	0.15



10.4.10The Bullie Burn is situated approximately 500 m north of Proposed Development. It is sourced from around NN 76328 11041 and splits at NN 81122 10301 into the Kier Burn and Mill Burn (which are both 2 km downstream of the Proposed Development). These two burns then enter Allan Water at NN 83471 07902 and NN 82746 07735, respectively. Plate 10-3 and Plate 10-4 displays photographs taken from the Site walkover on 15 January 2024. The location of Plate 10-3 and Plate 10-4 is shown in Figure 10-1, Appendix A Figures. In general, the watercourses have a bedrock base overlain by cobbles and boulders.

Plate 10-3: Left Bullie Burn taken at NN 80048 09954 facing downstream (As shown on Figure 10-1) and;



Plate 10-4: Taken at NN 83328 09514 facing downstream on 15 January 2024.





10.4.11Crocket Burn, a tributary to Muckle Burn, is over 1 km south downgradient from the Proposed Development. It flows into Muckle Burn at NN 79942 07950. From the Site visit, Muckle Burn has cobbles and boulders at its base with relatively clear flowing water (Plate 10-5 and Plate 10-6, the location of Plate 10-5 and Plate 10-6 is shown in Figure 10-1, Appendix A).



Plate 10-5: Muckle Burn taken at NN 80735 07366 facing upstream and; Plate 10-6: Downstream. (As shown on Figure 10-1)



10.4.12Each of these sub catchments have water features associated. These are listed in **Table 10-4**.



Water Feature Description **Distance to the** Scoped In/Out (WF) Site for Appraisal The source is a small lochan 1200 m south of the Allan Water (WF1) Scoped In situated around NN 91354 proposed existing Indirect construction 10193. The river flows roughly access track runoff from catchment west, before it flows south into upgrades. the River Forth at NS 78670 95998. Muckle Burn and Source is on relatively steep 787 m from the Scoped In associated tributaries terrain at NN 74360 08435 proposed existing Indirect construction (WF2) northwest of Site, Joins Allan access track runoff from catchment Water southwest of the Site at upgrades. Flows to NN 81832 06647. the west and south of the Site. Crocket Burn (WF3) A tributary of the Muckle Burn, Two tributaries of Scoped In the stream is sourced around NN Crocket Burn are Proximity to 7739 0823 and flows into the located within the development Muckle Burn at NN 7907 9394. Site, approximately The stream has approximately 1100 m downgradient four tributaries which flow south. of the substation drainage, and the track extension and upgrades. Bullie Burn, and Originates at approximately NN 80 m from proposed Scoped In associated tributaries 76220 11136, joins Keir Burn existing access track Indirect construction (WF4) north of the site. Flows is over upgrades. Flows to runoff from catchment steep terrain. the north of the Site. Keir Burn and Originates from Bullie Burn at Scoped In 299 m from proposed associated tributaries approximately NN 81210 10340 existing access track Indirect construction on steep terrain to the north of upgrades. Flows to (WF5) runoff from catchment the site and enters Allan Water at the east and north of approximately NN 83462 07899 the Site . to the southeast of the site. Mill Burn and Flows from Bullie Burn at NN Scoped In The proposed existing associated tributaries 81122 10300, flows southeasterly access track Proximity to (WF6) to join Feddal Burn at NN 82309 upgrades cross the development 08986 which then joins Allan Mill Burn at NN 81985 Water at NN 82744 07730 south 09732. This flows into Feddal Burn of site. Flows through three downstream which lochans (NN82451034, NN 82308 09236 and NN82020985) may be the source of before joining Feddal Burn. PWS. Flows to the southeast of the Site. Feddal Burn (WF7) Sourced around NN 8000 0888, 625 m downgradient Scoped In Feddal Burn flow roughly south of the Site. Proximity to through approximately four small development lochans (largest 7,000 m² in area). Feddel Burn eventually flows into Allan Water at NN 8274 0773.

Table 10-4 Summary of Water Features within the Study Area



Water Feature (WF)	Description	Distance to the Site	Scoped In/Out for Appraisal
Unnamed Drain (WF8)	Current drainage of the existing Braco West Substation. Sourced around NN 7963 0931, the drain runs around the perimeter of the existing Braco West Substation before entering Bullie Burn at NN 7933 0968 and NN 7955 0973.	The proposed track extension and upgrades will cross the drains at NN 7947 0954 and NN 7937 0948	Scoped In Proximity to development
Unnamed Drain (WF9)	Proposed drainage of the existing Braco West Substation. Sourced around NN 79783 09487, the drain is proposed to run around the perimeter of the existing Braco West Substation and the proposed development and flow past the proposed SUDS basin. The drainage will enter tributaries of Crocket Burn at NN 79181 08551 and NN 79242 08698.	The proposed drainage is present on-site and runs alongside the track extension and upgrades. The proposed drainage layout flows across the proposed substation screening buffer at NN 79068 08734.	Scoped In Proximity to development
Unnamed water feature including pond and drain (WF10)	A small pond situated around NN 79030 08792 with an area of 86 m ² . It appears to be sourced from drainage ditches which flow from the forested area to the northwest and cross the existing access track at NN 78832 08901. From the pond the ditch appears to continue flowing alongside the access track before flowing into the Crocket Burn.	Situated in the southwestern corner of the of the Site.	Scoped In Proximity to development

Geology and Soils

- 10.4.13According to BGS mapping¹⁴⁷ the superficial deposits at the Site comprise Peat across the western area of the Site (i.e., around the proposed substation and the track extension and upgrades), and also in the area around Mill Burn (i.e small area of the proposed existing access track upgrades). Till (Devensian Diamicton), is shown to underlie the Peat and also outcrops across the centre and eastern area of the Site. Glaciofluvial Ice Contact Deposits are present within the southeastern extent of the Site. Alluvium (clay, silt, sand and gravel) is present in localised areas in the Study Area, following watercourses including Bullie Burn, Kier Burn, Muckle Burn, Crocket Burn, Feddal Burn and Allan Water.
- 10.4.14The bedrock geology underlying the Site is shown to comprise Teith Sandstone Formation within the western area, predominantly beneath the footprint of the proposed substation and proposed track extension and upgrades. Cromlix Mudstone Formation and Dunblane Sandstone Formation are shown within the central and eastern areas of the Site,



respectively (i.e., in the areas of the proposed existing access track upgrades). All strata are from the Strathmore and Arbuthnott-Garvock Groups.

- 10.4.15The bedrock is disrupted by faults within 1 km of the boundary of the Site. The faults are inferred and located approximately 30 m southwest, 110 m southwest and 900 m northeast of the Site.
- 10.4.16There are no BGS designated areas of made ground or artificial ground recorded within the Site or within the surrounding area. This type of soil refers to man-made or modified soils during construction, redevelopment, decommissioning or infilling activities for example.
- 10.4.17Although no made ground is shown on published BGS mapping¹⁴⁷ on the Site and within 1 km, localised made ground from the existing Braco West Substation and existing access tracks / roads is likely to be present.
- 10.4.18One borehole was present within the northeast of the Site (BGS Geoindex reference NN70NE9) adjacent to the existing Braco West Substation.
- 10.4.19A review of the most recent ground investigation (*Igne-Report on Ground Investigation*, *LT307 Braco West Sites 2 &3, 26 January 2024*) (Appended as part of desk study in **Appendix H Geo-Environmental Desk Study**) undertaken onsite which included the drilling of 17 boreholes and 21 trial pits up to maximum depths of 15.75 mbgl and 3 mbgl, respectively, has identified the following general sequence:
 - Peat from surface up to 1.90 m below ground level (bgl) and described as soft brown to dark brown spongy amorphous¹⁶³. Peat was encountered in all locations except for two trial pits (TP10 New and TP21).
 - Made ground was encountered from surface up to maximum depth of 0.70 mbgl¹⁶⁴ in two trial pits (TP21 and TP23) and described as of dark brown/grey to brown slightly gravelly silty fine to coarse sand with occasional roots, or reddish brown gravely clayey fine to coarse sand with medium to high cobble content and occasional pieces of wood.
 - Superficial deposits (underlying peat or made ground) of sand, gravel and clay between 0.20 m bgl¹⁶⁵ to 5.50 m bgl¹⁶⁶, and described as brown to reddish brown very gravelly silty fine to coarse sand, and red brown sandy clay with sandstone boulders, respectively. Gravel was encountered between 0.45 m bgl to a maximum depth of 2.70 m bgl and described as brown very sandy silty with medium cobble content or reddish brown very sandy silty. Deposits of silt were encountered in BH04 between 0.55 m bgl and 1.20 m bgl and described as reddish brown slightly gravelly sandy.
 - Bedrock was encountered in all locations except in TP04, TP05, TP09, TP11, TP12 New, TP13 New and TP21.
 - Bedrock of medium strong brown grey/reddish brown sandstone was encountered between 0.90 m bgl¹⁶⁷ and 5.50 m bgl¹⁶⁸ (depths of top of the bedrock). Very weak to weak greyish brown mudstone with reddish brown siltstone laminae was encountered between 3.80 m bgl¹⁶⁹ to 10.55 m bgl (depths of top of the bedrock). The maximum

¹⁶³ Based on BH18

¹⁶⁴ Based on TP21

¹⁶⁵ Based on TP13 New

¹⁶⁶ Based on BH01

¹⁶⁷ Based on TP01

¹⁶⁸ Based on BH01

¹⁶⁹ Based on BH02



bottom depths of bedrock were 15.75 m bgl and 15.45 m bgl for sandstone and mudstone, respectively.

- 10.4.20The Site does not lie within a Coal Mining Reporting Area, according to the Mining Remediation Authority map viewer¹⁴⁶.
- 10.4.21The Groundsure report indicates three non-coal mining small-scale quarrying operations within the surrounding area of the Site, including the following:
 - The Glassick Sand Pit is recorded in the Groundsure report as located on-site. However, inspection of the historical mapping shows the Sand Pit to be located off-site approximately 20 m southeast of the Site, and adjacent to the west of the proposed existing access track upgrades and B8033 road. The commodity obtained from the quarry was sand, and the operational status of the pit is 'Ceased', with operations expected to have been ceased prior to 1977 when the sand pit was no longer indicated on mapping.
 - The Nether Braco & Silverton Farms quarry located 68 m northeast of the Site for the commodity of sand and gravel, the status of the quarry is 'Ceased'.
 - The Carsemeg Wood Sandstone Quarry located 193 m southeast of the Site for the commodity of sandstone, the status of the quarry is 'Ceased'.
- 10.4.22A review of the BGS Onshore Geoindex170 indicates an additional ceased quarry (Blairmore) at approximately 700 m northeast of the proposed existing access track upgrades.
- 10.4.23A review of the National Soil Map of Scotland indicates 'Organic Soils' with the soil group classed as 'Blanket peats' and the major soil subgroup classed as 'Dystrophic blanket peat' within the west and north of the Site. The soil association along the proposed existing access track upgrades is predominantly 'Balrownie' with component soils classed as 'Brown earths' and 'Peaty gleyed podzols'. The latter is also present within the western area of the Site, where the substation is proposed. This is shown in **Figure 5-2, Appendix A Figures**.
- 10.4.24The peat coverage across the Site and surrounding area is described as 'peat body at surface'. The map recorded the Site area to have undergone 'Recent Ploughing'. The most recent land cover data from the map was from 2015 when the site cover was classified as 'coniferous woodland'.
- 10.4.25According to the Carbon and Peatland 2016 Map, no areas of Class 1 or Class 2 soils are present on-site or in the immediate surrounding area. Soils across the Site and 1 km Study Area are classed as Class 0, 4 and 5 (therefore, not considered to be of national importance).
- 10.4.26A review of the NatureScot Map¹⁵⁴ and the Groundsure Report indicates that there are no recorded ecological sensitive sites or geological sites within the boundary of the Proposed Development or within 1 km.
- 10.4.27According to the UK Radon website¹⁵⁶ the Site is located within an area where the potential for radon is less than 1%. This is also confirmed by the Groundsure report. It is, therefore,

¹⁷⁰ GeoIndex (2024) – [Online] [accessed 8/08/2024] Available from: British Geological Survey (bgs.ac.uk)


anticipated that radon protective measures would not be necessary should the construction of any new occupied buildings within the Site be undertaken. None are proposed currently.

- 10.4.28The Site and surrounding area are in a low risk area, which is defined by Zetica as an *"area indicated as having 15 bombs per 1000 acres or less"*, according to the Zetica UXO risk map¹⁵⁵.
- 10.4.29A Zetica PDSA indicates that the Site is in the Landward Area of Perth which recorded bombing during WWII by High Explosive bombs to a density of 1.1 bombs per 405 hectares. Zetica recommended that a detailed desk study is commissioned to assess, and potentially zone, the UXO hazard level on the Site.

Groundwater

10.4.30The Site is underlain by a bedrock WFD groundwater body 'Dunblane' (SEPA ID: 150628). It has been classified with water quality as 'Good' and overall condition as 'Poor' in 2022 (Table 10-5). It has an area of around 181.3 km² and is dominated by fracture flow. To the south of the Study Area near the B8033, there is also a superficial WFD groundwater body 'Strathearn Sand and Gravel' (ID: 150811). This is a superficial aquifer which is dominated by intergranular flow. It has 112.6 km² area and a 'good' overall status (2022) (Table 10-5).

WFD Parameter	Dunblane (ID: 150628)	Strathearn Sand and Gravel (ID: 150811)
Overall status	Poor	Good
Quantitative status	Poor	Good
Quant – Saline Intrusion	Good	Good
Quant – SW Interaction	Poor	Good
Water balance	Good	Good
Chemical status	Good	Good
Interaction	Good	Good
Specific pollutants	Good	Good
Chromium	Good	Good
Zinc	Good	Good
Manganese	Good	Good
Other Substances	Good	Good
Nitrate	Good	Good
Priority substances	Good	Good
Cadmium	Good	Good
Lead	Good	Good
Drinking Water Protected Area	Good	Good
Priority substances	Good	Good
Atrazine	Good	Good

 Table 10-5 WFD Parameters for the Dunblane Groundwater Body and the Strathearn Sand and Gravel

 Groundwater Body



WFD Parameter	Dunblane (ID: 150628)	Strathearn Sand and Gravel (ID: 150811)
Simazine	Good	Good
Other Substances	Good	Good
Epoxyconazole	Good	Good
Nitrate	Good	Good
General tests	Good	Good
Priority substances	Good	Good
Atrazine	Good	Good
Simazine	Good	Good
Trichloroethene	Good	Good
Benzene	Good	Good
Specific pollutants	Good	Good
Chromium	Good	Good
Other Substances	Good	Good
Electrical Conductivity	Good	Good
Epoxyconazole	Good	Good
Nitrate	Good	Good
Free Product	Good	Good
Vinyl Chloride	Good	Good
Water quality	Good	Good

10.4.31The Dunblane Groundwater body is within the Lower Old Red Sandstone Aquifer. Table
 10-6 displays the aquifer properties. The Old Red Sandstone aquifers are typically well cemented, with relatively low intergranular porosity and permeability.

Table 10-6 Aquifer properties of the Lower Old Red Sandstone¹⁷¹

Porosity (%)	Hydraulic Conductivity (m/d)	Transmissivity (m²′d)	Specific Capacity (m ³ /d/m)	Storativity	Operational Yield (m ³ /d)
~10	0.01-2	50-150	40-100	~0.0001	200-400

10.4.32Groundwater was encountered during the drilling of boreholes NN70NE2 at 130 m bgl and NN70NE8 at 128.2 m bgl, located approximately 2.6 km and 2.5 km southeast of the Site, respectively, according to the BGS borehole logs¹⁷². Additionally, borehole log NN80NW1 located 2.46 km southeast of the Site recorded the initial water strike depth to be 30ft (9.14m) below the well top, and the standing level of water inside the borehole to be 3ft (0.91m) below the well top. It is not recorded if the well top is flush with the ground or raised.

¹⁷¹ BGS, 2015. Scotland's aquifers and groundwater bodies [online]. [Accessed 09 May 2024]. Available from:

https://nora.nerc.ac.uk/id/eprint/511413/1/OR15028.pdf

¹⁷² British Geological Survey, 2024. *Borehole records* [online]. [Accessed 09 May 2024]. Available from: https://www.bgs.ac.uk/information-hub/borehole-records/



Overall, these records provide a glimpse into groundwater levels in the area at the time of their construction, they do not represent groundwater levels across the Site.

- 10.4.33A review of the most recent ground investigation (*Igne-Report on Ground Investigation*, LT307 Braco West Sites 2 &3, 26 January 2024) (Appended as part of desk study in Appendix H Geo-Environmental Desk Study) has identified groundwater in three of the trial pits -TP07 at 1.20 m bgl, TP09 at 2.00 m bgl and TP13 New at 1.50 m bgl, within bedrock and superficial deposits.
- 10.4.34Groundwater flow direction within the aquifer units is expected to be influenced by the local topography. Mapping indicates that the local topography falls downward to the south and southeast, as well as to the north. As such groundwater is thought to flow in a southerly and southeasterly direction towards the Allan Water, and in a northerly direction toward the Bullie Burn. However, the nature and extent of groundwater bodies within the area is unknown, and as such no certainty can be placed on the existence or movement of possible groundwaters.
- 10.4.35The Site and Study Area are situated within Dunblane Groundwater Drinking Protection Zone and the southern end of the Study Area is situated within the Allan Water Valley Groundwater Drinking Protection Zone.

Abstractions

10.4.36There are six Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) authorisations within the 1 km Study Area, according to SEPA. These are shown in Table 10-7.

Authorisation No	Site	NGR	Authorisation Usage	Closest Distance to Site (m)
CAR/R/1015862	Edincraig Edincraig, Braco, Dunblane FK15 9RA	NN 82092 08536	Sewage (Private) Primary	724
CAR/R/1054220	East Woodside Cottage +2, Braco, Dunblane East Woodside Cottage, Braco, Dunblane FK15 9RA	NN 82463 08711	Sewage (Private) Primary	328
CAR/R/1087955	The Barn, Mid Feddal Farm, Braco, Dunblane The Barn, Mid Feddal Farm, Braco, DUNBLANE FK15 9RB	NN 82210 08643	Sewage (Private) Primary	574
CAR/R/1125865	New Braco Substation, Nr Braco New Braco Substation, Feddal Hill, Nr Braco FK15 9QZ	NN 79450 09450	Sewage (Private) Primary	Within the Site
CAR/R/1148061	Mid Feddal House, Braco, By Dunblane Mid Feddal House, Braco, By Dunblane FK15 9RB	NN 82243 08667	Sewage (Private) Primary	529
CAR/R/1148072	Cottage 1-3, Mid Feddal, Braco, Dunblane Cottage 1, Cottage 2,	NN 82228 08678	Sewage (Private) Primary	525

Table 10-7 CAR authorisations within the Study Area



Authorisation No	Site	NGR	Authorisation Usage	Closest Distance to Site (m)
	Cottage 3, Mid Feddal, Braco, Dunblane FK15 9RB			

- 10.4.37There is no groundwater abstraction under controlled CAR licence recorded for the Site. Hence, no further consideration of groundwater abstractions is undertaken in this appraisal.
- 10.4.38PWS data was received from PKC on 17 January 2024 and from Stirling Council on 31 January 2024. Overall, there are 4 PWS within the Study Area. Table 10-8 lists out each of these PWS alongside the grid reference, source, and usage. Appendix I Private Water Supply Assessment provides a PWS assessment outlining the potential impacts of the Proposed Development to these supplies.
- 10.4.39Another PWS was identified at Ballendall (within the Stirling Council area). However, it is situated approximately 1 km from the Site. Therefore, the PWS at Ballendall has been scoped out of this assessment.

ID	Property as listed by PKC and/or SC	NGR	Source Type	Usage	Closest Distance to the Site (m)
PWS-B-01	Bentick Farm Supply	NN 80708 08820	Unknown	W13 PWS Type B Supply	998
PWS-B-02	Blairmore Supply	NN 80792 09925	Unknown- potentially spring	W18 New Regulated Supply	41
PWS-B-03	Calziebeg Farm Supply	NN 80868 09128	Unknown	W13 PWS Type B Supply	770
PWS-B-04	Carsemeg Farm Supply	NN 81300 09200	Unknown	W13 PWS Type B Supply	680

 Table 10-8 Private Water Supplies within the Study Area

GWDTE

10.4.40According to the basic hydrogeological assessment carried out, it was identified that there are potentially highly and moderate GWDTEs present. To the southeast, southwest and north of the proposed substation platform there are four potentially highly dependent GWDTEs. In the southwest two potentially moderately dependent GWDTEs were also identified. However, surveys found that there was no obvious source which supplies these



ecosystems and therefore they are likely sustained by rainfall. More details can be found within **Chapter 5 Ecology and Nature Conservation.**

Flood Risk

10.4.41A detailed flood risk assessment has been undertaken for the Proposed Development in support of the planning application. Flood risk will be dealt with through the planning process based on the separate assessment carried out as part of the planning application. Therefore, flood risk is excluded from this EA report.

Drainage

10.4.42A detailed drainage assessment has been undertaken for the Proposed Development in support of the planning application. Drainage will be dealt with through the planning process based on the separate assessment carried out and therefore, drainage is excluded from this EA report.

Land Contamination

- 10.4.43The earliest available OS map reviewed was dated 1862-1863, which shows the Site as undeveloped with mainly open moorland across the Site, with two access tracks running from the southeast to northwest and another access track running along the northeast of the Site, entering the Site from the east. These tracks were shown on OS maps until 1977. Additionally, sections of the existing access track were present within the south and east of the Site and is shown in its full length since 2010 OS map.
- 10.4.44The Site is indicated, on 2001 OS mapping, to be divided into sections of plantation forestry.
- 10.4.45The most significant change, within the Contaminated Land Risks Study Area, is the construction of the existing Braco West Substation first shown on 2014 OS map within the northeastern area of the Site. An access track is shown running northeast to southwest along the north boundary of the Site on mapping from 2024.
- 10.4.46Surrounding areas are in land use of predominantly agricultural / farmland, forestry and vacant land. Crofthead Farm and a pond were shown adjacent to the west of the eastern extent of the existing access track, on 1862-1863 OS map. On the same map, Glassick Farm and Feddal House, including a corn mill, were located approximately 160 m east and 240 m west of the Site, respectively. The pond was shown as 'Mill Dam' on OS maps from 1901 until 1977. A well was shown adjacent to the east of the existing access track and replaced by a pump on the 1901 OS map.
- 10.4.47A sand pit (i.e. Glassick sand pit) was shown adjacent to the west of the junction of the existing access track and the B8033 road on the 1901 OS map. A well was shown to the south of Feddal House, approximately 200 m southwest of the existing access track.
- 10.4.48On the 1977 OS map, the sand pit and corn mill were no longer shown. A sheep dip was shown adjacent to the existing access track in the northeast, until the 2024 OS map. Carsemeg Wood Sandstone Quarry was located approximately 193 m southeast of the existing access track, working of the quarry is understood to be ceased according to the



Groundsure Report (see Section 11.5.18 in desk study appended in **Appendix H Geo-Environmental Desk Study**).

10.4.49Sources of contamination which may impact the Site include:

<u>On-site</u>

- Made ground associated with the construction of the existing Braco West Substation, and associated car park, and construction of the existing access track.
- Electricity substation with potential for contaminants such as hydrocarbons, heavy metals, inorganics (e.g. sulphates).

Off-site

- Made ground associated with the construction of the existing access track, farmhouses and associated agricultural infrastructure.
- Potentially infilled land associated with former quarries, ponds, wells and sand pit.
- Sheep dip may have been used with a variety of pesticides including chemicals such as metals, organochlorines, organo-phosphates or pyrethroid.
- Potential windblow asbestos from historical and current farm buildings (offsite).

Summary of Sensitivities

10.4.50**Table 10-9** summarises the sensitivities assigned to the various resources/receptors as discussed in this chapter.

Parameter	Sensitivity	Justification
Allan Water (WF1)	High	Allan Water has a Good overall classification and according to the National River Flow Archive (NRFA) the water feature has an estimated flow of Q95 <1.0 m ³ /s. It is also likely the water features hosts salmon and trout.
Muckle Burn and associated tributaries (WF2)	High	Muckle Burn has a High overall classification and is likely to have salmon and trout.
Crocket Burn (WF3)	Medium	Small water feature which is not classified as a WFD water body but could have species such as salmon and trout.
Bullie Burn, and associated tributaries (WF4)	High	Bullie Burn has a High overall classification and is likely to have salmon and trout.
Keir Burn and associated tributaries (WF5)	Medium	Small water feature which is not classified as a WFD water body but could have species such as salmon and trout.
Mill Burn and associated tributaries (WF6)	Medium	Small water feature which is not classified as a WFD water body but could have species such as salmon and trout.
Feddal Burn (WF7)	Medium	Small water feature which is not classified as a WFD water body but could have species such as salmon and trout.
Unnamed Drain (WF8)	Low	Small water feature which is not classified as a WFD water body.

