SSEN Transmission

Cambushinnie 400kV Overhead Line Tie-In

Environmental Appraisal

May 2025

Scottish & Southern Electricity Networks
TRANSMISSION

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LIST OF ABBREVIATIONS

AAWT	Annual Average Weekday Traffic
AD	Anno Domini
AIS	Air Insulated Switchgear
AOD	Above Ordnance Datum
AQMA	Air Quality Management Area
ASTI	Accelerated Strategic Transmission Investment
ATU	Allyl thiourea
AWI	Ancient Woodland Inventory
BCT	Bat Conservation Trust
BESS	Battery Energy Storage System
BGL	Below Ground Level
BGS	British Geological Survey
BNG	Biodiversity Net Gain
BoCC	Birds of Conservation Concern
BSI	British Standard Instituition
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
$CaCO_3$	Calcium Carbonate
CAR	Controlled Activities Regulations
CAT	SSEN Carbon Asset Database
CBS	Cement Bound Sand
CCRA	Climate Change Risk Assessment
CEMP	Construction Environmental Management Plan
CH_4	Methane
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CO	Carbon Monoxide
CO2	Carbon Dioxide
CTMP	Construction Traffic Management Plan
DEFRA	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero Standards
DfT	Department for Transport
DTM	Digital Terrain Model
EA	Environmental Appraisal

EcIA	Ecological Impact Assessment
ECoW	Environmental Clerk of Works
ECU	Energy Consents Unit
EIA	Environmental Impact Assessment
EPZ	Equipotential Zones
ESO	Electricity System Operator
EU	European Union
GCR	Geological Conservation Review
GDL	Garden and Designed Landscape
GEMP	General Environmental Management Plan
GHG	Greenhouse Gas
GI	Ground Investigation
GLTA	Ground Level Tree Assessment
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GPP	Guidance on Pollution Prevention
GW	Gigawatt
GWDTE	Groundwater Dependent Terrestrial Ecosystems
H_2S	Hydrogen Sulphide
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
HSI	Habitat Suitability Index
ICCI	In-Combination Climate Change Impact
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
km	Kilometre
KPI	Key Performance Indicator

kV	Kilovolt
LB	Listed Building
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Area
LCT	Landscape Character Type
LNCS	Local Nature Conservation Site
LoD	Limit of Deviation
LVA	Landscape and Visual Appraisal
m	Metre
MTBE	Methyl-tert-butyl-ether
MW	Megawatt
NBN	National Biodiversity Network
ND	National Development
NGR	National Grid Reference
NMPi	National Marine Plan interactive
NPF4	National Planning Framework 4 (Scotland)
NPSE	Nation Policy Statement for Energy
NPS EN-5	National Policy Statement for Electricity Networks Infrastructure
NRFA	National River Flow Archive
NRPB	National Radiological Protection Board
NVC	National Vegetation Classification
NWSS	Native Woodland Survey of Scotland
OEMP	Operational Environmental Management Plan
Ofgem	Office of Gas and Electricity Markets
OHL	Overhead Line
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbons
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
PMP	Peat Management Plan
PPG	Pollution Prevention Guidance

PRF	Potential Roost Feature
PWS	Private Water Supply
RBMP	River Basin Management Plan
RCP	Representative Concentration Pathway
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SBTi	Science-based Target initiatives
SEPA	Scottish Environment Protection Agency
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
SUDS	Sustainable Drainage System
SVOC	Semi Volatile Organic Compound
SWMP	Site Waste Management Plan
TPH	Total Petroleum Hydrocarbon
UGC	Underground Cable
UK	United Kingdom
UKCP18	UK Climate Projection 2018
UKHab	UK Habitat Classification
UNDRR	United Nations Office for Disaster Risk Reduction
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
VP	Vantage Point
WCA	Wildlife and Country Act
WF	Water Feature
WFD	Water Framework Directive
WPP	Water Protection Plan
WWII	World War Two
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

1. INTRODUCTION AND PROJECT NEED

1.1 Overview of the Proposed Development

1.1.1 This 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 consent under section 37 of the Electricity Act 1989 ("the 1989 Act").

1.1.2 The application seeks consent under section 37 of the 1989 Act and deemed planning permission under section 57(2) of the Town and Country Planning (Scotland) Act 1997, to construct and operate electricity infrastructure which would form the Cambushinnie 400 kilovolt (kV) overhead line (OHL) tie-in, and ancillary development works. This is hereafter referred to as "the Proposed Development" and is described in **Chapter 2 Proposed Development**. An EIA Screening Opinion was requested from the Energy Consents Unit (ECU). This was returned on 29 April 2024 and stated that the Proposed Development does not qualify as an Environmental Impact Assessment (EIA) development (**Reference ECU00005074, Appendix L EIA Screening Opinion**).

1.1.3 The Applicant is also seeking deemed planning permission under section 57(2) of the Town and Country Planning (Scotland) Act 1997 for certain elements of the Proposed Development, or ancillary development required to facilitate its construction and operation. The ancillary development will include the installation of temporary access tracks, vegetation clearance, temporary working areas and upgrades to existing access tracks and existing access points.

1.1.4 This 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 4[1] (NPF4), the Electricity System Operator's (ESO) Pathway to 2030 Holistic Network Design[2], the British Energy Security Strategy[3] and the Accelerated Strategic Transmission Investment (ASTI) framework[4].

1.1.5 SSEN Transmission is proposing to upgrade the existing Beauly-Denny 275 Kilovolt (kV) circuit to operate at 400 kV to mirror the ratings of the existing 400 kV circuit which already operates at this voltage. This upgrade does not require any works to be done to the existing OHL infrastructure, other than new tie ins, but requires alterations to existing substations at Beauly, Fasnakyle, Fort Augustus, Tummel, Errochty, Kinardochy and Braco West which connect onto the existing line. Works are required at each of the substations with differing scopes and requirements and therefore consenting types and timescales.

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

2 National Grid ESO, 2022. *Pathway to 2030* [online]. [Accessed 02 July 2024]. Available at: https://www.nationalgrideso.com/document/262676/download

3 HM Government, 2022. *British Energy Security Strategy* [online]. [Accessed 02 July 2024]. Available at: https://assets.publishing.service.gov.uk/media/626112c0e90e07168e3fdba3/british-energy-security-strategy-web-accessible.pdf

4 Ofgem, 2023. *Accelerated Strategic Transmission Investment Guidance And Submission Requirements Document* [online] [Accessed 02 July 2024]. Available at: https://www.ofgem.gov.uk/sites/default/files/2023-08/Accelerated%20Strategic%20Transmission%20Investment%20Guidance%20And%20Submission%20Requirements%20Document.pdf

1.1.6 The 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.

1.1.7 It is anticipated that the Proposed Development will be operational in perpetuity. The design life of the individual components of the Proposed Development is considered to be approximately 45 years or more, however, these will be maintained or replaced as part of a regular maintenance and monitoring regime. Consequently, as the Proposed Development would support ongoing transmission of electricity in the wider area, it is considered permanent and as such decommissioning is not considered in this EA.

1.2 National Significance

1.2.1 In July 2022, National Grid, the Electricity System Operator (ESO), 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 United Kingdom (UK) and Scottish Government's 2030 offshore wind targets of 50 Gigawatts (GW) 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.

1.2.2 SSEN Transmission holds a licence under the 1989 Act for the transmission of electricity in 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

1.3.1 National Planning Framework 4 (NPF4) 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".*

1.3.2 Of particular relevance to the Proposed Development, NPF4 states that regarding National Development 3 (ND3), Strategic Renewable Electricity Generation and Transmission Infrastructure, this will *"support 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."

1.3.3 It 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

1.4.1 The location for ND3 is set out as being "All of Scotland" 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."*

1.4.2 The 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

1.5.1 In 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).

1.5.2 The ESO'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.

1.5.3 In 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 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.

1.5.4 This project, 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 Strategy.

2. PROPOSED DEVELOPMENT

2.1 Introduction

2.1.1 This 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 - 10**.

2.2 The Proposed Development Site

2.2.1 The Limit of Deviation (LoD) shown in **Figure 2-1, Appendix A Figures** defines the maximum extent within which the Proposed Development can be built. This is hereafter referred to as the "Proposed Development Site" or the "Site". The LoD is described further in **Section 2.5.1.**

2.3 Proposed Development Components

2.3.1 The Proposed Development will consist of a temporary layout arrangement for construction, and a permanent layout arrangement for operation, the components of these are illustrated in **Figures 2-2** and **2-3**, **Appendix A Figures** respectively and will comprise the following elements:

- Two temporary towers 380T and 379T to allow for short term OHL diversions during the construction of the new terminal tower 380R;
- One new permanent terminal tower 380R;
- Dismantling of redundant tower 380; and
- Temporary access routes to permanent and temporary towers except at T378.

2.3.2 The components described above comprise the Proposed Development covered by this EA and application for consent under section 37 of the 1989 Act.

2.3.3 The OHL tower design would consist of a 400kV steel lattice design. The permanent new terminal tower 380R will be a maximum height of 62.42 meters (m) above ground level. The temporary diversion towers 379T and 380T are anticipated to measure heights of approximately 52 m and 49 m respectively.

2.4 Associated Project Developments

2.4.1 The associated developments listed below do not fall directly under the remit of this EA, however are described in the developments for consideration in the cumulative appraisal in **Table 11-1**. Where appropriate, the cumulative effects of the associated developments are also assessed in **Chapters 4-10** and summarised in **Table 11-2**.

- Proposed Cambushinnie substation, the Proposed Development will tie-in to this development, consent for the substation infrastructure will be sought by the applicant under a separate Town and Country Planning Application;
- 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 track that bypasses the need to route construction traffic through Braco village, the applicant will progress this under the Town and Country Planning (Scotland) Act 1997. The construction of the haul track will connect the A822 and B8033 roads

with the western extent of the haul track connecting the B8033 to the existing access track.

2.4.2 The associated developments in conjunction with the Proposed Development describe the 'Project'.

2.5 Limit of Deviation

2.5.1 The Proposed Development includes a number of elements which, for construction, will need some flexibility in final siting to reflect localised land, engineering and environmental constraints. To allow for this flexibility, the Proposed Development includes Limit of Deviations (LODs) The LoD is the area either side of the proposed OHL components as described above, within which micro-siting will take place. The LoD parameters are set at 50 m either side of the proposed OHL components. The vertical LoD will be 6 m.

2.5.2 Any permanent access tracks will require a 50 m LoD to match the OHL LoD. Any spurs of access tracks (perpendicular to the main track) that link into the wayleave (the voluntary agreement between a landowner upon whose land an overhead line is to be constructed and SSEN Transmission[5]) will also require a 50 m LoD.

2.6 Construction

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

- Creation of temporary working areas at the towers to facilitate tower building, tower dismantling and the installation of conductors;
- Creation of temporary and permanent accesses to the temporary and permanent towers;
- The creation of two temporary towers 380T and 379T to allow the construction of the new terminal tower 380R close to the existing tower 380;
- The construction of a new permanent terminal tower 380R;
- Re-installation of conductors from tower 381 to 379 through tower 380R;
- Installation of downleads from tower 380R to the substation gantries; and
- Dismantling of temporary towers (380T and 379T) and redundant tower 380.

Construction Compounds

Site Compound and Laydown Areas

2.6.2 Temporary working areas will be required to enable construction of the works. It is currently anticipated that a tower laydown area comprising of stone material, of approximately 75 x 50 m, at all permanent and temporary tower positions will be required to facilitate construction works. The main site compound will be shared with the proposed Cambushinnie substation and will be applied for through the separate application for planning permission under the Town and Country Planning (Scotland) Act 1997 for the proposed substation.

2.6.3 Hardstanding areas will be required to support a mobile crane for tower erection and will consist of crushed stone laid on geotextile membrane.

Implementation of Equipotential Zones (EPZs)

2.6.4 Equipotential Zones (EPZs) are work zones required to protect workers from electric shock caused by differences in the electric potential between objects in the work area.

[5] SSEN Transmission (2020). *PR-NET-ENV-501 Procedures for Routing Overhead Lines and Underground Cables of 132kV and above.*

2.6.5 The EPZs will need to be constructed on flat ground created by cutting or filling, overlaid with metal access panels electrically bonded to the adjacent tower.

2.6.6 EPZs would be set back approximately 1.5x the tower length and are made up using temporary metal panels.

OHL Construction

Tower Construction

2.6.7 The new towers tower 379T, tower 380T and tower 380R would be delivered to site as bundled steel and loaded onto the working area next to the proposed tower site. Tower sections would be assembled within the working area to 'boxed up' sections, i.e. where sections of equipment will be built/erected using a telehandler and / or mobile crane. The working area would need to be constructed on flat ground created by cutting or filling to create a level working area.

Conductor for Temporary Diversion

2.6.8 The circuits (sets of conductors with three different phases) would be able be transferred onto the temporary diversion once the temporary towers (tower 380T and tower 379T) were in place. Each circuit would require an outage to transfer from the existing circuit to the temporary tower arrangement.

Conductor Removal and Installation

2.6.9 With both circuits diverted, work could commence on the foundations for the permanent tower 380R and building the towers themselves. On completion of the new towers, the circuits would be able to be removed from the temporary diversion and onto the new towers.

2.6.10 Where possible the existing conductors would be transferred to the temporary / permanent spans for re-use using lowering and raising methodology across the span.

2.6.11 Where not possible to be transferred, the conductor would be lowered from the temporary arrangement and rolled onto cable drums and removed from the Site. A new conductor would be installed using traditional drum pulling methodology / EPZs. Using a new conductor prevents risk of defects in the permanent arrangement when the conductor is lowered and raised during construction.

Tower Removal

2.6.12 The towers to be removed, 380T, 379T and tower 380, would be dismantled using a mobile crane. The dismantled towers would be the property of SSEN Transmission and would be the responsibility of SSEN Transmission to reuse, recycle or dispose of appropriately. The foundations for the removed towers would be removed using a hydraulic breaker to an acceptable depth, normally 1.5 m below ground level.

Reinstatement

2.6.13 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 Site works.

Delivery of Structures and Materials

2.6.14 Pre-mixed concrete would be delivered to Site. Hardcore and earthworks materials for the construction of the Proposed Development would be a combination of Site won material, and locally imported materials. Site won materials would be prioritised over imported materials to reduce the impact on local roads and the environment.

2.6.15 There would be a volume of surplus excavated material arising from the foundation works and it is envisaged this could be spread around the base of the tower to reduce the amount of road haulage to and from the Site.

Construction Programme

2.6.16 The timing of works is still to be confirmed however it is anticipated that construction of the Proposed Development would take approximately 19 months subject to consents and construction of the associated substation and wider project elements.

Construction Hours of Work

2.6.17 Construction working hours are anticipated to typically be restricted to 07:00 to 19:00 Monday to Friday and 08:00 to 13:00 on Saturday, with only some continuous activities carried out by exception. 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. These working hours are subject to approval from Perth and Kinross Council (PKC).

Construction Traffic

2.6.18 The A822 public road 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 proposed new haul track development would be used for construction vehicles between the B8033 and A822 to access the Site.

2.6.19 A 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 I 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 8 Traffic and Transport**.

2.7 Operations and Maintenance of the OHL

Operational Infrastructure

2.7.1 A need for permanent operational facilities has been identified to support operational requirements.

- Lighting – the Proposed Development would not be illuminated at night during normal operation.
- Permanent Access – it is anticipated that vehicle access to the Site would be via the existing public road network and dedicated site access track.

Staff

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

Maintenance Programme

2.7.3 OHLs require very little maintenance once operational. Regular inspections would be undertaken to identify any unacceptable deterioration of components so that they can be replaced. From time to time, inclement weather, storms, or lightning could cause damage to either the insulators or the conductors. If conductors are damaged, short sections would have to be replaced. During the operation of the Proposed Development, it would be necessary to manage vegetation along the OHL conductor to maintain required safety clearance distances.

2.8 Landscape Mitigation Measures and Biodiversity Enhancement

2.8.1 Landscape and visual mitigation measures, including native woodland planting and peatland seeding to provide a degree of visual screening and/ or to help integrate the Proposed Development into the surrounding landscape have been proposed. 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**. The plan is also included in the associated Cambushinnie substation EA and includes measures related to the Proposed Development and associated substation and UGC developments.

2.9 Mitigation Proposals

2.9.1 Mitigation 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 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 - 10** and would be implemented by SSEN Transmission in order to minimise the likely significant effects.

Embedded Mitigation

2.9.2 The 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.

2.9.3 Design environmental embedded mitigation measures for the Proposed Development are listed in **Table 2-1** below:

Table 2-1 Design Environmental Embedded Mitigation Measures

Mitigation Reference	Mitigation Title	Description
EM1	Lighting requirements	The structures of the Proposed Development would not be illuminated at night during 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 currently anticipated between 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.
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

Mitigation Reference	Mitigation Title	Description
		the Proposed Development would be a combination of locally sourced and site won materials. There will be a volume of surplus excavated material arising from the foundation works and it is envisaged this could be spread around the base of the tower to reduce the amount of road haulage to and from the Site. Site won materials would be prioritised over imported materials to reduce the impact on local roads and the environment.
EM3	Screening of the Proposed Development	All landscape and visual mitigation are embedded and covered in detail in **Chapter 4 Landscape Character and Visual Impact,** and **Appendix F Landscape and Habitat Management Plan** Key embedded mitigation measures relevant to landscape and visual impacts include: • Wider landscape fragmentation is limited through siting the OHL corridor and ties adjacent to the proposed Cambushinnie and existing Braco West substations, and within existing plantation forestry.
EM4	Construction Traffic Management Plan (CTMP)	A CTMP would operate throughout the duration of the construction programme. **Appendix I 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 and 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 location; • 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.
EM5	Construction Environmental Management Plan (CEMP and General Environmental	Mitigation measures will be implemented through the use of a CEMP which will be produced by the main contractor, and

Mitigation Reference	Mitigation Title	Description
	Management Plans (GEMPs)	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 K GEMPs and SPPs**.
EM6	Biodiversity Net Gain (BNG) Landscape and Habitat Management Plan (LHMP)	A BNG assessment has been undertaken for the Proposed Development, proposed Cambushinnie substation and UGC. A BNG Report (**Appendix E Biodiversity Net Gain Report**) and a Landscape and Habitat Management Plan (**Appendix F Landscape and Habitat Management Plan)** have been prepared to demonstrate how SSEN Transmission's target BNG figures could be achieved. The Landscape and Habitat Management Plan (LHMP) details specific requirements for enhancement measures (e.g. blanket bog restoration, woodland creation/enhancement).
EM7	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.
EM8	Science Based Targets initiatives	Science-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 have committed to the following verified SBTi , 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 55% by 2033 from a 2020 baseline; and • Committing to working closely with its supply chain so that 35% of its suppliers will have a Science-based target (SBT) set by 2026.
EM9	SSEN Transmission Sustainable Supplier Code[6]	SSEN Transmission Sustainable Supplier Code sets out its Sustainable Procurement Goals, aligned the UN's Sustainable Development Goals. Implementation of these measures will ensure the project mitigates GHG emissions and contribute towards Scotland's Net Zero targets. The following 2025 targets include (but 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;

[6] SSEN, 2023. *Sustainable Supplier Code* [online]. [Accessed on 11 April 2024]. Available at: https://www.ssen.co.uk/globalassets/about-us/sustainability/documents/ssen-distribution---scsc-supplier-code-4-pager-v5.pdf

Mitigation Reference	Mitigation Title	Description
		• 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.
EM10	Climate Change Risk Assessment	SSEN Transmission's Climate Resilience Strategy[7] 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.

Construction Environmental Management and Good Practice

2.9.4 Construction 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.

2.9.5 A Construction Environmental Management Plan (CEMP) will be implemented during the construction period. The requirement for a CEMP would be expected to be included as a condition on the planning consent 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;
- Waste (construction); and
- Operation and management of the Site (including construction compounds).

2.9.6 The CEMP will incorporate SSEN Transmission's GEMPs and Species Protection Plans (SPPs) (see **Appendix K GEMPs and SPPs**) which are applied as a standard requirement to all construction sites and practices.