Table 10-9 Sensitivity of Resources/Receptors



Parameter	Sensitivity	Justification
Unnamed Drain (WF9)	Low	Small water feature which is not classified as a WFD water body.
Unnamed water feature including pond and drain (WF10)	Low	Small water feature which is not classified as a WFD water body.
Dunblane Groundwater Body	High	Moderately productive aquifer which is within a Groundwater Drinking Protection Zone. Possibly could be supplying nearby PWS.
Strathearn Sand and Gravel	High	Has a 'Good' WFD classification and is within a groundwater drinking water protection zone. Possibly could be supplying nearby PWS.
PWS	High	Drinking water supply
Geology/Sensitive Sites	Not applicable	No geological conservation review sites (GCR) were recorded within the study area, therefore, impacts to geological receptors are highly unlikely.
Soil	Medium	According to BGS and the National Map of Scotland, there is peat on the Site and within the Study Area (Section 10.4.13). However, the Carbon Peatland Map, classes soils across the site as Class 0, 4, and 5 hence, not of nationally important resource (Section 10.4.25). For these reasons, peat is of medium sensitivity.
Receptors of Land Contamination: Human Health, Water Environment and the Built Environment	Low to Medium	Limited potential sources of contamination, associated with made ground on-site and off-site, electricity substation (on-site), car park (on-site), access track and road (on-site and off-site); and infilled land (Section 10.4.49)

10.5 Embedded Mitigation

Design Mitigation and Assumptions

Good practice measures

10.5.1The adoption of the CEMP and applicable GEMPs would reduce the probability of a pollution incident occurring and reduce the magnitude of any incident that may occur through a combination of good site environmental management procedures, including minimising storage of topsoil strip volumes, soil management, staff training, availability of contingency equipment and emergency plans.

10.5.2SSEN Transmission GEMPs (**Appendix O GEMPs and SPPs**) applicable to this chapter are:

- Watercourse Crossings GEMP
- Working In or Near Water GEMP
- Private Water Supplies GEMP
- Soil Management GEMP
- Contaminated Land GEMP
- Working with Concrete GEMP



- Oil Storage and Refuelling GEMP
- Waste Management GEMP
- Working in Sensitive Habitats GEMP
- Dust Management GEMP
- Restoration GEMP
- Forestry GEMP
- Bad Weather GEMP.

10.6 Appraisal

10.6.1This appraisal assumes that good practice measures, including GEMPs (**Appendix O GEMPs and SPPs**), Surface Water Drainage Strategy and abiding with Controlled Activities Regulation (CAR) authorisation requirements are adopted to manage potential effects. Mitigation measures to prevent pollution and manage drainage will be addressed within a CEMP.

Construction Phases

10.6.2During the construction phase of the Proposed Development, there is the potential for the following short-term impacts on the hydrology, hydrogeology, geology and soil environment. Throughout this appraisal, a 'worst-case' scenario is assumed for all construction effects.

Pollution of surface watercourses, groundwater, and soils

- 10.6.3During the construction phase, a number of potential pollutants could be introduced during the Site works (from construction plant, equipment and materials) including oils, hydrocarbons, inorganics, sulphates, sulphides, cement, concrete, waste and wastewater.
- 10.6.4There is the potential for made ground associated with the existing Braco West Substation and car park (on-site), the access roads and track (on-site and off-site), and infilled land associated with the sand pit, ponds, wells and quarries (off-site) (**Section 10.4.49**) which may be a potential source of contamination. Potential contaminants could include metals and inorganic compounds, pH, polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH) including benzene, toluene, ethylbenzene, xylene (BTEX) and methyltert-butyl-ether (MTBE), semi volatile organic compounds (SVOCs), volatile organic compounds (VOCs), asbestos¹⁷³, sulphates, sulphides, cyanides, phenols and asbestos containing materials (ACMs).
- 10.6.5Ground investigation undertaken to date onsite and in the Study Area indicates that contamination within made ground is not present at concentrations likely to represent potential impact, but where encountered, made ground should be carefully managed in

¹⁷³ The likelihood of asbestos presence is considered low, given the date of construction of the existing Braco West Substation being after the year 2000 and the absence of previous developments on site. Asbestos is only considered from offsite sources-farm buildings.



accordance with the Contaminated Land GEMP (**Appendix O GEMPs and SPPs**) to mitigate potential risks.

10.6.6Potential contaminants are noted in **Section 10.4.49**, and if present in ground which may be disturbed could impact nearby surface waters, underlying groundwater and soils. Potential effects are discussed as follows.

Oils and Hydrocarbons

- 10.6.7Sources of oils and hydrocarbons during construction relevant to the Proposed Development includes oil / fuel storage in mobile tanks during construction, fuel storage in barrels and plant / equipment used. The operation of the existing Braco West electricity substation itself and car park (on-site) could be a potential source of hydrocarbons, through small scale leaks and/or spillages. Made ground associated with the existing Braco West Substation and car park (on-site), the access roads and track (on-site and off-site), and infilled land associated with the sand pit, ponds, quarries and wells (off-site) may also be sources of hydrocarbon contaminants.
- 10.6.8Such contaminants, if present, can affect the water quality of the nearby surface waters and underlying groundwaters, also potentially impacting soils and bedrock.
- 10.6.9The most direct pathway for contaminants to reach surface waterbodies on the Site is via surface water run-off, lateral migration of contaminants via shallow deposits and/or groundwater, service runs and drainage systems on Site.
- 10.6.10The most direct pathway for contaminants to reach groundwater within the superficial deposits is by leaching and migration of contaminants via shallow made ground and natural superficial deposits.
- 10.6.11The most direct pathway for contaminants to reach groundwater within the underlying bedrock is by leaching and migration of contaminants via shallow made ground and bedrock.
- 10.6.12As GEMP Oil Storage and Refuelling (see Appendix O GEMPs and SPPs) would be implemented, impacts on water quality, soil and geology from routine construction activities are not considered likely to be significant. Additionally, GEMP –Contaminated Land and GEMP – Waste Management (see Appendix O GEMPs and SPPs would be implemented to mitigate potential risks from oils and hydrocarbons.

Concrete and Cement

- 10.6.13Concrete would be delivered to the Site pre-mixed for the construction of the Proposed Development.
- 10.6.14Concrete (which includes cement) is highly alkaline and its release into the water environment could have an adverse effect on water quality and ecology. There is also the potential for localised pollution of groundwater during the construction of foundations.
- 10.6.15The major pathways for concrete / cement contaminated water to reach soil and groundwater is via direct contact with construction materials (suspended in surface water



runoff into drains and watercourses, especially during periods of high runoff rainfall events), aggressive ground conditions (pH and sulphate) and accidental wash downs.

- 10.6.16It is proposed that concrete be brought to site ready-mixed and poured in-situ. Other elements would be pre-cast. These measures would significantly reduce the potential impact from cement contamination to negligible.
- 10.6.17Should it be necessary to mix concrete on-site, the measures within GEMP– Working with Concrete (see **Appendix O GEMPs and SPPs**) would be adhered to.

Modification of Groundwater Levels and Flows

- 10.6.18There would only be shallow excavations involved for the construction of the Proposed Development. Therefore, there it would be unlikely that there would be any impacts to groundwater levels and flows.
- 10.6.19Rainwater entering excavations, may require to be pumped out and discharged to ground/ditch, where it is uncontaminated.
- 10.6.20The appraisal of impacts to GWDTE is included in **Chapter 5 Ecology and Nature Conservation** including where necessary mitigation measures.

Site Water Resources and Foul Drainage

- 10.6.21Site water resources and foul drainage would include water supply for construction and welfare facilities and disposal of wastewater.
- 10.6.22Water supply for construction and welfare facilities is anticipated to be low volume. Water would be sourced from two boreholes. One temporary borehole for construction site water supply located within the construction compound welfare and one permanent borehole for water supply to the Site located adjacent to the western side of the proposed substation platform. The new boreholes would be installed into aquifers as opposed to shallow springs to ensure long term viability of the supply. The expected volume abstracted for each borehole is less than 10 m3 / day such that they would fall within CAR General Biding Rule 2 (GBR2). During system commissioning of the boreholes a sample would be taken for analysis to determine the treatment needed to ensure that the supply would meet the requirements of the Private Water Supplies (Scotland) Regulations 2006 and the Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017.
 - 10.6.23Waste water from construction welfare facilities is to be removed via a tanker.
 - 10.6.24A Construction Site SEPA CAR licence¹⁷⁴ would be required for the discharge of water-run off to the water environment.
 - 10.6.25During operation, foul drainage discharge would be relatively low volume because the Site would not be permanently manned. The proposed foul drainage for the platform substation buildings will discharge via a gravity drainage system into a suitably placed package treatment plant / cess pool or tank. Details of this will be confirmed during the detailed design stage. The foul water drainage for the site will be privately owned and maintained. If any licenses are required from SEPA, these will be determined at the next

 $^{^{174} {\}rm SEPA, 2024.} \ {\it Water run-off from \ construction \ sites \ [online]. \ [Accessed 01 \ July 2024]. \ Available \ from: \ https://www.sepa.org.uk/regulations/water/pollution-control/water-run-off-from-construction-sites/$



stage once the design has been finalised to ensure all correct information is submitted as part of that assessment.

Public/Private Water Supplies

- 10.6.26There are 4 PWS within the 1 km Study Area, according to data provided by PKC and Stirling Council.
- 10.6.27The known PWS were evaluated based on their position relative to the Site, and any potential pollutant-source-pathway-receptor relationships, in order to determine the potential for the Proposed Development to have an adverse effect on PWS. **Table 10-10** displays the distance of each of the PWS from the Site. The closest infrastructure includes the existing access track situated around NH 35500 08127. All 4 PWS within the Study Area are situated downstream of the Proposed Development and of any proposed works. However, any contaminated surface water runoff would be captured by the proposed drainage and SUDS basin on the site. See **Appendix I PWS Assessment** for further details. Prior to works commencing, a PWS survey would be carried out to confirm the exact locations of the PWS, see **Table 10-10**, and whether they are still in use.

ID	Source Type	Usage	Closest Distance to the Site (m)	Potential Pathway
PWS-B-01	Unknown	W13 PWS Type B Supply	998	Potential road run-off, but likely too far distant to cause impacts
PWS-B-02	Unknown- potentially spring	W18 New Regulated Supply	41	Contaminated run-off from the road
PWS-B-03	Unknown	W13 PWS Type B Supply	770	Potential road run-off, but likely too far distant to cause impacts
PWS-B-04	Unknown	W13 PWS Type B Supply	680	Potential road run-off, but likely too far distant to cause impacts

Table 10-10 Private Water Supply Assessment

Soil Excavation and Waste

- 10.6.28Disturbance of soil, peat and made ground for the implementation of foundation excavations has the potential to release potential contamination, and impact surrounding soil and groundwater. Any damage to soil quality affects the long-term functioning of the soils, which degrade and lose structure once excavated. These can result on impacts to the water environment, hydrogeology, and the built environment. Management of soil onsite will be undertaken in accordance with Soil Management GEMP and Waste Management GEMP, which will minimise potential impacts to soil.
- 10.6.29There could be the potential to disturb soil during construction of the proposed existing access track upgrades including the widening of the access track and the foundation excavation. This could lead to increased sediment-laden runoff into surface water



features. There is particular risk to Mill Burn which directly crosses the proposed existing access track upgrades. The water environment and the flora and fauna that it supports may be adversely affected by excessive fine sediment contained within construction site run-off, dewatering activities or from works directly affecting water features. Run-off laden with fine sediment is principally generated by rainfall falling onto land that has been cleared of any vegetation where the ground may be compacted, reducing infiltration. Potential sources of fine sediment contaminated water include that which is generated by the construction activities themselves (e.g. vehicle washing), debris from the use of overland conveyors to move spoil from below ground works to temporary stockpile locations, dewatering of excavations, and from works directly within water features themselves. Generally, excessive fine sediment in run-off is chemically inert and affects the water environment through smothering riverbeds and plants, temporarily changing water quality (e.g. increased turbidity and reducing photosynthesis), and by causing physical and physiological adverse impacts on aquatic organisms (e.g. abrasion, irritation etc.). Management of soil on-site would be undertaken in accordance with Soil Management GEMP and Waste Management GEMP which would minimise any such risks to the water environment. Additionally, guidance outlined within Guidance on Pollution Prevention 5: Works and maintenance in or near water for construction of maintenance works near, in or over water would be followed¹⁷⁵.

- 10.6.30The Site is located within an area underlain by peat and organic material. Investigations undertaken across the Site indicate peat deposits are typically <1.0 m in thickness across the proposed substation platform and track extension and track upgrades and will require to be excavated during the construction process.. Care should be taken when excavating the peat given the peat is a protected carbon capture source and to minimise the release of carbon and any other potential contaminants. Management of peat would be undertaken in accordance with Working in Sensitive Habitats GEMP.
- 10.6.31A site specific Stage 1 (outline) Peat Management Plan (PMP) has been produced for the Proposed Development and has been included within **Appendix N Peat Management Plan & Peat Landslide Hazard Risk Assessment**. This PMP provides information on the site selection process, the investigations undertaken to determine peat depth and extent, and an approximate volume of peat excavation based on the current design stage. The PMP also provides mitigation measures, which the detailed design and construction works would be undertaken in accordance with, in relation to the peat present on Site to minimise the impact the Proposed Development has on it.
- 10.6.32The PMP also provides information on how the peat excavated as a result of the Proposed Development would be reused and commits the Applicant to reusing all peat excavated from the Site. The PMP also provides outline inspection and monitoring principles which would be taken forward as the design and construction works develop. The use and development of the PMP as the Proposed Development progresses would ensure the impact of the peat soils is reduced as far as is practicable.
- 10.6.33As peat is present within the Site, and the Site is on sloping ground, there is a risk of a peat landslide being caused by the construction of the Proposed Development. As such, a Stage

¹⁷⁵ SEPA, (2017). Works and maintenance in or near water for construction or maintenance works near, in, or over water, *GPP 5. Natural Resources Wales, SEPA, Agriculture, Environment and Rural Affairs and Northern Ireland Environment Agency 2017.* [online] [Accessed 08/01/2025] Available from https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-5-works-and-maintenance-in-or-near-water/.



1 Peat Landslide Hazard Risk Assessment (PLHRA) has been produced for the Proposed Development to assess the likelihood of a peat landslide occurring, as well as the exposure (impacts) a peat landslide could have if it occurred. Where a peat landslide has been assessed to be likely, mitigation measures to reduce the impacts of this have been proposed as part of the PLHRA. The Stage 1 PLHRA has been included as part of **Appendix N Peat Management Plan & Peat Landslide Hazard Risk Assessment**.

Operation Phase

Pollution of surface watercourses, groundwater, and soils

- 10.6.34During operation, oil filled Super Grid Transformers (SGTs) would be bunded and have adequate containment to prevent release of oils into the surface water drainage system, soil, or underlying geology and aquifers. Oil-water interceptors would be used to mitigate for potentially oily drainage.
- 10.6.35There would be no other further impacts during the operation phase from the Proposed Development on geology and soils or the water environment.

10.7 Cumulative Effects

- 10.7.1A cumulative appraisal was conducted taking into account the 'scoped in' planning applications as detailed in **section 13.1.2** and **Table 13-1**, these are listed below;
 - Cambushinnie 400kV OHL tie-in
 - Cambushinnie UGC between the existing Braco West substation and the Proposed Development
 - 21/00756/FLM: 49.9MW energy storage facility
 - 22/02231/FLM: 49.9MW energy storage facility compound

10.7.2

- 10.7.3The construction impacts of the OHL, UGC and battery storage facilities will likely be related to potential contamination of underlying groundwater, nearby surface waters and soils from oils, fuel stored in barrels and/or mobile tanks, and/or plant/equipment used, cement, concrete, waste and wastewater, and also potentially from made ground and soil disturbance associated with excavations for foundations. These potential effects would be managed through project-specific CEMPs for the OHL and UGC cumulative developments and the following GEMPs: Watercourse Crossings GEMP, Working In or Near Water GEMP, Private Water Supplies GEMP, Soil Management GEMP, Contaminated Land GEMP, Working with Concrete GEMP, Oil Storage and Refuelling GEMP, Waste Management GEMP, Forestry GEMP and Bad Weather GEMP.
- 10.7.4Potentially silt laden run-off would be prevented from entering water courses and/or drainage channels by using straw bales, silt fences, cut off drains and drainage onto vegetated areas. If deemed necessary, an Environmental Clerk of Works would supervise the construction works to ensure that the CEMP and associated mitigation measures are being implemented effectively.
- 10.7.5Although, the OHL and UGC would be adjacent to the Proposed Development, assuming their CEMPs and the GEMPs are applied during the construction and operation it is unlikely



that there would be any cumulative effects on geology, soils, and the water environment. Furthermore, the two battery storage facilities are also adjacent to the Proposed Development, however it is unlikely they would cause any cumulative effects to human health, water environment, built environment, geology and soils receptors associated with the Proposed Development.

10.7.6It is not considered that the combined effects of construction and operation would be greater than the predicted effects for each project in isolation.

10.8 Recommendations and Mitigation

- 10.8.1A summary of the mitigation measures would be provided to the Principal Contractor, who would ensure mitigation measures are implemented. The implementation of the mitigation measures would be managed by a suitably qualified and experienced Environmental Clerk of Works.
- 10.8.2 Protection measures for watercourses, soils, geology and groundwater would be set out in the CEMP for the Proposed Development, which is to be prepared in consultation with SEPA and submitted prior to the commencement of construction activities. These measures would be in accordance with SSEN Transmission's GEMPs (see Appendix O GEMPs and SPPs).
- 10.8.3Mitigation measures on how surface water runoff will be treated will be detailed within the Surface Water Drainage Strategy.
- 10.8.4The Principal Contractor would be required to consider all construction activities and satisfy themselves that they are aware of all PWS and abstractions in the local area that may be at risk of adverse effects to the supply sources or infrastructure. Should any further PWS or abstractions be identified which require protection, specific mitigation would be developed and agreed with the local property owners and SEPA. Depending on proximity to works, water quality and/or quantity monitoring before and during construction may be required by the Principal Contractor.
- 10.8.5 If contamination is identified at any point during construction work, then contact would be made with a suitably competent environmental consultant for further risk assessment to be undertaken.
- 10.8.6The Principal Contractor would be required to be aware of the potential for fuels spills when refilling equipment or moving plant that uses fuel to minimise and reduce the possibility of spillages of leaks. Any compound areas used during the works would be kept to a high level of housekeeping and all fuel storage, if used for plant or equipment, would be bunded.
- 10.8.7The Principal Contractor would be required to adopt the Stage 1 Peat Management Plan and Peat Landslide Hazard Risk Assessment, included within **Appendix N Peat Management Plan & Peat Landslide Hazard Risk Assessment**. The Principal Contractor would also be required to produce a Stage 2 PMP and PLHRA post consent and following the design of the Proposed Development to full maturity. It would take into account any new information obtained, provide full details of the proposed design as it relates to the peat, and how impacts on the peat would be minimised / mitigated, providing full details on how the peat excavated will be reused. It is anticipated the PMP and PLHRA would discharge any planning conditions which may be applied in relation to the peat. Following



this a construction phase PMP would be produced by the Principal Contractor prior to construction works starting and would be updated throughout the construction works.



11. CLIMATE CHANGE AND CARBON

11.1 Introduction

- 11.1.1This chapter sets out the methodology, baseline conditions, assessment of effects, and mitigation considerations for the Proposed Development in relation to climate change.
- 11.1.2The climate assessment has been carried out in accordance with Institute of Environmental Management and Assessment (IEMA), 'Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance'¹⁷⁶ and 'Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation'¹⁷⁷. Consideration is given to the following aspects of climate change assessment, as detailed in **Table 11-1**:

Assessment Type	Definition
Lifecycle Greenhouse Gas (GHG) Impact Assessment	Impact of GHG emissions arising from the Proposed Development on the climate, including how it will affect the UK and Scotland meeting its national carbon budgets.
Climate Change Risk Assessment (CCRA)	The resilience of the Proposed Development to climate change impacts, including how the design will consider projected impacts of climate change.
In-combination Climate Impact (ICCI) Assessment	The combined impact of the Proposed Development and potential climate change on receptors in the receiving environment.

Table 11-1 Definitions of climate change assessment elements

- 11.1.3This chapter should be read in conjunction with the description of the Proposed Development in **Chapter 2 Description of Proposed Development**. Other relevant topic chapters may include:
 - Chapter 5 Ecology and Nature Conservation;
 - Chapter 9 Traffic and Transport; and
 - Chapter 10 Hydrology, Hydrogeology and Soils.

11.2 Legislation, Policy and Guidance

Legislation

11.2.1Relevant legislation to the assessment of effects on the climate and the assessment of climate change impacts is presented in **Table 11-2**.

Table 11-2 Relevant Climate Change Legislation

Legislation	Legislation details
United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement	The Paris Agreement ¹⁷⁸ is a legally binding agreement within the UNFCCC dealing with GHG emissions

¹⁷⁶ IEMA, 2022. Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance – second Edition [Online]. Available from: https://www.iema.net/preview-document/assessing-greenhouse-gas-emissions-and-evaluating-their-significance [Accessed 18 April 2024].

¹⁷⁷ IEMA, 2020. Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation [Online]. Available from:

https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 [Accessed 18 April 204].

¹⁷⁸ UNFCC, 2015. *Paris Agreement* [Online]. Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf [Accessed 11 April 2024].



Legislation	Legislation details
	mitigation, adaptation and finance starting in the year 2020. It requires all signatories to strengthen their climate change mitigation efforts to keep global warming to well below 2 °C this century and to pursue efforts to limit global warming to 1.5 °C.
Climate Change Act 2008 and Climate Change Act (2050 Target Amendment) Order 2019	In June 2019, the Climate Change Act ¹⁷⁹ was amended, requiring the UK Government to reduce the UK's net emissions of GHGs by 100% (net zero) relative to 1990 levels by 2050.
	The UK carbon budgets are in place to restrict the amount of GHG emissions the UK can legally emit in a five-year period. The UK is currently in the 4 th Carbon Budget period, from 2023 to 2027. The 3 rd , 4 th and 5 th Carbon Budgets reflect the previous 80% reduction target by 2050. The 6 th Carbon Budget is the first to align with the legislated UK Government 2050 net-zero commitment.
Carbon Budgets Order 2011 Carbon Budget Order 2016 Carbon Budget Order 2021	The Sixth Carbon Budget ¹⁸⁰ , the first to align with the amended carbon reduction target, was published by the Climate Change Committee for consideration by the Government in December 2020. In April 2021, the Government accepted the Climate Change Committee's 965 million Tonnes of carbon dioxide equivalent (MtCO ₂ e) recommendation and laid the Carbon Budget Order 2021 before parliament. The CCC released their 7 th Carbon Budget in February 2025 and advised the UK Carbon Budget to be set at 525 MtCO ₂ e, which will later be agreed in Parliament.
	and set into law. However, this depends on agreement with the UK Government and is therefore subject to change. Additionally, the CCC's feedback may also evolve based on input from the UK Government.
The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 ¹⁸¹ and Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017	The Regulations state that an EIA (where relevant) must include:
	"a description of the likely significant effects of the development on the environment resulting from the impact of the project [/development] on climate (for example, the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project [/development] to climate change".

¹⁷⁹ UK Government, 2021. *Climate Change Act 2008* [Online]. UK Government. [Accessed 18 April 2024]. Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents. [Accessed 18 April 2024].

¹⁸⁰ UK Government, 2021. *The Carbon Budget Order 2021* [Online]. UK Government. [Accessed 5 March 2025]. Available at: https://www.gov.uk/guidance/carbon-budgets#setting-of-the-first-to-third-carbon-budget_[Accessed 5 March 2025].

¹⁸¹ Scottish Government. (2017). Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/102/contents/made [Accessed 04 November 2024]



Legislation	Legislation details
Climate Change (Emissions Reduction Targets) (Scotland) Act 2019	The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 ¹⁸² amends the original Climate Change (Scotland) Act 2009, introducing key updates to the legislative framework for GHG emissions reductions, with a clear commitment to achieving net- zero GHG emissions by 2045. The updates include the introduction of Scottish carbon budgets, shifting from annual and interim targets to multi-year budget targets, thereby aligning reporting with international best practices in carbon management. The Act requires Scottish Ministers to develop climate change plans through public consultations, enhancing transparency and accountability in setting and achieving emissions targets. Additionally, it includes provisions to assess the impact of major capital projects on these targets, ensuring that climate considerations are integrated into infrastructure planning and decision-making.
Climate Change (Emissions Reduction Targets) (Scotland) Act 2024 ¹⁸³	The Climate Change (Emissions Reduction Targets) (Scotland) Act 2024 ¹⁸⁴ amends the original Climate Change (Scotland) Act 2009, introducing key updates to the legislative framework for GHG emissions reductions, with a clear commitment to achieving net- zero GHG emissions by 2045. The updates include the introduction of Scottish carbon budgets, shifting from annual and interim targets to multi-year budget targets, thereby aligning reporting with international best practices in carbon management. The Act requires Scottish Ministers to develop climate change plans through public consultations, enhancing transparency and accountability in setting and achieving emissions targets. Additionally, it includes provisions to assess the impact of major capital projects on these targets, ensuring that climate considerations are integrated into infrastructure planning and decision-making.

Policy

1.

11.2.2Policy relating to Climate Change and the assessment of potential effects of the Proposed Development is presented in **Table 11-3**.

Table 11-3 Relevant Climate Change Policy

Policy	Policy details
National Policy Statement (NPS) for Energy	The NPS sets out the national policy for energy infrastructure. This considers the large-scale infrastructure which will be required to ensure the UK can provide a secure, reliable, and affordable supply of energy.

¹⁸² The Scottish Government, 2020c. *Reducing Greenhouse Gas Emissions* [Online]. Available from: https://www.gov.scot/policies/climate-change/reducing- [Accessed 18 April 2024].

emissions/#:~:text=The%20Climate%20Change%20(Emissions%20Reduction,2030%2C%2090%25%20by%202040

¹⁸³ The Scottish Government, 2024. Climate Change (Emissions Reduction Targets) (Scotland) Act 2024 [Online] Available from: https://www.legislation.gov.uk/asp/2024/15/enacted [Accessed 15, January 2025]

[[]Online]. Available from: https://www.legislation.gov.uk/asp/2024/15/enacted [Accessed 15 January 2025]. ¹⁸⁴ The Scottish Government, 2024. Climate Change (Emissions Reduction Targets (Scotland) Act 2024. [Accessed 11 November 2024]. Available at: https://www.parliament.scot/bills-and-laws/bills/s6/climate-change-emissions-reduction-targets-scotland-bill



Policy	Policy details
	While planning matters are devolved to the Scottish Government, energy policy is reserved to the UK Government. Therefore, the NPS may be a relevant consideration in planning decisions in Scotland. NPS EN-1 ¹⁸⁵ is the overarching Statement for Energy and covers the UK's goals for net zero emissions and their relevance to energy infrastructure, climate impacts and adaptation, adverse effects and benefits and climate change projections. flood risk and the importance of relevant mitigation.
NPS for Electricity Networks Infrastructure (NPS EN-5) ¹⁸⁶	The NPS for Electricity Networks Infrastructure covers the importance of climate change adaptation and resilience, and details the requirement for developments such as he Proposed Development to be designed to be resilient to extreme weather conditions.
Our Green Future: Our 25-year Plan to Improve the Environment	Our Green Future: Our 25-year Plan to Improve the Environment 2019 ¹⁸⁷ sets out government action to help the natural world regain and retain good health. It aims to deliver cleaner air and water in our cities and rural landscapes, protect threatened species and provide richer wildlife habitats.
Transport Decarbonisation Plan, Decarbonising Transport: a better, greener Britain	Transport Decarbonisation Plan, Decarbonising Transport: a better, greener Britain ¹⁸⁷ . The UK Government has published a Transport Decarbonisation Plan titled "Decarbonising Transport: a better, greener Britain", which outlines its plans to reduce transport emissions in order to achieve its goal of net zero emissions by 2050.
National Planning Framework 4 (NPF4) ¹⁸⁸	The Scottish Ministers adopted NPF4 on 13 February 2023. NPF4 sets out how the Scottish Government's planning and development approach will help achieve a net-zero, sustainable Scotland by 2045.
Update to the Climate Change Plan 2018–2032: Securing a green recovery on a path to net zero: climate change plan 2018-2032 (Scottish Government, 2020b) ¹⁸⁹	This document updates the 2018 Climate Change Plan to reflect the setting of new ambitious targets to end Scotland's contribution to climate change by 2045. It also reflects on how Scotland emerges from COVID-19 recognising that there is a chance to rebuild the economy in a way that delivers a greener, fairer and more equal society. In line with the 2018 plan, the focus is on the period up to 2032.
Climate Ready Scotland: climate change adaptation programme 2019 – 2024	The Scottish Government's five-year programme to prepare Scotland for continual climate change challenges identifies key outcomes for the country in its preparations for a net zero transition and future. Relevant outcomes include Outcome 3: our inclusive and sustainable economy is flexible, adaptable, and responsive to the changing climate, Outcome 4: our society's supporting systems are resilient to climate change, and Outcome 5: our natural environment is valued, enjoyed, protected, and enhanced and has increased resilience to climate change.

¹⁸⁵ Department of Energy Security and Net Zero (DESNZ), 2023. *National Policy Statement for Energy* [Online]. Available from:

https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf [Accessed 17 May 2024] ¹⁸⁶ DESNZ, 2023. National Policy Statement for Electricity Networks Infrastructure [Online]. Available at:

https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf. [Accessed 17 May 2024]. ¹⁸⁷ Department for Transport, 2021. *Decarbonising Transport: A Better, Greener Britain* [Online]. Available at:

https://assets.publishing.service.gov.uk/media/610d63ffe90e0706d92fa282/decarbonising-transport-a-better-greener-britain.pdf [Accessed 11 April 2024]. ¹⁸⁸ Scottish Government (2023) National Planning Framework 4. [Online] Available at: https://www.gov.scot/publications/national-planning-framework-4/ [Accessed 18/10/2024]

¹⁸⁹ Scottish Government, 2020. Securing a green recovery on a path to net zero: climate change plan 2018–2032 – update [Online]. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2020/12/securing-green-recovery-path-net-zero-update-climatechange-plan-20182032/documents/update-climate-change-plan-2018-2032-securing-green-recovery-path-net-zero/update-climate-change-plan-2018-2032-securing-green-recovery-path-net-zero/update-climate-change-plan-2018-2032-securing-green-recovery-path-net-zero.pdf 2032-securing-green-recovery-path-net-zero/govscot%3Adocument/update-climate-change-plan-2018-2032-securing-green-recovery-path-net-zero.pdf [Accessed 18 April 2024].



Policy	Policy details
(Scottish Government, 2019) ¹⁹⁰	
Draft Energy Strategy and Just Transition Plan (Scottish Government, 2023) ¹⁹¹	At present, the Scottish Government is consulting on a route map to deliver a national net zero energy system. The draft highlights the need for safe and secure energy as the basis for a just transition towards net zero by 2045. It covers the Government's ambitions for Scotland's energy future for example, increasing contributions from renewable sources, phasing out new petrol and diesel cars, and increasing employment in Scotland's energy production sector against a decline in North Sea production. Central to achieving these ambitions as set out in the Plan will be significant investment in net zero energy, policy and legislation that supports a net zero energy system, and route maps for energy supply and demand.
Scottish National Adaptation Plan 3 ¹⁹²	The Scottish National Adaptation Plan 2024-2029 outlines Scotland's strategy to prepare for and adapt to the impacts of climate change. It focuses on building resilience across key sectors, including infrastructure, ecosystems, and communities, to mitigate risks from climate change-related events such as flooding and heatwaves. This plan is relevant to the CCRA, as it provides a framework for identifying vulnerabilities and implementing adaptation measures to enhance the resilience of developments like the Proposed Development.

Guidance

11.2.3Relevant guidance for the assessment of climate change effects is presented in Table 11-4.

Table 11-4 Relevant Climate Change Guidance

Guidance	Guidance Detail
IEMA: Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance ¹⁹³	The approach to evaluating the significance of GHG emissions from the Proposed Development has been undertaken in accordance with this guidance.
IEMA: Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation ¹⁹⁴	The approach for assessing the significance of climate change risks on the Proposed Development has been undertaken in accordance with this guidance.

¹⁹⁰ Scottish Government, 2019. Climate Ready Scotland: climate change adaptation programme 2019 – 2024 [Online]. Available at:

https://www.gov.scot/publications/climate-ready-scotland-second-scottish-climate-change-adaptation-programme-2019-2024/pages/8/ [Accessed 17 May 2024].

¹⁹¹ Scottish Government, 2023. Draft Energy Strategy and Just Transition Plan [Online]. Available at: https://www.gov.scot/publications/draft-energystrategy-transition-plan/documents/ [Accessed 17 May 2024].

¹⁹² Scottish Government (2024). Scottish National Adaptation Plan 2024-2029. [Online] Available at: https://www.gov.scot/publications/scottish-nationaladaptation-plan-2024-2029-2/ [Accessed: 17 October 2024]

¹⁹³ Institute of Environmental Management and Assessment (IEMA), 2022. Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance.

¹⁹⁴ Institute of Environmental Management and Assessment (IEMA), 2022. *Climate Change Adaption Practitioner Guidance* [Online]. Available from: https://s3.eu-west-2.amazonaws.com/iema.net/documents/IEMA-Climate-Change-Adaptation-Practitioner-Guidance-November-2022-1.pdf [Accessed 18 April 2024].



Guidance	Guidance Detail
The GHG Protocol ¹⁹⁵	The GHG Protocol is a widely used standard for measuring and managing GHG emissions. The protocol provides guidance on how to identify, measure, report and verify GHG emissions from various sources, such as energy use, transportation, and waste.
Publicly Available Specification (PAS) 2080:2023 Carbon Management in Buildings and Infrastructure ¹⁹⁶	PAS 2080 provides guidance on how to manage carbon emissions and promote sustainability in infrastructure projects. The PAS outlines a framework for the management of GHG emissions throughout the project lifecycle, from planning and design to construction and operation.
The British Standards Institution (BSI) BS EN ISO 14064-1:2019 ¹⁹⁷ and 14064-2:2019 (2019a and b, respectively) ¹⁹⁸	The British Standards Institution (BSI) BS EN ISO 14064-1:2019 and 14064-2:2019 (2019a and b, respectively) provides specifications for organisational-level and project-level guidance for the quantification and reporting of GHG emissions and removals.
Carbon calculator for wind farms on Scottish peatlands ¹⁹⁹	The carbon calculator is a tool to support the process of determining wind farm developments in Scotland but is relevant for this assessment as all developments can impact peatland. The tool's purpose is to assess, in a comprehensive and consistent way, the carbon impact of wind farm developments. This is done by comparing the carbon costs of wind farm developments with the carbon savings attributable to the wind farm. For the GHG assessment, the peat calculator provided by SSEN Transmission on ASTI framework projects are used, which the methodology in line with the carbon calculator for wind farms on Scottish peatlands.
International Union for Conservation of Nature (IUCN) Peatland Code Carbon Calculator ²⁰⁰	The IUCN Peatland Code Carbon Calculator estimates GHG emission savings from peat restoration projects. It considers factors such as model uncertainty, leakage, and risk buffers to calculate the net emissions reduction in tonnes of CO ₂ equivalent (tCO ₂ e). For the climate assessment, this tool was used to inform the GHG impact of peat restoration within the red line boundary of the Proposed Development.

¹⁹⁵ World Resources Institute (WRI) & World Business Council for Sustainable Development (WBCSD), 2004. The GHG Protocol', A Corporate Accounting and Reporting Standard. [Accessed 20 May 2024]

¹⁹⁶ BSI Group, 2023. Carbon Management in Infrastructure and Built Environment - PAS 2080 [Online]. Available at: https://www.bsigroup.com/en-

GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/ [Accessed 20 May 2024].

¹⁹⁷ The British Standards Institution (BSI), 2019a. BS EN ISO 14064-1:2019. Greenhouse gases. Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals. London: BSI. [Accessed 15 January 2025]

¹⁹⁸ The British Standards Institution (BSI), 2019b. BS EN ISO 14064-2:2019. Greenhouse gases. Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements. London: BSI. [Accessed 15 January 2025] ¹⁹⁹ Scottish Government, 2022. *Carbon calculator for wind farms on Scottish peatlands: factsheet* [Online]. Available at:

https://www.gov.scot/publications/carbon-calculator-for-wind-farms-on-scottish-peatlands-factsheet/ [Accessed 20 May 2024].

²⁰⁰ IUCN UK Peatland Programme, 2023. Peatland Code Carbon Calculator. [Online] Available at: https://www.iucn-uk-velocity.com

peatlandprogramme.org/peatland-code> [Accessed 21 October 2024].



Guidance	Guidance Detail
SSEN Carbon Calculator	The SSEN Transmission Carbon Calculator is an Excel-based GHG calculation tool built specifically to quantify the GHG emissions for energy infrastructure projects. The tool was used in the climate assessment to quantify the GHG emissions associated with the electrical assets used on-site.
SSEN Transmission Carbon Asset Database (CAT)	A working group has been set up between the three Great British Transmission Operators to develop a master Carbon Asset (CAT) Database which contains greenhouse gas intensity factors for specific assets to allow for more accurate reporting on embodied carbon emissions.
Department for Energy Security and Net Zero Standards (DESNZ) Emissions Factors ²⁰¹	The DESNZ's Emissions Factors are a set of factors developed by the UK Government's DESNZ to calculate GHG emissions from various sources, such as electricity and fuel consumption. The factors take into account the emissions associated with the production and distribution of energy, as well as the emissions associated with combustion or use of the energy source.
Inventory of Carbon and Energy ²⁰²	The Inventory of Carbon and Energy (ICE) provides embodied energy and carbon dioxide (CO ₂) emissions data for a wide range of materials and building components. The ICE database enables calculation of the embodied energy and CO ₂ emissions associated with a building or construction project, taking into account the materials used, manufacturing processes, and transportation.
Think Hazard ²⁰³	Think Hazard is an online tool developed by the United Nations Office for Disaster Risk Reduction (UNDRR) that provides information on natural hazards such as floods, earthquakes, and landslides.
Technical Guidance on Climate Proofing of Infrastructure in the Period 2021-2027 ²⁰⁴	The "Technical Guidance on Climate Proofing of Infrastructure in the Period 2021-2027," developed by the European Commission, aims to integrate climate resilience into EU-funded infrastructure projects across sectors like transport, energy, and water management. It outlines steps for climate risk assessment, adaptation measures, and implementation, with a focus on resilient designs, materials, and nature-based solutions. This guidance was used to inform the methodology for the CCRA, particularly in evaluating climate risks and selecting appropriate adaptation measures.

²⁰¹ Department for Energy Security and Net Zero, 2023. *Greenhouse gas reporting: conversion factors 2023* [Online]. Available from:

https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023_ [Accessed 20 May 2024]. 202 Circular Ecology, 2019. Inventory of Carbon and Energy V3.0 (ICE) [Online]. Available at: https://circularecology.com/news/ice-database-v3-launched [[Accessed 18 April 2024]. 203 Think Hazard, 2023. Scotland. Think Hazard [Online]. Available at: https://www.thinkhazard.org/en/report/3184-united-kingdom-scotland [Accessed 18

April 2024]. ²⁰⁴ European Commission. (2021). Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027. [Online] Available at: https://ec.europa.eu/clima/sites/default/files/adaptation/what/docs/climate_proofing_infrastructure_en.pdf. [Accessed 7 August 2024].



Guidance	Guidance Detail
Royal Institute of Chartered Surveyors (RICS) Professional Statement Whole Life Carbon Assessment ²⁰⁵	RICS Professional Statement Whole Life Carbon Assessment was used in the GHG emissions calculation methodology. The professional statement provides a consistent life cycle GHG assessment implementation plan and reporting structure for built projects in accordance with BS EN 15978: 2011: (Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method).

11.3 Assessment Methodology and Significance Criteria

11.3.1This section provides a summary of the assessment methodology for the Lifecycle GHG Assessment and CCRA.

Extent of the Study Area

Lifecycle GHG Assessment

- 11.3.2The Study Area for the Lifecycle GHG assessment includes:
 - Direct GHG emissions arising through the construction and operation works within the Site as shown on **Figure 2-3a-c Appendix A Figures**.
 - Indirect GHG emissions occurring offsite encompass embodied carbon in materials. Transportation, upstream activities (such as well-to-tank processes and transmission disturbance losses), as well as the processing and disposal of waste.

<u>CCRA</u>

11.3.3The CCRA Study Area encompasses the works that make up the Site as shown on **Figure 2-3a**, **Appendix A Figures**.

Method of Baseline Data Collation

Lifecycle GHG Assessment

- 11.3.4For the purposes of the GHG assessment, the baseline conditions are a 'business as usual' scenario where the Proposed Development does not go ahead.
- 11.3.5The baseline comprises of existing carbon stocks and sources of GHGs within the boundary of the existing Proposed Development. The methodology for calculating GHG emissions and removals was consistently used across the construction and operation of the Proposed Development.

<u>CCRA</u>

11.3.6The current baseline for the CCRA was based on historic climate data obtained from the Met Office²⁰⁶ recorded by the closest meteorological station to the Proposed Development (Stirling), located approximately 20 km southeast of the Site for the period 1981-2010. As

²⁰⁵ RICS (2023) Whole life carbon assessment for the built environment, 2nd edition. [Online] Available at https://www.rics.org/profession-standards/ricsstandards-and-guidance/sector-standards/construction-standards/whole-life-carbon-assessment [Accessed 7 August 2024].



part of the CCRA, this was compared to the future baseline throughout the life of the Proposed Development.

- 11.3.7The future baseline for the CCRA was based on future UK Climate Projections 2018²⁰⁶ (UKCP18). This projection data provides probabilistic indications of how global climate change is likely to affect areas of the UK using pre-defined climate variables and time periods.
- 11.3.8For the purpose of the assessment, UKCP18 probabilistic projections for pre-defined 30-year periods for the following average climate variables have been obtained and are further analysed:
 - Mean annual temperature;
 - Mean summer temperature;
 - Mean winter temperature;
 - Maximum summer temperature;
 - Minimum winter temperature;
 - Mean annual precipitation;
 - Mean summer precipitation; and
 - Mean winter precipitation.
- 11.3.9UKCP18 probabilistic projections have been analysed for the 25 km grid square within which the Proposed Development is located. These figures are expressed as temperature/precipitation anomalies in relation to the 1981-2010 baseline. This baseline was selected as it provides projections for 30-year time periods (e.g. 2020-2049) for the parameters analysed within the assessment compared to the 30-year land-based projections that would be generated from the 1981-2010 baseline.
- 11.3.10UKCP18 uses a range of possible scenarios, classified as Representative Concentration Pathways (RCPs)²⁰⁷, to inform differing future emission trends. These RCPs specify the concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to preindustrial levels'. RCP8.5 is considered to be the

²⁰⁶ Met Office. (2019). UK Climate Projections 2018. [Online] Available from https://www.metoffice.gov.uk/research/approach/collaboration/ukcp [Accessed 18 October 2024]

²⁰⁷ Met Office. (2018) UKCP18 Guidance: Representative Concentration Pathways. [Online] Available at:

https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---representative-concentration-pathways.pdf [Accessed 18 October 2024].



worst-case global scenario with the greatest concentration of GHGs in the atmosphere and has been used for the purposes of this assessment as a worst-case scenario.

11.3.11As part of this assessment, the increased frequency and severity of extreme weather events (such as heavy and/or prolonged precipitation, storm events, wildfires and heatwaves) was also assessed.

Assessment Modelling Methodology

11.3.12This section sets out the scope and methodology for the assessment of the impacts of the Proposed Development on climate change.

Lifecycle GHG Assessment

11.3.13To identify the magnitude of GHG impact over the lifecycle of the Proposed Development, GHG emissions are calculated in line with the PAS 2080:2023 Guidance208 and the principles set out in the GHG Protocol²⁰⁹. GHG emissions from construction activities, embodied carbon in materials, and the operation of the Proposed Development have been quantified in this ES using a calculation-based methodology, in line with the GHG Protocol:

Activity data x GHG emissions factor = GHG emissions values

Activity data is a quantifiable measure of activity, such as operating hours or volumes of fuels used. Emission factors convert the activity data into GHG emissions. Activity data was sourced from data provided by SSEN Transmission. Where specific data was not available, a mix of assumptions and industry benchmarks have been used to fill data gaps. Where this was not possible, then a qualitative approach to assessing the GHG impacts was followed, in line with the IEMA GHG Guidance.

- 11.3.14Emission factors were sourced from the DESNZ 2024 emission factor database²⁰¹, and the Bath University Inventory of Carbon and Energy database²¹⁰, both publicly available sources.
- 11.3.15The SSEN peat calculator used across ASTI framework projects are adopted to estimate the GHG emissions associated with peat excavation and management. The methodology from Scottish Government Windfarm Carbon Calculator¹⁹⁹ and IUCN Peatland Code Calculator200 were followed to assess the GHG emissions associated with peat carbon sequestration and potential carbon losses from peat disturbance. The SSEN Transmission Carbon Calculator was used to inform the GHG Assessment of the electrical assets used

²⁰⁸ British Standards Institution (BSI) (2023) PAS 2080 - Carbon management in infrastructure and built environment. [Online] Available at: https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/ Date [Accessed 4 November 2024]

²⁰⁹ World Resources Institute (WRI) & World Business Council for Sustainable Development (WBCSD), (2004) The GHG Protocol, A Corporate Accounting and Reporting Standard [Online] Available at: https://ghgprotocol.org/corporate-standard [Accessed 4 November 2024]

Ref. 6-1 ²¹⁰ The University of Bath (2019). The ICE Database Version 4.0. [Accessed 18 April 2024].



on-site. Appropriate assumptions were sourced from the RICS Guidance for whole life GHG assessments205.

- 11.3.16In line with the GHG Protocol guidelines²¹¹, the GHG assessment is reported as tonnes of carbon dioxide equivalent (tCO₂e) and has considered the seven Kyoto Protocol gases:
 - Carbon dioxide (CO₂);
 - Methane (CH₄);
 - Nitrous oxide (N₂O);
 - Sulphur hexafluoride (SF₆);
 - Hydrofluorocarbons (HFCs);
 - Perfluorocarbons (PFCs); and
 - Nitrogen trifluoride (NF₃).
- 11.3.17These gases are broadly referred to in this EA under an encompassing definition of 'GHGs', with the unit of tCO₂e (tonnes CO₂ equivalent) or MtCO₂e (mega tonnes of CO₂ equivalent).
- 11.3.18**Table 11-5** summarises the key anticipated GHG emissions sources to the Proposed Development by lifecycle stage, in line with PAS 2080:2023 Guidance²¹². Additionally, the RICS Guidance for whole life GHG assessments²⁰⁵ have been integrated to inform the scope and reporting framework of the GHG assessment.

Life cycle stage	PAS 2080:2023 Module	Activity	Primary emission sources
Product stage	A1-A3	Raw material extraction and manufacturing of products are required to build the equipment for the Proposed Development. Transportation of materials for such processes/ manufacturing (where available).	Embodied GHG emissions from energy use in the extraction of materials and manufacture of components and equipment. GHG emissions from the transportation of products and materials during their processing and manufacture. Due to the nature of the equipment, this could require shipment of certain aspects over significant distances.
Construction process stage	A4	Transportation of construction materials to the Proposed Development. Due to the nature of the equipment required, this could require shipment of certain aspects over significant distances.	Transport of construction materials is included under the construction process stage, where these are not included in embodied GHG emissions.

 Table 11-5: Potential GHG emissions arising from the Proposed Development

²¹² British Standards Institution (BSI) (2023) PAS 2080 - Carbon management in infrastructure and built environment. [Online] Available at: https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/ Date [Accessed 4 November 2024]

²¹¹ World Resources Institute (WRI) & World Business Council for Sustainable Development (WBCSD), (2004) The GHG Protocol, A Corporate

Accounting and Reporting Standard [Online] Available at: https://ghgprotocol.org/corporate-standard [Accessed 4 November 2024]



Life cycle stage	PAS 2080:2023 Module	Activity	Primary emission sources
	A5	On-site construction activity.	GHG emissions from energy (electricity, fuel, etc.) consumption for plant and vehicles, and generators on site.
		Transport of construction workers.	Fuel consumption from transport of materials to Site (where these are not included in
		Disposal of any waste generated during the	embodied GHG emissions).
		construction processes.	GHG emissions from fuel use for worker commuting.
		Land Clearance	GHG emissions from disposal of waste.
		Enabling works	GHG emissions from fuel consumption for transportation of waste.
			Disturbance of peat during construction.
Operation stage	B1-B8	Energy use from the operation of the Proposed Development.	Carbon sequestration associated with the restored peat.
		Maintenance activities	GHG emissions from grid electricity use and transmission and distribution losses.
			GHG emissions associated with maintenance activities (e.g. replacement components and fuel use).

- 11.3.19Due to lack of data available at this time, construction and operation emission data has been estimated using benchmarking based on the SSEN Bingally Substation development. This project was chosen as a benchmark as it is a similar scale substation to the substation which would form part of the Proposed Development which has had a recent environmental appraisal completed.
- 11.3.20To account for uncertainties in the project whole life carbon results of the Proposed Development, uplifts have been applied in line with RICS guidance^{213.} Uncertainty factor uplifts have been applied to each of the lifecycle stages in line with contingency factors, carbon data uncertainty and quantities uncertainty. **Table 11-6** defines the percentage uplifts applied for each uncertainty factor to give a 25% overall uplift to the Bingally Substation emissions.