[7] SSEN, 2023. *Climate Resilience Strategy* [online]. [Accessed 20 May 2024]. Available at: https://www.ssen.co.uk/globalassets/about-us/sustainability/documents/ssen-climate-resilience-strategy-progress-report-2023.pdf

2.9.7 The CEMP will be produced prior to commencement of construction activities and will form part of the contractor documents between the applicant, and the appointed Principal Contractor.

Operational Residues and Emissions

2.9.8 Due to the nature of the Proposed Development, operational residues and emissions are 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.

2.9.9 Noise emissions from the Proposed Development are likely to be minimal and limited to that generated from existing maintenance and operational activities.

2.9.10 No significant emissions are likely from electric and magnetic fields following compliance with regulations and legislation and the regular maintenance of equipment.

3. METHODOLOGY

3.1 Introduction

3.1.1 This 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.

3.1.2 A detailed overview of the guidance and methodology adopted for each technical study is provided within the respective technical chapters of this EA (**Chapters 4-10**).

3.2 Approach to the Environmental Appraisal

3.2.1 SSEN Transmission intends to submit an application for consent under section 37 of the 1989 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, as presented in **Table 2-1** and **Table 12-1**. The approach followed in the EA is to initially identify the topics which require a level of assessment to determine the potential for 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.

3.2.2 For 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 is 'scoped in' or 'scoped out' of further assessment.

3.2.3 For 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 in accordance with appropriate methodologies and best practice guidelines. Further details on this are provided in the technical chapters.

3.2.4 **Chapter 12 Summary of Mitigation Measures**, collates the additional mitigation measures recommended in each of the technical chapters, which will be taken forward for inclusion in the site-specific CEMP.

3.3 Scope of the Environmental Appraisal

3.3.1 An initial review of baseline conditions and sensitive receptors has been undertaken. **Figures 3-1a-d, Appendix A Figures**, illustrate the identified environmental constraints within 5 km of the Proposed Development. The environmental constraints identified below are discussed in further detail in **Chapters 4-10**.

3.3.2 The following key environmental constraints have been identified within the study area, these include:

- The Site is located within the Landscape Character Area (LCA) Lowland Hills - Tayside.
- The Site is located within a Drinking Water Protected Area for groundwater.
- The closest farmstead/residential property to the Site is Tamano Farm, which is approximately 1.2 km southeast of the Site.
- The Site is located across the following agricultural land classes:
  - Class 4.1 *"Land capable of producing a narrow range of crops, primarily grassland with short arable breaks of forage crops and cereal".*

  - Class 5.2 *''land capable of use as improved grassland. Few problems with pasture establishment but may be difficult to maintain''*[8].

- The Site is approximately 1.3 km northwest of an area of Ancient Woodland.
- There are five private water supplies (PWS) within 2 km of the Site.
- The Site sits on a moderately productive 2B class Aquifer.
- An unnamed watercourse which drains into the Bullie Burn is present within the Site. The Bullie Burn is classified as having a Moderate Overall condition[9].
- Scheduled Monument (SM) (SM3088) a Fort at Grinnan Hill is approximately 3.77 km east of the Proposed Development.

8 NatureScot, 2022. *National Soil Map of Scotland* [online]. [Accessed 01 July 2024]. Available at: https://soils.environment.gov.scot/maps/soil-maps/national-soil-map-of-scotland/

9 SEPA, 2015. *Water Classification Hub* [online]. [Accessed 01 July 2024]. Available at: https://www.sepa.org.uk/data-visualisation/water-classification-hub/

Table 3-1 Scoping Review

Topic	Scoped In	Scoped Out
Landscape Character and Visual Impact	A Landscape and Visual Appraisal (LVA) is proposed as part of the EA following the guidelines set out in the good practice documents.	An assessment of the following has been scoped out of the EA: Landscape and visual receptors including landscape designations that are located beyond 3 km from the Proposed Development, or where forestry will screen views of the Proposed Development.
Ecology and Nature Conservation	The following potentially significant environmental risks have been scoped into the Ecology and Nature Conservation Appraisal: • Habitats (temporary loss, permanent loss, degradation); • Ecologically designated sites; • Legally protected and notable species; • Temporary disturbance and/or displacement of species during construction; • Disturbance and/or displacement of species; and, • Direct mortality of species.	The following designated sites and protected species have been scoped out of the Ecology and Nature Conservation Appraisal: • 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. • None of the other four SACs within the Zone of Influence (ZoI) (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 6 km from the Site at closest. • Impacts on otter and water vole due to the limited aquatic environment and sub-optimal terrestrial habitats within the Site. • 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

Topic	Scoped In	Scoped Out
		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 the Energy Consents Unit (ECU), setting out why likely significant effects are not considered possible and therefore that further HRA is not considered necessary. The ECU 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; • Temporary disturbance and/or displacement of species of birds; • Potential for direct mortality of species.	Given the relative distance from the Site, the following ornithological designated sites and features identified are scoped out of the Ornithology Appraisal: • South Tayside Goose Roosts Special Protection Area (SPA) and Ramsar site. Approximately 5.5 km east of the Proposed Development; • Loss of breeding sites for species listed under Schedule 1 of the Wildlife and Country Act 1981. However, note that the South Tayside Goose Roosts 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 the ECU, setting out why likely significant effects are not considered possible and therefore that further HRA is not considered necessary. The ECU will need to confirm agreement or otherwise, as the competent authority for HRA matters.
Forestry	A combined appraisal of ecology, landscape and forestry is proposed. Professional Forestry input will continue to inform the EA, mitigation, and design within the related principles. More information on forestry inputs within the EA can be found in the following appendix: • **Appendix F Landscape and Habitat Management Plan**	A Forestry Appraisal has been scoped out of this EA. The National Forest Inventory and field survey, for associated infrastructure, identifies the area as felled: restocking is of young trees, planted in 2017. The restocking is yet to establish complete forest cover across the compartment and traversing this compartment, to access the OHL, has negligible effect on forestry. However, at the location of the Proposed Development, full restocking with Sitka spruce, has been achieved but the receptor has low

Topic	Scoped In	Scoped Out
		sensitivity, on account of early growth stage of commercial forestry and the magnitude of impact is also low. The Applicant has documented a Forestry Compensation Planting and Management Strategy for the Proposed Development submitted as part of the planning application. The area of forest land that would be affected by the Proposed Development is appropriately captured by the Forestry Compensation Planting and Management Strategy. Additionally, a unified approach to tree loss compensation and mitigation design, including forestry input, for the Proposed Development, is presented in: • **Appendix F Landscape and Habitat Management Plan** The Applicant has further committed to off-site forestry compensation planting proposals which will be developed to match the area of on-site forestry removal and will include conifer crops with the potential to produce timber.
Cultural Heritage	The following potentially significant environmental risks are scoped into the Cultural Heritage Appraisal: Permanent physical impacts on previously unrecorded heritage assets due to construction of the Proposed Development; and • Permanent physical impacts on previously unrecorded heritage assets due to construction of temporary construction compounds or other works areas required.	Based on the current design, changes to the appearance of the OHL will be minor during the operational phase. Therefore, the following cultural heritage features have been scoped out of the Cultural Heritage Appraisal: • Physical impacts on designated assets; and • Impacts on the setting of designated and non-designated assets.
Traffic and Transport	In accordance with Institute of Environmental Management and Assessment (IEMA) Guidelines 2023[10] the environmental assessment of road traffic will assess the potential significance of effects for the following categories: • Severance of communities; • Fear and Intimidation;	As it is considered unlikely there will be material construction traffic generated whose loads would fall within the current classifications for carriage of hazardous goods (Class 1-9), the following environmental risks from the 2023 IEMA Guidelines[10] on Traffic and Transport Environmental assessment will be scoped out of the appraisal: • Hazardous Loads.

[10] IEMA (2023) Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement [online] Available at: https://www.iema.net/media/5mrmquib/iema-report-environmental-assessment-of-traffic-and-movement-rev07-july-2023.pdf [Accessed: February 2025]

Topic	Scoped In	Scoped Out
	• Road user and pedestrian safety; • Pedestrian and non-motorised amenity; • Pedestrian & non-motorised delay; • Road vehicle driver and passenger delay; and • Large loads.	
Hydrology, Hydrogeology, Geology Soils and Peat	Construction impacts for the receptors below are scoped into the EA: • Soils; • Areas of peatland; • Geology; • Land Contaminations; • Human health of site users; • Human heath of third-party neighbours; • The water environment (including surface water and groundwater aquifers); • Hydrogeology; • Dunblane groundwater body; • Potential Groundwater Dependent Terrestrial Ecosystems (GWDTEs); • Surface Water; • Bullie Burn and associated tributaries; • Muckle Burn and associated tributaries; • Private Water Supply (PWS); and • Unnamed water features. Further information on peat can be found in **Appendix J Peat Management Plan** as part of the EA.	From the baseline summary, the following receptors will be scoped out of the EA: • A detailed flood risk assessment has been undertaken by Jacobs, including the Proposed Development. Flood risk will be dealt with through the planning process based on the separate assessment. Therefore, flood risk is scoped out of this EA report. • Operational impacts of the Proposed Development have been scoped out.

Topic	Scoped In	Scoped Out
Climate Change	The following assessments will be carried out in line with IEMA Guidelines[11] as part of the Climate Change appraisal: • Greenhouse Gas (GHG) Impact Assessment; • Climate Change Risk Assessment (CCRA); and • In-Combination Climate Change Impact assessment (ICCI).	Sea level rise is the only issue scoped out of the EA at this stage as the Proposed Development is in an upland location remote from the coast.
Land Use and Agriculture	N/A	An appraisal of land use and agriculture is scoped out of the EA. Impacts on agriculture have been scoped out as the Proposed Development is not on productive agricultural land as classified by the Scottish Soil Capability for Agriculture Map[12]. The Proposed Development is also within an existing wayleave for OHLs. The area of forest land that would be affected by the Proposed Development, and associated substation and UGC developments is appropriately captured in the Compensatory Planting Strategy. A unified approach to tree loss compensation and mitigation design, including forestry input, is presented in: • **Appendix F Landscape and Habitat Management Plan**
Socioeconomics and Tourism	N/A	An appraisal of socioeconomics and tourism is scoped out of the EA. The potential impacts on socioeconomics and tourism identified during scoping are addressed in greater detail in the following EA chapters: • **Chapter 4 Landscape and Visual Impact** • **Chapter 5 Ecology and Nature Conservation** • **Chapter 7 Cultural Heritage**
Population and Human health	N/A	An appraisal of population and human health assessment is not proposed as part of the EA.

[11] IEMA, 2020. *Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation* [online]. [Accessed 18 April 204]. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020

[12] Scottish Soils (2024) *National scale land capability for agriculture map* [online] Available at: https://map.environment.gov.scot/Soil_maps/?layer=5 [Accessed: February 2025]

Topic	Scoped In	Scoped Out
		Potential impacts on population and human health found during scoping are addressed in greater detail in the following chapters: • Potential visual effects of the Proposed Development on nearby receptors are considered in **Chapter 4 Landscape and Visual Impact.** • Potential effects of the Proposed Development transport and transport impacts are considered in the Traffic and Transport assessment. Further details on this assessment can be found in **Chapter 8 Traffic and Transport**. • Potential effects of the Proposed Development on water quality are considered in **Chapter 9 Hydrology, Hydrogeology, Geology and Soils.** • Potential effects of the Proposed Development on climate change are considered in **Chapter 10 Climate Change.** • Effects on population and human health from Electromagnetic fields (EMFs) are considered to be unlikely as it is the Applicant position 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.
Air Quality	N/A	An appraisal of 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

Topic	Scoped In	Scoped Out
		means these would be localised, short-term and intermittent. Potential effects would be mitigated further through the implementation of mitigation measures, in particular the project CEMP and relevant GEMPs.
Material Assets and Waste	N/A	An appraisal of Material Assets and Waste is scoped out of the EA, including the following environmental risks: • Potential land contamination impacts are considered in **Chapter 9 Hydrology, Hydrogeology, Geology and Soils** of this EA. • Details of excavated and waste material will be managed in accordance with the Site Waste Management Plan (SWMP) and CEMP documents.
Major Accidents and Disasters	N/A	An appraisal of Risk of Major Accidents and/or Disasters Assessment is not proposed as part of the EA. Potential major accidents and disaster will be managed through appropriate Proposed Development design and facilities management during the construction and operational phase.

3.4 Consultation Undertaken

3.4.1 A pre-application meeting was held with the ECU on 6 March 2024 to introduce the need for the Proposed Development and the predicted timescales.

3.4.2 A request for an EIA Screening Opinion was submitted to the ECU on 4 March 2024. The ECU screening opinion was returned on the 29 April 2024 and stated that the Proposed Development does not qualify as an EIA development in terms of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (Reference: ECU00005074, **Appendix L EIA Screening Opinion**). A formal EIA is therefore not required under the legislation.

3.4.3 An initial public consultation event was held at Braco Village Hall, Braco village on 22 August 2023 (15:00-19:30). This focused primarily on the detailed site selection process for the proposed Cambushinnie substation. However, arrangements for the Proposed Development were also addressed.

3.4.4 Two public consultation events were held at Braco Village Hall, Braco village on 20 March 2024 (15:00-19:00) and 12 June 2024 (15:00-19:30).

3.4.5 The 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.

3.5 Cumulative Effects

3.5.1 There 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 culmination 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.

3.5.2 The 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 are considered to 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 the ECU, to allow sufficient time to compile the EA Report.

3.5.3 A cumulative appraisal has been undertaken considering the developments in-combination with the Proposed Development, this is presented in **Chapter 11 Cumulative Developments**. The development proposals which will be considered in the cumulative appraisal are outlined in **Section 11.1.2** and **Table 11-1**.

3.6 Assumptions and Limitations

3.6.1 The key assumptions and limitations applied to the preparation of this EA Report are set out below. Assumptions and limitations specific to certain topics are identified in the appropriate technical chapter.

3.6.2 A 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.

3.6.3 Baseline 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.

3.6.4 The design, construction and completed stages of the Proposed Development will (at least) satisfy minimum environmental standards, consistent with contemporary legislation, practice, and knowledge.

4. LANDSCAPE CHARACTER AND VISUAL IMPACT

4.1 Introduction

4.1.1 This chapter considers the potential for effects on landscape character and visual amenity resulting from the Proposed Development.

4.1.2 This 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.

4.1.3 This chapter is supported by the following figures in **Appendix A Figures**:

- **Figure 4-1 Zone of Theoretical Visibility**;
- **Figure 4-2 Landscape Character Types**;
- **Figure 4-3 Viewpoints and Recreational Routes**; and
- **Figure 4-4 Cumulative Developments**.

4.1.4 This chapter is also supported by visualisations contained in **Appendix C Visualisations**.

4.2 Information Sources

4.2.1 The following information sources have been used to inform this report:

- Online mapping including Ordnance Survey (OS) maps and aerial photography;
- Scottish Landscape Character Types Map and Descriptions[13]; and
- Relevant local planning and policy documents.

4.3 Methodology

4.3.1 The EIA screening process (undertaken in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017) has confirmed that the Proposed Development is not considered to constitute EIA development. The scope and approach of the Landscape and Visual Appraisal (LVA) outlined below reflects this status and the nature and scale of the Proposed Development.

4.3.2 The 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 Edition[14];

13 Landscape Institute and Institute of Environmental Management Assessment, 2013. *Guidelines for Landscape and Visual Impact Assessment. Third Edition.* NatureScot. Scottish Landscape Character Types and Descriptions. [Online] Available at: Scottish Landscape Character Types Map and Descriptions | NatureScot

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

- Landscape Institute (2019) Technical Guidance Note 06/19, Visual Representation of Development Proposals[15], and
- Landscape Institute (2021) Technical Guidance Note 02/21, Assessing landscape value outside national designations[16].

4.3.3 GLVIA 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

4.3.4 Landscape 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.

4.3.5 The 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.

4.3.6 Landscape 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.

4.3.7 The 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;
- 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; and
- Functional - Landscape which performs a clearly identifiable and valuable function, particularly in the healthy functioning of the landscape.

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

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

4.3.8 Landscape 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.

4.3.9 The 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 high, medium, or low. **Table 4-1**, below, outlines indicators that inform landscape value, susceptibility, and sensitivity.

Table 4-1 Sensitivity of Landscape Receptors

	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.

Visual Sensitivity

4.3.10 The 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.

4.3.11 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.

4.3.12 The 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.

4.3.13 As with landscape susceptibility, judgements about the susceptibility of visual receptors have been described as high, medium, or low using consistent and reasoned judgements.

4.3.14 The 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. **Table 4-2**, below, outlines indicators that inform landscape value, susceptibility, and sensitivity. Landscape sensitivity has been described based on a scale of high, medium, or low.

Table 4-2 Sensitivity of Visual Receptors

	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. 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.		People whose attention or interest is not focused on their surroundings and where the view is incidental to their enjoyment.

Landscape Magnitude of impact

4.3.15 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 will be experienced (for example within the application boundary, the immediate setting around that boundary, at the local landscape character area 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.

4.3.16 An overall appraisal of the magnitude of landscape effect resulting from the 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 **Table 4-3**.

Table 4-3 Landscape Magnitude of impact

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.

Visual Magnitude of impact

4.3.17 Visual 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 will be experienced, and whether views of this will 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).

4.3.18 An overall assessment of the magnitude of visual change resulting from the 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.

Table 4-4 Visual Magnitude of impact

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.

Level of Effects

4.3.19 Determination 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.

4.3.20 The landscape appraisal has taken account of direct and indirect changes to existing landscape elements, features, and 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.

4.3.21 The 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.

4.3.22 The level of landscape and visual effects are described with reference to the criteria presented in the **Table 4-5** below.

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

4.3.23 Landscape 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 appraisal 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 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.

4.4 Study Area

4.4.1 An initial Study Area of 2 km from the Site has been identified for the LVA. The extent of the Study Area has been informed by an initial 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 potential greatest landscape and visual effects.

Zone of Theoretical Visibility

4.4.2 Initial ZTV mapping has been undertaken to establish the theoretical extent of visibility of the Proposed Development. The ZTV has been used to inform the extent of the Study Area and the identification of landscape and visual receptors. The ZTV maps indicated areas from where it may be possible to view the Proposed Development. It is 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 its use are outlined below:

- The ZTV is based on a bare ground model – OS Terrain 5 Digital Terrain Model (DTM) data which does not take account of the screening effects of vegetation, buildings or other structures;
- The ZTV has been calculated based on the OHL geometry and maximum height of the final OHL structure, at 62.420 m in height.
- Some areas of theoretical visibility may comprise buildings, forestry, and woodland which do not 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.

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

4.5 Baseline Environment

Landscape Character

4.5.1 No landscape designations have been identified within the Study Area. The closest designation, Braco Garden and Designed Landscape (GDL), is located just over 2 km to the northeast of the Site. Intervening topography and woodland would limit potential visibility of the Proposed Development from the GDL and as such it is not considered further within the LVA.

4.5.2 The 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 Site, including overhead transmissions lines (notably the 400kv Beauly- Denny line), wood-pole lines and the existing Braco West Substation.

4.5.3 The landscape appraisal for the Proposed Development is based on the Landscape Character Types (LCTs) defined and described by NatureScot[17]. 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
- LCT 380: Lowland Hills – Tayside
- LCT 384: Broad Valley Lowlands – Tayside

4.5.4 The 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[18].

LCT 149: Lowland Hills – Central

4.5.5 This 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, particularly within the Study Area. 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.

4.5.6 This 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

4.5.7 This 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.

4.5.8 This 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 low.

LCT 380: Lowland Hills – Tayside

4.5.9 This 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

[17] Nature Scot (2022). *Scottish Landscape Character Types Map and Descriptions* [Online] [Accessed 01 May 2024] Available at: Scottish Landscape Character Types Map and Descriptions | NatureScot

[18] Nature Scot (2022) *Scottish Landscape Character Types Map and Descriptions* [Online] [Accessed 01 May 2024] Available at: Scottish Landscape Character Types Map and Descriptions | NatureScot

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.

4.5.10 This 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 overhead lines and existing Braco West Substation. On balance, landscape value is considered to be low.

LCT 384: Broad Valley Lowlands – Tayside

4.5.11 This 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 large estates include pockets and glens of mature woodland and lochans.

4.5.12 This 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

4.6.1 This 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 settlement and residential properties, largely comprising a series of scattered farmsteads and rural properties, 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 B8033.

Representative Viewpoints

4.6.2 The visual assessment 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 potential for significant effects. The locations are the same as those used for the appraisal of the proposed Cambushinnie Substation, although with two excluded due to distance and/ or lack of potential visibility of the Proposed Development.

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 4-3**, **Appendix A Figures**.

Table 4-6 Representative Viewpoints

ID	Name	Receptor Type	Easting	Northing	Visual Value
1	Core Path BRAC/111/4 (west)	Recreational	280349	710532	Low
Baseline Description: This viewpoint is representative of recreational users along the Core Path BRAC/111/4. 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 substation and OHL towers. This is a typical view across the landscape where OHL towers and forestry are prominent manmade features. Taking this into account visual value is low.					
2	Core Path BRAC/111/4 (east)	Recreational	280916	710620	Low
Baseline Description: This viewpoint is representative of recreational users along the Core Path BRAC/111/4 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 on 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.					
3	Core Path BRAC/108/3 along laneway to Tamano Farm	Recreational and Residential	280595	708052	Low
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.					

4.7 Embedded Mitigation

4.7.1 Landscape 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 Proposed Development 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;
- Removal and replacement of an existing OHL tower to avoid increase in the number of towers, and positioning the replacement tower in a similar location to the existing tower; and
- Incorporating native woodland planting and peatland seeding to provide a degree of screening and/ or to aid landscape integration.

4.8 Sources of Effect

4.8.1 Sources of potential landscape and visual effects include the following:

- Temporary physical change to the landscape as a result of vegetation and OHL tower removals, introduction of construction compounds, temporary OHL towers, 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 a new OHL tower and connections;
- Change to perceptual aspects of the landscape character resulting from the introduction of the Proposed Development into adjacent or nearby landscapes; and
- Longer term and/or permanent change to the composition and nature of views because of introduction of a new OHL tower and connections.

4.9 Appraisal of Landscape Effects

4.9.1 Landscape effects are a combination of the physical changes to the fabric of the landscape arising from the Proposed Development. This includes perceptual changes – the way these physical changes alter how the landscape is perceived. The landscape appraisal considers the effect of the Proposed Development on the LCTs found within the Study Area.

LCT 149: Lowland Hills – Central

4.9.2 Landscape 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.

4.9.3 During 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. Where views of construction are possible, they would be seen in the context of the existing OHL and appear not dissimilar to periodic maintenance operations. Overall, there would be little 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.

4.9.4 At operation, the overall number of OHL towers would remain unchanged and although the new tower may appear slightly different with additional connections this would have little or no influence on the perceptual qualities or key characteristics of this LCT and as such there would be no discernible change. The level of effect on the Lowland Hills – Central LCT is considered to be **neutral**.

LCT 150 – Lowland Hill Fringes - Central

4.9.5 Landscape value is considered to be low. Factors that reduce susceptibility include the presence of existing wind turbines, OHL and plantation forestry. Taking this into account susceptibility is low. Combining the identified low value with low susceptibility results in a low sensitivity.

4.9.6 Construction activities would be in the neighbouring LCT (LCT 149: Lowland Hills- Central) and therefore would not result in any direct change. The ZTV indicates relatively widespread visibility from the parts of this LCT within the Study Area. However, intervening woodland and topography would limit visibility of much of the low-level construction activity, limiting the sense of change. Higher level works to install the temporary and permanent towers and remove the existing tower may be visible but would be experienced in the context of the existing OHL and would have little influence on the perceptual qualities or overall impression of this LCT. On balance, the magnitude of impact would be very low and the level of effect **negligible adverse** at construction.

4.9.7 At operation, the Proposed Development would not result in any discernible change to the setting or perceptual qualities of this LCT. There would be no change to the impression of character and as such the level of effect would be **neutral**.

LCT 380: Lowland Hills – Tayside

4.9.8 Landscape 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.

4.9.9 Construction 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 and restocked plantation adjacent to the existing substation. Construction would include creation of working areas, OHL diversions with two temporary towers, construction of a new terminal tower 380R, reinstallation of conductors and downleads, removal of temporary towers followed by the removal and reinstatement of temporary roads and hardstanding. This would result in temporary clearance of vegetation, changes in landform and pattern to create tower bases and working areas and may locally reduce the sense of isolation due to increased movement and activity. There would be limited loss of other landscape features. Effects during construction would be short-term, temporary, and relatively localised to the immediate context of the Site. The more valued landscape elements would remain intact, with little influence on the wider extent of the LCT. Taking all of this into account, combined with the context of the existing OHL, the

magnitude of impact is assessed as low. The low sensitivity combined with the low magnitude of impact would result in **minor adverse** effects at construction.

4.9.10 During operation, the Proposed Development would result in a barely perceptible change to the key characteristics or impression of character. The introduction of replacement terminal tower 380R and tie-ins would be concentrated within a very small part of the landscape, within the context of the existing OHL corridor and largely balanced by the removal of an existing tower. Temporary compounds would be reinstated, and landscape and habitat measures implemented. Landscape effects would be considered permanent. The overall magnitude of impact would be very low. The low sensitivity combined with the very low magnitude of impact would result in **negligible adverse** effect at operation.

LCT 384 Broad Valleys Lowlands – Tayside

4.9.11 Landscape 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.

4.9.12 During construction, potential change would occur out-with this LCT and therefore would be indirect and result from the presence of activities within the neighbouring LCT. A combination of topography and existing woodland and forestry would limit potential change by screening much of the lower level construction activity. Higher level works to install the temporary and permanent towers and remove the existing tower may be visible but would be experienced in the context of the existing OHL and would have little influence on the perceptual qualities or overall impression of this LCT. The magnitude of impact is judged to be very low. The low sensitivity combined with the very low magnitude of impact would result in **negligible adverse** effects during construction.

4.9.13 During operation, the Proposed Development would not result in any discernible change to the setting or perceptual attributes of this LCT. The replacement of an existing OHL tower with a new terminal tower across a small part of the setting and within the same context as the existing OHL would result in no change to the impression of character and the level of effect is **neutral**.

4.10 Appraisal of Visual Effects

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

4.10.1 The 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 OHL corridor and substation. On balance visual susceptibility is medium. The combination of the low value and medium susceptibility results in a medium sensitivity.

4.10.2 During construction, activities would be focused across a small part of the background within the context of the existing OHL. Construction activities within the view would be limited to the upper parts of construction of two temporary towers, new tower 380R and the subsequent removal of temporary towers. The movement and activity on the skyline would be a temporary distraction within a small part of the more expansive views available from this location and would be short term in duration. Considering this, the magnitude of impact

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

4.10.3 During operation, the Proposed Development would result in removal of an existing OHL tower and replacing it with a new terminal tower and connectors. This may marginally increase the prominence of the OHL towers but would have little influence on the overall composition or impression of the view. Any impression of change would be limited to a very small part of the view and as such 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 2 Core Path BRAC/111/4 (east)

4.10.4 The value of the view is judged to be low. Views of the landscape setting and backdrop contribute positively to the experience of recreational users, however the existing presence of OHL, existing Braco West Substation and commercial forestry somewhat reduced the scenic quality. Considering this, visual susceptibility is medium. The combination of the low value and medium susceptibility results in a medium sensitivity.

4.10.5 During construction, movement of vehicles and machinery and other construction activities will be visible across a small part of the background of the view to the west. Their activities will largely occur adjacent to the existing OHL towers and existing Braco West Substation. Intervening landform is likely to limit visibility of lower level activities, with visibility largely limited to the upper parts of construction of the two temporary towers, construction of the new tower 380R and the subsequent removal of temporary towers. Effects at construction would be temporary in nature and of a short duration. Considering this, the magnitude of impact would be low at construction. The medium sensitivity of the receptor combined with the low magnitude of impact would result in a **minor adverse** effect during construction.

4.10.6 At operation, the Proposed Development will be perceptible within a very small part of the view and will appear similar to the existing OHL features with the addition of a terminal tower and associated wirescape in place of an existing tower. Most of the view, which consists of plantation forestry along with upland slopes and moorland would remain intact as will the overall composition and balance of features in the view. Considering this, the magnitude of impact would be very low at operation. The medium sensitivity of the receptor combined with the very low magnitude of impact would result in a **negligible adverse** effect during operation.

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

4.10.7 The value of the view is judged to be low. Views experienced from residential receptors are considered 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 medium. The combination of the low value and medium susceptibility results in a medium sensitivity.

4.10.8 During construction, movement and activity associated with construction of temporary towers, permanent towers and the removal of towers would occur on the background across a small horizontal extent of the view north and would be seen in the context of the existing OHL. Some of the lower level activity may be partially screened by intervening trees and topography, although this is likely to be limited and higher level activities would be visible from the viewpoint and adjacent section of the core path. Change to views from construction would be temporary in nature and of a short duration. Overall, considering the

limited extent of change and the existing OHL context, the magnitude of impact would be low at construction. The medium sensitivity of the receptor combined with the low magnitude of impact would result in a **minor adverse** effect during construction.

4.10.9 During operation, the new OHL tower and associated connections will be visible to the north-west, occupying a small part of the view and appearing largely similar to the existing OHL towers, one of which would be removed. The balance and composition of features in the overall view would remain similar and there would be limited perceptible change to views experienced by recreational users along this part of the core path network. Considering this, the magnitude of impact is very low during operation. The medium sensitivity of the receptor combined with the very low magnitude of impact would result in a **negligible adverse** effect at operation.

4.11 Cumulative Appraisal

4.11.1 This section presents an appraisal of potential cumulative effects resulting from the Proposed Development in addition to the cumulative developments. In line with good practice guidance[14,15,16] the cumulative appraisal is undertaken on a targeted basis focused on the most significant cumulative effects. Cumulative developments included within the scope of this appraisal were agreed in consultation with PKC and are set out in **Table 4-7,** below and their locations shown on **Figure 4-4**, **Appendix A Figures**.

Table 4-7 Landscape and Visual Cumulative Developments

Cumulative Development	Planning Reference & Description	Status
Proposed Cambushinnie 400kV substation	24/00001/PAN: Approximately 20 m south of the Site Formation of a 400kV substation comprising erection of ancillary buildings, hardstand, plant and machinery access laydown/work compound areas.	Pre-application
Proposed UGC route	Within the Site The development will comprise two 132kV underground cable circuits to connect back the existing Braco West Substation. These will connect the new 400kV AIS substation to the existing 275kV substation. Each underground cable will be approximately 500 m in length.	Permitted Development – not yet in construction
49.9MW energy storage facility	21/00756/FLM: Adjacent to the 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
49.99MW energy storage facility (compound)	22/02231/FLM: Adjacent to the northeast of the Proposed Development. Formation of a 49.99MW battery energy storage compound.	Application Approved

4.11.2 The following two cumulative scenarios have been considered as part of this appraisal:

- Cumulative Scenario 1: The cumulative baseline for this scenario includes schemes which have been consented and/or are under construction in addition to existing operational schemes; and,

- Cumulative Scenario 2: The cumulative baseline for this scenario includes schemes at application stage in addition to existing operational schemes and those which have been consented and/or are under construction.

4.11.3 The appraisal of cumulative magnitude of impact and level of effect involves consideration of the additional change resulting from the Proposed Development to each cumulative baseline scenario during operation.

Cumulative Landscape Appraisal

4.11.4 Potential 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.

4.11.5 As a result of the limited nature of change resulting from the Proposed Development identified in the LVA, it is considered that there is very limited potential for cumulative landscape effects on the landscape receptors found within the Study Area. The cumulative landscape assessment therefore takes a targeted approach, focusing on LCT 380 - Lowland Hills – Tayside within which each of the cumulative developments and the Proposed Development would be located.

LCT 380 - Lowland Hills – Tayside

4.11.6 In 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.

4.11.7 In Scenario 2, the proposed UGC route would be installed and reinstated such that it would not contribute to a cumulative effect. The proposed battery storage compound (22/02231/FLM) and Cambushinnie 400kV substation would have a slightly greater and localised influence on the baseline landscape. Taken together with the consented battery storage facility (21/00756/FLM), the cumulative schemes would increase the local influence of electrical infrastructure on a small part of this LCT.

4.11.8 The addition of the Proposed Development into both cumulative scenarios would result in only a very minor change, replacing an existing OHL tower with a new terminal tower and associated connections. There would be little perceptual change to the landscape character and as such the cumulative magnitude of impact would be very low and the level of cumulative effect **negligible adverse** for both scenarios.

Cumulative Visual Appraisal

4.11.9 The cumulative visual effects are described in **Table 4-8** below.

Table 4-8 Cumulative Visual Appraisal

Receptor	Sensitivity	Cumulative Magntidue of Effect	Level of Effect
Viewpoint 1 Core Path BRAC/111/4 and Viewpoint 2 Core Path BRAC/111/4	Medium	Scenario 1 In cumulative scenario 1, the proposed battery storage scheme would be visible in sequential views along the core path. The addition of the Proposed Development into this cumulative scenario would result in very limited cumulative change to the visual composition given the existing context of the OHL. Taking this into account the cumulative magnitude of impact is very low.	Scenario 1 **Negligible Adverse**
		Scenario 2 The addition of the Proposed Development in this cumulative scenario would be similar to that assessed under scenario 1. The other three cumulative schemes would not be visible. The upper part of the downleads from the OHL tie-in towards the Cambushinnie 400kV Substation development would be visible however the substation itself would be screened. Taking this into account, the cumulative magnitude of impact remains very low.	Scenario 2 **Negligible Adverse**
Viewpoint 3 Core Path BRAC/108/3 along laneway to Tamano Farm	Medium	Scenario 1 In this scenario, no cumulative change is anticipated. The cumulative schemes would not be visible due to intervening woodland. There would be no cumulative change.	Scenario 1 **Neutral**
		Scenario 2 In scenario 2, the Cambushinnie 400kV substation would be a noticeable feature across a small part of the view in front of and at a lower level than the existing OHL. The remaining cumulative schemes would not be visible and as such would not contribute to a cumulative effect. The addition of the Proposed Development in this cumulative scenario would very marginally add to the scale and mass of electrical infrastructure within the view. However, the new OHL tower would appear behind and in the same part of the view as the proposed Cambushinnie substation, limiting the sense of cumulative change. Taking this into account, the cumulative magnitude of impact is very low.	Scenario 2 **Negligible Adverse**

4.12 Summary of Findings

4.12.1 **Table 4-9** below provides a summary of the findings of the LVA.

Table 4-9 Summary of Effects

Receptor	Sensitivtity	Construction Magnitude of impact	Level of Effect	Operation Magnitude of impact	Level of Effect
LCT 149 Lowland Hills – Central	Low	Very Low	Negligible Adverse	No Change	Neutral
LCT 150 – Lowland Hill Fringes - Central	Low	Very Low	Negligible Adverse	No Change	Neutral
LCT 380 - Lowland Hills – Tayside	Low	Low	Minor Adverse	Very Low	Negligible Adverse
LCT 384 Broad Valleys Lowlands – Tayside	Low	Very Low	Negligible Adverse	No Change	Neutral
Viewpoint 1 Core Path BRAC/111/4	Medium	Low	Minor Adverse	Very Low	Negligible Adverse
Viewpoint 2 Core Path BRAC/111/4	Medium	Low	Minor Adverse	Very Low	Negligible Adverse
Viewpoint 3 Core Path BRAC/108/3 along laneway to Tamano Farm	Medium	Low	Minor Adverse	Very Low	Negligible Adverse

4.12.2 Potential change on the character of the LCTs found within the Study Area would be limited given the nature of the Proposed Development which would largely involve replacement of an existing OHL tower with a new terminal tower and associated connections. The appraisal has identified that the majority of LCTs will receive a negligible adverse level of effect during construction, with no discernible change and a neutral level of effect during operation. Slightly greater change is anticipated for the Lowland Hills – Tayside LCT, within which the Proposed Development would be located. The increased movement and activity during construction would result in a minor adverse level of effect, reducing to negligible adverse during operation, when there will be little perceptual change. Cumulative change on this LCT is also anticipated to be negligible adverse in relation to both cumulative scenarios.

4.12.3 In relation to visual amenity, the appraisal has identified that each of the viewpoints would experience relatively limited change to a small part of the view, resulting in a minor adverse

level of effect at construction. At operation, the impression of change would be reduced and although perceptible would not influence the overall composition of impression of the view and as such the level of effects would be negligible adverse. Cumulative change on each of the viewpoints is also anticipated to be negligible adverse in relation to both cumulative scenarios, although with no cumulative change experienced from viewpoint 3 in relation to scenario 1 due to no potential visibility of the cumulative schemes.

5. ECOLOGY AND NATURE CONSERVATION

5.1.1 This EA chapter will consider the potential effects of the Proposed Development on habitats and species at the Site and within the wider local area. Evaluation of the existing baseline environment will be made through a combination of desk-based study, field surveys, and consultation. This chapter was written with cognisance of the methodology set out in Chartered Institute of Ecology and Environmental Management (CIEEM) (2022)[19] guidance.

5.1.2 Birds are considered separately in **Chapter 6 Ornithology**.

5.1.3 This 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 any consultation undertaken to date to inform the EA;
- Presents the results of the surveys;
- Provides an outline of embedded mitigation, an appraisal of ecological features and potential significant effects, and recommends further mitigation measures and recommendations.

5.1.4 Throughout 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) [20] and for bryophytes, Atherton *et al* (2010)[21].

5.2 Information Sources

5.2.1 External sources used to inform this chapter are referenced appropriately.

5.2.2 The report 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 Groundwater Dependent Terrestrial Ecosystems;** and
- **Figure 5-5 Mammal and Other Notable Species Survey Results**.

Consultation

5.2.3 At the time of writing this chapter, consultations had been held regarding the potential ecological impacts of the Proposed Development with the following consultees (note that relevant consultation responses are detailed in **Table 5-1** below and some of the organisations are yet to respond):

- PKC, NatureScot, Scottish Environment Protection Agency (SEPA), Forestry and Land Scotland, Scottish Forestry, Forth District Salmon Fishery Board, Fisheries

19 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

20 Stace, C E (2019) *New Flora of the British Isles, 4th edition*. C&M Floristics.

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

Management Scotland, Royal Society for the Protection of Birds (RSPB), Scottish Wildlife Trust, and Scottish Wild Land Group.

5.2.4 The 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**.

Table 5-1 Summary of Consultation

Consultee	Summary of 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 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 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 causes 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.

Desk Study

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

Table 5-2 Desk Study Data Sources

Data Source	Date Accessed	Data Obtained
Mammal Society Species Hub[22]	19 February 2024	Information on protected and important mammals.
Marine Scotland Maps National Marine Plan interactive (NMPi)[23]	19 February 2024	Rivers important for migratory fish.

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

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

Data Source	Date Accessed	Data Obtained
NatureScot – Peatland Action[24]	19 February 2024	Information on peat depth measurements collected across Scotland.
NatureScot SiteLink webpage[25]	19 February 2024	SAC and Ramsar sites within 10km of the Site. Sites of Special Scientific Interest (SSSIs) within 2km of the Site.
NatureScot Natural Spaces webpage[26]	19 February 2024	Ancient Woodland Inventory (AWI) for Scotland and Native Woodland Survey of Scotland (NWSS).
National Biodiversity Network (NBN) Atlas Scotland[27]	12 April 2024	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[28]	19 February 2024	Aerial imagery to identify potential habitats and connectivity relevant to interpretation of planning policy and potential protected/notable species constraints.
Perth and Kinross Local Development Plan 2 (PKLDP2)[29]	19 February 2024	Information on local policies regarding the environment.
The PKC follows the Tayside LBAP (2016-2026)[30]	19 February 2024	Information on protected or notable species.
Saving Scotland's Red Squirrels[31]	12 April 2024	Red squirrel *Sciurus vulgaris* records.
SEPA Water Classification Hub[32]	19 February 2024	Watercourse classification data.