Table 11-6: RICS Guidance Uncertainty in Whole Life Carbon Analysis (WLCAs)

RICS Uncertainty category	% uplift applied
Contingency factor – early design	15%

²¹³ RICS (2023) Whole life carbon assessment for the built environment, 2nd edition. [Online] Available at https://www.rics.org/professionstandards/rics-standards-and-guidance/sector-standards/construction-standards/whole-life-carbon-assessment [Accessed 7 August 2024].



Total	25%
Quantities uncertainty factor	4%
Carbon data uncertainty factor	6%

Determining magnitude of change

- 11.3.21In line with IEMA GHG guidance¹⁷⁶, the Proposed Development's predicted GHG emissions were compared against existing carbon budgets for the UK and Scotland. The Proposed Development's impact on GHG emissions was assessed by comparing it to net-zero trajectories and evaluating its alignment with UK and Scottish decarbonisation policies.
- 11.3.22The UK carbon budgets are in place to restrict the amount of GHG emissions the UK can legally emit in a five-year period. The UK is currently in the 4th Carbon Budget period, from 2023 to 2027, as detailed in **Section 11.4**. The 3rd, 4th and 5th Carbon Budgets reflect the previous 80% reduction target by 2050. The 6th Carbon Budget is the first to align with the legislated UK Government 2050 net-zero commitment. The CCC released their 7th Carbon Budget in February 2025 and advised the UK Carbon Budget to be set at 535 MtCO₂e, which will later be agreed in Parliament and set into law. However, this depends on agreement with the UK Government and is therefore subject to change. Additionally, the CCC's feedback may also evolve based on input from the UK Government.
- 11.3.23This GHG assessment, therefore, uses the IEMA GHG guidance²¹⁴ to assess the significance of effects, with the UK Carbon Budgets and Scottish GHG reduction targets providing context to the GHG emissions as detailed in **Table 11-7** and **Table 11-8**.

Carbon budget	Electricity Generation Carbon Budget based upon the Carbon Budget Delivery Plan (MtCO ₂ e)	UK Carbon Budget (MtCO₂e)	Indicative Carbon Budgets based upon the CCC's balanced Net-Zero Pathway (MtCO ₂ e)
3 rd (2018-2022)	-	2,544	-
4 th (2023-2027)	143	1,950	-
5 th (2028-2032)	63	1,752	-
6 th (2033-2037)	42	965	-
7 th (2038-2042)		-	535
8 th (2043-2047)		-	195
9 th (2048-2050)		-	17

 Table 11-7: UK Carbon budgets and indicative budgets based upon Climate Change Committee balanced Net-Zero Pathway.

11.3.24To illustrate the development's trajectory towards net-zero by 2050, it is recommended that the CCC's²¹⁵ balanced Net-Zero pathway is utilised post-2037, in the absence of

²¹⁵ CCC (2020); The Sixth Carbon Budget Dataset. [Online] Available at: https://www.theccc.org.uk/2021/02/01/the-numbers-behind-the-budget-six-ways-to-explore-the-sixth-carbon-budget-dataset/

²¹⁴ IEMA, 2022. Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance – second Edition [Online]. Available from: https://www.iema.net/preview-document/assessing-greenhouse-gas-emissions-and-evaluating-their-significance [Accessed 18 April 2024].



any nationally legally binding carbon budgets after using the subsequent 6th carbon budget. Beyond 2050, the UK is expected to remain at net-zero.

- 11.3.25The CCC Balanced Net-Zero Pathway is recommended to be divided into five-year periods post-2037 to align with the existing UK national carbon budgets time periods. The proposed carbon budget periods derived from the Net-Zero pathway encompass the 7th, 8th, and 9th indicative budget periods up to 2050 in line with the UK's 1.5-degree trajectory.
- 11.3.26However, it should be noted that the supplementary carbon budgets beyond 2037 have not been formally adopted by the UK government or ratified by parliament and can only be used as an indicative measure to contextualise the Proposed Development's progress toward the national net-zero trajectory.
- 11.3.27Besides the UK Government's carbon budgets, the Scottish Government previously published annual GHG emission reduction targets that align with Scotland's legislated 2045 net-zero target²¹⁶, which are detailed in **Table 11-8**. These (now repealed) interim targets were derived from annual percentage reductions relative to Scotland's 1990 GHG emissions baseline.

Year	Scotland Annual Target (MtCO₂e)	Year	Scotland Annual Target (MtCO ₂ e)
2024	33.5	2035	14.3
2025	31.4	2036	13.1
2026	29.2	2037	11.9
2027	27.1	2038	10.7
2028	24.8	2039	9.4
2029	22.7	2040	8.2
2030	20.5	2041	6.6
2031	19.3	2042	4.9
2032	18.0	2043	3.3
2033	16.8	2044	1.6
2034	15.6	2045	0

Table 11-8: Scottish Government Annual Targets

11.3.28The Scottish Government passed legislation and received royal assent in November 2024, to abandon the statutory annual targets (**Table 11-8**) and established a framework for developing specific carbon budgets for Scotland, similar to the approach used by the UK Government. However, at the time the climate assessment was conducted, the Scotland-specific carbon budgets had not yet been published by the CCC for adoption by the Scottish Government. As a result, the previous GHG emissions targets were used

²¹⁶ Scottish Government (2019) Climate Change (Emissions Reduction Targets (Scotland) Act 2019. [Online] Available at: https://www.legislation.gov.uk/asp/2019/15/enacted [Accessed 4 November 2024]



to quantitatively assess the magnitude of GHG emissions associated with the Proposed Development.

Significance of Effects

- 11.3.29The IEMA guidance²¹⁴ states that there are currently no agreed methods to evaluate quantified levels of GHG significance, that the application of the standard EIA significance criteria is not considered to be appropriate for climate change mitigation assessments, and that professional judgement is required to contextualise a project's GHG emission impacts. EIA Guidance is being followed to deliver a proportionate EA assessment. **Table 11-9** states the significance criteria that will be applied to the Proposed Development.
- 11.3.30IEMA guidance on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance'²¹⁴ states that mitigation should be considered from the outset and throughout the project's lifetime whilst also helping to deliver a proportionate EA in line with the EIA guidance. Once the magnitude of emissions is determined, mitigation measures should be proposed.
- 11.3.31A project's impact can shift from significant adverse to non-significant effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based emissions trajectory of ongoing but declining emissions towards net zero.

Significance Level	Effects	Description	Example in the guidance
Significant	Major adverse	A project that follows a 'business- as-usual' or 'do minimum' approach and is not compatible with the UK's net zero trajectory or accepted aligned practice or area- based transition targets. It is down to the practitioner to differentiate between the 'level' of significant adverse effects e.g. 'moderate' or 'major' adverse effects.	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
	Moderate adverse		The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.

Table 11-9: Definition of Levels of Significance



Significance Level	Effects	Description	Example in the guidance
Not significant	Minor adverse	A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that. It may have residual emissions but is doing enough to align with and contribute to the relevant transition scenario, keeping the UK on track towards net zero by 2050 with at least a 78% reduction by 2035 and thereby potentially avoiding significant adverse effects.	The project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
	Negligible	A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory and has minimal residual emissions. This project is playing a part in achieving the rate of transition required by nationally set policy commitments.	The project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
Significant	Beneficial	A project that causes GHG emissions to be avoided or removed from the atmosphere. Only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.	The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

Climate Change Risk Assessment

- 11.3.32The methodology for the CCRA has been developed in line with IEMA CCRA Guidance²¹⁷ and in accordance with the EU Technical Guidance on Climate Proofing Infrastructure²¹⁸.
- 11.3.33The CCRA considered the impact of future climate change on the Proposed Development. The assessment uses UKCP18 projections²⁰⁶ and the Think Hazard tool²⁰³ to identify

 ²¹⁷ IEMA, 2020. Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation [online]. [Accessed 18 April 204].
 Available from: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020
 ²¹⁸ European Commission (2021). EC Technical Guidance on Climate Proofing of Infrastructure. [Online] [accessed 4 November 2024] Available from:
 CRITICAL INFRASTRUCTURE PROTECTION & RESILIENCE - EC Technical Guidance on Climate Proofing of Infrastructure



potential climate hazards impacting the construction and operation of the Proposed Development from 2020 to 2099.

11.3.34Climate parameters considered in the CCRA include the following:

- Extreme weather events;
- Temperature change; and
- Precipitation change.

11.3.35The following key terms and definitions relating to the CCRA will be used:

- Climate hazard a weather or climate-related event which has the potential to do harm to environmental or community receptors or assets, for example, increased winter precipitation;
- Climate change impact an impact from a climate hazard which affects the ability of the receptor or asset to maintain its function or purpose; and
- Consequence any effect on the receptor or asset resulting from the climate hazard having an impact.
- 11.3.36The CCRA is semi-qualitative and provides commentary on how the Proposed Development will be resilient to climate change within the context of current and predicted future climate conditions.
- 11.3.37The CCRA identified potential climate change impacts and considered the likelihood of their occurrence and the potential consequence of their impact, taking account of the measures incorporated into the design of the Proposed Development.
- 11.3.38UKCP18 projections, historical climate data and other climate data such as the Think Hazard Tool²⁰³ were assessed to understand the likelihood of the climate hazard occurring.
- 11.3.39The likelihood of a climate impact occurring is then identified based on the likelihood of the hazard occurring combined with the vulnerability of the Proposed Development, using professional judgment and in discussion with the design team. The criteria in **Table 11-10** are applied to understand the likelihood of a climate impact occurring.

Likelihood category	Qualitative description (frequency of occurrence)	Quantitative description (probability of occurrence)
Rare	Highly likely to occur	5%
Unlikely	Unlikely to occur	20%
Moderate	As likely to occur as not	50%
Likely	Likely to occur	80%
Almost certain	Very likely to occur	95%

Table 11-10: Likelihood of a Climate Change Impact Occurring

11.3.40The consequences were assessed according to **Table 11-11** respectively. The categories and descriptions provided are based on the IEMA CCRA guidance¹⁷⁷ and EU Technical Guidance on Climate Proofing Infrastructure²¹⁸.



Risk areas	Insignificant	Minor	Moderate	Major	Catastrophic
Asset damage / Engineering / Operational	Impact can be absorbed through normal activity	An adverse event that can be absorbed by taking business continuity actions	A serious event that requires additional emergency business continuity actions	A critical event that requires extraordinary / emergency business continuity actions	Disaster with the potential to lead to shut down or collapse or loss of the asset / network
Safety and Health	First aid case	Minor injury, medical treatment	Serious injury or lost work time	Major or multiple injuries, permanent injury, or disability	Single or multiple fatalities
Environment	No impact on baseline environment. Localised in the source area. No recovery required	Localised within site boundaries. Recovery measurable within one month of impact	Moderate harm with possible wider effect. Recovery in one year	Significant harm with local effect. Recovery longer than one year. Failure to comply with environmental regulations / consent	Significant harm with widespread effect. Recovery longer than one year. Limited prospect of full recovery
Social	No negative social impact	Localised, temporary social impacts	Localised, long-term social impacts	Failure to protect poor or vulnerable groups (1). National, long-term social impacts	Loss of social licence to operate. Community protests
Financial (for single extreme event or annual average impact) (**)	x % Internal Rate of Return (IRR) (***) < 2 % of turnover	x % IRR 2 – 10% of turnover	x % IRR 10 – 25% of turnover	X % IRR 25 – 50% of turnover	x % IRR >50% of turnover
Reputation	Localised, temporary impact on public opinion	Localised, short-term impact on public opinion	Local, long-term impact on public opinion with adverse local media coverage	National, short- term impact on public opinion; negative national media coverage	National, long-term impact with potential to affect the stability of the Government
Cultural heritage and	Insignificant impact	Short term impact.	Serious damage	Significant damage with	Permanent loss with resulting impact on society

Table 11-11: Level of Consequence of a Climate Change Impact Occurring



Risk areas	Insignificant	Minor	Moderate	Major	Catastrophic
cultural premises		Recovery or repair.	with wider impact to tourism industry	national and international impact	
(1) Including groups that depend on natural resources for their income/livelihoods and cultural heritage (even if not considered poor) and groups considered poor and vulnerable (and often that have less capacity to adapt) as well as persons with disabilities and older persons.					
(*) The ratings and values suggested here are illustrative. The project promoter and climate-proofing manager may choose to modify them.					
(**) Example indicators – other indicators that may be used including costs of immediate / long-term emergency measures; restoration of assets; environmental restoration; indirect costs on the economy, indirect social costs.					

(***) Internal Rate of Return (IRR).

Significance of Effects

11.3.41The likelihood and consequence of climate change impacts, as determined above, is combined to determine a risk rating. The significance of climate change impacts is determined by this risk rating. Table 11-12 sets out how the significance was assessed. The assessment has considered confirmed design and adaptation measures.

		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
	Rare	Low (Not Significant)	Low (Not Significant)	Medium (Not Significant)	High (Significant)	Extreme (Significant)
poo	Unlikely	Low (Not Significant)	Low (Not Significant)	Medium (Not Significant)	High (Significant)	Extreme (Significant)
Likelih	Moderate	Low (Not Significant)	Medium (Not Significant)	High (Significant)	Extreme (Significant)	Extreme (Significant)
	Likely	Medium (Not Significant)	High (Significant)	High (Significant)	Extreme (Significant)	Extreme (Significant)
	Almost certain	High (Significant)	High (Significant)	Extreme (Significant)	Extreme (Significant)	Extreme (Significant)

Table 11-12: Significance of Effect Matrix for CCRA

Lifecycle GHG Assessment

- 11.3.42In cases where specific information about energy usage, materials, or the GHG emissions of important aspects of the assets is unavailable, assumptions are made. These assumptions are based on industry estimates, professional best practices, and estimates provided by SSEN Transmission.
- 11.3.43Key assumptions applied in the GHG assessment are presented in **Table 11-13**. The life cycle modules are labelled in accordance with PAS 2080:2023 Guidance²⁰⁸. Key sources of assumptions include the RICS Guidance for whole life GHG assessments²⁰⁵ and SSEN Transmission's Carbon Calculator.



Life cycle m	odule	Emission Source	Key assumptions
Baseline Conditions		Carbon sequestrati on of in- situ peat.	The assessment of GHG emissions from the loss of carbon storage is conducted with the peatland calculator adopted across ASTI project framework in line with SSEN Transmission methodology. Emission factors used to estimate the carbon sequestration potential of the peatland were derived from the SSEN Transmission ASTI Framework. It was assessed based on the estimated total volume of peat impacted and conservative estimation on the carbon content and bulk density of peat. The peat at the proposed substation was assumed to be degraded and previously disturbed but is expected to be enhanced throughout the construction period. The peat has been assumed to be 'Modified' for purposes of calculating the baseline and for post construction. The total area of peat impacted is 163,241.4286 m ² with an average depth of 0.7 m. These numbers were obtained from the Peat Management Plan (PMP). To account for uncertainty factors in the data, an 18% uplift of emissions has been applied for contingency factors, data uncertainty and quantity uncertainty, in line with the RICS Guidance. The assessment is considered outside of project lifecycle stages and will be reported separately.
A: Before Use Stage	A1-3 Product Stage	A1-3 Raw materials supply and manufactu re	Embodied GHG emissions from the proposed substation civils and proposed existing access track upgrades were estimated using benchmark construction data from the SSEN Transmission Bingally Substation project. To account for uncertainty factors in the data, a 25% uplift of emissions has been applied for contingency factors, data uncertainty and quantity uncertainty, in line with the RICS Guidance. For material waste, an uplift was applied to the Bingally Substation data based on RICS waste assumptions.
	A4-5 Construc tion Process Stage	A4 Material transport	The RICS assumptions applied to material transport distances and transport modes. It was assumed that average-laden heavy goods vehicles (HGVs) were used to transport construction materials to the Site. Benchmark emissions from the SSEN Transmission Bingally Substation have been used, including a 25% data uncertainty uplift.
		A5.2 Constructi on activities	GHG emissions from construction plant were estimated based on a benchmark using the SSEN Bingally Substation project. This used previous AECOM projects and the embodied carbon from the list of temporary equipment, using indicative fuel consumption assumptions. A 25% uplift in uncertainty was applied to the emissions from Bingally Substation.
		A5.3 Waste	Benchmark data was used on the SSEN Transmission Bingally Substation project with a 25% uncertainty factor uplift applied. RICS wastage rates and assumptions applied for end-of-life scenarios per material type. Applying the RICS wastage %, 942 m ³ of peat was assumed as waste as a worst case. It was assumed the resoil of the peat wasted as it was not in a restored area.
		A5.4 Worker transport	Estimated using the SSEN Transmission Bingally Substation project including a 25% uncertainty uplift. An assumption was made that an average 100 km round trip commute and one employee per average-sized car (fuel type unknown). Based on similar types of projects.
B: Use Stage	B1-8	B2 Maintenan ce	Benchmark data was used on the SSEN Transmission Bingally Substation project with a 25% uncertainty factor uplift applied. RICS assumptions applied to estimate maintenance GHG

Table 11-13: Key assumptions applied in the GHG assessment



Life cycle m	odule	Emission Source	Key assumptions
	Use Stage		emissions. Maintenance GHG emissions are estimated as 1% of A1-A5 GHG emissions.
		B3 Repair	Benchmark data was used on the SSEN Transmission Bingally Substation project with a 25% uncertainty factor uplift applied. RICS assumptions applied to estimate repair GHG emissions. Repair GHG emissions are assumed to be equivalent to 25% of B2 GHG emissions and 10% of A1–A3 GHG emissions for electrical equipment.154,595 m ² of peat was also included within the emissions which was assumed restored modified.

Climate Change Risk Assessment

- 11.3.44Climate change projections, by their very nature, are associated with a range of assumptions and limitations. There are inherent uncertainties associated with climate projections. Climate projections are not predictions of the future but are rather a projection based on the best available data and science.
- 11.3.45To account for this uncertainty, a 'high' emissions scenario (RCP 8.5) has been used in this assessment, which is consistent with the precautionary principle.

11.4 Sensitive Receptors

GHG Assessment

- 11.4.1The global climate was identified as the receptor for the purposes of the GHG assessment. The sensitivity of the climate to GHG emissions is 'high'. The rationale is as follows:
 - GHG emission impacts could compromise the UK's Carbon Budget Delivery Plan²¹⁹ sector-specific electricity generation carbon budgets and Net-Zero Pathways and, therefore, the ability to meet its future carbon reduction trajectory;
 - Any additional GHG impacts could compromise the UK's and Scotland's ability to reduce its GHG emissions and, therefore, the ability to meet its future legally binding carbon budgets;
 - The extreme importance of limiting global warming to below 2°C above industrial levels, while pursuing efforts to limit such warming to 1.5°C as set out in the Paris Agreement²²⁰ and a Special Report on Global Warming of 1.5°C published by the Intergovernmental Panel on Climate Change (IPCC)²²¹ highlighted the importance of limiting global warming below 1.5°C; and
 - Disruption to global climate already has diverse and wide-ranging impacts on the environment, society, economic and natural resources. Known effects of climate change include increased frequency and duration of extreme weather events, temperature changes, rainfall and flooding, and sea level rise and ocean acidification. These effects are largely accepted to be negative, profound, global, likely, long-term to permanent, and are transboundary and cumulative from many global actions.

²¹⁹ The Carbon Budget Order 2021. S2021/750. Available at: The Carbon Budget Order 2021 (legislation.gov.uk) The Carbon Budget Order 2021 Available from: legislation.gov.uk [Accessed 4 November 2024]

²²⁰ UNFCC, 2015. *Paris Agreement* [Online]. Available from: https://unfccc.int/sites/default/files/english_paris_agreement.pdf [Accessed 11 April 2024].

²²¹ IPCC (2018). Special Report on Global Warming of 1.5°C. [Online] [Accessed 4 November 2024] available from: Global Warming of 1.5 °C


CCRA

11.4.2The receptor for the CCRA is the Proposed Development itself, including workers, infrastructure, and visitors.

11.1 Baseline Environment

Lifecycle GHG Assessment

- 11.1.1The baseline for the assessment of the impact of the Proposed Development on climate is a projected 'business as usual' scenario where the Proposed Development is not constructed, and the current operation of the Site will continue. The future baseline therefore consists of carbon emissions and stores associated with land use during the construction and operation phases of the Proposed Development.
- 11.1.2The current land use within the Site and the local area consists predominantly of peatlands and access tracks for forestry activities (as illustrated in **2-1, Appendix A Figures)**. The abundance of peat within and around the Site suggests a carbon sink potential.
- 11.1.3The GHG sequestration associated with peat carbon sequestration in the current baseline was estimated based on the annual GHG sequestered by the in-situ peat. These GHG sequestrations are reported in **Table 11-14.** It was estimated that the carbon sequestrated within the peat is 101,942 tCO₂e²²². These estimates are derived from the peat volumes reported in **Appendix N Peat Management Plan & Peat Landslide Hazard Risk Assessment**.
- 11.1.4In addition to the existing baseline, a future baseline was developed to assess the GHG emissions sequestered by the in-situ peat over the 60-year reference period. It was estimated that an additional 3,465 tCO₂e would be sequestered as emissions during this timeframe.
- 11.1.5These GHG emissions were calculated based on the peat volumes reported in the PMP (see Appendix N Peat Management Plan & Peat Landslide Hazard Risk Assessment).

²²² Carbon sequestration is the process of capturing and storing atmospheric CO_2 , and GHG emissions are reported as negative when sequestration removes more CO_2 than is emitted, indicating a net reduction in emissions.



For the assessment, it was assumed that the peat at the Site is degraded and previously disturbed.

Table 11-14: GHG Assessment: Existing and Future Baseline

Carbon Value reported	Scenario	GHG sequestration (tCO ₂ e)
Carbon Storage ²²³ (tCO ₂ e)	Existing Baseline	81,554
Carbon Flux ²²⁴ rate (tCO ₂ e per year)	Existing Baseline	-58
Carbon Flux (60 years)	Future Baseline	-3,465

Climate Change Risk Assessment

11.1.6The CCRA of climate change risks to the Proposed Development were based on historic climate data from the closest weather station to the Proposed Development (Stirling, located approximately 20 km south of the Proposed Development) for the period 1981-2010, as summarised in **Table 11-15**.

Table 11-15: Historic Climate Data²²⁵

Climate parameter	Value
Mean Annual Max Temp (°C)	12.9
Mean Annual Min Temp (°C)	5.6
Mean summer maximum daily temp (°C)	19.0
Mean winter minimum daily temp (°C)	1.1
Warmest Month on Average (°C)	19.7
Warmest Month on Average (Month)	July
Coldest Month on Average (°C)	0.8
Coldest Month on Average (Month)	December
Frost days per annum	53
Mean Annual Rainfall Levels (mm)	1018.9
Mean summer rainfall (mm)	66.1
Mean winter rainfall (mm)	106.0
Wettest Month on Average (mm)	128.8
Wettest Month on Average (Month)	January
Driest Month on Average (mm)	49.2
Driest Month on Average (Month)	April

²²³ Carbon Storage refers to the process of capturing and holding carbon in natural reservoirs (i.e. peat).

²²⁴ Carbon Flux refers to the rate at which carbon is exchanged between a peatland ecosystem and the atmosphere. Carbon flux is producing emissions and so is presented as a negative.

²²⁵ UK Met Office, 2019. UK Climate Projections 2018 (UKCP18) [Online]. Available at:

https://www.metoffice.gov.uk/research/approach/collaboration/ukcp [Accessed 11 April 2024].



- 11.1.7In addition to the historical climate data presented above. The following events are examples of extreme climatic conditions experienced across Scotland in the past:
 - Highest recorded temperature was 34.8°C on the 19th July 2022²²⁶;
 - Lowest recorded temperature was -15.9°C on the 29th December 1995²²⁶;
 - Highest 24-hour rainfall total for a rainfall day was 238 mm and was recorded on 17th January 1974²²⁶;
 - The highest gust speed recorded was 142 mph and was recorded on 13th February 1989²²⁶; and
 - Recent storm events in the west of Scotland, including Storms Babet²²⁷, Jocelyn²²⁸, and Kathleen²²⁹, caused severe flooding, travel disruptions, and infrastructure damage.
- 11.1.8The future baseline for the CCRA assessment is based on UK Climate Projection 2018 (UKCP18) data from the Met Office for the 25 km grid square in which the Proposed Development is located (Stirling, approximately 20 km to the south of the development).²³⁰ Baseline climate change projections are highlighted in **Table 11-16**.
- 11.1.9Major climatic variables contributing to these risks include but are not limited to increased amount of extreme weather conditions (e.g., flooding and heatwaves) as well as increased temperatures due to climate change.
- 11.1.10During the construction phase under the RCP8.5 scenario, there is likely to be an increase in daily temperatures. Furthermore, under the RCP8.5 it is likely that the summer rainfall is likely to decrease and lead to more drought risk in summer. However, the overall and winter rainfall is likely to increase which could cause greater risks of flooding.