Ecology Survey

5.2.6 A 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[33,34]. Ecology surveys included detailed vegetation surveys,

[24] NatureScot (2024) *Peatland Action* (online) Available at: https://www.nature.scot/climate-change/nature-based-solutions/peatland-action/peatland-action-data-research-and-monitoring/peatland-action-open-data [Accessed: 19 February 2024]

[25] NatureScot (2024) *SiteLink* (online) Available at: https://sitelink.nature.scot/home [Accessed: 19 February 2024]

[26] NatureScot (2024) *Natural Spaces* (online) Available at: www.cagmap.snh.gov.uk/natural-spaces/ [Accessed: 19 February 2024}

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

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

[29] PKC (2019) *Local Development Plan* (online) Available at: https://www.pkc.gov.uk/ldp2 [Accessed: 19 February 2024]

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

[31] Saving Scotland's Red Squirrels (online) Available at: https://scottishsquirrels.org.uk/ [Accessed: 19 February 2024]

[32] SEPA (2023) *Water Classification Hub* (online) Available at: www.sepa.org.uk/data-visualisation/water-classification-hub/ [Accessed: 19 February 2024]

33 JNCC (2010). *Handbook for phase 1 habitat survey – a technique for environmental audit*. Joint Nature Conservation Committee, Peterborough.

34 UKHab (2024) *UK Habitat Classification*. [Online] [Accessed 01 May 2024] Available at: https://ukhab.org/

protected mammal surveys and an assessment of habitat suitability for notable and protected species. Surveys were conducted on 11 and 12 April 2023, 15 January 2024, 18 March 2024 and 4 April 2024. The survey area included the Site and extended from 30 m to 500 m beyond the Site (dependent on the type of survey). The field survey methodology is detailed further in **Sections 5.3.7** to **5.3.21**.

5.3 Methodology

Sensitive Ecological Receptors

5.3.1 Sensitive ecological receptors (also referred to as 'important' ecological features) have the potential to suffer 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 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*".[19]

5.3.3 Consequently, 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 importance of an ecological feature should be considered within a defined geographical context as per the CIEEM Guidance[19].
- 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 AWI within 2 km of the Site.
- Habitats listed on Annex I of the Habitats Directive.
- Habitats listed on the SBL, which are thus identified as being of principal importance for biodiversity conservation in Scotland.
- Species listed on Annexes I and II of the Habitats Directive.
- Species listed on Schedules 2 and 4 of the Conservation of Habitats and Species Regulations 2017.
- Species listed on Schedule 1, 5 and 8 of the Wildlife and Countryside Act 1981 Act (WCA), and badger *Meles meles*.
- Species listed on the SBL, which are thus identified as being of principal importance for biodiversity conservation in Scotland.
- Invasive non-native species listed on Schedule 9 of the WCA (although this does not legally apply in Scotland), those considered to be of EU concern under the Invasive Alien Species Regulation (Regulation (EU) 1143/2014), and additional species commonly considered to be invasive as listed in Annex B of the NatureScot Developing with Nature guidance (NatureScot, 2023)[35].

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

5.3.4 Other 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

5.3.5 A 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.

5.3.6 A stratified approach was taken when defining the desk Study Area based on the likely ZoI 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

5.3.7 The Preliminary Ecological Appraisal (PEA) 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) guidance[36], and defined using the UKHab[37], 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.

5.3.8 Notes were made for each habitat of dominant, typical, and notable (including invasive non-native) plant species, and these reflect conditions at the time of survey. Condition of baseline habitats was recorded in the field by the field surveyor using the condition criteria set out for the Statutory biodiversity metric[38]. Habitat suitability for ecological important receptors (such as invertebrates, fish, reptiles, and amphibians) were noted.

NVC Survey

5.3.9 A Natural Vegetation Classification (NVC) survey was carried out following published guidelines[39], in all areas of habitat within the Site. Surveys were conducted on 4 April 2024. The NVC survey was focussed most greatly on notable habitats identified by the UKHab survey (e.g. GWDTE[40] or habitats listed on the Scottish Biodiversity List (SBL)). The survey extended to 250 m from the Proposed Development.

5.3.10 The 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 where considered useful. Where NVC communities occurred as complex mosaics, more than one NVC type is shown per

36 Joint Nature Conservation Committee (2010) *Handbook for Phase 1 habitat survey - a technique for environmental audit*.

37 UK Habitat Classification ukhab.org/

38 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] [Accessed 01 July 2024] Available at: https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides

39 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.

40 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*.

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. 'Je/M23b/MG10 (70:20:10)'.

Otter and Water Vole Survey

5.3.11 Surveys for otter *Lutra lutra* and water vole *Arvicola amphibius* were carried out along all suitable watercourses within the Site. The survey followed guidance in published literature[41,42]. Surveys were conducted on 18 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.

Bat Roost and Habitat Suitability

5.3.12 In accordance with industry-standard guidelines (Collins, 2023)[43] 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 March 2024 and extended to 30 m from the Proposed Development. According to the guidance, features within trees were assessed as having 'PRF-I', where they contained features suitable only for individual or very small numbers of bats, or 'PRF-M', where they had suitability for use by multiple bats, including a maternity colony.

5.3.13 PRFs searched for included suitable holes, cracks, or splits in trees. Note that no buildings were assessed for bat roost potential because no buildings were present. 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.

5.3.14 The general suitability of the habitat within the Site was also classified according to the definitions provided in BCT Guidance.

Badger

5.3.15 A badger survey was completed within the Site, in accordance with standard guidance[44,45]. Evidence searched for included setts, spoil heaps, bedding, guard hairs, latrines, footprints, trails, scratch marks and signs of foraging activity. Surveys were conducted 18 March 2024 and extended to 30 m from the Proposed Development.

Great Crested Newt

5.3.16 Field surveys were conducted 18 March 2024 to assess habitats within the survey area to support great crested newt *Triturus cristatus*, including Habitat Suitability Index (HSI)

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

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

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

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

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

calculation for relevant ponds, following English Nature (2001)[46] and Froglife (2001)[47] guidance. The survey extended to ponds up to 500m from the Proposed Development. This is in line with updated Natural England guidance (Natural England, 2022), which states that "surveys up to 250 metres are usually sufficient, but developers may need to increase this to 500 metres if there are no obvious barriers to newts dispersing into the wider environment". Additional studies have also found that great crested newts can use suitable terrestrial habitat up to 500 m from a breeding pond but that there is a notable decrease in great crested newt abundance beyond 250 m from a breeding pond (Franklin, 1983[48]; Oldham and Nicholson, 1986[49]; Jehle, 2000[50]; Jehle and Arntzen, 2000[51])

Reptiles

5.3.17 Field 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*, common lizard *Zootoca vivipara* and slow worm *Anguilla fragilis*), following Froglife (1999)[52] and JNCC (2003)[53] guidance.

Notable/Important Invertebrates:

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

Protected or Notable Plants

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

Other Notable Species

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

Non-native Invasive Plant Species

5.3.21 The survey included recording evidence of the presence of invasive non-native plant species (INNS), including but not limited to those of UK concern, such as those identified on Schedule 9 of the WCA (although this no longer applies in Scotland), and of European Union (EU) concern under the EU Invasive Alien Species Regulation, and additional species commonly considered to be invasive as listed in Annex B of the NatureScot *Developing with Nature* guidance[35].

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46 English Nature (2001). *The Great Crested Newt Mitigation Guidelines.* [online]. [Accessed 01 July 2024] Available at: https://www.froglife.org/info-advice/our-publications/great-crested-newt-conservation-handbook/

47 Froglife (2001). T*he Great Crested Newt Conservation Handbook*. [online]. [Accessed 01 July 2024] Available at: https://www.froglife.org/info-advice/our-publications/great-crested-newt-conservation-handbook/

48 Franklin, P. (1993). *The migratory ecology and terrestrial habitat preferences of the great crested newt Triturus cristatus at Little Wittenham Nature Reserve*. M.Phil Thesis. De Montfort University. Dept. Applied Biology and Biotechnology.

49 Oldham, R.S. and Nicholson, M. (1986). *Status and Ecology of the Warty Newt Triturus cristatus, Final Report. Report by Leicester Polytechnic under contract to Nature Conservancy Council,* Contract No. HF 3/05/123 Year 3

50 Jehle, R. (2000) *The terrestrial summer habitat of radio-tracked great crested newts (Triturus cristatus) and marbled newts (Triturus marmoratus). Herpetological Journal* **10(4)**, pp 137-142.

51 Jehle, R. and Arntzen, J.W. (2000). *Post-breeding migrations of newts with contrasting ecological requirements. Journal of Zoology*, London **251**, pp 297-306.

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

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

Ecological Appraisal

5.3.22 The 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 Ecological Appraisal. This was conducted in accordance with the industry-standard guidelines published by CIEEM[36].

5.3.23 This Ecological Appraisal was completed with reference to the CIEEM Ecological Impact Assessment (EcIA) guidance. The 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.

5.3.24 Where appropriate, mitigation measures have been recommended within the EA to remedy any adverse impacts (which will be detailed within a CEMP).

5.3.25 Enhancement 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 Gain (BNG) assessment has been prepared (see **Appendix E Biodiversity Net Gain Report**), to ensure that the Proposed Development meets the requirement of NPF4.

Limitations

5.3.26 Desk 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.

5.3.27 Where 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 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.

5.3.28 Baseline 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 guidance, re-survey is recommended if construction or enabling works will take place more than two years since the date of field survey.

5.3.29 The 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. 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.

5.3.30 The 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.

5.3.31 There 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

5.4.1 There are six statutory designated sites for nature conservation within the possible ZoI 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**.

Table 5-3 Statutory Locally Designated Nature Conservation Sites

Site Name	Reason for Designation	Relationship to the Proposed Development
European Sites		
River Teith SAC	• Atlantic salmon *Salmo salar*; • Brook lamprey *Lampetra planeri*; • River lamprey *Lampetra fluviatilis*; and, • Sea lamprey *Petromyzon marinus*.	Located at closest: • 6.1 km from the Site by land. • 36 km downstream of the Site following a hydrological link of unnamed watercourses within the Site flow into the Bullie 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: • 6 km east of the Site. • 16 km downstream from the Site following Keir Burn, which then flows into Allan Water, which passes through the SAC. No watercourses flow directly from the Site to the SAC. 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: • 9.2 km south of the Site. • Over 26 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.

Site Name	Reason for Designation	Relationship to the Proposed Development
Glenartney Juniper Wood SAC	• Juniper *Juniperus communis* on heaths or calcareous grasslands.	Located at closest: • 8.9 km northwest 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. Intervening land includes the Glen Artney Hills.
Upper Strathearn Oakwoods SAC	• Western acidic oak woodland.	Located at closest: • 9.7 km north-northeast 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 Special Scientific Interest		
Carsebreck and Rhynd Lochs SSSI	• Raised bog; and, • Hydromorphological mire range.	Located at closest 6 km east of the Site by land. 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

5.4.2 There is one non-statutory designated site for nature conservation within the possible ZoI 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

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 2.1 km northeast from the Site. Intervening land comprises a mix of arable/pastoral farming. There is no direct hydrological connection between the LNCS and the Site.

Waterbodies

5.4.3 The Keir Burn, a tributary of the Allan Water is hydrologically connected via the presence of drainage grips that lead to the Bullie Burn. The Keir Burn is classified by SEPA under the Water Framework Directive (WFD) as in 'Moderate' overall status and is also listed by the Scottish Government's Marine Directorate as a river supporting Atlantic salmon and sea trout.

Ancient and Native Woodland

5.4.4 There are no woodlands listed on the AWI[54] that occur within 1 km of the Site (see **Figure 5-2, Appendix A Figures**). The NWSS[55] also holds two records of woodlands within 1 km of the Site, to the northeast and southeast of the Site just under 1 km from the Site.

Peatland

5.4.5 NatureScot[56] indicates the presence of Class 5 peat soil[57] within the Site, described as dystrophic blanket peat of 50 to 100 cm in depth[56] (see **Figure 5-2**, **Appendix A Figures**). Peaty gleyed podsols are shown to be under a southern section of the Site, of the type usually associated with heather moorland (and coniferous plantation).

Habitat Overview

5.4.6 Habitat survey results are shown on **Figure 5-3**, **Appendix A Figures**. The majority of the habitats within the Site are recently re-stocked (or semi-mature) Other Coniferous Woodland dominated by Sitka spruce *Picea sitchensis*, which appears to be planted over a degraded bog-type habitat. The land around the existing towers of the Beauly-Denny OHL is Other Upland Acid Grassland dominated by soft-rush *Juncus effusus*, developed from disturbed peatland. Degraded Bog is present in the wayleave to the existing OHL, with abundant hare's-tail cottongrass *Vaccinium vaginatum* present. The access track leading to the existing Braco substation is hardstanding of crushed stone.

5.4.7 **Table 5-5** shows a list of the habitat types (by UKHab and NVC) identified within the area surveyed, with the notable habitats highlighted.

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

UKHab Level 3	UKHab Level 4 (SBL[58] priority habitats in bold)	Constituent NVC types (code and name)	UKHab Level 5 (where applies; Annex I[59] habitats in bold)
Coniferous woodland	w2c 29 Other coniferous woodland - Plantation	n/a	n/a
Bog	f1a6 Degraded blanket bog	M20 *Eriophorum vaginatum* blanket & raised mire	f1a6 – H7130 Blanket bog (non-priority)

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

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

56 NatureScot, (2016). *Carbon and Peatland 2016 map* [online]. [Accessed 07 July 2024]. Available at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/soils/carbon-and-peatland-2016-map

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

58 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.

59 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	UKHab Level 4 (SBL[58] priority habitats in bold)	Constituent NVC types (code and name)	UKHab Level 5 (where applies; Annex I[59] habitats in bold)
Fen, marsh and swamp	f2b Purple moorgrass and rush pasture	M23b *Juncus effusus/acutiflorus – Galium palustre* rush-pasture *Juncus effusus* sub-community	n/a
Acid grassland	g1b Upland acid grassland	U2 *Avenella flexuosa* grassland	g1b6 - Other upland acid grassland
		Je *Juncus effusus* grassland	n/a

Woodland, Scrub, and Hedgerows

5.4.8 Other Coniferous Woodland is the only woodland type within the Site. These are semi-mature stands, dominated by Sitka spruce, with remnant bog vegetation underneath, including heather *Calluna vulgaris*, and the mosses *Pluerozium schreberi, Polytrichum formosum* and *Sphagnum capillifolium*. Outside of the Site to the east, stands have been felled within the last few years have been replanted with Sitka spruce. These support common bent *Agrostis capillaris*, wavy hairgrass *Avenella flexuosa*, heather, soft rush, heath woodrush *Luzula multiflora*, heath bedstraw *Galium saxatile*, *P. formosum* and various pleurocarpous mosses.

5.4.9 These woodlands were of a low degree of naturalness and therefore none merited inclusion in the NVC survey, and none are considered Annex I habitats.

5.4.10 The Tayside Local Biodiversity Action Plan (LBAP) (2016-2026)[30] 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.

Peat Bog and Associated Habitats

5.4.11 Non-wooded or forested land on deep peat within the Site has abundant hare's tail cottongrass, frequent purple moorgrass *Molinia caerulea*, the moss *Polytrichum commune*, heather, and *P. schreberi*, with occasional *S. capillifolium*. This Degraded bog lacks peat-building sphagnum moss, only *Sphagnum 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.

5.4.12 Degraded blanket bog is a 'non-priority' Annex I H7130 habitat under the Habitats Directive. The Tayside LBAP (2016-2026)[30] includes Blanket Bog as a priority habitat for local conservation. All Blanket Bog is also SBL 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.

Flushes and Rush Pasture

5.4.13 Rush pastures of the NVC-type M23b are frequent outside of the Proposed Development in localised areas to the north of the Site, 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 *Rumex acetosa* and marsh thistle *Cirsium palustre*, over a thick carpet of mosses including *Calliergonella cuspidatum*, *Brachythecium rivulare* and *Philonotis fontana*. 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). However, it is assumed that all the rush pastures associated with the slopes of the Bullie Burn are GWDTE, as discussed in **Section 5.5.4**.

Grassland and Arable

5.4.14 Other upland acid grassland has developed on an area of disturbed deep peat adjacent to and surrounding the existing OHL, corresponding broadly to the species-poor non-NVC 'Je' (as described in Averis, 2004). The habitat is dominated by soft-rush and has little other species providing vegetative cover. Swards have abundant pleurocarpous moss and frequent wavy hairgrass; drier slopes support locally frequent heather.

Other Terrestrial Habitats

5.4.15 The existing Braco West Substation and access track are Hardstanding (Artificial Unvegetated, Unsealed Surface).

Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

5.4.16 Potential GWDTEs identified within 250 m of the Site are shown on **Figure 5-4**, **Appendix A Figures**. The only NVC vegetation community identified within the survey area that is potentially ground water dependant is M23b. This habitat is potentially highly groundwater dependent as defined in relevant guidance[60].

5.4.17 The 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 9 Hydrology, Hydrogeology, Geology and Soils**. Potentially highly GWDTE, of the NVC type M23b, are present outside of the Site to the north of the existing Braco West Substation platform, associated with the Bullie Burn. It is assumed that this habitat is a GWDTE.

Bats

5.4.18 The desk study did not identify any records of bats within 1 km of the Site. However, it should be noted that Tayside LBAP[61] lists three bat species in the protected species list: brown long-eared bat *Plecotus auritus,* Natterer's bat *Myotis nattereri*, and Daubenton's bat *Myotis daubentonii*.

5.4.19 The 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 likely to be very few or no roosting opportunities within the location of the Site, given the dominance of non-native conifers and lack of other potentially suitable roosting features (such as buildings with potential access features).

5.4.20 Consequently, based on the habitats and features and general upland nature of the Site, it is concluded that this area has Low habitat suitability for bats (for activity such as

60 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*. [online]. [Accessed 01 July 2024] Available at https://www.sepa.org.uk/media/143868/lupsgu31_planning_guidance_on_groundwater_abstractions.pdf

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

commuting and foraging), with Negligible roosting potential, in accordance with definitions provided by the BCT[62].

Otter and Water Vole

5.4.21 The desk study did not identify any records of otter or water vole within 1 km of the Site. However, otter is included in the Tayside LBAP protected species list.

5.4.22 The location of otter evidence found during field surveys is shown on **Figure 5-5**, **Appendix A Figures**. One, fresh spraint was found near a small pond (described in detail in **Section 5.4.34** below). No otter refuges were noted within the survey area. The presence of otter refuges within the survey area of the Site is highly unlikely. The most suitable watercourses for otter within the area, including for the creation of refuges (lie-ups and holts), is the Keir Burn (outside of the survey area and northeast of the Site).

5.4.23 No evidence of water vole was recorded during the field survey. All potential water vole habitat on the Site was assessed as (at best) sub-optimal for the species. The ditches associated with the commercial forestry plantation have extremely limited water vole habitat suitability, as they have little to no water and are likely to be dry for long periods of the year 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.

Pine Marten

5.4.24 The 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 Site[63].

5.4.25 No large, mature 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, which 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.

5.4.26 Given 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

5.4.27 The desk study identified no records of red squirrel *Sciurus vulgaris* within 1 km of the Site. However, they are known to occur in the wider area. Red squirrel is also included in the protected species list on the Tayside LBAP.

5.4.28 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.

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

63 Mammal Society. *Mammal Society Full Species Hub – Pine Marten* [online] [Accessed 01 July 2024] Available at: https://www.mammal.org.uk/species-hub/full-species-hub/discover-mammals/species-pine-marten/

5.4.29 Given the above, red squirrel are likely to be absent from the Site and at low population densities in the wider area.

Badger

5.4.30 The 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.

5.4.31 The woodland within the Site is Sitka spruce plantation (mostly newly felled and/or 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 Site.

Amphibians and Reptiles

5.4.32 The desk study identified no amphibian or reptile records within 1 km of the Site. The following species are listed in the Tayside LBAP: adder, slow-worm, common lizard, great crested newt, and common toad.

5.4.33 The desk study did not reveal any records of great crested newt within the desk study search area. An unconfirmed record of great crested newt was found in the 10 km grid square NN70, within which the Site lies. This record is to the southeast of Doune (9.5 km distant from the Site), isolated from the Site by major barriers.

5.4.34 There was a single standing open water body identified within 500 m of the Site. The pond is 250 m southwest of the southern tip of the Site (see **Figure 5-5**, **Appendix A Figures**). The pond was peaty, with dark-coloured water and was likely to be over a metre deep. Common frog *Rana temporaria* spawn and three palmate newts *Lissotriton helveticus* were observed. Duckweed *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). The pond area was 6 m long x 6 m wide, it is likely to never dry, water quality was good, the perimeter of the pond is not shaded, impacts from waterfowl are minor, fish are presumed absent and terrestrial habitat was assessed as poor. The surrounding habitat is 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. No optimal quality habitat for foraging or hibernating was found during surveys.

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

5.4.36 During the field survey, one common lizard sighting was recorded (shown on **Figure 5-5**, **Appendix A Figures**). The habitat in this location comprises mainly felled/re-stocked coniferous woodland areas which 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) 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).

5.4.37 Given 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 (or any other common reptile) is not likely to be at high densities, given the poor quality of the habitat.

Terrestrial Invertebrates

5.4.38 The 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 ZoI of the Proposed Development.

5.4.39 Notable 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 extremely 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. The woodland plantation provides little to no opportunities for notable terrestrial invertebrates (e.g. beetles, butterflies, and moths), as the habitat is not semi-natural or in good condition (e.g. species-rich, semi-natural ground flora, good structural diversity, and presence of deadwood – except for stumps of felled Sitka spruce).

Fish and Aquatic Invertebrates

5.4.40 The desk study identified no records of notable fish within 1 km of the Site. No records of aquatic invertebrates 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.

5.4.41 The Keir Burn is hydrologically connected to the Site via drainage ditches that meet the Bullie Burn to the northwest of the Site, over 200 m distant. It is likely that notable fish occur in the Keir Burn and it is possible that notable fish occur within the small watercourses associated with it, such as the Bullie Burn. However, fish are certain to be absent from the Site due to the nature of the dry ditches and the barrier to movement posed by the steep-sided forestry plantation which the ditches pass through.

5.4.42 The Keir Burn has potential to support notable aquatic invertebrates. The other watercourses within the Site and wider area are unlikely to support notable aquatic invertebrates due to their small size and modified nature. The ditches within the Site and beyond the Site boundary 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

5.4.43 The desk study identified no records of INNS of plant or animal within 1km of the Site. No invasive species were noted during field surveys.

5.5 Embedded Mitigation

5.5.1 A 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.

5.5.2 A Construction Environmental Management Plan (CEMP) will be prepared by the contractor and submitted for approval by PKC, in consultation with SEPA and NatureScot where necessary, prior to commencement of construction (see **Appendix K GEMPs and SPPs**).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 will be made aware of relevant ecological features and the mitigation measures and working procedures that must be adopted. This will be achieved as part of the induction process and/or through Toolbox Talks;
- An Ecological/Environmental Clerk of Works (ECoW) will be employed for the duration of construction and conduct regular site inspections. The ECoW will advise on and monitor implementation of mitigation measures and compliance with legislation concerning ecological features;
- The ECoW or other suitably qualified and experienced ecologist will 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 will 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 will be adopted, following SEPA Guidance on Pollution Prevention (GPP) and Pollution Prevention Guidelines (PPG), including the following:
  - Controls and contingency measures to manage run-off from construction areas and sediment;
  - All oils, lubricants and other chemicals will 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 will 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 will follow tree protection guidance set out in British Standard 5837:2012 (British Standards Institution, 2012);
- Requirements for peat management to ensure construction operations adhere to the mitigation hierarchy set out in the NPF4[64]; and,
- 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.

5.5.3 Embedded mitigation measures in relation to sensitive ecological features include:

64 Nature Scot 2023. *Advising on peatland, carbon-rich soils and priority peatland habitats in development management.* [online] [Accessed 1 July 2024] Available at: https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management

- Prioritise avoiding loss or other impacts on peatlands (e.g. bog habitats). Consideration should be given to minimising the impacts on these habitats and compensation by on- or off-Site enhancement of peatland habitats to achieve an overall biodiversity net gain;
- 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;
- If otter refuges, water vole burrows, pine marten dens, 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 Development[65]. If this becomes the case, obtain an appropriate license from NatureScot, which will require proportionate mitigation.

5.5.4 In regard to all other habitats (including potential GWTDE – as described in **Sections 5.6.17** to **5.6.18** 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

5.6.1 Although there is a theoretical hydrological link between the Site and the River Teith SAC, the Site is over 20 km downstream from the SAC. Given a) the nature of the Proposed Development, b) the degree of dilution over 20 km or more to the SAC, c) that there is no downstream hydrological link between the Site and the Carsebreck and Rhynd Lochs SSSI, and d) that pollution controls can be expected to be required to be embedded in a CEMP (see **Appendix K GEMPs and SPPs**), there is not likely to be any pollution impact within the SAC or the SSSI.

5.6.2 None of the other four designated sites for nature conservation within the ZoI (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 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[66]. There is no conceivable pathway for potential air pollution impacts on the qualifying habitats of the SAC which are located 5.5 km from the Site at closest. This distance precludes any effect on habitats from air pollution.

5.6.3 Consequently, 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 and they are scoped out of assessment. Furthermore, as per consultation feedback presented in **Section 5.2.4**, NatureScot stated that there will likely be no significant effect for the

65 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.

66 Highways England 2019. *Design Manual for Roads and Bridges – LA105 Air Quality*. Highways England.

qualifying interests of all relevant designated sites. Given the above, the SAC and SSSI are scoped out of assessment.

5.6.4 Braco Castle Wood LNCS has no possible hydrological link with the Site. Moreover, the LNCS is at a distance from the Site (2.1 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.

5.6.5 Due to lack of evidence of their presence and highly sub-optimal nature of the habitat present, water vole are likely absent, and no impacts on this species are considered possible.

5.6.6 Given 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.

5.6.7 The desk study did not find great crested newt present within 1 km of the Site. As stated in **Section 5.4.34**, there was a single, small (6 x 6 m) standing waterbody within 500 m of the Site. The pond was in an isolated area (with no other ponds within 500 m), 250 m from the Site. Great crested newts generally move within 250 m of a breeding pond[67].

5.6.8 Given the intervening land of commercial forestry which presents a significant barrier to movement, it is unlikely that any newts that may potentially breed in this pond would be present on Site. No ponds or habitat typically used by great crested newt (native woodlands, scrub, rough grassland) are present within 250 m of the pond. Moreover, the vast majority of habitats within the Site present no opportunities for great crested newt hibernation. These include upland areas of disturbed commercial plantation, an existing hardstanding access track (with only occasional poor quality grassy margins).

5.6.9 It is not anticipated that any habitats that present opportunities for great crested newt hibernacula will 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 are scoped out of the assessment.

5.6.10 Notable fish species associated with the River Teith SAC will not occur within the ditches and watercourses within the Site and the surrounding area. Indirect effects to fish from pollution will be suitability protected via embedded mitigation measures.

Sensitive Ecological Receptors

5.6.11 The 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 guidance[19], field survey data and professional judgement.

67 Nature Scot 2020. *Standing advice for planning consultations - Great Crested Newts*. [online] [Accessed 01 July 2024] Available at: https://www.nature.scot/doc/standing-advice-planning-consultations-great-crested-newts

5.6.12 There are no ecological features considered to be of County importance (or above). County importance is defined in CIEEM Guidance[19] and outlined in **Section 5.3.3**.

5.6.13 Relevant ecological features considered to be of Local importance are:

- Degraded Blanket Bog (on deep peat);
- GWDTE;
- bats;
- otter;
- pine marten;
- red squirrel; and
- badger.

Potential Significant Effects

5.6.14 Potential significant impacts and effects from the construction and operation of the Proposed Development on ecological features are as follows:

- Temporary habitat loss (e.g., OHL route);
- 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;
- 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); 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).

5.6.15 It 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.

Habitats

5.6.16 Degraded bog and all other habitats (including Other Upland Acid Grassland with immature willow scrub) are expected to recover within two years following reinstatement of the temporary works areas. The success of this will be achieved through close adherence to embedded mitigation as outlined in **Section 5.5.3**.

GWDTE

5.6.17 Potentially highly GWDTE, of the NVC type M23b, are present to the north of the Site. 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.

5.6.18 Potentially highly GWDTE are outside of the Site (including areas of 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 intervening land is already highly hydrologically modified. Therefore, indirect impacts as a

result of 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

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

Summary

5.6.20 The Site largely comprises commercial plantation forestry and other highly disturbed habitats with little to no ecological value, with only localised areas of a notable habitat – Degraded Blanket Bog.

5.6.21 GWDTE were identified within the survey area. However, these habitats were assessed as being unlikely to be impacted by the Proposed Development.

5.6.22 Notable and protected species found to be present within the Site were otter and common lizard. However, no otters, or resting or breeding sites were found. Suitability for bat roosting was Negligible and suitability of habitat for bat feeding/commuting was Low. Habitat suitability for water vole, pine marten, red squirrel and badger were low.

5.6.23 Notable watercourses were identified downstream of the Site with potential to support notable populations of fish (e.g. the Kier Burn). However, notable fish do not occur within the Site.

5.7 Recommendations and Mitigation

Designated Sites

5.7.1 As noted above, five European sites within 10 km of the Site and one SSSI within 2 km of the Site have been scoped out of further assessment.

Opportunities for ecological enhancement

5.7.2 The following enhancement could also be considered to 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 habitat, as advised by an ecologist, which would function as refuges for the benefit of common lizard.

5.8 Cumulative Effects

5.8.1 A cumulative appraisal was conducted for the 'Scoped-in' planning applications shown in **Section 11.1.2** and **Table 11-1**, these are listed below;

- Proposed Cambushinnie 400kV substation;
- Cambushinnie UGC between the existing Braco West substation and the Proposed Cambushinnie substation;
- 21/00756/FLM: 49.9MW energy storage facility; and
- 22/02231/FLM: 49.99MW energy storage facility compound.

5.8.2 As the Proposed Development itself is unlikely to result in any significant effects on ecology, cumulative effects are therefore highly unlikely.

6. ORNITHOLOGY

6.1 Introduction

6.1.1 This EA chapter will consider the potential effects of the Proposed Development on ornithology on Site and within the wider local area. Evaluation of the existing baseline environment will be 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 (2022)[19] guidance.

6.1.2 This 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;
- 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

6.2.1 The report draws on the following technical figures in **Appendix A Figures**:

- **Figure 6-1 Statutory and Non-Statutory Designated Sites**.

Consultation

6.2.2 At the time of writing this chapter, consultations had been held regarding the potential ecological 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.

6.2.3 NatureScot responded and stated that there will likely be no significant effect for the qualifying interests of all relevant designated sites.

Desk Study

6.2.4 Several 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[68]	19 February 2024	Aerial imagery to identify potential habitats and connectivity relevant to interpretation of planning policy and potential protected or notable species constraints.
PKLDP2[69]	19 February 2024	Information on local policies regarding the environment.
PKC follows the Tayside LBAP (2016-2026)[70]	19 February 2024	Information on protected or notable species.
NatureScot SiteLink webpage[71]	19 February 2024	SPA and Ramsar sites within 10km of the Site. SSSIs within 2km of the Site.
NBN Atlas Scotland[72]	12 April 2024	Commercially available records of protected and/or important species within 1km of the Site, made since 2000.

6.3 Methodology

Sensitive Ornithological Receptors

6.3.1 CIEEM's *Guidelines for Ecological Impact Assessment 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*"[19].

6.3.2 Consequently, 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');
- Convention on Wetlands of International Importance ('Ramsar Convention');
- Wildlife and Countryside Act 1981 (the 'WCA');
- Species on the SBL, which are thus identified as being of principal importance for biodiversity conservation in Scotland; and,
- Birds of Conservation Concern (BoCC) Red List.

6.3.3 Other bird species that may be rare, scarce, or otherwise notable will be included where deemed appropriate through available information and/or professional judgement.

[68] Bing Maps (2025). *OS 1:25,000 Maps and Aerial Photography*. [Online] Available at: Bing Maps - Directions, trip planning, traffic cameras & more [Accessed 19 February 2024]

[69] Perth and Kinross Council (2019). *Perth and Kinross Local Development Plan 2.* [Online] Available at https://www.pkc.gov.uk/ldp2 [Accessed 19 February 2024]

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

[71] NatureScot (2024) *SiteLink* (online) Available at: https://sitelink.nature.scot/home [Accessed: 19 February 2024]

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

6.3.4 The Tayside Local Biodiversity Action Plan (2016-2026)[61] 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 the reed beds not present within or within close proximity to the Site. The Tayside LBAP is split into different broad habitat types which include upland, farmland and woodland LBAPs.

6.3.5 The Upland Local Biodiversity Action Plan (LBAP) refers to upland birds with a specific mention of golden eagle *Aquila chrysaetos*, snow bunting *Plectrophenax nivalis* and common scoter *Melanitta nigra* – three species that are not anticipated to be on Site, according to their known distribution.

6.3.6 The Farmland LBAP[61] 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 results of an assessment of the importance for the Site to farmland and woodland birds are provided in **Section 6.4.9** and **6.4.10**).

6.3.7 The Woodland LBAP[61] makes reference to woodland bird such as great-spotted woodpecker *Dendrocopos major*, chiffchaff *Phylloscopus collybita* and blackcap *Sylvia atricapilla*. The Water & 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

6.3.8 A desk study was carried out in February and April 2024 which identified nearby designated sites and commercially available records of notable bird species.

6.3.9 The desk study sought to identify ornithological features within the likely ZoI of the Proposed Development that could be significantly affected by its construction and operation.

6.3.10 A stratified approach was taken when defining the desk Study Area based on the likely ZoI of the Proposed Development. Accordingly, the desk study searched for:

- SPA or Ramsar sites within 10km of the Site;
- SSSIs within 2km of the Site;
- Locally designated nature conservation sites within 2km of the Site; and,
- Records of protected and/or important bird species within 1km of the Site.

Survey

6.3.11 The Preliminary Ecological Appraisal (PEA) included a walkover survey of the survey area, broadly following the Phase 1 habitat survey methodology as set out in JNCC (2010)[33]. Habitats were classified according to the UKHab[73] system. 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, and migrating birds, either individually notable species or assemblages of both common and rarer species.

6.3.12 No other ornithology survey was carried out or is considered necessary to inform the EA. Although not considered necessary specifically for the Proposed Development, survey for the presence of notable raptor species red kite *Milvus milvus* and goshawk *Accipiter*

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

gentilis nesting within or in close proximity to the neighbouring site of the proposed Cambushinnie substation. These surveys were carried out as part of the environmental assessment for the proposed Cambushinnie substation. Surveys 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 500 m of the proposed substation and involved searching for any signs of raptor nests and listening for calls.

Limitations

6.3.13 The 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.

6.4 Baseline Environment

Statutory Designated Sites

6.4.1 There are three statutory designated sites for ornithological features within the potential ZoI 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**.

Table 6-2 Statutory Locally Designated Nature Conservation Sites

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 5.5 km east of the Site. There are several nearby watercourses, but none directly flow from the Site to the SPA, 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, the settlement of Braco, 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	As above for South Tayside Goose Roosts SPA.

Site Name	Reason(s) for Designation	Relationship to the Proposed Development
	for nationally important numbers of nesting ducks.	
Carsebreck and Rhynd Lochs SSSI	The qualifying features relating to ornithology are: • Non-breeding greylag goose; and, • Pink-footed goose.	Located at closest 5.5 km east of the Site. The boundary of the Carsebreck and Rhynd Lochs SSSI is concurrent with the South Tayside Goose Roosts SPA / Ramsar site. 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

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

Important Birds

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

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

Common Name	Binomial Name	No. of Records	Designation*
Cuckoo	*Cuculus canorus*	2	SBL, BoCC Red List
Lesser redpoll	*Acanthis cabaret*	4	SBL
Mistle thrush	*Turdus viscivorus*	5	BoCC Red List
Siskin	*Spinus spinus*	11	SBL
Skylark	*Alauda arvensis*	1	SBL, BoCC Red List, LBAP
Song thrush	*Turdus philomelos*	7	SBL, LBAP
* Designations are follows: Stricter protection is afforded to birds listed on Schedule 1 of the Wildlife and Countryside Act 1981; 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.			

6.4.4 The 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**).

6.4.5 While 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 Proposed Development 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 from the SPA and 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 Site or within 1 km provides high quality terrestrial habitat for any of the qualifying features

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

6.4.6 Similarly to the above, the distance of the Site to the Carsebreck and Rhynd Lochs SSSI (the boundary of which is concurrent with the southern parcel of South Tayside Goose Roosts SPA) presents virtually no risk of disturbance to the notified features of the SSSI. Direct disturbance to birds within the SSSI is considered to be unlikely.

6.4.7 It is highly improbable that the South Tayside Goose Roosts SPA and Ramsar site and the 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 5.5 km from the Site (at the closet point).

6.4.8 As detailed in **Sections 6.4.4 - 6.4.6** above, it is concluded that significant impacts on the South Tayside Goose Roosts SPA and Ramsar site are unlikely. As stated in **Section 6.2.3**, NatureScot responded during consultation and stated that there will likely be no significant effects for the qualifying interests of all designated sites.

6.4.9 All the other notable species in **Table 6-3** could breed at the Site and immediately surrounding area. The coniferous plantation is suitable for siskin, song thrush, mistle thrush, and possibly lesser redpoll and cuckoo. Skylark almost certainly breeds on the open moorland areas. Almost all the habitats on the Site and surrounding area are also likely to be used by common nesting birds, including ground nesting species as well as species nesting in the plantation.

6.4.10 The 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 barn owl.

6.4.11 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 Site, dominated by commercial plantation forestry is generally unsuitable for tree sparrow, grey partridge, linnet, lapwing, and corn bunting.

6.4.12 The 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.

6.4.13 The Site is likely to support breeding populations of common and widespread birds as well as those listed on the SBL and BoCC Red Lists such as song thrush, mistle thrush and possibly lesser redpoll.

6.5 Embedded Mitigation

6.5.1 A 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 ECoW can provide advice on measures to minimise the risk of disturbance being caused.

6.6 Appraisal

Sensitive Receptors

6.6.1 The ecological baseline has been used to identify the important ornithological features that could be affected by the construction and operation of the 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.

6.6.2 Ornithological features of international importance comprise South Tayside Goose Roosts SPA and Ramsar site/Carsebreck (the boundary of which is concurrent with the Rhynd Lochs SSSI). Effects are considered 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). As per consultation feedback presented in **Section 6.2.3**, NatureScot stated that there will likely be no significant effect for the qualifying interests of all relevant designated sites. Therefore, potential impacts and likely significant effects will not require a full Habitats Regulations Assessment (HRA). An HRA Screening Letter will be submitted as part of the Section 37 planning application.

6.6.3 Notable farmland bird species, as listed in the Tayside Farmland LBAP (see **Section 6.3.6** and **6.4.7**), are unlikely to find the Site to be of importance for nesting or foraging (with the exception of skylark) – which comprises degraded upland habitats and a hardstanding access track. The Woodland LBAP is of little relevance to the Site (ornithological or otherwise) due to the low degree of naturalness of the woodland on Site (see **Chapter 5 Ecology and Nature Conservation** for details of the habitat type present). The Upland LBAP lists birds that are highly unlikely to be present on Site and therefore the LBAP is not relevant.

6.6.4 Ornithological features of local importance include common breeding birds (which include important/notable birds listed on the SBL and BoCC Red list). These species are of local importance because they are common and widespread species.

6.6.5 Temporary loss of breeding sites (e.g. as a result of ground works) 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 and the habitats, which would be expected to recover quickly (within two years). However, active nests and their eggs of all wild birds are protected under the Wildlife and Countryside Act 1981 from destruction, damage, or obstruction whilst in use.

6.6.6 Therefore, based on the information collected through the desk study described above, common breeding birds are not considered further in this EA.

Potential Significant Effects

6.6.7 The potential significant effects from the construction and of the Proposed Development on ornithological features can be categorised as follows:

- 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 pollution incident).

6.6.8 The 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 is also likely to be feasible. Habitat compensation and enhancement measures are outlined in **Chapter 5 Ecology and Nature Conservation** and **Appendix F Landscape and Habitat Management Plan.**

6.7 Recommendations and Mitigation

6.7.1 As noted above, five European sites within 10 km of the Site and one SSSI within 2 km of the Site have been scoped out of further assessment.