²²⁶ Met Office (2023) UK Climate Extremes. [Online] Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-extremes [Accessed 4 November 2024].

²²⁷ Met Office (2024) UK Storm Centre – Strom Babet. [Online] Available at:

https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2023/2023_08_storm_babet.pdf [Accessed 7 August 2024].

²²⁸ Met Office (2024) UK Storm Centre – Storm Isha and Jocelyn. [Online] Available at:

https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-

events/interesting/2024/2024_02_storms_isha_jocelyn.pdf [Accessed 4 November 2024].

²²⁹ Met Office (2024) UK Storm Centre – Storm Kathleen.[Online] Available at:

https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-

events/interesting/2024/2024_04_storm_kathleen.pdf [Accessed 4 November 2024].

²³⁰ UK Met Office, 2019. *UK Climate Projections 2018 (UKCP18)* [Online]. Available at:



Table 11-16: Climate Change Baseline and Projection Data

	Baseline data	Projection (chan	ge)			Projected	Climate
Climatic Variable	1981-2010	2020 - 2049	2040 - 2069	2070-2099	Beyond 2100	Trend	projection source
Temperature							
Mean annual maximum daily temperature (°C)	12.9	+0.9°C +0.4°C to +1.5°C	+1.7°C +0.8°C to +2.6°C	+3.2°C +1.8°C to +4.8°C	No projection data	¢	UKCP18 RCP8.5
Mean summer maximum daily temperature (°C)	19.0	+0.9°C +0.1°C to +1.7°C	+1.8°C +0.5°C to +3.1°C	+3.7°C +1.5°C to +6.1°C	available, trend towards increasing temperatures	↑ (UKCP18 RCP8.5
Mean winter minimum daily temperature (°C)	1.1	+0.8°C -0.1°C to +1.6°C	+1.3°C +0.2°C to +2.6°C	+2.3°C +0.4°C to +4.3°C	expected to continue	↑ (UKCP18 RCP8.5
Number of days of air frost per annum	53					Ļ	Met Office
Highest temperature for baseline period (°C)	19.47 (July)	+0.9°C +0.1°C to +1.7°C	+1.8°C +0.5°C to +3.1°C	+3.7°C +1.5°C to +6.1°C	No projection data available, trend towards	↑ (UKCP18 RCP8.5
Lowest temperature for baseline period (°C)	0.8 (December)	+0.8°C -0.1°C to +1.6°C	+1.3°C +0.2°C to +2.6°C	+2.3°C +0.4°C to +4.3°C	increasing temperatures expected to continue	↑ (UKCP18 RCP8.5
Rainfall	·						
Mean annual rainfall (mm)	1018.9	+2.9% -1.2% to +7.1%	+3.4% -2.4% to +9.6%	+4.1% -4.0% to +13.0%	No projection data available, potential for overall trend in increased rainfall to continue	Ţ	UKCP18 RCP8.5
Mean summer rainfall (mm)	66.1	-5.3% -19.0% to +8.6%	-14% -32% to +3.7%	-27% -51% to -0.3%	No projection data available, possible for	Ļ	UKCP18 RCP8.5



	Baseline data	Projection (chang	je)			Projected	Climate
Climatic Variable	1981-2010	2020 - 2049	2040 - 2069	2070-2099	Beyond 2100	Trend	projection source
					decrease in summer rainfall trend to continue		
Mean winter rainfall (mm)	106	+9.6% -3.4% to +23.2%	13.6% -2.2% to +31.9%	+25.2% -1.1% to +54.2%	No projection data available, increase in winter rainfall possible	Î	UKCP18 RCP8.5
Wettest month on average (mm)	128.8 (January)	+9.6% -3.4% to +23.2%	13.6% -2.2% to +31.9%	+25.2% -1.1% to +54.2%	No projection data available	î	UKCP18 RCP8.5
Driest month on average (mm)	49.2 (April)	-5.3% -19.0% to +8.6%	-14% -32% to +3.7%	-27% -51% to -0.3%	No projection data available	Ļ	UKCP18 RCP8.5
Other							
Storms	The UKCP18 model suggest a small contribution from storm surges, however it is unclear if the frequency and severity of future storm surges is going to change. Rising sea levels due to climate change are expected to worsen the impacts of storm surges.					î↓	UKCP18 RCP8.5
Droughts	The Met Office has projected a trend towards drier summers on average, with the trend being stronger under a high GHG emission scenario compared to a low one, however, it is the distribution of rainfall throughout the seasons that will determine UK drought risk.					î	UKCP18 RCP8.5
Wildfires	The wildfire hazard is clas Hazard tool. This means t support a hazardous wildf	ssified as medium a that there is betwee ire that may pose s	ccording to the info n a 10% and 50% o ome risk of life and	rmation that is curre chance of experience property loss in an	ently available to the Think sing weather that could y given year.	î	Think Hazard



11.2 Issues Scoped out

- 11.2.1A separate ICCI assessment has been excluded from the Climate Change assessment on the basis that this is a proportionate approach for an EA.
- 11.2.2Sea level rise as an environmental risk has been scoped out of the assessment as the Proposed Development would be situated in an upland location.
- 11.2.3Decommissioning has been scoped out of the assessment due to the nature of the Proposed Development, in that it is supporting the ongoing transmission of electricity in the wider area, it is treated as permanent and as such decommissioning is not considered in this EA.
- 11.2.4A0 lifecycle module is the preconstruction stage and represents the preliminary studies and works such as strategy and brief development, design efforts and cost planning. This has been scoped out of the lifecycle GHG assessment. Currently, there is no robust methodology for calculating A0 emissions. However, they are expected to be minimal, contributing less than 1% to the total GHG emissions of the Proposed Development. According to the IEMA guidance¹⁷⁶, GHG emissions anticipated to be below 1% of the total project emissions can be excluded from the assessment. Therefore, emissions from A0 have been scoped out on this basis.

11.3 Embedded Mitigation

- 11.3.1Mitigation should focus on measures to reduce GHG emissions from the construction and operation of the Proposed Development, to align with the Scottish Government's target to achieve net zero emissions by 2045 and remain so thereafter.
- 11.3.2Standard mitigation measures will be implemented during construction work, including compliance with both project wide and site-specific environmental management procedures, including SSEN Transmission's General Environmental Management Plans (GEMPs) and Species Protection Plans (SPPs) (Appendix O GEMPs and SPPs).
- 11.3.3A Construction Environment Management Plan (CEMP) would be developed for the project and adopted by the successful contractor during the construction phase. This would provide information on the proposed infrastructure and aid in avoiding, minimising, and controlling adverse environmental impacts associated with the Proposed Development. The CEMP would be continuously updated throughout the pre-construction phase.

Lifecycle GHG Mitigation

- 11.3.4The various mitigation measures embedded within the design of the Proposed Development align with Scottish Government's targets to achieve net zero emissions by 2045 and remain so thereafter.
- 11.3.5Science-based Target initiatives (SBTi) define and promote best practice in emissions (including Scope 1, 2 and 3) reductions and net zero targets in line with climate science.



SSEN Transmission has committed to the following verified SBTi²³¹, which will be applied to the Proposed Development to help mitigate against adverse GHG impacts:

- Committing to reduce its combined Scope 1 and 2 emissions by 46% by Financial Year 2029/2030 from a 2018 base year;
- Commitment to reduce Scope 3 Transmission Losses GHG Emissions 50% per gCO₂e from losses/kWh by FY2029/2030 from a 2018 base year; and
- Committing to working closely with its supply chain so that 67% of its suppliers by spend will have a Science-based target (SBT) set by 2025.

11.3.6The SSEN Transmission Sustainable Supplier Code²³² sets out its Sustainable Procurement Goals, aligned the UN's Sustainable Development Goals. Implementation of these measures would ensure the Proposed Development mitigates GHG emissions and contributes towards Scotland's Net Zero targets. The following 2025 targets include (but are not limited to):

- 50% of its supply chain will have a strategy for reducing energy consumption by 2025;
- 56% of the supply chain by spend will have a sustainable sourcing policy;
- 60% of the supply chain by spend will have strategies in place to achieve zero waste to landfill;
- 60% of the supply chain by spend will have strategies in place to reduce water consumption for SSEN Transmission projects;
- 65% of the supply chain by spend must have their own carbon reduction policy and target in place; and
- 50% of the supply chain by spend will have a biodiversity policy. Regular inspections of equipment will be undertaken to identify deterioration of components and will be replaced where necessary to ensure maximum efficiency.

Climate Change Risk Assessment

- *11.3.7*Mitigation measures for the CCRA will be informed by the design team. These will focus on measures to increase the resilience of the Proposed Development and receptors in the surrounding environment to climate change impacts.
- 11.3.8SSEN Transmission's Climate Resilience Strategy²³³ provides a holistic overview of SSEN Transmission's actions for ensuring the future resilience of its business and providing benefits to customers. The strategy outlines SSEN Transmission's adaptation action including those relevant to overhead line conductors, underground cable systems, substations, transformers, and switchgears in relation to a number of extreme weather events.
- 11.3.9A CEMP will be developed which will aid in avoiding, minimising, and controlling adverse environmental impacts from extreme weather events, such as storms, droughts, and

²³¹ SSEN, . SSEN Transmission world first science-based target accreditation. [Online]. Available at: https://www.ssen-

transmission.co.uk/news/news--views/2020/8/ssen-transmission-world-first-science-based-target-accreditation/ [Accessed 11 April 2024]. ²³² SSEN, 2023. *Sustainable Supplier Code* [Online]. Available at: https://www.ssen.co.uk/globalassets/about-us/sustainability/documents/ssendistribution---scsc-supplier-code-4-pager-v5.pdf [Accessed 11 April 2024].

²³³SSEN, 2023. Climate Resilience Strategy [Online]. Available at: https://www.ssen.co.uk/globalassets/about-

us/sustainability/documents/ssen-climate-resilience-strategy-progress-report-2023.pdf [Accessed 20 May 2024].



increased temperatures, associated to the Proposed Development. Best practice approaches and specific actions to implement mitigation measures will be included.

11.3.10Relevant GEMPs have been outlined in **Chapter 10: Hydrology, Hydrogeology and Soils** and include a number of good practice measures in reducing pollution incidents and also reducing the magnitude of incidents due to good site environmental management procedures.

11.4 Appraisal

Lifecycle GHG Assessment

Construction Phase

- 11.4.1For the purposes of the climate assessment, the construction phase of the Proposed Development is assumed to start in 2025 and take approximately four years.
- 11.4.2The GHG emissions associated with the construction phase of the Proposed Development have been calculated in line with the methodology, assumptions and limitations detailed in **Section 11.3**. The results are provided in **Table 11-17: Construction** phase GHG emissions. The life cycle modules are labelled in accordance with PAS 2080:2023 guidelines²³⁴.

Life cycle Module Emission Source		Emission Source	GHG Emissions (tCO ₂ e)
A: Before	A1-3 Product Stage	A1-3 Raw materials supply and manufacture	18,974
Use Stage	A4-5	A4 Material transport	16,131
Olugo	Construction Process Stage	A5.2 Construction activities	9,130
		A5.3 Waste	105
		A5.4 Worker transport	6,210
Total tCO ₂ e over the Construction period		struction period	50,550
Total Carbon Storage Loss (Biogenic Carbon) (A5.1) ²³⁵		Biogenic Carbon) (A5.1) ²³⁵	3,308
Total tCO	e over the Constru	uction phase (including biogenic carbon)	53,858

Table 11-17: Construction phase GHG emissions

- 11.4.3The total GHG emissions associated with the Proposed Development in the construction phase are 53,858 tCO₂e as detailed in **Table 11-17**. The majority of construction phase GHG emissions are attributed to the embodied GHG emissions in raw materials. The key contributors are the manufacture of steel and concrete.
- 11.4.4GHG emissions from peat excavation are considered as a worst-case scenario. It is assumed that the 2,986 m³ of peat intended for reuse and the 942 m³ of surplus peat under the PMP (Appendix N Peat Management Plan & Peat Landslide Hazard Risk Assessment) is instead lost, applying a 65% carbon content and a bulk density of 300 kg/m³, values at the upper end of the peat range, ensuring a conservative estimate. However, the PMP emphasises minimising peat waste and encourages reuse and restoration wherever

²³⁴ BSI Group, 2023. *Carbon Management in Infrastructure and Built Environment – PAS 2080* [Online]. Available at: https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/ [Accessed 20 May 2024].

²³⁵ In accordance with the RICS Guidance, biogenic carbon (GHG emissions associated with peatland excavation and restoration) has been reported separately from other GHG emissions. However, for the purposes of the EIA, these GHG emissions have been contextualised against the carbon budgets to inform the significance assessment.



possible. Additional GHG emission sources include material transport, worker transport and waste.

- 11.4.5To contextualise this impact, these construction GHG emissions are compared to the UK carbon budgets which coincide with the construction phase. This comparison is presented in **Table 11-18**. For additional context, the Proposed Development has also been contextualised against the Scottish GHG reduction targets and sector-specific electricity generation carbon budgets. These are presented in **Table 11-18** and **Table 11-19**.
- 11.4.6The potential construction GHG emissions of the Proposed Development are estimated to contribute less than 0.06% of any carbon budget or GHG reduction target reported below. For this comparison, the construction GHG emissions are assumed to be distributed evenly across the years of the construction period.

Table 11-18: Comparison of construction phase GHG emissions with UK carbon budgets

UK Carbon Budget Period	UK Carbon Budget (tCO₂e)	Construction GHG Emissions (tCO ₂ e)	Construction GHG Emissions as a proportion of UK Carbon Budget
4 th (2023 – 2027)	1,950,000,000	40,393	0.002%
5 th (2028 – 2032)	1,725,000,000	13,464	0.001%

Table 11-19: Scottish GHG reduction targets relevant to the construction period

Scottish GHG Carbon Budget Period	Aggregated annual Scottish emissions target (tCO2e)	Estimated total emission (tCO₂e) over carbon reduction period	% of GHG reduction period
2025-2028	112,500,000	53,858	0.05%

Table 11-20: Power sector residual emissions across carbon budgets relevant to the construction period

UK Carbon Budget Period	Sectoral Residual Emissions (tCO ₂ e)	Estimated total emission (tCO₂e) over the carbon budget period	% of Residual Emissions for Power Sector
4 th (2023 – 2027)	143,000,000	40,393	0.03%
5 th (2028 – 2032)	63,000,000	13,464	0.02%

Operation phase

- 11.4.7It is expected that development will remain in perpetuity. For the purposes of the climate assessment a reference operational period of 60 years was assumed, in accordance with asset lifespans.
- 11.4.8GHG emissions associated with the operational phase of the Proposed Development have been calculated in line with the methodology, assumptions and limitations outlined in Section 11.3. The results are provided in Table 11-21. The life cycle modules are labelled in accordance with PAS 2080:2023 Guidance²³⁶.

Table 11-21: Operation phase GHG emissions

Life cycle Module	Emission Source	GHG Emissions (tCO ₂ e)

²³⁶ BSI Group, 2023. *Carbon Management in Infrastructure and Built Environment – PAS 2080* [Online]. Available at: https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/ [Accessed 20 May 2024].



B: Use Stage	B2 Maintenance	505
	B3 Repair	568
Total B2 and B3 (tCO ₂ e)		1,073
Total biogenic flux carbon (B1 Use) ²³⁷	0	
Total Operational emissions (tCO₂e)	1,073	
Total annual average Operational phase emissions (tCO ₂ e)		17.88

- 11.4.9The total GHG emissions associated with the Proposed Development over the course of the operational phase are 1,073 tCO₂e as detailed in **Table 11-21**, with the majority of emissions arising from maintenance and repair activities. As a worst case scenario it has been assumed that operational peat emissions are 0 to ensure a conservative estimate.
- 11.4.10No data was available to quantify the GHG emissions from energy use during the operation of the Proposed Development. However, energy consumption is expected to be minimal as the primary function is to facilitate the transmission of electricity rather than consume it. Operational energy use is limited to powering control systems and auxiliary services such as lighting, all of which are highly efficient and consume only a minimal amount of electricity. These GHG emissions are anticipated to be negligible due to the continued decarbonisation of the electricity grid, and therefore are not expected to have a material impact on the overall GHG emissions of the Proposed Development.
- 11.4.11To contextualise this impact, these operation GHG emissions are compared to the UK carbon budgets which coincide with the operation phase. This comparison is presented in **Table 11-22**. For additional context, the Proposed Development has also been contextualised against the relevant Scottish GHG reduction targets and sector-specific electricity generation carbon budgets. These are presented in **Table 11-23** and **Table 11-24** respectively.
- 11.4.12The potential operation GHG emissions of the Proposed Development are estimated to contribute less than 0.0001% of any respective carbon budget or GHG reduction target reported below. For this comparison, the operational GHG emissions are assumed to be distributed evenly across the years of the operational period. The UK and Scotland are expected to remain net zero after 2050 and 2045, respectively.

UK Carbon Budget Period	UK Carbon Budget (tCO₂e)	Operational GHG Emissions (tCO₂e)	Operation GHG Emissions as a proportion of the UK Carbon Budget
5 th (2028 – 2032)	1,725,000,000	71.5	0.000004%
6 th (2033 – 2037)	965,000,000	89.38	0.000009%
7 th (2038 – 2042)	535,000,000	89.38	0.00002%
8 th (2043 – 2047)	195,000,000	89.38	0.00005%
9 th (2048 – 2050)	17,000,000	45.94	0.0003%

Table 11-22: Comparison of operation phase GHG emissions with UK carbon budgets.

²³⁷ In accordance with the RICS Guidance, biogenic carbon (GHG emissions associated with peatland excavation and restoration) has been reported separately from other GHG emissions. However, for the purposes of the EA report, these GHG emissions have been contextualised against the carbon budgets to inform the significance assessment.



Estimated total (tCO₂e) over % of GHG reduction Scottish GHG Aggregated annual **Carbon Budget Scottish emissions** carbon reduction period period target (tCO₂e) 67,954,788 2028-2030 35.75 0.00005% 2031-2040 179 137,303,100 0.0001% 2041-2044238 16,394,400 71.5 0.0004%

Table 11-23: Scottish GHG reduction targets relevant to the operational period.

Table 11-24: Power sector residual emissions across carbon budgets relevant to the operational period.

Scottish GHG Carbon Budget Period	Aggregated annual Scottish emissions target (tCO2e)	Estimated total (tCO ₂ e) over the carbon budget period	% of Residual Emissions for Power Sector
5 th (2028 – 2032)	63,000,000	71.5	0.0001%
6 th (2033 – 2037)	420,000,000	89.38	0.00002%

Overall

Lifecycle GHG Assessment

- 11.4.13Although the Proposed Development will result in increased GHG emissions, it's important to consider the Proposed Development's role in wider UK and Scottish policy to decarbonise the electricity grid. This consideration is crucial when assessing its overall impact on the climate.
- 11.4.14The Proposed Development will support the ongoing expansion of renewable energy generation within the UK energy system by providing the necessary infrastructure to support the increased transmission of low-carbon electricity. This will contribute to the decarbonisation of the electricity generation sector as renewables increasingly replace higher-carbon energy sources. This aligns with the UK Government's goal of fully decarbonising the electricity system by 2035, whilst aiming to achieve a clean power system by 2030.
- 11.4.15Embedded mitigation measures, such as the PMP (Appendix N Peat Management Plan & Peat Landslide Hazard Risk Assessment), CEMP, and other relevant controls, will provide appropriate measures to limit GHG emissions. These controls are aligned with relevant existing and emerging policy requirements and adhere to best practice design standards for minimising the GHG impact.
- 11.4.16As discussed in **Sections 11.4.5** and **11.4.7**, the Proposed Development's GHG impact during construction and operation has been quantitatively assessed against the relevant carbon budgets and net-zero targets. The Proposed Development is in line with the UK and Scotland's policies to decarbonise the electricity grid and transition to net zero by 2050 and 2045, respectively. The Proposed Development's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. Therefore, in accordance with IEMA guidance²¹⁴ (see **Section 11.3**), the GHG emissions associated with the Proposed Development's construction and operation are assessed as **Minor Adverse** and **Not Significant**. A project with 'not significant' effects is fully in line with measures necessary to achieve the UK and Scotland's trajectory towards net zero.
- 11.4.17In addition, SSEN Transmission's commitment to the Science-Based Targets initiative (SBTi) provides effective management of minor residual GHG emissions, aligning with

²³⁸ Excludes 2045 as no GHG emissions can be emitted from 2045 onwards.



policy requirements and supporting the project's contribution to the net-zero transition. The Applicant's Net Zero Transition Plan²³⁹ further aligns with the UK and Scotland's net-zero targets by setting clear goals to reduce the Applicant's GHG emissions in line with the 1.5°C target of the Paris Agreement²⁴⁰. This includes a commitment to engage with suppliers to adopt science-based targets (SBTs) by 2026, with 35% of suppliers expected to align with SBTs.

Climate Change Risk Assessment

- 11.4.18The impacts of climate change are projected to become apparent over the coming decades. Therefore, effects of climate change are not anticipated to be experienced during the construction phase, which is anticipated to take place between 2026 – 2029. However, it is pertinent to consider extreme weather events which may occur during the construction phase. These include periods of intense precipitation, which may hamper construction activities, and periods of very hot weather, which impact worker well-being.
- 11.4.19During operation, climate change may result in increased precipitation, leading to an increase in surface water and groundwater flooding that could damage physical assets and disrupt operations.
- 11.4.20Over the coming years there is likely to be an increased chance of extreme weather events, such as droughts and storms, which could lead to physical and operational damage of the OHL structures.
- 11.4.21Climate change may result in higher ambient air temperatures that could cause impacts during operations. This could lead to an increase in electricity consumption, increasing the energy demand of the Proposed Development and ancillary developments, leading to higher GHG emissions.
- 11.4.22These types of impacts would be considered within a CEMP, which will be developed for the Proposed Development and adopted by the successful contractor during the construction phase. The CEMP will provide information on avoiding, minimising, and controlling adverse environmental impacts associated with the Proposed Development, as well as defining good practice and specific actions required to implement mitigation measures.
- 11.4.23This assessment has found there are no significant residual climate change risks associated with the Proposed Development, assuming the embedded mitigation measures are successfully implemented into the design.
- 11.4.24The effect of climate change risk on the Proposed Development during the construction and operation phase is therefore deemed to be **Not Significant.**

11.5 Cumulative Effects

11.5.1The assessment of cumulative effects does not apply to the GHG assessment as the assessment is inherently cumulative. The CCRA also focuses on the Proposed

240 UNFCC, 2015. Paris Agreement [Online]. Available from: https://unfccc.int/sites/default/files/english_paris_agreement.pdf [Accessed 11 April 2024].

²³⁹ Scottish Government, 2019. Climate Ready Scotland: climate change adaptation programme 2019 – 2024 [Online]. Available at:

https://www.gov.scot/publications/climate-ready-scotland-second-scottish-climate-change-adaptation-programme-2019-2024/pages/8/ [Accessed 17 May 2024].



Development itself, so cumulative effects do not apply. Further information is provided in **Table 13-1**.

11.6 Recommendations and Additional Mitigation

- 11.6.10verall, the GHG impact of the Proposed Development will be **Minor Adverse** and **Not Significant**. The Proposed Development will bring long-term benefits to the UK by upgrading energy-related infrastructure. This is essential for integrating new sources of renewable power and upgrading the National Grid's capacity to facilitate the electrification of the broader economy. This, in turn, will support the transition away from fossil fuels and help achieve net zero emissions across the UK and Scotland.
- 11.6.2Consequently, no additional mitigation measures are anticipated to be necessary, as no significant impacts have been identified. Therefore, the existing GHG and CCRA mitigation measures incorporated into the design of the Proposed Development are deemed sufficient.



12. NOISE AND VIBRATION

12.1 Introduction

- 12.1.1This chapter considers the potential noise impacts that could arise as a result of the Proposed Development at the nearest noise sensitive receptors (NSR), during both the construction and operational phases.
- 12.1.2This chapter describes:
 - the assessment methodology;
 - the baseline conditions at the Site (the area which encompasses the Proposed Development) and in the surrounding area;
 - any embedded mitigation adopted for the purposes of the assessment;
 - a summary of the likely environmental risks taking into account national legislation;
 - the further mitigation measures required to prevent, reduce or offset any environmental risks; and
 - the likely residual effects after these measures have been employed.

12.1.3This chapter is accompanied by the following figures and appendices:

- Appendix K Glossary of Acoustic Terms;
- Appendix L Baseline Noise Survey Details;
- Appendix M Indicative Plant for use during the Construction Phase;
- Figure 12-1 Baseline Measurement Position and Noise Sensitive Receptors, Appendix A Figures; and
- Figure 12-2 Construction Traffic Noise Assessment Routes, Appendix A Figures.