6.7.2 The following enhancement would be incorporated, in addition to the embedded mitigation (see **Section 6.5** above) that does 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:

- Installation of bird boxes on suitably mature trees in the local area (e.g. in the area of the Bullie Burn).

6.8 Cumulative Effects

6.8.1 A cumulative appraisal was conducted for the 'Scoped-in' planning applications shown in **Section 11.1.2** and **Table 11-1**, these are listed below;

- Proposed Cambushinnie 400kV substation;
- Cambushinnie UGC between the existing Braco West substation and the Proposed Cambushinnie substation;
- 21/00756/FLM: 49.9MW energy storage facility; and
- 22/02231/FLM: 49.99MW energy storage facility compound.

6.8.2 As the Proposed Development itself will not result in any likely significant effects, cumulative effects are therefore unlikely.

7. CULTURAL HERITAGE

7.1 Introduction

7.1.1 This EA chapter will assess the potential effects of the Proposed Development on archaeology and cultural heritage.

7.1.2 Cultural 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 impacts posed by the Proposed Development on cultural heritage; and
- Recommendations for additional mitigation measures as required.

7.2 Information Sources

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

- **Figure 7-1 Known Heritage Assets within the 1 km Study Area adopted for the Baseline Study;**
- **Figure 7-2 Known Heritage Assets within 1 km of the Site;**
- **Figure 7-3 Designated Assets within the 2 km Study Area adopted for Setting Impacts;**
- **Figure 7-4 Designated Heritage Assets within 2 km of the Site;**
- **Figure 7-5 Zone of Theoretical Visibility and Heritage Assets;**
- **Appendix B Gazetteer;** and
- **Appendix D Site Photographs.**

7.2.2 External sources used to inform the baseline and appraisal are referenced appropriately.

Legislation

7.2.3 The 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)[74];
- 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)[75];
- Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997[76];
- Ancient Monuments and Archaeological Areas Act 1979[77]; and

[74] Scottish Government (1997) *Town and County Planning Act,* Edinburgh: Scottish Government.

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

[76] Scottish Government (1997) *Planning (Listed Buildings and Conservation Areas) (Scotland) Act,* Edinburgh: Scottish Government.

[77] UK Government (1979) *Ancient Monuments and Archaeological Areas Act,* Edinburgh: HMSO.

- Historic Environment Scotland Act 2014[78].

National Planning Policy

7.2.4 The principal elements of national policy and guidance comprise:

- NPF4[1];
- Historic Environment Policy for Scotland (HEPS)[79];
- Our Past, Our Future - The Strategy for Scotland's Historic environment [80];
- Planning Advice Note (PAN) 2/2011 – Planning and Archaeology[81];
- PAN 71 – Conservation Area Management[82]; and
- The HES 'Managing Change in the Historic Environment' series of guidance notes (particularly *Managing Change in the Historic Environment: Setting*[83]).

7.2.5 NPF4 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 and states:

> *"h) Development proposals affecting scheduled monuments will only be supported where:*
>
> - *direct impacts on the scheduled monument are avoided;*
> - *significant adverse impacts on the integrity of the setting of a scheduled monument are avoided; or*
> - *exceptional circumstances have been demonstrated to justify the impact on a scheduled monument and its setting and impacts on the monument or its setting have been minimised*."

7.2.6 Impacts 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 long-term future of the historic environment asset or place.*
>
> *The beneficial outcomes for the historic environment asset or place should be secured early in the phasing of the development, and will be ensured through the use of conditions and/or legal agreements.*
>
> *o) Non-designated historic environment assets, places and their setting should be protected and preserved in situ wherever feasible. Where there is potential for non-designated buried archaeological remains to exist below a site, developers will provide an evaluation of the archaeological resource at an early stage so that*

[78] Historic Environment Scotland (2014) *Historic Environment Scotland Act,* Edinburgh: HMSO.

79 Historic Scotland (2019) *Historic Environment Policy for Scotland,* Edinburgh: Historic Environment Scotland.

80 Historic Environment Scotland (2014) *Our Past Our Future*, Edinburgh: Historic Environment Scotland.

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

[82] Scottish Government (2004) *Planning Advice Note 71 – Conservation Area Management,* Edinburgh: Scottish Government.

[83] 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."

7.2.7 Policy 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*"

7.2.8 A new strategy entitled 'Our Past, Our Future' was released in June 2023[81]. 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

7.2.9 The PKLDP2 was adopted in 2019[84]. 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.

Guidance

7.2.10 The assessment has been undertaken following the Chartered Institute for Archaeologists (CIfA) Standards and Guidance for Historic Environment Desk-Based Assessment[85].

7.3 Methodology

7.3.1 As part of this appraisal exercise, a search of relevant data has been undertaken with material collected for a Study Area of 1 km. These sources include:

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

85Chartered Institute for Archaeologists, 2020. *Standard and guidance for historic environment desk-based assessment* [online]. [Accessed 01 July 2024]. Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf

- PastMap[86];
- Historic Environment Scotland (HES) website[87];
- Historic mapping on the National Library of Scotland website[88];
- PKC Historic Environment Record (HER) data[89]; and
- Other available online sources.

7.3.2 A review of designated assets within 2 km of the Site identified no designated assets. Furthermore, the proposed OHL works are limited to altering the position of one existing tower, and as a result, the changes to the appearance of the OHL are unlikely to occur. As a result, impacts on setting have been scoped out of this assessment and are therefore not considered further.

7.3.3 All assets are listed in the gazetteers provided in **Appendix B Gazetteer**, these are also shown on **Figure 7-1, Appendix A Figures**. 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 database[90] have no prefix, while assets from the PKC Historic Environment Record (HER) have the prefix MPK. A single asset recorded as part of the walkover survey has the prefix 'AECOM'.

Appraisal of Impacts

7.3.4 The environmental appraisal will consider any impacts to the value (significance) of an asset, either physically or through changes to its setting.

7.3.5 The 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 Scottish planning policy (as referred to above at **Section 7.2.4**), including the Historic Environment Policy for Scotland (HESP)[91]. The value (sensitivity) 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**.

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

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

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

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

90 Canmore, n.d. Canmore [online]. [Accessed 01 July 2024]. Available at: https://canmore.org.uk/

91 Historic Scotland (2019) *Historic Environment Policy for Scotland,* Edinburgh: Historic Environment Scotland.

Table 7-1 Heritage Value (Sensitivity) Criteria

Value	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.

7.3.6 Having 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.

7.3.7 When professional judgement is considered, some sites may not fit into the specified category in this table. Each heritage asset will be assessed on an individual basis and take account of regional variations and their individual qualities.

7.3.8 The level and degree of impact (magnitude of impact) will be assigned with reference to a four-point 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 value (sensitivity) of the asset is caused, this will be stated, and the asset will not be taken further to full assessment.

Table 7-2 Magnitude of Change Criteria

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.

7.3.9 All archaeological work will be undertaken in line with guidance published by the Chartered Institute for Archaeologists[85].

Consultation

7.3.10 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. Initial consultation was undertaken with the PKC Archaeologist when Historic Environment Record (HER) data was ordered as part of the assessment in April 2024. 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 Development, proposed Cambushinnie substation, UGC route and haul track 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, allowing for 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 it was 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.

7.3.11 Mitigation will include avoiding historic landscape features (such as drystone walls, gateposts, etc) where possible to avoid accidental damage. Any sections of drystone wall that need to be removed for construction should be reinstated. If the wall cannot be reinstated because a permanent access is needed, the wall ends should be 'made good' and finished in a way that will avoid further damage through collapse.

7.3.12 Initial consultation with Historic Environment Scotland (HES) comprised a pre-application response provided on 5 October 2023, where it was 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.

7.3.13 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.

7.4 Baseline Environment

Study Area

7.4.1 This chapter examines the potential effects and impacts on sites of archaeological and cultural heritage interest resulting from the Proposed Development. The baseline for this chapter examines the following components (hereafter referred to as the "Combined Project Development Boundary") as agreed with the PKC Archaeologist as detailed in **Section 7.3.10**:

- Proposed Development;
- Proposed Cambushinnie substation;
- UGC route; and
- Haul track.

7.4.2 The subsequent assessment of potential impacts in this chapter focuses on the Proposed Development only. 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. A total of ten designated assets were identified in this area.

7.4.3 A wider Study Area of 2 km was used for assessing changes to the setting of further designated assets. This was focused on 2 km from the Proposed Development Site and confirmed there were no designated assets. This absence of designated assets, as well as the nature of the Proposed Development, resulted in impacts on setting being scoped out.

Land use and Topography

7.4.4 The proposed Cambushinnie substation, which is one of the associated developments of the Proposed Development is centred on National Grid Reference (NGR) NN 79394 09313 and is located adjacent to the existing Braco West Substation, approximately 3.5 km west of the settlement of Braco (previously known as Ardoch[92]) in Perth and Kinross (**Figure 7-1, Appendix A Figures**). Located at approximately 255 m Above Ordnance Datum (AOD), the proposed Cambushinnie substation sits on the lower southeast slopes of an area of high ground that overlooks Strathallan and the Allan Water. While the high ground 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 and 100 m AOD.

7.4.5 The 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

7.4.6 A total of ten designated assets have been identified within the 1 km Study Area for the Combined Project Development Boundary, including two SMs (SM3088 and SM1601),

[92] Smith, R. (2001) *The Making of Scotland,* Edinburgh: Canongate Books Limited.

seven LBs (LB5801, LB5796, LB72, LB5795, LB5797, LB1259 and LBN5794), and one GDL Landscape (GDL000067) (see **Figure 7-1, Appendix A Figures**).

7.4.7 The majority of the designated assets are located near the eastern end of the proposed haul track in the village of Braco, and as such are some distance from the Site. 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 (SM1601). Grinnan Fort is located 176 m north of the proposed haul track, and some 2.4 km from the Site (SM3088), with traces of the ramparts on the north side visible in the woodland that covers the hill. The Site 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.

7.4.8 The Roman complex of Ardoch is located on the north side of Braco village and includes very well-preserved earthworks associated with a number of Roman camps and forts occupied over various periods in the first and second century Anno Domini (AD)(SM1601). The nearest component of the development aspects which are ancillary to the Proposed Development and associated developments is the proposed haul track 754 m to the south, with the proposed Cambushinnie substation over 4.3 km to the southwest.

7.4.9 The Listed Buildings (LBs) 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 (LB5795 and LB51259). Most of these assets are located within the settlement of Braco, with only Feddal Castle located outside of the settlement.

7.4.10 The GDL consists of the western limits of Braco GDL (GDL00067), which is located some 419 m north of the proposed access track upgrade, 1.5 km northeast of the site of the proposed Cambushinnie substation and 1.97 km northeast of the Proposed Development. 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.

7.4.11 A review of designated assets within 2 km of the Combined Project Development Boundary adopted 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 are within 2 km of the Combined Project Development Boundary, there were no designated assets within 2 km of the Site itself.

Non-designated Assets

7.4.12 A 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 **Appendix B Gazetteer** and **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 the village of Braco, as well as agricultural activities in the surrounding landscape.

7.4.13 Previously recorded heritage assets in the 1 km Study Area are discussed by period below.

Prehistoric and Roman (10,000BC to AD400)[93]

7.4.14 Limited evidence for prehistoric activity has been recorded within the 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 (25237), and a small grouping of bronze objects from the Glassick Farm area (25259; 25264; 25265; 25252).

7.4.15 While 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).

7.4.16 The earliest evidence for settlement remains is the fort on Grinnan Hill (SM3088). The site, which is located in an elevated position at the southern side of the settlement of Braco, 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 defences[94]. While this has not been subject to detailed archaeological investigations, its form would suggest it dates to the Iron Age period[95].

7.4.17 The 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 along the lower lying river valley, as well as Strathearn to the northeast of the Study Area[96]. 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.

7.4.18 Evidence 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 burials 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

[93] 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)

[94] 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*, Volume

[95] 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

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

Development Boundary, with a greater concentration of burials 10 km to the south of the Study Area along the valley of the River Teith between Callander and Dunblane[97].

7.4.19 While there is no evidence for prehistoric evidence 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 village and Strathallan.

7.4.20 There 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 second century[98]. 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 road which roughly follows the A822 towards Crieff. Other Roman sites in the wider landscape are largely concentrated on the alignment of the Roman Road on the southeast and northeast of Braco village and include the signal stations or towers of Shielhill[99] and Greenloaning[100].

7.4.21 In 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)

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

7.4.23 While 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 8km to the northeast, Auchterarder 10km to the east[101], and Dunblane 9km to the southwest[102]. Accounts do note, however, that the valley bottom of Strathallan was a wet boggy area that was often difficult to traverse[103], 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.

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

[98] Breeze, D. J. (1973) 'Exacations at Ardoch 1970' *in Proceedings of the Society of Antiquaries of Scotland,* Volume 102: Pages 122-129.

[99] 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

[100] Woolliscroft, D. J. & Hoffmann, B. (19987 'The Roman Gask System Tower at Greenloaning, Perth and Kinross' *in Proceedings of the Society of Antiquaries of Scotland,* Volume 127: Pages 563-576.

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

[102] Smith, R. (2001) *The Making of Scotland,* Edinburgh: Canongate Books Limited.

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

7.4.24 There 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)

7.4.25 As 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 Area, two of which have been positively dated to the medieval period. These are both findspots and include a gold button (MPK1852) found within the Braco village, and pottery (MPK17590) recorded to the north of Braco Village within the limits of Ardoch Roman Fort.

7.4.26 The 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).

7.4.27 The 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.

7.4.28 It 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 century[104]. 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)

7.4.29 The 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 the Braco village, as well as the lower slopes of ground rising from Strathallan, with assets in Braco village largely linked to settlement and assets on the fringes of Strathallan linked to agriculture.

7.4.30 Assets within Braco village, 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 village 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 northeast[105]. 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).

[104] Tranter, N. (1963) *The Fortified House in Scotland: Volume Two – Central Scotland,* Edinburgh: Oliver and Boyd.

[105] Taylor, W. 1976) *The Military Rods in Scotland,* London: David & Charles.

7.4.31 Features 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).

7.4.32 A review of early cartographic sources provide little information, as most are county-wide and therefore at a scale that does not provide any great detail, although Moll (1732)[106] does show the castle/tower house at Braco village 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 northeast[107].

7.4.33 The first detailed survey of the Study Area identified as part of the current assessment is the General Roy Survey undertaken between 1747 and 1755[108]. This shows the modern Braco village named as Ardoch, and 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 Hill, and on the line of the Keir Burn, appears to be shown as a pond or area where the water course widens.

7.4.34 The 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).

7.4.35 The 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 track.

7.4.36 A 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).

7.4.37 No features are marked on the upland section of the Study Area, with the landscape depicted as grazing or unimproved.

7.4.38 The First Statistical Account of Scotland provides an overview of the situation within the Parish of Muthill, of which Braco village was part, in the late 18th century, and this notes that the landscape of the Study Area largely consisted of poor-quality soils[109]. Braco village

[106] National 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 at: https://maps.nls.uk/view/00000293

[107] Viewed at *View map: Rutherford, Andrew, An Exact Plan of His Majesty's Great Roads through the Highlands of Scotland - Counties of Scotland*, 1580-1928 (nls.uk) accessed 24th May 2024.

108 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 at: https://maps.nls.uk/view/74414122

109 Scott, J. (1793) ‘Parish of Muthil’ in Sinclair, J. (ed.) *The Statistical Account of Scotland, Volume 8*: Perth, Edinburgh:

(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 Braco village (or 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.

7.4.39 The 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"*[110]. 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.

7.4.40 This 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 Knaik[111]. 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 track is proposed) is occupied by a series of enclosed fields flanking the Keir Burn. This pattern of fields is 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).

7.4.41 The OS mapping for the Study Area outside of Braco village 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 Cambushinnie 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.

7.4.42 Very 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 Braco village 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 Cambushinnie substation is located shown as unimproved or semi-improved rough pasture.

Modern (AD1900 – Present)

7.4.43 Three assets dating to the modern periods have been recorded within the Study Area, all of which are located around Braco village. 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 village (MPK10915), and the golf course (348440).

7.4.44 The settlement of Braco village continued to grow throughout the 20th century, with the village expanding south up to 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

110 Walker, J. (1845) 'Parish of Muthill' in Gordon, J. (ed.) *The New Statistical Account of Scotland, Volume 10*: Perth .

111 National Library of Scotland, n.d. *Perthshire, Sheet CXVII* [online]. [Accessed 24 May 2024]. Available at: https://maps.nls.uk/view/228779812

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 village (AECOM002).

7.4.45 In the upland regions of the Study Area, where the Proposed Development 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-1970s[112]. 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 existing operational OHL and existing Braco West Substation that the Proposed Development and associated developments aim to support, extend, and reinforce.

Landscape of the Site

7.4.46 The Site is focused in the upland area adjacent to the existing Braco West Substation, and a review of previously recorded heritage assets within 1km of the Site identified seven assets, although no assets were recorded within the Site and the nearest asset to the Site is over 700 m away (see **Table 2 Appendix B Gazetteer**, and **Figure 7-2, Appendix A Figures).** All of the previously recorded assets were linked to post-medieval agriculture, with the majority associated with seasonal grazing in the Crocket Burn area to the southwest of the Site (i.e. MPK5677; MPK5674; MPK6625). This pattern of settlement and land use matches that described in the baseline prepared for the Combined Project Development Boundary, with limited evidence for settlement and activity in the upland component, with the main focus of activity in the lower lying areas near Braco village and Strathallan.

7.4.47 In addition to this, a review of mapping as well as the walkover survey have confirmed that much of the Site has been subject to disturbance associated with commercial forestry, as well as other recent disturbance including the construction of the existing OHL and the existing Braco West Substation.

Walkover Survey

7.4.48 A walkover survey was undertaken on 1 February 2024 which included a visit to the Site and areas of the proposed Cambushinnie substation, proposed UGC route and access track upgrade (see **Appendix D Site Photographs**). Visits were also undertaken to Braco village, as well as Grinnan Fort (SM3088), Ardoch Fort (SM1601), and parts of Braco GDL (GDL00067) to examine possible impacts on the setting of assets.

7.4.49 The 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.

7.4.50 No new assets were recorded as part of the walkover survey in the Site or areas of the associated developments.

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

Archaeological Potential

7.4.51 While evidence for human activity has been recorded within the Study Area from the prehistoric period onwards, the main focus of settlement has been the low-lying area around Braco village and Strathallan, with only the seven non-designated assets previously discussed in **Section 7.4.6** recorded within 1 km of the Site (see **Table 2 Appendix B Gazetteer**, and **Figure 7-2, Appendix A Figures**). Activity in the upland section of the Study Area, where the Proposed Development and proposed Cambushinnie substation will 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 Site is considered to be low.

7.5 Appraisal

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

Construction Phase

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

- Permanent physical impacts on previously unrecorded heritage assets

7.5.3 The 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 Proposed Development. 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 within the Site is limited to agricultural activity, and that any assets that might be recorded or identified during works will be of low value and the resultant impact would be negligible.

Operational Phase

7.5.4 Operational impacts are limited to potential impacts on the setting of heritage assets.

7.5.5 While the Proposed Development will result in an alteration to the operational OHL, these alterations are considered to be minimal and will not change the overall appearance of the OHL. Furthermore, the designated assets are all located a considerable distance from the Proposed Development, with elements such as topography and existing planting/woodland/vegetation also limiting or removing most views from the designated assets towards the OHL. As a result, no operational impacts resulting from the Proposed Development are predicted.

7.6 Cumulative Effects

7.6.1 A cumulative appraisal was conducted for the 'Scoped-in' planning applications shown in **Section 11.1.2** and **Table 11-1**, these are listed below;

- Proposed Cambushinnie 400kV substation;
- Cambushinnie UGC between the existing Braco West Substation and the Proposed Cambushinnie substation;

- 21/00756/FLM: 49.9MW energy storage facility; and
- 22/02231/FLM: 49.99MW energy storage facility compound.

7.6.2 As the Proposed Development itself will not result in any significant effects, cumulative effects are therefore highly unlikely.

7.7 Recommendations and Mitigation

7.7.1 Due to the nature of the Proposed Development, as well as the results of the desk-based assessment, no impacts are predicted, and no further works are recommended.

8. TRAFFIC AND TRANSPORT

8.1 Introduction

8.1.1 This 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 Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement[113].

8.1.2 The traffic and movement assessment only considers the construction phase of the Proposed Development. The operational phase is unlikely to have a material impact on local roads, as only occasional operational and maintenance traffic is expected. .

8.1.3 This chapter is supported by **Appendix I Transport Statement.**

8.2 Information Sources

8.2.1 A traffic baseline is derived from 2024 survey data. Traffic surveys were conducted during April 2024 on public roads serving the Site. Twelve traffic surveys (8 automatic traffic counters and 4 junction counts) were undertaken to provide robust data from which a baseline position was established. The survey locations are shown in **Figure 8-1, Appendix A Figures**.

8.2.2 Department for Transport (DfT) recorded injury accident data was obtained from Crashmap[114].

8.2.3 Forecast construction traffic data for the Proposed Development was obtained from data provided by the Applicant. The construction period for the Proposed Development is, subject to the necessary consents being obtained, anticipated to begin in January 2028 and last approximately 19 months.

8.3 Assessment Methodology

8.3.1 The assessment methodology follows the IEMA Guidelines 2023[113]. Rule 1 and Rule 2 from the IEMA Guidelines are used to identify roads to be included in the environmental assessment:

- Rule 1. Include highway links where traffic flow 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.

8.3.2 The IEMA Guidelines[113] 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 Guidelines 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. For magnitude of change, the IEMA Guidelines describe those changes in traffic of 30%, 60% and 90% should be considered as ‘slight’, ‘moderate’ and ‘substantial’ respectively. **Table 8-1** reflects the IEMA Guidelines to quantify the magnitude of change for Proposed Development.

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

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

Table 8-1 Magnitude of Change

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.
Negligible	0% - 30%	Very little change from baseline conditions. Change is barely distinguishable approximating to no-change situation.

8.3.3 Receptors are locations or land-uses categorised by sensitivity or environmental value. **Table 8-2** describes the receptor sensitivity adopted for the assessment of Proposed Development traffic.

Table 8-2 Sensitivity of Receptors

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.

8.3.4 For the purposes of assessment, receptors are identified in accordance with IEMA Guidelines[113], and comprise the following:

- 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).

8.3.5 **Appendix I Transport Statement** provides an assessment of Study Area roads and the sensitivity of the IEMA Guidelines[113] receptors that may be present on those roads. **Table 8-3** summarises the sensitivity of Study Area roads as environmental receptors.

Table 8-3 Study Area Roads Sensitivity of Receptors

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

Road	Description	Sensitivity
(DfT Counter 20730)		

8.3.6 For 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 8-4** summarises the approach to deriving the significance of effects. Note, shading indicates a likely significant effect, subject to assessor's professional judgment.

Table 8-4 Significance of Effects

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

8.3.7 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.

8.3.8 The 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.

8.3.9 Of the categories included in IEMA Guidelines[113] it is proposed only Hazardous / Large Loads are scoped out. It is considered unlikely there will be material construction traffic generated whose loads would fall within the current classifications for carriage of hazardous goods (Class 1-9).

8.4 Traffic and Movement Baseline

8.4.1 Vehicle access to the Proposed Development will be via the existing public road network. Study Area roads will include the A9, the B8033 and A822 and local roads in the immediate environs of the Proposed Development.

8.4.2 The A9 forms part of the trunk road network in Scotland, connecting Stirling, Perth and Inverness. In the vicinity of Greenloaning, the A9 is a 70mph dual carriageway. Northbound traffic exits the A9 at Greenloaning via a slip road which connects to the A822. Southbound traffic exits the A9 at Greenloaning via a right turn filter lane which connects to Millhill Road.

8.4.3 The 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. A 30mph speed limit applies within Braco and a 40mph applies within Greenloaning. The A822 will be the route used by construction traffic between the A9 trunk road and the rural roads in the vicinity of the Site access.

8.4.4 The B8033 routes north to south parallel to the A822 and A9 between Braco village and Dunblane. National speed limits of 60mph apply to the route outside of urban environs on its route which is largely rural in nature.

8.4.5 Current 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 I Transport Statement**. In summary, the following traffic surveys were undertaken:

- 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.

8.4.6 The 2024 traffic data provides information on current vehicle flows as well as speeds, which 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 commence in 2028. This provides a robust assessment in terms of applying IEMA Guidelines Rule 1 and Rule 2[113] to determine which roads should be included in the environmental assessment.

8.4.7 Department for Transport (DfT) accident data has been sourced (via Crashmap) for the 5-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.

8.4.8 Vehicle 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.

8.4.9 **Table** 8-5 shows the 2024 baseline traffic data collected for Study Area roads.

Table 8-5 2024 Traffic Survey Data

Road	Daily Weekday Traffic (Two-Way)		
	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 Braco Bypass route)	4,303	77	4,380
A822 (North of A9)	4,192	85	4,277
Millhill Road (Between A9 and A822)	522	12	534
B8033 (East of Easter Feddal)	387	15	402
B8033 (West of 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

Proposed Development Traffic

8.4.10 Forecast construction traffic for the Proposed Development (OHL) was obtained from information provided by the Applicant. The OHL construction traffic programme is included within **Appendix I Transport Statement**. The peak month of construction for the Proposed Development (OHL) is May 2028.

8.4.11 The Proposed Development (OHL) is anticipated to generate 207 HGV movements and 336 Car / LGV movements during May 2028. Also, during May 2028 there is anticipated to

be 1,240 HGV movements and 1,840 Car/LGV movements associated with the proposed Cambushinnie substation and UGC associated development. Accordingly, for the Proposed Development (OHL) the construction traffic forecast is the sum of the above; that being 1,447 HGV movements and 2,176 Car/LGV movements during May 2028. Using a flat profile across May 2028 for construction traffic, and assuming 22 working days per month, results in 66 daily HGV movements and 99 daily Car / LGV movements.

8.5 Traffic and Movement Appraisal

8.5.1 For a robust assessment it is assumed all construction materials will be transported to 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.

8.5.2 Construction traffic generated by the Proposed Development will follow the proposed construction traffic haul track route. HGV construction traffic will route to the Site from the A9, via the A822 and the proposed [construction traffic] haul track route. It has been assumed that Car / LGV traffic will also use the proposed [construction traffic] haul track route.

8.5.3 **Table** 8-6 compares forecast daily Proposed Development construction traffic against baseline traffic to determine which roads must be included in the EA in accordance with IEMA Guidelines Rule 1 or Rule 2[113]. Roads to be included in the environmental assessment are marked Yes or No. The assessment uses the forecast construction traffic from the peak month of the programme which occurs in May 2028.

8.5.4 It should be noted that while only five Study Area roads would carry HGV construction traffic, Car / LGV trips may still use any part of the public road and therefore all roads within the Study Area have been included in the initial Rule 1 / Rule 2 assessment.

8.5.5 **Figure 8-2, Appendix A Figures** highlights the location of these roads.

Table 8-6 IEMA Guidelines Roads to be Included in Environmental Assessment

Road	Baseline		Proposed Development		% Increase		Environmental Assessment
	HGV	All Vehs	HGV	All Vehs	HGV	All Vehs	
A822 (North of A822 / Feddal Road Junction)	102	4,102	0	100	0%	2%	No
A822 (South of A822 / Feddal Road Junction)	123	4,398	0	100	0%	2%	No
Feddal Road	18	828	0	0	0%	0%	No

Road	Baseline		Proposed Development		% Increase		Environmental Assessment
	HGV	All Vehs	HGV	All Vehs	HGV	All Vehs	
(West of A822 / Feddal Road Junction)							
A822 (At Braco Bypass route)	80	4,555	66	166	82%	4%	Yes
A822 (North of A9)	88	4,448	66	166	75%	4%	Yes
Millhill Road (Between A9 and A822)	12	555	66	166	529%	30%	Yes
B8033 (East of Easter Feddal)	16	418	0	0	0%	0%	No
B8033 (West of Craighead)	9	277	0	0	0%	0%	No
A9 South (DfT Counter 724)	2,992	31,316	66	166	2%	1%	No
A9 North (DfT Counter 20730)	3,496	27,447	66	166	2%	1%	No

8.5.6 **Table** 8-6 shows that four roads require environmental assessment. These include Feddal Road, the A822 (at the haul track location), A822 (north of the A9 slips) and Millhill Road.

Severance of Communities

8.5.7 **Table 8-7** 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 2023[113].

Table 8-7 Severance of Communities Significance of Effect

Road	% Change in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At Braco Bypass route)	4%	Negligible	Medium	Negligible
A822 (North of A9)	4%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	30%	Low	Medium	Minor

8.5.8 Classifying the significance of effects: prior to mitigation, the likely effect of construction traffic on severance of communities would be a direct, temporary, **Minor Adverse (Not Significant)** effect.

8.5.9 For severance of communities the significance of effects for all Study Area 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

8.5.10 **Table 8-8** presents the significance of effect on Fear and Intimidation on and by Road Users as a result of Proposed Development construction traffic. Using IEMA Guidelines methodology[113] for fear and intimidation magnitude of change, there is no step change in traffic flows from baseline conditions. The significance of effects for Fear and Intimidation are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023[113].

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

Road	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At Braco Bypass route)	Negligible	Low	Negligible
A822 (North of A9)	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	Negligible	Medium	Minor

8.5.11 Classifying the significance of effects: prior to mitigation, the likely effect of construction traffic for Fear and Intimidation on and by Road Users would be a direct, temporary, **Negligible (Not Significant)** effect.

8.5.12 For Fear and Intimidation on and by Road Users the significance of effects for all Study Area roads carrying construction traffic would be negligible.

Road User and Pedestrian Safety

8.5.13 **Table 8-9** 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 I Transport Statement** contains the construction traffic accident forecast. The significance of effects for Road User and Pedestrian Safety are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023[113].

Table 8-9 Road User and Pedestrian Safety Significance of Effect

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

8.5.14 Classifying the significance of effects: prior to mitigation, the likely effect of construction traffic on Road User and Pedestrian Safety would be a direct, temporary, **Negligible (Not Significant)** effect.

8.5.15 For Road User and Pedestrian Safety, the significance of effects for all Study Area roads carrying construction traffic would be negligible.

Non-Motorised User Amenity and Non-Motorised User Delay

8.5.16 **Table 8-10** 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 2023[113].

Table 8-10 Non-Motorised User Amenity and Delay

Road	% Change in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At Braco Bypass route)	4%	Negligible	Medium	Negligible
A822 (North of A9)	4%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	30%	Low	Medium	Minor

8.5.17 Classifying the significance of effects: prior to mitigation, the likely effect of construction traffic would be a direct, temporary, **Minor Adverse (Not Significant)** effect.

8.5.18 For non-motorised user amenity and delay, the significance of effects for all Study Area 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

8.5.19 **Table 8-10** 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 2023[113].

Table 8-11 Road User Passenger Delay

Road	% Change in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At Braco Bypass route)	4%	Negligible	Medium	Negligible
A822 (North of A9)	4%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	30%	Low	Medium	Minor

8.5.20 Classifying the significance of effects: prior to mitigation, the likely effect of construction traffic would be a direct, temporary, **Minor Adverse (Not Significant)** effect.

8.5.21 For road vehicle and passenger delay the significance of effects for all Study Area roads carrying construction traffic would be negligible or minor. One public road is forecast to have minor significance of effects: Millhill Road.

8.6 Mitigation

8.6.1 Mitigation relating to traffic movements associated with the Proposed Development would be focused primarily on HGV construction traffic, as the additional Car / LGV trips would have a negligible environmental effect on future traffic flows.

8.6.2 A Construction Traffic Management Plan (CTMP) would operate throughout the duration of the construction programme. **Appendix I Transport Statement** contains a framework CTMP. A detailed CTMP is expected to be conditioned and provided once a Principal Contractor is appointed, and will include:

- 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;
- 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.

8.7 Summary

8.7.1 Construction traffic forecasts for the Proposed Development presented in this chapter provide a robust basis for the assessment of environmental effects.

8.7.2 Prior 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 detailed Construction Traffic Management Plan (CTMP) would be conditioned as part of the Section 37 planning consent, and subsequently approved by relevant planning, roads, and emergency authorities.

8.7.3 Post-mitigation residual environmental effects associated with Proposed Development construction traffic are forecast to be direct, temporary Negligible (Not Significant). **Table 8-12** provides a summary of the potential effects identified in this chapter.

Table 8-12 Summary of Environmental Effects

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

8.8 Cumulative Assessment

8.8.1 The cumulative assessment considers two developments which are proposed in proximity of the Site. Both developments are Battery Energy Storage System (BESS) sites which are anticipated to generate four daily two-way Car / LGV trips and four daily two-way HGV trips. For the purpose 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.

8.8.2 For the purposes of cumulative assessment, there would also be some overlap in construction programme between the Proposed Development, the proposed Cambushinnie substation and proposed UGC works. Construction traffic associated with any overlap in project construction programmes is implicitly included within the construction traffic forecast.

8.8.3 **Table 8-13** considers the increase in daily traffic resulting from cumulative developments during the peak month of construction (May 2028).

Table 8-13 IEMA Guidelines Roads to be Included in Environmental Assessment

Road	Baseline		Cumulative Development		% Increase		Environmental Assessment
	HGV	All Vehs	HGV	All Vehs	HGV	All Vehs	
A822 (North of A822 / Feddal Road Junction)	100	4,043	0	108	0%	3%	No
A822 (South of A822 / Feddal Road Junction)	121	4,335	0	108	0%	2%	No
Feddal Road (West of A822 / Feddal Road Junction)	17	816	0	8	0%	1%	No
A822 (At Braco Bypass route)	79	4,490	74	182	92%	4%	Yes
A822 (North of A9)	87	4,384	74	182	84%	4%	Yes
Millhill Road (Between A9 and A822)	12	547	74	182	593%	33%	Yes
B8033 (East of Easter Feddal)	15	412	0	0	0%	0%	No
B8033 (West of Craighead)	9	273	0	0	0%	0%	No
A9 South (DfT Counter 724)	2,949	30,865	74	182	2%	1%	No

Road	Baseline		Cumulative Development		% Increase		Environmental Assessment
	HGV	All Vehs	HGV	All Vehs	HGV	All Vehs	
A9 North (DfT Counter 20730)	3,446	27,051	74	182	2%	1%	No

8.8.4 **Table 8-13** shows that four roads require environmental assessment due to meeting the threshold for Rule 1 or Rule 2. These include the A822 (at the haul track location), A822 (north of the A9 slips) and Millhill Road.

Severance of Communities

8.8.5 **Table 8-14** 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 2023[113].

Table 8-14 Severance of Communities Significance of Effect

Road	% Increase in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At Braco Bypass route)	4%	Negligible	Low	Negligible
A822 (North of A9)	4%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	33%	Low	Medium	Minor

8.8.6 Classifying the significance of effects: prior to mitigation, the likely effect of cumulative development traffic on severance of communities would be a direct, temporary, **Minor Adverse (Not Significant)** effect.

8.8.7 For severance of communities the significance of effects for all Study Area 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

8.8.8 **Table 8-15** presents the significance of effect on Fear and Intimidation on and by Road Users as a result of cumulative development construction traffic. Using IEMA Guidelines[113] methodology[113] for fear and intimidation magnitude of change, there is no step change in traffic flows from baseline conditions. The significance of effects for Fear and Intimidation on and by Road Users are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023. The full results of the assessment are included in **Appendix I Transport Statement**.

Table 8-15 Fear and Intimidation on and by Road Users Significance of Effect

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

8.8.9 Classifying the significance of effects: prior to mitigation, the likely effect of cumulative development traffic for Fear and Intimidation on and by Road Users would be a direct, temporary, **Negligible (Not Significant)** effect.

8.8.10 For Fear and Intimidation on and by Road Users the significance of effects for all Study Area roads carrying cumulative development construction traffic would be negligible.

Road User and Pedestrian Safety

8.8.11 **Table 8-16** 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 I Transport Statement** contains the construction traffic accident forecast. The significance of effects for Road User and Pedestrian Safety are based on an assessment of all traffic in accordance with the IEMA Guidelines 2023[113].

Table 8-16 Road User and Pedestrian Safety Significance of Effect

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

8.8.12 Classifying the significance of effects: prior to mitigation, the likely effect of cumulative development traffic on Road User and Pedestrian Safety would be a direct, temporary, **Negligible (Not Significant)** effect.

8.8.13 For Road User and Pedestrian Safety the significance of effects for all Study Area roads carrying cumulative development construction traffic would be negligible.

Non-Motorised User Amenity and Non-Motorised User Delay

8.8.14 **Table 8-17** 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 2023[113].

Table 8-17 Non-Motorised User Amenity and Delay

Road	% Increase in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At Braco Bypass route)	4%	Negligible	Medium	Negligible
A822 (North of A9)	4%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	33%	Low	Medium	Minor

8.8.15 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 would be a direct, temporary, **Minor Adverse (Not Significant)** effect.

8.8.16 For non-motorised user amenity and delay, the significance of effects for all Study Area roads carrying cumulative development construction traffic would be negligible or minor. One public road present Minor significance of effects: Millhill Road.

Road Vehicle and Passenger Delay

8.8.17 **Table 8-18** 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 2023[113].

Table 8-18 Road User and Passenger Delay

Road	% Increase in Total Traffic	Magnitude of Change	Sensitivity of Receptor	Significance of Effect
A822 (At Braco Bypass route)	4%	Negligible	Medium	Negligible
A822 (North of A9)	4%	Negligible	Low	Negligible
Millhill Road (Between A9 and A822)	33%	Low	Medium	Minor

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

8.9 Summary of Cumulative Development Effects

8.9.1 Construction 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.

8.9.2 Prior 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 8.6**), and subsequently approved by relevant planning, roads, and emergency authorities.

8.9.3 Post-mitigation residual environmental effects associated with cumulative development construction traffic are forecast to be direct, temporary Negligible (Not Significant). **Table 8-19** provides a summary of the potential effects identified in this chapter.

Table 8-19 Summary of Environmental Effects (Cumulative Development)

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

9. HYDROLOGY, HYDROGEOLOGY, GEOLOGY AND SOILS

9.1 Introduction

9.1.1 This chapter assesses the potential effects relating to Hydrology, Hydrogeology, Geology and Soils (including land contamination) in relation to the construction and operation 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.

9.2 Information Source

9.2.1 This chapter is supported by the following figure (see **Appendix A Figures**):

- **Figure 9-1 Surface Water Features**

9.2.2 The data relating to the Study Area, (see **Section 9.4** below) used to develop a baseline for soils, geology, land contamination, Water Framework Directive (WFD) catchments, watercourses and surrounding areas is summarised below:

- Groundsure Enviro and Geo Insight (ref. GS-BMC-5AI-LLZ-3UB, 6 February 2024) (Appended as part of **Appendix G Geo-environmental Desk Study**)
- Groundsure Enviro and Geo Insight (ref. GSIP-2024-14502-17022, 29 January 2024) (Appended as part of **Appendix G Geo-environmental Desk Study**)
- Geo-Environmental Desk Study LT520-Braco West Substation (SSEN Transmission, October 2023) (included within **Appendix H Geo-environmental Desk Study** of the LT520 Cambushinnie 400kV Substation EA (AECOM, 2024))
- Geo-Environmental Desk Study Overhead Line Tie-in; Cambushinnie 400kV Substation (AECOM, June 2024) (**Appendix G Geo-environmental Desk Study**)
- Igne - Report on GI, LT307 Braco West Sites 2 &3, (26 January 2024) (Appended as part of **Appendix G Geo-environmental Desk Study**)
- Coal Authority (CA) Interactive mapping (2024)[115]
- British Geological Survey (BGS) mapping (2024)[116]
- National River Flow Archive for surface water flow and rainfall information (2024)[117];
- Met Office (2023)[118];
- Scotland's Aquaculture website (2024)[119];
- Scotland's Environment website (2024)[120];
- Hydrogeological Map of Scotland (2024)[121];
- SEPA Water Classification Hub (2024)[122];

115 The Coal Authority 2023, *Interactive Map.* [online]. [Accessed 09 May 2024] Available at: https://mapapps2.bgs.ac.uk/coalauthority/home.html.