12.2 Information Sources

12.2.1The assessment has been informed by the following guidelines/policies:

- Planning Advice Note (PAN) 1/2011 Planning and Noise²⁴¹;
- Technical Advice Note (TAN): Assessment of noise 2011²⁴²;
- BS 5228-1: 2009+A1: 2014²⁴³;
- BS 5228-2: 2009+A1: 2014²⁴⁴;
- BS 4142:2014+A1:2019²⁴⁵;
- BS 7385-1: 1990²⁴⁶
- BS 7385-2: 1993²⁴⁷

²⁴¹ The Scottish Government, Planning Advice Note 1/2011: planning and noise, 3 Mar 2011. Available at

https://www.gov.scot/publications/planningadvice-note-1-2011-planning-noise/documents/

²⁴² Scottish Government (2011) Technical Advice Note: Assessment of noise. Available at: https://www.gov.scot/publications/technical-advice-note-assessment-noise/pages/1/

²⁴³ BSI Standards Publication, BS 5228-1:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Part 1: Noise, December 2008.

²⁴⁴ British Standards Institute (2014) *BS 5228: Code of Practice for noise and vibration control on construction and open sites. Part 2: Vibration.* London. BSI

²⁴⁵ BSI Standards Publication, BS 4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound, October 2014.

²⁴⁶ BSI Standards Institute, BS 7385-1 Evaluation and measurement for vibration in buildings. Guide for measurement of vibrations and evaluation of their effects on buildings. BSI

²⁴⁷ BSI Standards Institute (1993) BS 7385-2 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.



BS 7445 part 1:2003, part 2:1991, part 3:1991²⁴⁸;

- BS 8233:2014²⁴⁹:
- Planning Advisory Note 50: Controlling the Effects of Surface Mineral Workings (Planning Advise Note (PAN 50)²⁵⁰;
- Calculation of Road Traffic Noise (CRTN)²⁵¹; and
- ISO 9613-2:2024²⁵².

12.2.2The noise assessment has been based on the following information sources:

- Ordnance Survey (OS) Terrain 50 topography of the assessment study area which is summarised in **Section 12.3**.
- OS Open Vector buildings and roads layout information of the assessment study area which is summarised in **Section 12.3**.
- A detailed baseline noise survey undertaken to determine the prevailing ambient and background noise levels at locations considered representative of the nearest NSRs to the Proposed Development which is summarised in **Section 12.4**.
- Details of the construction activities and associated plant by the Project Team an which is summarised in **Section 12.3**. The measured sound pressure level data for the construction plant has been based on the database of information for similar plant contained in BS 5228-1²⁴³ and plant manufacturer data.
- Road traffic data provided in Chapter 9 Traffic and Transport.
- Source sound power data for the transformers which is summarised in **Section 12.3**.

12.3 Methodology

- 12.3.1The Proposed Development comprises two 400 kV transformers and ancillary equipment and minor upgrades to the existing access track. The assessment has followed the principles in PAN 1/2011²⁴¹. This document provides advice on the role of the planning system in helping to prevent and limit adverse effects related to noise. The PAN 1/2011²⁴¹ contains details of the legislation, technical standards and codes of practice for specific noise issues.
- 12.3.2The potential noise impacts that have been scoped into the assessment are detailed below:
 - Construction noise arising from the Proposed Development has been assessed at selected NSRs within a study area of approximately 2 km from the Site. However, it should be noted that noise propagation predictions over distances greater than 300 m must be treated with caution due to increasing importance of meteorological effects according to BS 5228-1243.
 - Construction vibration arising from the Proposed Development has been assessed at NSRs within a study area of approximately 100 m from the Site.
 - Groundborne vibration and air overpressure arising from possible blasting works during the construction phase of the Proposed Development at the nearest NSRs such that the locations with the greatest potential for adverse effects are assessed.

https://www.gov.scot/publications/planning-advice-note-pan-50-controlling-environmental-effects-surface-mineral/

²⁵¹ Calculation of Road Traffic Noise, 1988

²⁴⁸ British Standards Institute Multi-part document BS 7445: Description and measurement of environmental noise. London. BSI.

²⁴⁹ British Standards Institute (2014) BS 8233: Guidance on sound insulation and noise reduction for buildings London. BSI

²⁵⁰ The Scottish Government, Planning Advisory Note 50: Controlling the Effects of Surface Mineral Workings, 31 October 1996. Available at

²⁵² International Standards Organisation (2024). ISO 9613-2. Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.



- Changes in road traffic noise due to construction phase development generated traffic has been assessed for construction traffic routes in the vicinity of the Proposed Development.
- Operational noise arising from fixed plant associated with the Proposed Development has been assessed at selected NSRs within a study area of approximately 2 km from the Site.
- 12.3.3The operational phase of the Proposed Development is not anticipated to generate vibration, therefore an operational vibrational assessment is scoped out.

Consultation

- 12.3.4On 19 April 2024, consultation was undertaken with the Environmental Health Department of Perth and Kinross Council (PKC) and the proposed scope of the baseline noise survey and assessment methodology was agreed. On 25 April 2024, the Environmental Health Department of PKC agreed to the proposed assessment methodology.
- 12.3.5The consultation confirmed that a construction noise assessment for the Proposed Development would be carried out in accordance with the guidance set out in BS 5228²⁴³
 ²⁴⁴. For thoroughness, a construction vibration assessment for receptors within 100 m of any potential vibratory works has been included.
- 12.3.6The consultation also confirmed that the operational phase of the Proposed Development is to be assessed according to BS 4142²⁴⁵.

Construction noise

- 12.3.7An assessment has been undertaken to determine the likely impact arising from the construction phase of the Proposed Development upon residential NSRs near the construction phase activities. This assessment follows guidance in BS 5228-1²⁴³ described below. Distance to receptors and construction plant scenarios have been considered to carry out noise level predictions.
- 12.3.8BS 5228-1²⁴³ provides guidance on appropriate methods for minimising noise from construction activities. Techniques for predicting the likely noise effects from construction works are given; these are based on detailed information on the type and number of plant items being used, their location and the length of time they are in operation. Noise prediction methods are used to establish likely noise levels in terms of the L_{Aeq,T} over the core working day. A database of information is also provided, including measured sound pressure level data for a variety of different construction plant undertaking various common activities, which can be used to estimate levels of noise generated by typical construction works.
- 12.3.9The assessment criteria for construction noise have been determined based on the ABC method outlined in Table E1 included in Annex E of BS 5228-1²⁴³. The ABC method provides threshold noise levels which indicate a potential adverse effect from site specific construction noise on residential properties. The threshold values are derived based on the existing ambient noise levels at the receptor, L_{Aeq} (decibel (dB)), during the periods when construction is expected to occur (day, evening, night), and are shown in **Table 12-1**.



Period	Threshold value in dB L _{Aeq,T}				
	Category A ^A	Category B ^B	Category C ^C		
Night-time (23:00-07:00)	45	50	55		
Evening and weekends ^D	55	60	65		
Daytime (07:00-19:00) and Saturday (07:00-13:00)	65	70	75		

Table 12-1: BS 5228-1²⁴³ ABC method threshold of potential significant effects at dwellings

^ACategory A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

^B Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

^c Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

^D 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

- 12.3.10A series of construction noise level predictions have been undertaken in accordance with BS 5228-1²⁴³, with the results compared against criteria also derived from BS 5228-1²⁴³. These predictions have been undertaken to establish the potential noise levels applicable to the proposed construction stage activities at the NSRs.
- 12.3.11Following the BS 5228-1²⁴³ ABC Method (set out in **Table 12-1**) and given the baseline noise environmental at the nearest NSRs (see **Section 12.4**, it is considered appropriate that the predicted construction noise levels are assessed against the Category A noise threshold criteria, i.e. 65 dB L_{Aeq,T} (façade level).
- 12.3.12With regards to blast induced noise, BS 5228-1²⁴³ states the following:

"Blasting can be an emotive issue for residents around an opencast site. Good liaison between operator and residents is essential to prevent unnecessary anxiety. Wherever possible, the operator should inform each resident of the proposed times of blasting and of any deviation from this programme in advance of the operations. On each day that blasting takes place it should be restricted as far as practicable to regular periods."

Proposed construction works

- 12.3.13Details related to the typical construction activities works associated with the proposed construction phase are provided in **Chapter 2**. The key noise-generating activities which include construction vehicles are presented below:
 - Mobilisation;
 - Proposed existing access track upgrades;
 - Platform construction;



- Control building construction;
- Super Grid Transformer (SGT) bunds construction;
- Cable troughs installation;
- Platform fill (final 1 m);
- Hard landscaping;
- Control room works;
- Air Insulated Switchgear (AIS) installation;
- High Voltage (HV) cabling installation;
- Decommissioning activities related to the existing substation; and
- Use of the existing access track upgrades during the construction of the Proposed Development.
- 12.3.14The proposed construction activities would in general be undertaken during daytime periods. Working hours proposed are 07:00 to 19:00 Monday to Friday, 08:00 to 13:00 Saturday and no working on Sunday or bank holidays unless in exceptional circumstances. Working hours would be agreed with PKC.

Proposed Plant, Noise Levels and Programme

- 12.3.15A detailed breakdown comprising the specific plant items for each of the key activities is included in **Appendix M Indicative Plant for use during the Construction Phase**.
- 12.3.16The sound power levels for each item of plant have been adjusted based on the assumed percentage on-time. Where plant is not operational 100% of the time, the reduced sound power level has been calculated.
- 12.3.17In practice, the plant items identified for each stage will move around the Site, operating at different times, for different durations and at different locations. Consequently, noise levels at any receptor may vary day-on-day. Hence, it is necessary to rationalise the geographic and temporal spread of activities (and subsequent assessment) and to this end, various assumptions have necessarily been made as described in the following sections.
- 12.3.18The most important assumptions relate to the location of construction plant and their operational 'on-time' during the period of interest. With respect to the geographical location of the plant for each activity, it has been assumed to operate at a single point and at the closest point between the Site boundary and the closest façade of the NSRs to represent a worst-case scenario.
- 12.3.19It has been assumed that there would be worst -case 76 Heavy Goods Vehicle (HGV) movements on the existing access road over a 12 hour working day travelling at an average speed of 24 km/h, i.e. approximately 6 HGV movements per hour.
- 12.3.20Other assumptions in line with BS 5228-1²⁴³ which have been made with respect to the construction noise predictions are:
 - No barriers have been included;
 - Acoustically soft ground cover has been assumed between the noise source and receptor;
 - No atmospheric absorption has been included;
 - 3 dB has been added to all predictions to account for façade reflections;
 - Sources and receptors have both been taken to be 1.5 m high;
 - All distance between source and receivers are horizontal distances; and



• Meteorological conditions, such as wind speed and direction, have been taken to be 'neutral' i.e. would not influence the construction noise levels at the receptor.

Construction vibration

- 12.3.21Vibration from construction activities may impact on adjacent buildings. The transmission of groundborne vibration is highly dependent on the nature of the intervening ground between the source and receptor and the activities being undertaken. BS 5228-2²⁴⁴ provides data on measured levels of vibration for various construction works. Impacts are considered for both damage to buildings and annoyance to occupiers.
- 12.3.22Likely levels of vibration at given distances can be predicted using empirical methods and existing piling vibration data. Due to the distances involved between the Site and NSR locations, vibration from construction activities is unlikely to be subjectively noticeable and will not approach the threshold limits where structural damage to buildings may occur.
- 12.3.23**Table 12-2** details Peak Particle Velocity (PPV) vibration levels and provides a semantic scale for the description of construction vibration effects on human receptors, based on guidance contained in BS 5228-2²⁴⁴.

Peak Particle Velocity Level, millimetres per second (mm/s)	Description
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level.
1.0	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
0.3	Vibration might be just perceptible in residential environments.
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.

Table 12-2 Construction vibration criteria for human receptors (annoyance)

- 12.3.24In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels within buildings are controlled to those relating to annoyance (i.e. 1.0 mm/s), then it is highly unlikely that buildings would be damaged by construction vibration.
- 12.3.25The basic principles for carrying out vibration measurements and processing the data with regard to evaluating vibration impacts on buildings are established in BS 7385²⁴⁶. Table
 12-3 provides recommended PPV vibration limits for transient excitation for different types of buildings (as set out in BS 7385-2²⁴⁷). The PPV values in Table 12-3 are given in two ranges as very low frequency vibration (between 4 Hz to 15 Hz) is potentially more damaging to light framed building structures, and therefore has a lower threshold.



Type of Building Peak Component Particle Velocity in Frequency **Range of Predominant Pulse** 4 Hz to 15 Hz 15 Hz and above 50 mm/s at 4 Hz and above Reinforced or framed structures. 50 mm/s at 4 Hz and above Industrial and heavy commercial buildings ⁽¹⁾ Un-reinforced or light framed 15 mm/s at 4 Hz increasing to 20 20 mm/s at 15 Hz increasing to structures. Residential or light mm/s at 15 Hz 50 mm/s at 40 Hz and above commercial type buildings (2) ⁽¹⁾ Values referred to are at the base of the buildings ⁽²⁾ At frequencies below 4 Hz a maximum displacement of 0.6 mm (zero to peak should not be exceeded)

Table 12-3 Peak Particle Velocity (PPV) Limits for Cosmetic Damage

- 12.3.26With regards to blast operations a calculation method to determine blast induced vibration levels at different distances is presented (see page 73 of BS 7385²⁴⁶). The method presented is based on analysis of the results of vibration measurements undertaken at the Site. This method therefore relies upon a degree of blasting works being undertaken at the Site, before accurate distance calculations can be completed. The calculation method allows the resultant PPV vibration level to be determined at different distances for known charge weights.
- 12.3.27BS 7385²⁴⁶ states the majority of energy generated within the atmosphere from surface blasting is of a sub audible nature (i.e. at frequencies <20 Hz), although there is a component that is audible to the human ear and as such would be heard as noise. Audible noise and the sub-audible element (sensed as concussion) are together known as air overpressure.
- 12.3.28Air overpressure may be sensed or felt by humans and can excite secondary vibrations at audible frequencies in buildings (e.g. rattling of windows and ornaments on shelves) that have been found to give rise to adverse comments from occupants of buildings affected by the blasting. However, according to BS 7385²⁴⁶ there is no known evidence of structural damage to buildings/structures from excessive air overpressure levels from quarry blasting. It is stated that:

"routine blasting can regularly generate air overpressure levels at adjacent premises of around 120 dB (lin). This level corresponds to an excess air pressure which is equivalent to that of a steady wind velocity of 5 m/s (Beaufort force 3, gentle breeze) and is likely to be above the threshold of perception."

- 12.3.29The research referenced in BS 7385²⁴⁶ identifies that a poorly mounted window that is prestressed might crack at 150 dB (lin), with most windows cracking at around 170 dB (lin), whereas structural damage would not be expected at levels below 180 dB (lin).
- 12.3.30Whilst BS 7385²⁴⁶ does include a methodology for air overpressure measurement, the standard does state that due to uncertainties with meteorological conditions it is not possible to predict the location of maximum air overpressure. This is because pressure variations in the atmosphere due to windy conditions can mask the blast generated air overpressure, and for that this reason it is not accepted practice to set specific limits for air overpressure.



Construction blast induced noise, vibration and air overpressure

- 12.3.31It is anticipated that blasting works may be required in the construction of the substation platform. An assessment of potential blast induced air overpressure and groundborne vibration has been undertaken giving general consideration to the guidance in PAN 50²⁵⁰, BS5228-1²⁴³ and BS5228-2²⁴⁴.
- 12.3.32Paragraphs 33 to 38 of the PAN 50²⁵⁰ document are concerned with blasting, including vibration and air overpressure. It is confirmed that the levels of vibration generated by surface mineral workings are well below those required to cause structural damage to properties, but that vibration and air overpressure may give rise to nuisance. It is also confirmed that the levels of air overpressure and noise can be significantly affected by meteorological conditions.
- 12.3.33It is recommended that any planning conditions pertinent to blast-induced vibration should look to set acceptable vibration level limits, but that such an approach would be impractical for air overpressures due to affecting factors outside the control of the operator (e.g. meteorological effects). It is identified that the operator would always be concerned with maximising the effectiveness of the blast, and therefore minimising lost energy through air overpressure.
- 12.3.34A summary of good practice on blasting works is also presented within PAN 50²⁵⁰.
- 12.3.35BS5228-2²⁴⁴ identifies the best approach to the assessment of air over pressure should be based on site-specific operational measurements. A qualitative assessment of blast induced noise, vibration and air overpressure has therefore been undertaken.

Construction traffic noise

- 12.3.36The Proposed Development has the potential to affect road traffic noise levels along construction traffic routes. To inform the assessment of development generated traffic, a series of Basic Noise Level (BNL) calculations have been carried out drawing on the traffic data provided in **Chapter 9 Traffic and Transport**. The methodology adopted for the prediction of road traffic noise generally follows that set out in CRTN. Calculations have been undertaken for 'with' and 'without' the Proposed Development scenarios, to allow determination of the noise level change associated with the addition traffic movements during the construct phase.
- 12.3.37The significance of the identified noise level changes has then been determined and assessed in general accordance with the criteria from TAN²⁴² to PAN 1/2011²⁴¹. The criteria are presented in **Table 12-4**.

Impact Magnitude	Increase in BNL of closest public road used for construction traffic (dB)
Major	≥ 5.0
Moderate	3.0 - 4.9
Minor	1.0 - 2.9
Negligible	< 1.0

Table 12-4 Criteria for the assessment of Construction Traffic Noise at NSRs

12.3.38The significance of effect depends upon a number of factors, including the magnitude of change, the sensitivity of the receptor, the absolute noise level and the acoustic context.



Operational noise

12.3.39BS 4142²⁴⁵ describes methods for rating and assessing the following:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.
- 12.3.40The methods employed in this report in line with BS 4142²⁴⁵ use predicted outdoor sound pressure levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.
- 12.3.41In accordance with the assessment methodology, the specific sound level (L_{Aeq,T}) of the noise source being assessed is corrected, by the application corrections for acoustic features, such as tonal qualities and/or distinct impulses, to give a "rating level" (L_{Ar,Tr}).BS 4142²⁴⁵ effectively compares and rates the difference between the rating level and the typical background sound level (L_{A90,T}) in the absence of the noise source being assessed.
 - To derive a Rating Level for the Proposed Development, the specific sound level can be adjusted, by adding feature corrections for one or more distinctive characteristics. The feature corrections are summarised below:
 - Tonality (up to 6 dB);
 - Impulsivity (up to 9 dB);
 - Other sound characteristics (up to 3 dB); and
 - Intermittency (3 dB).
- 12.3.42The BS²⁴⁵ advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) when the noise source in question is likely to operate or is proposed to operate in the future.
- 12.3.43Comparing the Rating Level with the background sound level, BS 4142²⁴⁵ states:
 - "a) Typically, the greater this difference, the greater the magnitude of impact.
 - b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
 - c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
 - d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."
- 12.3.44It is noted that the 'context' of an assessment is an important consideration in an assessment. The examples included in BS 4142²⁴⁵ Annex A illustrate the contextual factors that may be of importance, for example:
 - the magnitude of the differences between Rating Level and background sound;
 - the character of the existing noise environment at receptors;



- the history of noise issues (e.g. complaints) associated with the operator or the site of the specific source under assessment;
- the diurnal period during which impacts are identified, and the relevance to the type of receptor; and
- the location at which actual impacts on the receptor could occur, i.e. indoor or outdoor.
- 12.3.45BS 4142²⁴⁵ provides guidance on minimising and reporting factors likely to contribute to uncertainty in the assessment. This includes following best practice guidance with regards to measurement and calculation of sound levels. In addition to BS 4142²⁴⁵, BS 8233²⁴⁹ recommends design levels for the control of noise in and around buildings. Of significance to this assessment, the guidance states:

"....it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB which would be acceptable in noisier environments.²⁴⁵"

Noise sensitive receptors

- 12.3.46NSRs are defined as any occupied premises outside a site used as dwellings (including gardens), places of worship, educational establishments, hospitals or similar institutions, or any other properties likely to be adversely affected by an increase in noise levels.
- 12.3.47The effects of noise-on-noise sensitive receptors are varied and complex. They include interference with speech communication, disturbance of work or leisure activities, disturbance of sleep, annoyance and possible effects on mental and physical health. In any neighbourhood, some individuals will be more sensitive to noise than others.

Proposed Substation

12.3.48To predict the sound levels from the Proposed Development, a 3D noise model has been created using Datakustik CadnaA noise modelling software. The software allows for complex conditions/ scenarios to be considered and implements the prediction algorithms in ISO 9613-2²⁵²; which contains methods for calculating sound attenuation during outdoor propagation. Operational noise from the Proposed Development has been assessed at selected NSRs within a study area of approximately 2 km from the Site.

12.3.49The following assumptions have been adopted in the noise model:

- Ground absorption: 0 (acoustically reflective ground) for the substation platform and 0.7 (acoustically absorptive ground) for surrounding rural land;
- A source height of 4 m for the transformer; and
- Noise levels calculated for NSRs at ground floor (1.5 m) and first floor level (4.0 m).

Noise Source Data

- 12.3.50Single figure sound power levels for the proposed substation plant were obtained. When assessing transformers in a BS 4142²⁴⁵ assessment it is important to consider tonality, as transformers typically output a tonal hum at 100 Hz. At this stage of the project, 1/1 octave band data is not available. In order to ensure accuracy and reliability, the single figure source data has been considered to be representative at 100 Hz, serving as a 'worst case' sound power level. This approach is robust in that the A-weighted broadband level is equated to the 100 Hz band A-weighted level for sound propagation calculations. By focusing all energy in this single lower frequency band, the diminishing effect of air/ground absorption on sound levels is minimized, as opposed to dispersing energy across multiple bands.
- 12.3.51The sound power levels provided are presented **Table 12-5**: Sound power levels.



Table 12-5: Sound power levels

Rated power Megavolt-ampere (MVA)	Max sound power level of Main unit at 50% load and 102.5% rated voltage. (dBA)	Max sound power level of cooler. (dBA)	Source document
120	78	83	SP-NET-SST-504 Specification for Two Winding Grid Transformers
>350	89	86	SP-NET-SST-520 Specification for Two Winding Grid Transformers

12.4 Baseline Environment

12.4.1The NSRs to the Proposed Development were identified by OS and aerial mapping and include dwellings situated to the south of the Site and to the north of the B8033. The details of the nearest NSRs identified by satellite imagery and relevant to this assessment are summarised in **Table 12-6**.

Table	1 2-6 :	Nearby	sensitive	receptors
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NSR	ID	x	Y	Distance to the Site
Gamekeeper Cottage	NSR1	282492	709164	50 m (proposed existing access track upgrades)
Crofthead	NSR2	281973	709501	130 m (proposed existing access track upgrades)
Tamano Farm	NSR3	280324	708414	1100 m (substation platform)
Craighead Howf	NSR4	280741	707722	1900 m (substation platform)

Baseline Noise Survey

- 12.4.2A noise survey to define the acoustic character of the area was carried out by an experienced acoustician. Sound level meters were left unattended at two locations as set out in Figure 12-1, Appendix A Figures. A weather station was also installed at Measurement Position 1 (MP1) for the duration of the survey period.
- 12.4.3Free-field continuous measurements were carried out between 08:00 on Wednesday 5 June 2024 until 12:00 on Monday 17 June 2024 at MP1. This measurement position was located within the land adjacent to the external amenity area of Tamano Farm (i.e. NSR3), southeast of the Proposed Development and was deemed representative of the typical prevailing environment.
- 12.4.4Free-field continuous measurements were carried out between 10:00 on Wednesday 19 June 2024 until 12:00 on Wednesday 26 June 2024 at Measurement Position 2 (MP2).



This measurement position was located within the land adjacent to the external amenity area of Craighead Howf (NSR4), southeast of the Proposed Development and was deemed representative of the typical prevailing environment.

- 12.4.5The sound level meters were installed on a tripod 1.5 m in height from the ground and positioned in free field conditions. Photographs of the sound level meters in-situ are presented in **Appendix L Baseline Noise Survey Details**.
- 12.4.6Noise levels at MP1 and MP2 were dominated by wildlife and nature sounds. Adverse weather was also noted via weather monitoring during the survey period; therefore, periods of any adverse weather have been excluded from the data analysis.
- 12.4.7**Table 12-7** presents the noise survey results measured at the noise monitoring positions. Nature sounds are the dominant source in this area in line with the rural character of the Site, occasional farm associated noises are the secondary contributor to the overall makeup of the soundscape. Further information on the measured noise levels are presented in **Appendix L Baseline Noise Survey Details**.

Position	Measured sound pressure levels (dBA)						
	LAeq,12h daytime	LAeq,4h evening	Typical daytime background LA90,day	Typical night-time background LA90,night			
MP1	46	40	44*	32	31		
MP2	50	43	47*	32	27		
* Elevated noise levels between 3am -6am due to dawn chorus/wildlife							

Table 12-7:Noise survey results

Meteorological Conditions

- 12.4.8An Outpost COBRA2 Series 3G Weather Station was installed at MP1 (Grid reference 280324 708414). The weather conditions were measured for the duration of the survey and are deemed representative of the weather conditions observed at the Site.
- 12.4.9The weather conditions over the full measurement period were varied. Noise measurements recorded during dry conditions with wind speeds lower than or equal to 5 m/s were included for analysis and all other data was omitted. Temperature during the measurement period ranged between a high of 25°C to a low of 3°C.

Future Baseline

12.4.10Given the rural nature of the Site, it is not anticipated that existing noise levels within the vicinity of the Proposed Development would be subject to significant changes. Therefore, existing and future baseline noise levels have been assumed to be the same and are hereafter referred to as "the baseline".

12.5 Embedded Mitigation

Construction phase

12.5.1Several safeguards exist to minimise the effects of construction noise, these include:



- EC Directives and UK Statutory Instruments that limit noise emissions of a variety of construction plant;
- Guidance set out in BS 5228-1²⁴³ which covers noise control on construction sites; and
- The powers that exist for local authorities under Sections 60 and 61 of the Control of Pollution Act 1974²⁵³ to control noise from construction sites.
- 12.5.2It is expected that the Principal Contractor and its sub-contractors will at all times apply the principle of Best Practicable Means (BPM), as defined in Section 72 of the Control of Pollution Act 1974²⁵³, which is usually the most effective means of controlling noise from construction sites. Such measures, where appropriate, may include the following:
 - any compressors brought onto the Site to be silenced or sound reduced models fitted with acoustic enclosures;
 - all pneumatic tools to be fitted with silencers or mufflers;
 - care to be taken when erecting or striking scaffolds to avoid impact noise from banging steel. All operatives undertaking such activities to be instructed on the importance of minimising noise;
 - deliveries to be programmed to arrive during normal working hours where possible, however occasional night-time working may be required to facilitate the delivery of the transformers due to potential road closures;
 - care to be taken when unloading vehicles to minimise noise;
 - delivery vehicles to be routed so as to minimise disturbance to local residents;
 - delivery vehicles to be prohibited from waiting within or in the vicinity of the Site with their engines running;
 - all plant items to be properly maintained and operated according to manufacturers' recommendations in such a manner as to avoid causing excessive noise;
 - electrically powered plant should be preferred, where practicable, to mechanically powered alternatives. All mechanically powered plant should also be fitted with suitable silencers, as appropriate;
 - all plant to be sited so that the effect of noise at nearby noise sensitive properties is minimised;
 - problems concerning noise from construction works can often be avoided by taking a considerate and neighbourly approach to relations with local residents. Effective liaison with the local community would be established and maintained throughout the construction period. This would include provision of information on the on-going activities (including blasting where required) and provision of contact telephone numbers for the Site to obtain information during operational hours, a representative being identified with appropriate authority to resolve any problems and a log of complaints and actions taken to remedy these being maintained; and
 - the good practice advice detailed in both BS 5228-1²⁴³ and BS 5228-2²⁴⁴ would be complied with.
- 12.5.3In addition, should blasting be required, the following good practice measures would be employed to reduce potential vibration and air overpressure from blasting works which can be ensured through the production and management of Construction Blasting Plan to be agreed with PKC:

²⁵³ UK Government (1974) Control of Pollution Act 1974 Available at: https://www.legislation.gov.uk/ukpga/1974/40/contents



- care would be taken with the development of faces, and with trial blasts, as anomalous vibration levels might be produced when there is no free face to relieve the energy produced;
- appropriate burden would be ensured to avoid over- or under-confinement of the charge;
- accurate drilling and setting out would be undertaken;
- charge levels would be appropriate;
- exposed detonating cords would not be used;
- stemming with appropriate material such as sized gravel or stone chippings would be undertaken;
- decking charges/in hole delays/delay detonation would be used to ensure smaller maximum instantaneous charges (MICs);
- a series of groundborne vibration measurements and air overpressure measurements would be undertaken to check compliance with appropriate criteria (adopted from BS 5228-2²⁴⁴);
- each charge would be individually designed to maximise efficiency and reduce energy loss through vibration and air overpressure;
- the use of surface detonating cords and secondary blasting would be avoided wherever possible;
- the areas of heave and the total charges would be minimised;
- blasting in adverse weather conditions would be avoided (i.e. wind in the direction of sensitive receptors);
- blasting would be undertaken only within the (less-sensitive) hours of 10:00 and 12:00 and 14:00 and 16:00 on Mondays to Fridays, and 10:00 and 12:00 on Saturdays; and
- local residents would be informed in advance of the proposed times of blasting works, along with details of the good practice mitigation measures that are in place, to ensure good relations and appropriate reassurance.

Operational phase

12.5.4The proposed fixed plant to be installed and operated as part of the Proposed Development will be designed such that, where practicable, the derived Rating Level for the operational plant is no greater than the existing background (L_{A90}) sound levels at the nearby NSRs.

12.6 Appraisal

Construction noise

- 12.6.1Construction activity can lead to a degree of noise disturbance at locations in close proximity. It is, however, a temporary source of noise. Noise levels at any one location vary as different combinations of plant machinery are used. Noise levels also vary throughout the construction period of the Proposed Development as the construction activities and phases change.
- 12.6.2NSR1 and NSR2 are the closest NSR to the proposed existing access track upgrades, and in turn have the potential to be impacted by the works associated with the proposed existing access track upgrades **Table 12-8** presents the noise levels associated with the typical construction activities at NSR1 and NSR2 during the weekday daytime period.



Table 12-8: Predicted construction noise levels associated with the access road upgrades, Façade, $L_{\mbox{\scriptsize Aeq,T}}$

Phase of construction	Sound pressure level at NSR dB L _{Aeq}		
	NSR1	NSR2	
Proposed existing access track upgrades	62	61	
HGV movements on the proposed existing access track upgrades	55	54	

- 12.6.3As seen in **Table 12-8** the predicted noise levels for the worst case construction activities for the existing access track upgrades are below the Category A threshold of 65 dB for weekday daytime hours.
- 12.6.4NSR3 and NSR4 are closest to the substation platform. **Table 12-9** presents the noise levels associated with each of the typical construction activities at NSR3 and NSR4 during the weekday daytime period.



Table	12-9:Predicted	construction	noise levels	associated	with the	proposed	substation,	Façade,	

Phase of construction	Sound pressure level at NSR dB LAeq			
	NSR3	NSR4		
Mobilisation	32	26		
Platform construction	48	42		
Control building	37	31		
SGT1 Transformer bund	36	30		
SGT2 Transformer bund	36	30		
AIS bases + ducting	35	29		
Cable troughs PH1	34	29		
Cable troughs PH2	34	29		
Platform fill (final 1m)	40	34		
Phase 1 Hard landscaping	36	31		
Phase 2 Hard landscaping	36	31		
Control building	37	31		
SGT & AIS installation	33	28		
HV cabling	33	27		
Decommissioning existing substation	29	23		

12.6.5**Table 12-10** presents the predicted façade noise levels associated with the use of the existing access track at the nearest NSRs during weekday daytime periods.



Table 12-10: Predicted construction noise levels associated with the use of the existing access track, Façade, $L_{\text{Aeq},\text{T}}$

Phase	Sound pressure level at NSR dB L _{Aeq}			
	NSR1	NSR2		
Existing access track upgrades Movements (76 HGV movements per day)	53	53		

12.6.6As seen in **Table 12-9** and **Table 12-10** the predicted noise levels for the typical construction activities associated with the Proposed Development at the nearest NSRs fall below the Category A threshold of 65 dB for weekday daytime hours.

Construction site vibration

12.6.7**Table 12-11** presents the distances at which vibration levels are predicted to meet the criteria thresholds set out in **Table 12-2**, based on a specified confidence limit (where applicable). It should be noted that the data presented in **Table 12-11** are general in nature and are not site specific.

Vibration generating activity	Confidence Limit	PPV (mm/s)	Minimum distance between receptor and works (m) before PPV (mm/s) exceeded.		
Vibratory Rollers - start &	95	0.3	80		
end ⁽¹⁾	95	1.0	30		
	95	10	4		
Vibratory Rollers - Steady	95	0.3	60		
State ⁽¹⁾	95	1.0	25		
	95	10	5		
HGV Movement ⁽²⁾	N/A	0.3	7		
	N/A	1.0	2		
	N/A	10	N/A		
Excavation	N/A	0.3	9		
	N/A	1.0	3		
	N/A	10	N/A		
(1) Assumes 2 rollers, 0.5 mm amplitude, drum width of 1.3 m, e.g. heavy-duty ride on roller.					
(2) Assumes PPV of 1 mm/s at 2 m, referenced within TRL Report 53.					

Table 12-11 Predicted groundborne vibration levels

12.6.8Taking into account the distances between construction activities associated with the Proposed Development and the nearest NSRs, **Table 12-11** indicates the predicted vibration levels are well below limits at which cosmetic building damage becomes likely (15



mm/s) and, at worst, be below the level which will cause complaint but can be tolerated if prior warning and explanation has been given to residents (i.e. less than <1.0 mm/s). This indicates the vibration generated by the construction activities associated with the Proposed Development are unlikely to impact the nearest NSRs.

Construction blast induced noise, vibration and air overpressure

- 12.6.9PAN 50²⁵⁰ confirms that the levels of groundborne vibration as a result of blasting during surface mineral workings "are well below those required to give rise to structural damage". With regard to human perception of vibration due to blasting, BS 5228-2²⁴⁴ states that "ground borne vibration can lead to concern being expressed by residents around open cast sites", but that any concerns raised are "usually over the likelihood of property damage" rather than annoyance/ nuisance (which is unsurprising given the infrequent, occasional nature of the source). The standard goes on to state that "Good public relations have been shown to reassure the public of the fact that normal production blasting has not been found to damage property, and that even the most cosmetic of plaster cracking is extremely unlikely".
- 12.6.10If blasting works were to be required, given the embedded mitigation measures such as keeping local residents informed of the times of blasting works and good practice mitigation measures, it is considered that appropriate measures are in place to allay possible concerns from residents.
- 12.6.11Notwithstanding this, the closest residential receptor is NSR3, which is at a distance of approximately 1.1 km from the proposed substation platform if blasting works were to be required. This substantial distance is sufficient that concerns over possible impacts (either building damage or nuisance) as a result of groundborne vibration are not expected.
- 12.6.12Provided that an exposed detonating cord is not used (which is the usual situation see **Section 12.5**), the characteristic noise from a blast is no longer a sharp crack but rather a 'dull thump'. Peak noise levels from blasting are comparable to the sort of levels typically generated at properties by passing cars, but in the case of blasting would only exist for around a second and also occur relatively infrequently.
- 12.6.13Because of its very brief duration, infrequent occurrence and low frequency content (much of which is below 20 Hz and hence inaudible to the human ear) blast noise is usually considered not to be a significant problem with respect to disturbance to humans.
- 12.6.14Air overpressure may be sensed or felt by humans and can excite secondary vibrations at audible frequencies in buildings (e.g. rattling of windows and ornaments on shelves) that has been found to give rise to adverse comments from occupants of buildings affected by the blasting. However, there is no known evidence of structural damage to buildings/structures from excessive air overpressure levels from quarry blasting.
- 12.6.15Noise attenuation due to topography (whether natural or man-made), ground effects and air absorption between the blast site and receiver would be much greater for the audible component of the pressure wave (i.e. above 20 Hz), but relatively slight on the lower frequency (or concussive) component. As a consequence, the air overpressure from blasting can carry over large distances.
- 12.6.16BS 5228-2²⁴⁴ notes that "*meteorological conditions, over which the operator has no control, such as temperature, cloud cover, humidity, wind speed, turbulence and direction would all affect the intensity of air overpressure at any location*". These meteorological effects cannot be reliably predicted, although under still conditions, once outside the



immediate vicinity of the blast, air overpressure intensity would reduce at 6 dB per doubling of distance.

- 12.6.17For the reasons stated above regarding blast design and the prevailing meteorological conditions, both of which would influence source levels, it is not possible to predict air overpressure from blasting with any certainty this is confirmed in BS 5228-2²⁴⁴. Furthermore, it is not generally accepted practice to set specific limits for air overpressure. In order to control air overpressure, the best practical approach is to take measures to minimise its generation at source, as outlined in the embedded mitigation section above.
- 12.6.18These embedded mitigation measures are sufficient to allay possible concerns from residents were blasting works be required. Notwithstanding this, the substantial separation distance of at circa 1.1 km and greater from the substation platform is sufficient that possible impacts as a result of air overpressures are not expected.

Construction traffic noise

- 12.6.19The results of the Transport Assessment (Appendix J Transport Statement) have been used as the basis for determining the change in noise levels arising on existing roads as a result of construction traffic. Road traffic noise calculations have been carried out in accordance with CRTN²⁵¹, being undertaken for a notional receptor location 10 m from the edge of the carriageway of each road considered. A notional receptor has been used because the change in traffic noise level adjacent to any given road will be the same at all distances where noise from that route is dominant. Traffic noise calculations have been undertaken to establish the change in the daytime L_{A10,18hr} noise level.
- 12.6.20Predictions have been undertaken for the following scenarios:
 - Scenario 1: 2027 Baseline;
 - Scenario 2: 2028 Baseline;
 - Scenario 3: 2027 Baseline + substation construction;
 - Scenario 4: 2027 Baseline + Underground Cable construction;
 - Scenario 5: 2028 Baseline + Overhead Line construction;
 - Scenario 6: 2027 Baseline + Cumulative Developments + Substation Construction;
 - Scenario 7: 2027 Baseline + cumulative developments + Underground Cable construction; and
 - Scenario 8: 2028 Baseline + cumulative developments + Overhead Line construction.
- 12.6.21The changes in road traffic noise levels have been determined by subtracting the noise level predictions determined for the baseline scenarios (i.e. without development), from that determined for the with development scenarios. The resulting change is therefore that associated with the additional construction traffic movements.
- 12.6.22In undertaking these calculations, traffic speeds have been set to the applicable speed limit for each route considered. The predicted road traffic noise levels are shown in Table 12-12 for each considered link. The changes in road traffic noise due to construction traffic are shown in, Table 12-12 for each considered route. The location of the routes can be seen in Figure 12-2.



Route Noise Level LA10,18hr (dB) Baseline + **Baseline + Cumulative Baseline** Proposed **Developments + Proposed** Development **Development** Sc 4 Sc 2 Sc 5 Sc 1 **Sc 3** Sc 8 Sc 6 Sc 7 Link A: A822 63.3 63.3 63.5 63.5 63.5 63.5 63.5 63.5 North of A822 / Feddal Road Junction Link B: A822 62.7 62.7 62.8 62.8 62.8 62.8 62.8 62.8 South of A822 / Feddal Road Junction Link C:Feddal 48.3 48.4 48.8 48.8 48.7 48.8 48.8 48.8 Road West of A822 / Feddal **Road Junction** Link D: A822 62.5 62.5 63.4 63.4 63.3 63.4 63.4 63.4 North of A822 / Braco Cemetary Junction 63.5 64.2 64.2 Link E: A822 A9 63.4 64.2 64.2 64.1 64.2 Slips Link F: Millhill 47.7 47.7 54.9 54.5 54.0 54.9 54.5 54.5 Road West of A9 / Millhill Road Junction Link G: A9 S DfT 74.2 74.2 74.2 74.2 74.2 74.2 74.2 74.2 Counter 724 Link H: A9 N DfT 74.2 74.2 74.3 74.3 74.3 74.3 74.3 74.3 Counter 20730

Table 12-12 Predicted Road traffic noise levels from construction traffic LA10, 18hr (dB)

12.6.23As can be seen from **Table 12-12** the links subject to the highest noise level changes are the Millhill Road (West of A9/ Millhill Road Junction) during the substation construction



phase. The change in noise level is the same when cumulative developments are considered. Assessed in accordance with the criteria in **Table 12-4**, the magnitude of impact would be major. However, in addition to the change in road traffic noise as a result of the development generated traffic it is necessary to consider the sensitivity of the receptor, the absolute noise level and the acoustic context. There are a number of residential properties within 10 m of Millhill Road. The noise levels at these receptors are dominated by road traffic noise from the A9 and likely to be in the region of 65 dB $L_{A10,18Hr}$, indicating any changes in traffic flow along Millhill Road due to construction traffic would be imperceptible as the predicted noise levels for all scenarios are below 55 dB. Therefore, it is considered that the magnitude of this impact would be negligible.

12.6.24For all remaining routes noise level changes range from 0.0 dB to +0.9 dB and the magnitude of impact would, at worst, be negligible.

Operational Noise

12.6.25The predicted noise levels arising from the Proposed Development at the nearest NSRs, i.e. NSR3 and NSR4, are presented in **Table 12-13**.

NSR	Ground Floor Daytime, L _{Aeq,T}	First Floor Night-time, L _{Aeq,} ^τ		
NSR3 ¹	18	18		
NSR4 ¹	11	13		
(1) In the absence 1/3 octave band source level data, it has been assumed that all of the energy in the 100 Hz 1/3 octave band.				

Table 12-13 Predicted noise levels at NSRs, dB

- 12.6.26The results in **Table 12-13** indicate the predicted noise levels are below the existing prevailing noise at the nearest NSRs set out in **Table 12-7**.
- 12.6.27Based on BS 4142²⁴⁵ if a noise source is considered tonal, a penalty is to be applied. Due to the absolute levels predicted and the distance between the nearest NSRs and the Proposed Development a tonality present has not been applied to the predicted operational sound level. Other sound characteristics which can incur a penalty include intermittent and impulsive noise. These have been discounted from this assessment as the proposed substation will produce a steady noise.
- 12.6.28**Table 12-14** shows the BS 4142²⁴⁵ assessment for the nearest NSRs taking account of the acoustic feature correction, which when added to the predicted noise level, gives the combined noise level, referred to as the Rating Level for daytime and night-time period.

	BS 4142 Assessment Period			
	Daytime		Night-time	
	NSR3	NSR4	NSR3	NSR4
Predicted Operational Noise Level, L _{Aeq} dB	18	11	18	13
Acoustic feature correction	+6	+6	+6	+6

Table 12-14 BS 4142²⁴⁵ Assessment



Rating Level dB(A)	24	17	24	19
Background Sound Level, L _{A90} dB	32	32	31	27
Difference, dB	-8	-15	-7	-8

12.6.29The results in **Table 12-14** show that the predicted Rating Level from the Proposed Development would be below the background sound levels at the nearest NSRs during the daytime and night-time periods. This indicates that the fixed plant of the Proposed Development would have a low impact at the nearest residential NSRs.

12.7 Recommendations and Mitigation

Construction Phase

- 12.7.1Mitigation measures have been embedded into the Proposed Development. A Construction Noise Management Plan, detailed in **Table 2-4** (reference EM9) will be prepared by the Principal Contractor with recommendations related to noise and vibration for the construction phase of the Proposed Development. The Principal Contractor will apply BPM and adhere to the Construction Environmental Management Plan (CEMP), General Environmental Management Plans (GEMPs) (Appendix O GEMPs and SPPs) and, where necessary, a Construction Blasting Plan.
- 12.7.2The assessment has identified that, with the embedded mitigation measures in place, a significant effect would not arise with respect to blast induced noise, vibration and air overpressure. An appropriate planning condition can be used to ensure that the content of the CEMP, including the listed mitigation measures, are agreed with PKC, and that the appointed contractor is required to comply with the CEMP.

Operational Phase

12.7.3As set out in **Section 12.6**, the proposed fixed plant to be installed and operated as part of the Proposed Development would have a low impact at the nearby NSRs. Compliance with appropriately derived sound level limits could be ensured by use of an appropriately worded planning condition. Consideration of further, specific, noise mitigation measures is therefore considered unwarranted at this stage.

Cumulative Appraisal

- 12.7.4There is the potential for cumulative effects to occur as a result of the Proposed Development and cumulative developments identified in the surrounding area. Cumulative effects may arise during both the demolition and construction phases and the operational phase.
- 12.7.5The Noise and Vibration chapter presents the assessment of changes in road traffic noise due to construction phase development generated traffic development generated traffic on construction routes in the vicinity of the Proposed Development. The assessment concluded changes in road traffic noise would, at worst, be negligible.
- 12.7.6In addition, a review of the cumulative developments identified in **Table 13-1** of **Chapter 13 Cumulative Developments** has been undertaken to determine the potential for incombination effects to arise.
- 12.7.7**Table 12-16** In-combination Effects below presents the cumulative appraisal of incombination effects and, where necessary, the control or mitigation measures which will be employed to manage potential cumulative effects.



Table 12-16 In-combination Effects

Development	Planning Reference and Description	Potential In-Combination Effects
Cambushinnie 400kV OHL tie-in	The construction of a new terminal tower, and two temporary towers, and removal of existing tower to facilitate the tie-in of the Proposed Development to the existing Braco West Substation.	Taking into consideration the distance between common receptors for the Proposed Development and the OHL, no construction or operational phase cumulative effects are expected.
Cambushinnie Forest, Braco	15/01842/PN: Forestry related works, encompassing the Proposed Development. Status: Currently in operation.	Taking into consideration the distance between common receptors for the Proposed Development and related forestry works, no construction phase cumulative effects are expected.
49.9 megawatt (MW) energy storage facility	21/00756/FLM: Adjacent to the north of the Proposed Development. Comprised of 50 battery storage container units, control building, ancillary equipment, parking, access track, boundary treatments, landscaping, and associated works. Status: "Approve the application." Not currently in operation.21/00756/FLM: Approximately 500m north of the Proposed Development. Comprised of 50 battery storage container units, control building, ancillary equipment, parking, access track, boundary treatments, landscaping, and associated works. Status: 'Approve the application.' Not currently in operation.	Taking into consideration the distance between common receptors for the Proposed Development and the Energy Storage Facility, no construction or operational phase cumulative effects are expected.
49.9MW energy storage facility	22/02231/FLM: Adjacent to the north of the Proposed Development. Formation of a 49.99MW battery energy storage compound. Status: "Awaiting Decision."22/02231/FLM: Approximately 700m North of the Proposed Development. Formation of a 49.99MW battery energy storage compound. Status: 'Awaiting Decision.'	Taking into consideration the distance between common receptors for the Proposed Development and the Energy Storage Facility, no construction or operational phase cumulative effects are expected.


13. CUMULATIVE DEVELOPMENTS

13.1 Introduction

- 13.1.1 This chapter sets out a summary of the potential cumulative environmental effects as a result of the Proposed Development, as set out in more detail as relevant, within Chapters 4 12. The purpose of the assessment is to assess whether the combination of multiple effects upon a common receptor would result in an effect of greater significance than the individual effects.
- 13.1.2The following developments outlined as 'scoped in' in Table 13-1 have the potential for cumulative effects given the likelihood that they would be constructed concurrently with the Proposed Development. The location of these developments is shown in Figure 13-1 Appendix A, Figures.



Table 13-1 Developments Considered in Cumulative Appraisal

Planning Application Reference/Name	Description	Location	Status	Construction Timeframe	Scoped in / out
24/00373/SCRN Proposed Cambushinnie OHL tie-in.	The OHL tie-in element will be subject to its own application for consent under section 37 of the 1989 Act. This development will comprise one permanent tower and 2 temporary towers to facilitate the OHL tie-in between the existing Beauly – Denny OHL and the Proposed Development (substation).	Shindour Feddal Hill Wood Braco. Adjacent to Proposed Development	Intended for planning	2026-2029	Scoped in
Implementation of an UGC between existing Braco West Substation and proposed Cambushinnie substation.	The development will comprise two 132kV UGC circuits that will connect back to the existing Braco West Substation. These will connect the new 400kV AIS substation to the existing 275kV substation. Each UGC will be approximately 500 m in length.	Shindour Feddal Hill Wood Braco. Overlaps with the Site.	Permitted development	2026-2029	Scoped in
Implementation of Haul road adjacent to Braco village.	The haul road will run from the A822, south of Braco, crossing the Keir Burn (using a temporary bridge approximately 4.1m above ground level and 48m in length) and B8033, before continuing north-west through the fields towards Easter Feddal. The haul road will then connect to the existing private track leading towards Braco West Substation. The new track excluding the bridge will be approximately 1.2 km in length and 6.5 m wide. The haul road will be permanent and comprise of approximately 400 m of bound surfacing between the A822 and B8033 east of Keirallan, up to the main temporary construction compound. The road west of this compound up to the western junction with the existing substation access track will comprise of approximately 800 m of unbound type 1 material. A temporary works compound will be required to enable construction works; this will be located adjacent to	Land adjacent to Braco village between the A822 and B8033.	Intended for planning	Prior to October 2025	Scoped out as the haul road will be operational during construction of the Proposed Development.



Planning Application Reference/Name	Description	Location	Status	Construction Timeframe	Scoped in / out
	the A8033 for office, welfare and storage space. There will be riverbank reinforcement work, three topsoil storage areas and potentially up to three bridge fabrication areas.				
15/01842/PN: Forestry related works, encompassing the Site.	Approximately 1.7 km of new forestry track to extend the existing track.	Shindour Feddal Hill Braco	In operation	N/A	Scoped out as development is currently in operation, therefore construction periods will not overlap.
21/00756/FLM: 49.9MW energy storage facility	Comprised of 50 battery storage container units, control building, ancillary equipment, parking, access track, boundary treatments, landscaping, and associated works.	Adjacent to the northeast of the Proposed Development	Application approved	Unknown	Scoped in
22/02231/FLM: 49.99MW battery energy storage compound.	Formation of a 49.99MW battery energy storage compound.	Adjacent to the northeast of the Proposed Development	Application approved	Unknown	Scoped in
PPA-340-2110: Strathallan wind farm	Erection of 9 turbines, access and associated works. Status: Appeal granted	Land At Greenscares Plantation, Near Braco, Perth and Kinross,	In operation	Construction completed	Scoped out as development is in operation



13.2 Cumulative Appraisal

13.2.1A cumulative effects assessment was undertaken for the Proposed Development, in combination with the developments summarised above. This assessment is summarised in **Table 13-2** below.



Table 13-2 Cumulative Assessment

Торіс	Potential Cumulative Effects	Mitigation Measures
Landscape and Visual	 The following two cumulative scenarios have been considered as part of this appraisal: Cumulative Scenario 1: The cumulative baseline for this scenario includes cumulative developments which have been consented in addition to existing operational schemes. Cumulative Scenario 2: The cumulative baseline for this scenario includes cumulative developments at application stage in addition to existing operational schemes and those which have been consented. 	None required given embedded mitigation already integrated into the Proposed Development.
	As a result of the restricted nature of potential visibility and the limited nature of change resulting from the Proposed Development identified in the LVA, it is considered that there is very limited potential for important cumulative landscape effects on the majority of the landscape receptors found within the Study Area. The cumulative landscape appraisal therefore takes a targeted approach, focusing on LCT 380 - Lowland Hills – Tayside, within which each of the cumulative schemes and the majority of the Proposed Development would be located. Although the Proposed Development would also result in direct effects within LCT 384 - Broad Valleys Lowlands – Tayside, these would be limited and localised in nature, related to the proposed existing access track upgrades and as such are not considered to contribute to potential cumulative effects. As identified in the non-cumulative assessment, above, there would be little or no visibility of the Proposed Development from the majority of the identified representative viewpoints and visual receptors at Viewpoint 2 (Core Path BRAC/111/4 (east)), Viewpoint 4 (Core Path BRAC/104/1) and Viewpoint 5 (Core Path BRAC/108/3 close to Calzieveg Farm) and as such they are not considered further in the cumulative assessment. An appraisal of potential cumulative visual impacts on the remaining representative viewpoint 1:	



Торіс	Potential Cumulative Effects	Mitigation Measures
	• The Proposed Development would be predominantly screened from the viewpoint location. However, there is potential for slightly greater visibility of the Proposed Development from more elevated sections of the core path to the west. From these locations the addition of the Proposed Development to scenario 1 would be broadly similar to that set out in the non-cumulative assessment. It would locally add to the presence of electrical infrastructure in the view, but not to the extent where it becomes a defining characteristic. On balance, the magnitude of cumulative impact would be low and when combined with the medium sensitivity would result in a minor adverse level of cumulative effect in relation to scenario 1.	
	 In scenario 2, the Cambushinnie UGC would be installed and reinstated such that it would not contribute to a cumulative effect. The Cambushinnie OHL Tie-in would result in minor alterations and a very slight increase in the impression of OHL towers in a limited part of the view. The battery storage compound (22/02231/FLM) would have a slightly greater influence on the baseline view, increasing the extent of the view affected by electrical infrastructure. 	
	• Where visible, the Proposed Development would add further electrical infrastructure into the view and although it would not increase the extent of the view affected it would add slightly to the overall concentration of development within a small part of the view. The other cumulative schemes, and particularly the combination of the existing Braco West Substation and both the consented and proposed battery storage schemes would have a greater presence and influence on the view, such that the additional change resulting from the Proposed Development would be relatively limited. On balance, the cumulative magnitude of impact would be low and when combined with the medium sensitivity would result in a minor adverse level of effect in relation to scenario 2.	
	• Proposed mitigation measures, including tree and woodland planting, would further reduce potential visibility and therefore cumulative effects of the Proposed Development in the longer term.	
	Viewpoint 3:	
	• In scenario 1, the consented battery storage facility (21/00756/FLM) would be screened from this location and as such there would be no additional cumulative effects.	



Торіс	Potential Cumulative Effects	Mitigation Measures
	 In scenario 2, the Cambushinnie UGC would be installed and reinstated and the proposed battery storage compound (22/02231/FLM) would be screened by topography and vegetation such that these schemes would not contribute to a cumulative effect. The Cambushinnie OHL Tie-in would result in minor alterations and a very slight increase in the impression of OHL towers in a limited part of the view. Potential cumulative change and level of effect resulting from the addition of the Proposed Development would be the same as that identified in the non-cumulative assessment, moderate adverse immediately after construction and at year 15 of operation, reducing to minor adverse in the longer term once proposed mitigation planting establishes and begins to mature. Ballendall, Knoxfauld and Craighead – scattered residential properties In scenario 1, the consented battery storage facility (21/00756/FLM) would be 	
	 predominantly screened by outbuildings, topography and vegetation from each of the residential properties such that it would not contribute to a cumulative effect. In scenario 2, the Cambushinnie UGC would be installed and reinstated and the proposed battery storage compound (22/02231/FLM) would be screened by topography and vegetation such that these schemes would not contribute to a cumulative effect. The Cambushinnie OHL Tie-in would result in minor alterations 	
	and a very slight increase in the impression of OHL towers in a limited part of the views, although would be relatively distant and often at least partially screened. No additional, cumulative effects are anticipated in scenario 2. Easter Feddal – scattered residential properties	
	 In both scenario 1 and 2 each of the cumulative schemes would be predominantly or fully screened from these properties such that they would not contribute to a cumulative effect. Although there may be a slight increase in the number of vehicles using the existing access track at operation, this is not anticipated to result in any discernible change to views and as such there would be no cumulative visual effects on these properties. 	
Ecology and Nature Conservation	No in-combination effects with the all other developments.	None required as no significant cumulative effects are anticipated.
Ornithology	No in-combination effects with all other developments.	None required as no significant cumulative effects are anticipated.



Торіс	Potential Cumulative Effects	Mitigation Measures
Cultural Heritage	No cumulative effects are anticipated as a result of the schemes considered as part of the Cumulative Assessment.	None required as no significant cumulative effects are anticipated.
Forestry	Each project principally affects young conifers growing on areas that have been recently felled, under existing management plans. These areas are not priority or sensitive ecological habitat with reference to Joint Nature Conservation Committee Annex I habitat listings and Scottish Biodiversity Listing Priority Habitats. The development area does not affect the potential for continuation of commercial forestry in the area.	An integrated landscape and habitat management plan (see Appendix F Landscape and Habitat Management Plan) has been prepared with reference to forestry. The selection of Scots pine, oak, rowan, and birch as principal tree species is shared with local energy storage projects.
Traffic and Transport	Environmental effects of cumulative construction traffic on public road network are not predicted. No significant effects are predicted.	None required beyond the CTMP as no significant cumulative effects are anticipated.
Hydrology, Hydrogeology, Geology and Soils	There will be a new OHL located adjacent to the north of the Proposed Development, and two underground 132Kv cable circuits (UGC) that would connect the Proposed Development to the existing Braco West Substation located in the northeast of the Site. Additionally, two BESS projects (50.0 MW and 49.9 MW) will be located adjacent to the northeast of the Proposed Development. The construction impacts of the OHL, UGC and BESS projects will likely be related to contamination of underlying groundwater, nearby surface waters and soils from oils, fuel stored in barrels in mobile tanks and/or plant/equipment used, cement, concrete, waste and wastewater, and also potentially from made ground and soil disturbance associated with the excavations of foundations. These potential effects would be managed through the SHE Transmission CEMP and the following GEMPs- Soil Removal, Storage and Reinstatement GEMP 4, GEMP 5 – Unexpected Contaminated Land, GEMP 6 – Working with Concrete, GEMP 7 – Oil Storage and Refuelling, Waste Management GEMP 9, Working in Peat, Blanket Bog, Wet Heath and Dry Heath Habitats GEMP 10 (see Appendix O GEMPs and SPPs). Potentially sill laden run-off will be prevented from entering water courses and/or drainage channels by using straw bales, silt fences, cut off drains and drainage onto vegetated areas. If deemed necessary, an Environmental Clerk of Works will supervise the construction works to ensure that the CEMP and associated mitigation measures are being implemented effectively. It is anticipated that some areas of peat will be excavated as part of the two BESS projects. The CEMP will include a peat management which will be in place during construction and operation.	None required as no significant cumulative effects anticipated.



Торіс	Potential Cumulative Effects	Mitigation Measures
	Although, the OHL and UGC are adjacent to the Proposed Development, assuming their CEMPs and the SSEN Transmission GEMPs are applied during the construction, operation and decommissioning it is unlikely that there would be any further impacts on geology, soils, and the water environment. Furthermore, the two BESS schemes adjacent to the Proposed Development are unlikely to cause any effects to the human health, water environment, built environment, geology and soils receptors associated with the Proposed Development. It is not considered that the combined effects of construction and operation would be greater than the predicted effects for each project in isolation.	
Climate Change	The assessment of cumulative effects does not apply to the GHG assessment as the assessment is inherently cumulative. The CCRA also focuses on the Proposed Development itself, so cumulative effects do not apply.	None required as no significant cumulative effects anticipated.
	Climate Change is the result of cumulative impacts as it is the result of innumerable minor activities. A single activity may itself result in a minor or insignificant impact, but when combined with many other activities, the cumulative impact could be significant. The nature of GHGs is such that their impact on receptors (the global climate) is not affected by the location of their source. The GHG emissions assessment by its nature is a cumulative assessment and considers whether the Proposed Development would contribute significantly to emissions on a national level.	
	The global atmosphere is the receptor for Climate Change impacts and has the ability to hold GHG emissions. As noted in the third principle of considering the aspect of significance in the IEMA GHG Assessment guidance "GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant". While the impact of any individual Proposed Development may be limited, it is the cumulative impact of many Proposed Development over time that could have a significant impact on Climate Change.	
	As such, it is impossible to define a study area for the assessment of cumulative effects on GHG emissions nor undertake a cumulative effects assessment, as the identified receptor is the global climate and effects are therefore not geographically constrained. Consequently, consideration of the Proposed Development's effects and other developments on GHG emissions is not considered applicable.	



Торіс	Potential Cumulative Effects	Mitigation Measures
	As the CCRA is only concerned with the assets of the Proposed Development and a broader consideration of existing interdependent infrastructure, a cumulative assessment is not required.	
Noise and Vibration	Taking into consideration the distance between common receptors for the Proposed Development and the OHL, UGC and two BESS schemes, no construction or operational phase cumulative effects are expected.	None required as no significant cumulative effects anticipated.



14. SUMMARY OF MITIGATION MEASURES

- 14.1.1**Chapters 4-12** above highlight the potential environmental risks and present mitigation measures for managing these risks.
- 14.1.2The embedded and additional mitigation proposed within this EA is listed below in **Table 14-1**. The CEMP will include these protection measures.

Mitigation Reference	Title of Mitigation	Description
EM1	Lighting requirements	Proposed buildings would not be illuminated at night during normal operation. Floodlights would be installed but would only be used in the event of a fault or any maintenance being undertaken during the hours of darkness; or during the overrun of planned works; or when sensor activated as security lighting for night-time access. The access track would not be lit under normal operation.
		As far as possible, works should be carried out in daylight to minimise the risk of disturbing protected or notable nocturnal species. If any temporary artificial lighting is required for construction works, this should be strongly directional and directed only on to the works area, and be turned off when not required, to minimise light spill and adverse effects on nocturnal wildlife.
		Working hours are proposed to be between 07:00 to 19:00 Monday to Friday and 08:00 to 13:00 on Saturdays. There would be no working on Sunday or bank holidays unless in exceptional circumstances and agreed with PKC.
EM2	Delivery and sourcing of structures and materials.	Materials would be a mix of site-won and locally sourced materials. Concrete would be delivered to site pre-mixed. Hardcore and earthworks materials for the construction of the Proposed Development would be a combination of site won, through cutting of the existing surface to construct the platforms and locally imported materials. Site won materials would be prioritised over imported materials to
EM3	Screening of	reduce the impact on local roads and the environment.
LINIS	Proposed Development	detail in Chapter 4 Landscape Character and Visual , and Appendix F Landscape and Habitat Management Plan.
		visual impacts include:
		 Siting of the substation infrastructure within a relatively visually contained location, within existing plantation forestry and adjacent to the existing Braco West Substation and OHL, therefore limiting potential for landscape fragmentation and visual impacts;
		 Incorporating earthworks and native woodland planting around the Proposed Substation to provide screening and aid landscape integration; and Targeted peatland restoration within suitable areas, providing habitat creation and reflecting the landscape context.

Table 14-1 Schedule of Mitigation



Mitigation Reference	Title of Mitigation	Description
EM4	Security Fencing	A 4 m high palisade fence would be installed around the substation platform. In addition a standard post and wire deer fence would be installed around areas of tree / shrub planting where appropriate.
EM5	CEMP and GEMPs.	Mitigation measures will be implemented through the use of a full CEMP prior to commencement of works controlled by way of planning condition which will cover all the receptors associated with the Proposed Development. The adoption of the applicable GEMPs will reduce the probability of a pollution incident occurring and reduce the magnitude of any incident due to a combination of good site environmental management procedures, including minimising storage of soil volumes, soil management, staff training, availability of contingency equipment and emergency plans. The relevant GEMPs can be found in Appendix O GEMPs and SPPs .
EM6	СТМР	 A CTMP would operate throughout the duration of the construction programme. Appendix J Transport Statement contains a Framework CTMP. The requirement for a detailed CTMP including the following is expected to be controlled by way of an attached planning condition to the consent, if approved, and provided once a Principal Contractor is appointed: Site entry and exit arrangements from public roads; Traffic routeing plans – defining the routes to be taken by HGVs to the Site avoiding sensitive locations; Construction traffic hours and delivery times; Strategy for traffic management and measures for informing construction traffic of local access routes, road restrictions (statutory limits: width, height, axle loading and gross weight), timing restrictions (if applicable) and where access is prohibited; Measures to protect the public highway (e.g. wheel wash facilities); Measures for the monitoring of the CTMP to ensure compliance from construction drivers and appropriate actions in the event of non-compliance; and Mechanism for responding to traffic management issues arising during the works (including concerns raised from the public) including a joint consultation approach with relevant road authorities.
EM7	Biodiversity Net Gain Landscape and Habitat Management Plan	SSEN Transmission has undertaken a Biodiversity Net Gain assessment for the Proposed Development. A Biodiversity Net Gain Report (Appendix E Biodiversity Net Gain Report) and Landscape and Habitat Management Plan (Appendix F Landscape and Habitat Management Plan (LHMP)) will be prepared as part of the measures necessary to achieve SSEN Transmission's target BNG figures. The LHMP details specific requirements for enhancement measures (e.g. blanket bog restoration, woodland creation/enhancement).
EM8	Reinstatement	Following commissioning of the Proposed Development, all temporary construction areas would be reinstated. Reinstatement



Mitigation Reference	Title of Mitigation	Description
		would form part of the contract obligations for the Principal Contractor and would include the removal of all temporary access tracks and work sites.
EM9	Noise	A Noise Management Plan will be prepared by the Principal Contractor with recommendations related to noise and vibration for the construction phase of the Proposed Development. The Principal Contractor will apply BPM and adhere to the Applicant's CEMP and GEMPs.
EM10	Blasting Plan	 The following good practice measures would be employed to reduce potential vibration and air overpressure from blasting works which can be ensured through the production and management of Construction Blasting Plan to be agreed with PKC: Care would be taken with the development of faces, and with trial blasts, as anomalous vibration levels might be produced when there is no free face to relieve the energy produced; Appropriate burden would be ensured to avoid over- or under-confinement of the charge; Accurate drilling and setting out would be undertaken; Charge levels would be appropriate; Exposed detonating cords would not be used; Stemming with appropriate material such as sized gravel or stone chippings would be undertaken; Decking charges/in hole delays/delay detonation would be used to ensure smaller maximum instantaneous charges (MICs); A series of groundborne vibration measurements and air overpressure measurements would be undertaken to check compliance with appropriate criteria (adopted from BS 5228-2244); Each charge would be individually designed to maximise efficiency and reduce energy loss through vibration and air overpressure; The use of surface detonating cords and secondary blasting would be avoided wherever possible; The areas of heave and the total charges would be minimised; Blasting in adverse weather conditions would be avoided (i.e. wind in the direction of sensitive receptors); Blasting would be undertaken only within the (less-sensitive) hours of 10:00 and 12:00 and 14:00 and 16:00 on Mondays to Fridays, and 10:00 and 12:00 on Saturdays; and Local residents would be informed in advance of the proposed times of blasting works, along with details of the good practice mitigation measures that are in place, to ensure good relations and appropriate reassurance.
ECO1	GWDTE	It is considered unlikely that GWDTE would be impacted by the Proposed Development. However, to minimise potential impacts on GWDTE all works must seek to avoid direct disturbance.



Mitigation Reference	Title of Mitigation	Description
		where possible. Mitigation must be employed for individual GWDTE (where required) to ensure that hydrological connectivity from upstream groundwater supplies to the downstream GWDTE is maintained (to maintain existing hydrological regimes). Suitable GWDTE mitigation methods in relation to the construction of access tracks include the use of:
		Permeable track (e.g. coarse aggregate base); and/orCulverts installed at regular intervals.
ECO2	Fish	Fish will be safeguarded by minimising works in or beside all watercourses and open water, and adoption of measures to ensure waterbodies are protected from pollution (by adhering to SEPA Guidance on Pollution Prevention ⁷⁴). Water crossings must be constructed in accordance with authorisations and Method Statements granted/accepted by SEPA.
ECO3	Invasive Non- Native Species (INNS) Biosecurity Management Plan (BMP) or Method Statement	It is an offence in Scotland to plant, or otherwise cause to grow, any plant in the wild at a location outside its native range. Appropriate actions (such as avoidance, specific treatment and/or standard best practice) should therefore be integrated into any works which may affect invasive non-native plant species, to manage the risks and avoid potential breaches of legislation. Such actions should be compiled in a Biosecurity Management Plan (BMP) or, at minimum, a Method Statement. These actions would include avoiding disturbance of invasive non-native plants as far as possible, cleaning of heavy plant, machinery and PPE used in the vicinity of these species, and careful management of any arisings (including potentially contaminated substrate) should they need to be removed. Note that it is best practice, more sustainable and more cost-effective, where feasible, for invasive non-native species arisings to be left within existing infested areas, or at least retained onsite, rather than removing material offsite – removal to landfill is the least sustainable and often the most expensive option. A BMP or Method Statement is likely to be required, as INNS are located near the access track that may be disturbed by works. Production of a BMP would require clarification of the exact locations of species with the potential to become invasive, particularly giant hogweed, snowberry, and dogwood. Establishing this would require a specific walkover survey of localised parts of the Site and could be carried out as a pre- construction survey.
ECO4	Peatland bog restoration Peat Management Plan	Blanket bog restoration will be conducted in suitable locations around the proposed substation platform. Peatland habitats in this area have been badly disturbed by former forestry operations, leaving the land heavily ridged and drained. Good condition for Blanket bog could be met through interventions using recognised best practice techniques (e.g. smoothing and/or drainage channel blocking – which would likely make use of excess peat won from the area of the proposed substation platform) to bring the water table at/near the bog surface all year, with ongoing maintenance of tree/scrub clearance. Peatland restoration measures are described in Appendix N Peat Management Plan & Peat Landslide Hazard Risk Assessment .



Mitigation Reference	Title of Mitigation	Description
ECO5	Broadleaved woodland creation/ enhancement	Broadleaved woodland creation/enhancement will be conducted in suitable areas around the proposed substation platform, using species appropriate to the locality and simulating the canopy of a natural woodland type.
ECO6	Additional biodiversity benefits	 The followings enhancement could also be considered that do not contribute towards the calculation of biodiversity net gain, but can still deliver improvements for biodiversity that would also work towards achievement of 'biodiversity benefits' under NPF4: Use of removed woody material to create log-piles in appropriate retained habitat, as advised by an ecologist, which would function as refuges for the benefit of reptiles, amphibians and invertebrates (e.g. within the vicinity of a SUDS basin); and installation of bird boxes on suitably mature trees (or possibly constructed buildings for the Proposed Development).
ORN1	Breeding Birds	 Mitigation measures will be detailed in a Breeding Bird Protection Plan (BBPP). This document will be prepared and submitted for approval by PKC, in consultation with NatureScot where necessary, prior to commencement of construction. The BBPP will detail the mitigation measures proposed in this document to safeguard breeding birds (including raptors). This will include the following recommended specific mitigation measures: If raptors are confirmed or suspected of breeding, construction phase mitigation measures would be required, as per those afforded to breeding sites of Schedule 1 species. For goshawk, for example, the recognised disturbance zone is up to 500 m. However, goshawk have a moderate level of sensitivity to disturbance and so, it is possible that nesting goshawk would habituate to construction disturbance (and almost certainly the operation of the substation) – this would depend on a number of factors including: proximity to works; the nature of the works; and, the susceptibility to disturbance of the individual bird(s); For the construction period, a suitably experienced ornithologist would conduct watching briefs of nests, under licence, of active Schedule 1 raptors nests within recognised disturbance zones to the Site; and, Where required to safeguard breeding raptors, a suitably experienced ornithologist Environmental Clerk of Works will set in place a 'no works zone' within the disturbance distance of a suspected or confirm nest (March to August, inclusive). Within this no works zone, all construction work (including felling works or any site movements) will cease for the duration of the nesting period.
ORN2	Vegetation Clearance - Breeding Birds	 Ideally, undertake all vegetation clearance outside of the breeding bird season, which is generally taken to be between March and August, inclusive; and Where vegetation clearance must take place during the breeding season, the area must first be checked by a



Mitigation Reference	Title of Mitigation	Description
		suitably experienced ecologist. A works exclusion zone must be implemented around any active bird's nest.
FOR1	Forestry Management	Forestry effects would be on trees that are intended for clear- felling and newly regenerating, previously clear-felled areas. The disruption to forestry management is limited and no extended management felling would be required because of the Proposed Development. Compensation of equivalent hectarage would provide like-for-like forestry mitigation.
FOR2	Tree Planting Landscape and Habitat Management Plan	A Landscape and Habitat Management Plan (Appendix F Landscape and Habitat Management Plan) has been prepared to meet forestry, biodiversity and landscaping objectives. This includes planting of native broadleaf trees to comprise sessile oak (<i>Quercus petraea</i>), holly (<i>Ilex aquifolium</i>), downy and silver birches (<i>Betula pubescens and Betula pendula</i>), rowan (<i>Sorbus aucuparia</i>), Scots pine (<i>Pinus sylvestris</i>) and an understorey of hawthorn, hazel (<i>Corylus avellana</i>) and elder (<i>Sambucus nigra</i>). The woodland areas would provide long-term screening of the Proposed Development. Proposals include an area of wet woodland separating peatland restoration and the principal woodland planting. The wet woodland would contain alder, downy birch, goat willow (<i>Salix caprea</i>), grey willow (<i>Salix cinerea</i>), and hazel.



APPENDIX A FIGURES

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APPENDIX B GAZETTEER



APPENDIX C VISUALISATIONS



APPENDIX D SITE PHOTOGRAPHS



APPENDIX E BIODIVERSITY NET GAIN REPORT



APPENDIX F LANDSCAPE AND HABITAT MANAGEMENT PLAN



APPENDIX G FORESTRY SURVEY DATA



APPENDIX H GEO-ENVIRONMENTAL DESK STUDY



APPENDIX I PRIVATE WATER SUPPLY ASSESSMENT



APPENDIX J TRANSPORT STATEMENT



APPENDIX K GLOSSARY OF ACOUSTIC TERMS



APPENDIX L BASELINE NOISE SURVEY DETAILS



APPENDIX M INDICATIVE PLANT USED IN CONSTRUCTION PHASE



APPENDIX N PEAT MANAGEMENT PLAN & PEAT LANDSLIDE HAZARD RISK ASSESSMENT



APPENDIX O GEMPS AND SPPS



APPENDIX P EIA SCREENING OPINION