116 British Geological Survey (BGS), 2020, *Onshore Geoindex*. [online]. [Accessed 09 May 2024] Available at: https://mapapps2.bgs.ac.uk/coalauthority/home.html. [Accessed 09 May 2024].

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

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

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

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

121 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/

122 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)[123];
- NatureScot Site Link Map Search (2024)[124]
- HES PastMap (2024)[125]
- Zetica Unexploded Ordnance (UXO) risk map (2024)[126]
- Zetica Pre-Desk Study Assessment (PDSA) (22 February 2024) (Appended as part of **Appendix G Geo-environmental Desk Study**)
- UK Radon map (2024)[127]
- UK Topography map (2024)[128]
- Scottish Government Energy Infrastructure (Energy Consents - Scottish Government) (2024)[129];
- Google Earth satellite imagery (Google Earth)[130]
- Carbon and Peatland 2016 Map (2024)[56]
- National Soil Map of Scotland (2024)
- Email correspondence with the Local Authority (PKC) on potentially contaminated land (received 23 February 2024) (Appended as part of **Appendix G 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 H Private Water Supply Assessment**). Information concerning abstractions, discharges and pollution events was received from SEPA on 22 March 2024.

9.2.3 A field survey was also conducted on15 January 2024.

9.3 Methodology

9.3.1 The 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 to request information relating to water abstractions, contaminated land, historical land use and areas of sensitivity;
- Consultation with PKC to request information on Private Water Supplies;
- Desktop study to obtain baseline and historical data;
- Field survey undertaken on 15 January 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;

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

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

[125] Historic Environment Scotland (2024). [Online]. Available at: https://pastmap.org.uk/map. [Accessed 09 May 2024].

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

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

[128] 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/

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

[130] Google Earth, 2023. [Online]. [Accessed 09 May 2024]. Available at: https://earth.google.com/web/@-3.47981663,150.00030013,-3256.63719952a,18709751.81607485d,35y,165.58670573h,0t,0r/data=OgMKATA

- Identification of options for the mitigation of potential effects taking account of the SSEN Transmission GEMPs (**Appendix K GEMPs and SPPs**); and
- **Appendix H Private Water Supply Assessment** will feed into the overall assessment of Hydrology, Hydrogeology, Geology and Soils.

9.3.2 The significance of the impacts upon the baseline environment will be defined as a function of the sensitivity of receptors and the magnitude of change.

9.3.3 This 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.

9.3.4 The Site will be assessed for flood risk in line with SPPs including NPF4[1]. A full flood risk assessment would be carried out if required.

9.4 Study Area

9.4.1 For the assessment of the Hydrology, Hydrogeology, Geology, and Soils, a Study Area up to 1 km from Proposed Development was used. For contaminated land risk assessment purposes, a Study Area of up to 250 m from the Proposed Development was used.

9.5 Baseline Environment

Surface Water Hydrology

9.5.1 Surface water features (and their attributes) within the Study Area are described in this section.

9.5.2 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.

9.5.3 As not all the watercourses in the Study Area are named, and some have multiple tributaries, each watercourse has been given a unique reference number.

9.5.4 The Proposed Development is situated within the Allan Water Catchment (ID:55). Within that catchment, the Proposed Development is located between two sub-catchments; Muckle Burn and Bullie Burn. Each of these sub-catchments have a number of water features associated. These are listed in **Table 9-1** below.

Table 9-1 Catchments and Water Features

Sub-Catchment	Water Feature
Muckle Burn	Crocket Burn
	Unnamed watercourses and ditches
Bullie Burn, Keir Burn and Mill Burn	Froskin Burn
	Tochie Burn

Sub-Catchment	Water Feature
	Feddal Burn
	Unnamed watercourses and ditches
	Unnamed ponds/lakes

9.5.5 Allan 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 9-2**).

Table 9-2 WFD Parameters for the Allan Water (Greenloaning to Dunblane), Bullie Burn and Muckle Burn

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

9.5.6 Allan Water is a large watercourse which is sourced from a small lochan situated around grid reference NN 91354 10193. The river flows roughly west, before it flows south into the River Forth at grid reference NS 78670 95998. Flow data from the National River Flow Archive gives a Q95 result of 0.861 m^3/s at Allan Water for Kinbuck[131]. **Plates 9-1** and **9-2**

[131] Google Earth, 2023. [Online]. [Accessed 09 May 2024]. Available at: https://earth.google.com/web/@-3.47981663,150.00030013,-3256.63719952a,18709751.81607485d,35y,165.58670573h,0t,0r/data=OgMKATA

shows the water feature from the Site walkover. It was observed to have sand, gravel and cobbles deposited to the centre around the bridge and along the banks.

Plate 9-1 Allan Water taken at NN 83463 07879 facing downstream (Taken 15 January 2024)

Plate 9-2 Allan Water facing downstream (Taken on 15 January 2024)

9.5.7 Chemistry data was supplied by SEPA on 22 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 below in **Table 9-3**.

9.5.8 No 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 websites[132].

9.5.9 Upstream 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.

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

Table 9-3 Chemistry data collected from Allan Water at the Knaik Confluence (NN 83733 07870) between January to September 2019 (total of 9 samples)

Parameter	unit	Average	Max	Min
Alkalinity (as Calcium Carbonate ($CaCO_3$))	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	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
Oxygen – dissolved - % saturation	%	105.61	133.00	94.30
pH	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

9.5.10 Of the two sub-catchments, the existing OHL crosses Bullie Burn at NN 79612 09772. Bullie Burn is sourced from around NN 76328 11041 and splits at NN 81122 10301 into the Kier Burn and Mill Burn (which are both approximately 1.5 km downstream of the Proposed Development). These burns then enter Allan Water at NN 83471 07902 and NN 82746 07735 respectively. **Plates 9-3** and **9-4** display photographs taken from the Site walkover on 15 January 2024. In general, Bullie Burn has a bedrock typology overlain by cobbles and boulders.

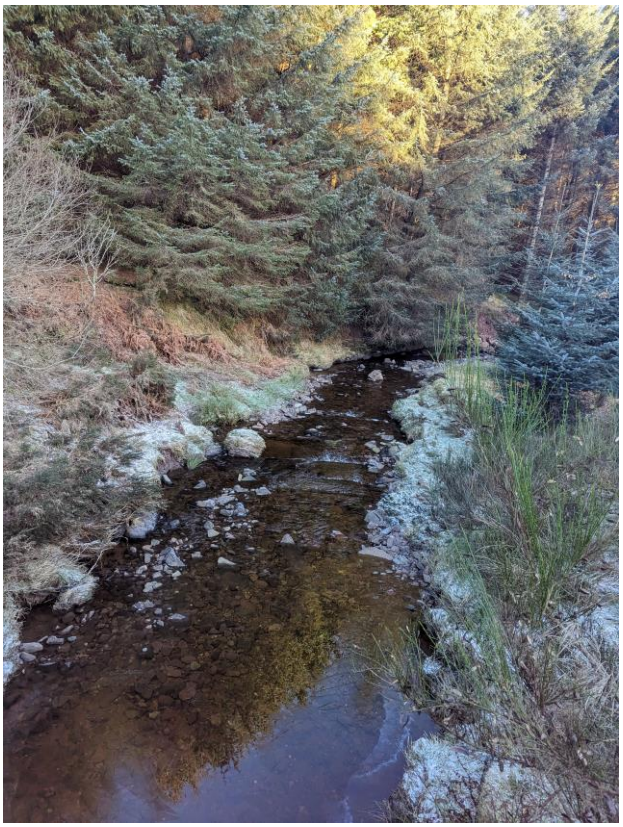

Plate 9-3 Left Bullie Burn taken at NN 80048 09954 facing downstream (Taken on 15 January 2024)

Plate 9-4 Bullie Burn at NN 83328 09514 facing downstream (Taken on 15 January 2024)

9.5.11 Crocket Burn, a tributary to Muckle Burn, is 144 m down gradient from the Proposed Development. It flows into Muckle Burn at NN 79942 07950. From the Site visit, Muckle Burn has a number of cobbles and boulders at its base with relatively clear flowing water (**Plate 9-5** and **Plate 9-6**).

Plate 9-5 Muckle Burn taken at NN 80735 07366 facing downstream (Taken on 15 January 2024)

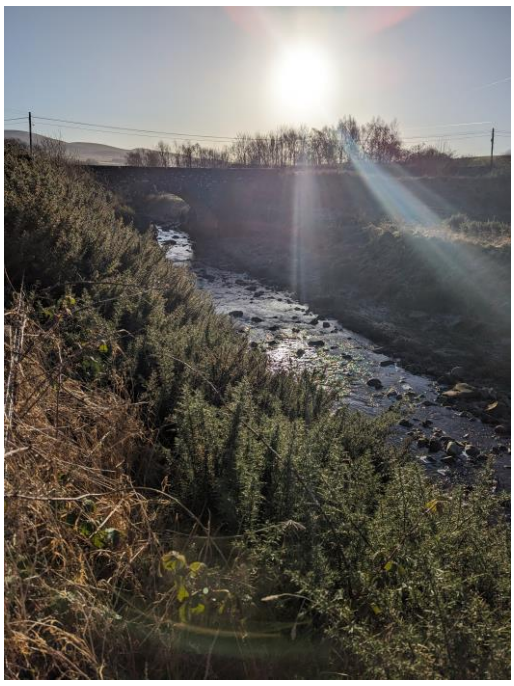

Plate 9-6 Muckle Burn downstream taken at NN 80735 07366 facing upstream (Taken on 15 January 2024)

9.5.12 No SEPA water chemistry or flow data was provided for Bullie Burn, Muckle Burn or associated tributaries.

9.5.13 It could be assumed that if Allan Water has salmon and trout present, then it is likely Bullie Burn, Muckle Burn or associated tributaries also support these species.

9.5.14 Each of these sub-catchments have a number of water features associated. These are listed in **Table 9-4**.

Table 9-4 Summary of Water Features within the Study Area

Water Feature (WF)	Description	Distance to Development	Scoped In/Out for Appraisal
Allan Water (WF1)	The source is a small lochan situated around NN 91354 10193. The river flows roughly west, before flow south in the River Forth at NS 78670 95998.	Site is 3.09 km north northwest of Allan Water.	Scoped In Indirect construction runoff from catchment
Muckle Burn and associated tributaries (WF2)	Source is on relatively steep terrain at NN 74360 08435 north west of the Site. Joins Allan Water southwest of the Site at NN 81832 06647.	1.02 km to the south of the Site. Flows to the west and south of the Site.	Scoped In Indirect construction runoff from catchment
Crocket Burn (WF3)	A tributary of the Muckle Burn, the stream is sourced around NN77390823 and flows into the Muckle Burn at NN 7907 9394. The stream has approximately four tributaries which flow south.	The tributaries of Crocket Burn are approximately 368 m, 413 m, 430 m and 1.03 km south and southeast of the Site respectively. Crocket burn is 597 m to the south.	Scoped In Indirect construction runoff from catchment
Bullie Burn, and associated tributaries (WF4)	Originates at approx. NN 76220 11136, joins Keir Burn north of the Site. Flow is over steep terrain.	Two tributaries to Bullie Burn travel through the Site.	Scoped In Indirect construction runoff from catchment
Keir Burn and associated tributaries (WF5)	Originates from Bullie Burn at approx. NN 81210 10340 on steep terrain to the north of the Site and enters Allan Water at approx. NN 83462 07899 to the southeast of the Site.	Keir Burn is 2.19 km northeast. Flows to the east and north of the Site.	Scoped In Indirect construction runoff from catchment
Mill Burn and associated tributaries (WF6)	Flows from Bullie Burn at NN 81122 10300, flows south easterly to join Feddal Burn at NN 82309 08986 which then joins Allan Water at NN 82744 07730 south of the Site. Flows through three lochans (NN82451034, NN 82308 09236 and NN82020985) before joining Feddal Burn.	Mill Burn is 2.17 km northeast. This flows into Feddal Burn downstream which may be the source of PWS. Flows to the east and south of the Site.	Scoped In Indirect construction runoff from catchment
Feddal Burn (WF7)	Sourced around NN80000888, Feddal Burn flow roughly south through approximately four small lochans (largest 7,000m^2 in area). Feddel Burn eventually flows into Allan Water at NN82740773.	797 m downgradient of the Site.	Scoped In Indirect construction runoff from catchment

Water Feature (WF)	Description	Distance to Development	Scoped In/Out for Appraisal
Unnamed Drain (WF8)	Current drainage of the existing Braco West Substation. Sourced around NN79630931, the drain runs around the perimeter of the existing Braco West Substation before entering Bullie Burn at NN79330968 and NN79550973.	204 m northeast of the Site.	Scoped In Proximity to works
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 Sustainable Drainage System (SUDS) pond. The drainage will enter tributaries of Crocket Burn at NN 79181 08551 and NN 79242 08698.	The proposed drainage flows within the red line boundary of the Site.	Scoped In Proximity to works
Unnamed water feature including pond and drain (WF10)	A small pond situated around NN 79030 08792 with a 86m^2 area. 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.	The pond is situated 290 m downstream of the temporary OHL. The upper sections of the drain flow beneath the new permanent and temporary OHL.	Scoped In Proximity to works

Flood Risk

9.5.15 A detailed flood risk assessment is being undertaken for the Proposed Development, the proposed Cambushinnie substation and the associated access route. Flood risk will be dealt with through the planning process based on the separate assessment carried out by SSEN as part of the Section 37 application and therefore is excluded from the EA.

Geology and Soils

9.5.16 According to BGS mapping[116], the drift geology at the Site is shown to mainly comprise superficial deposits of Peat, with a small area of Glacial Till (Devensian–Diamicton) within the southwest of the Site. The immediate surrounding comprises Alluvium (of clay, silt, sand, and gravel) to the northwest and northeast, and Glacial Till (Till Devensian-Diamicton) to the north, east, south and west of the Site.

9.5.17 The bedrock underlying the Site is the Teith Sandstone Formation (sandstone), and the Cromlix Mudstone Formation (mudstone and siltstone) is present in surrounding areas approximately 160 m east of the Site and 650 m south of the Site, both part of the Strathmore Group.

9.5.18 There are no BGS designated areas of Made Ground or Artificial Ground recorded on the Site or within the surrounding area. Although no Made Ground is shown on published BGS

mapping[116] on the Site and within 1 km, localised Made Ground from the existing Braco West Substation is likely to be present.

9.5.19 The bedrock is disrupted by faults within 1 km of the boundary of the Site. The faults are inferred and present at approximately 270 m southwest and 980 m south of the Site.

9.5.20 No borehole records were recorded on-site. The nearest borehole record was present to the immediate southeast of the Site, adjacent to the existing Braco West Substation (BGS Geoindex reference NN70NE9)*.* A review of the most recent GI (*Igne-Report on Ground Investigation, LT307 Braco West Sites 2 & 3, 26 January 2024*) (Appendix D as part of desk study in **Appendix G Geo-environmental Desk Study**) undertaken on-site, and within 500 m north and south of the Site which included the drilling of 17 boreholes and 21 trial pits up to maximum depths of 15.75 m below ground level (bgl) and 3.00 m bgl, respectively, has identified the following general sequence:

- Peat (on-site/off-site) from surface up to 1.90 m bgl and described as soft brown to dark brown spongy amorphous[133] Peat was encountered in all locations except for two trial pits (TP10 New (off-site) and TP21 (on-site)).
- Made ground (on-site) was encountered from surface up to maximum depth of 0.70 m bgl[134] in two trial pits (TP21 (on-site) and TP23 (on-site)) 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 (on-site/off-site) (underlying peat or Made Ground) of sand, gravel and clay between 0.20m bgl[135] to 5.50m bgl[136], 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 0.45m bgl to a maximum depth of 2.70m bgl[137] 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 0.55m bgl and 1.20m 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 0.90m bgl[138] and 5.50m bgl[139] (depths of top of the bedrock). Very weak to weak greyish brown mudstone with reddish brown siltstone laminae was encountered between 3.80m bgl[140] to 10.55m bgl[141] (depths of top of the bedrock). The maximum bottom depths of bedrock were 15.75m bgl[142] and 15.45m bgl[143] for sandstone and mudstone, respectively.

[133] Based on BH18 (onsite)
[134] Based on TP21 (onsite)
[135] Based on TP13 New (offsite)
[136] Based on BH01 (offsite)
[137] Based on BH01 (offsite), BH02 (onsite), BH05 (onsite), BH07 (offsite), BH08 (offsite)
[138] Based on TP01 (offsite)
[139] Based on BH01 (offsite)
[140] Based on BH02 (onsite)
[141] Based on BH05 (onsite)
[142] Based on BH05 (onsite)
[143] Based on BH05 (onsite)

9.5.21 According to the Coal Authority mapping[115], the Site does not lie within a Coal Mining Reporting Area.

9.5.22 The Groundsure report indicates three non-coal mining areas of vein mineral commodity; one on-site, and two off-site at distances of 681m north and 773m east of the Site. The off-site locations are well distanced from the Site and considered unlikely to represent potential impacts to the Site from a contamination perspective.

9.5.23 A review of the National Soil Map of Scotland[124] indicates 'Blanket peats' within the east, south, west and to the immediate north of the Site. Additionally, 'Podzols' are present within the centre, north, southwest and to the immediate south and northeast of the Site. Localised areas of 'gleys' are located approximately 510m southeast, and 740m-780m southwest of the Site. 'Alluvial soils and undifferentiated alluvial soils' are localised at approximately 120m northeast and 700m southwest of the Site. 'Brown soils' are located within 1km south of the Site.

9.5.24 According to the Carbon and Peatland 2016 Map[56], there are no areas of Class 1 or Class 2 soils present on-site or in the immediate surrounding area. Soils across the Site and surrounding area are classed as Class 4 & 5. Areas of Class 0 are shown at approximately 120m northeast and 410m southeast of the Site.

9.5.25 A review of the NatureScot Map[124] indicates that there are no recorded ecological sensitive sites or geological sites within the boundary of the Site or within 1km.

9.5.26 According to the UK Radon website[127] 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 anticipated that radon protective measures will not be necessary should the construction of any new buildings intended to be occupied within the Site be undertaken.

9.5.27 The 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 map[127].

9.5.28 A Zetica Pre-Desk Study Assessment (PDSA) has identified World War II (WWII) military activities on or affecting the Site. Zetica recommended that a detailed desk study is commissioned to assess, and potentially zone, the UXO hazard level on the Site. Risks appear to relate to the use of the nearby areas for live fire training during and post-WWII.

Groundwater

9.5.29 The Site is underlain by a bedrock WFD groundwater body 'Dunblane' (SEPA ID: 150628). It has been classified with a water quality standard of 'Good' and overall condition as 'Poor' in 2022 (**Table 9-5**). It has an area of around 181.3 km^2 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 km^2 area and a 'good' overall status (2022) (**Table 9-5**). This superficial water body has been scoped out of the appraisal due to its distance from the Site meaning that it is unlikely that there would be any impacts resulting from the Proposed Development.

Table 9-5 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)
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
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

WFD Parameter	Dunblane (ID: 150628)	Strathearn Sand and Gravel (ID: 150811)
Epoxyconazole	Good	Good
Nitrate	Good	Good
Free Product	Good	Good
Vinyl Chloride	Good	Good
Water quality	Good	Good

9.5.30 The Dunblane Groundwater body is within the Lower Old Red Sandstone Aquifer. **Table 9-6** displays the aquifer properties. The Old Red Sandstone aquifers are typically well cemented, with relatively low intergranular porosity and permeability.

Table 9-6 Aquifer properties of the Lower Old Red Sandstone[144]

Porosity (%)	Hydraulic Conductivity (m/d)	Transmissivity (m^2/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

9.5.31 The Dunblane Groundwater body has also been divided into groundwater aquifers. Within the Study Area, the Teith Sandstone Formation within Strathmore Group is situated below the Site. It is characterised by BGS as a Moderately Productive sandstone aquifer consisting of siltstones, mudstones, conglomerates, and interbedded lavas. Yields in the Strathmore aquifer typically range from 12l/s and the Groundsure report describes the flow as virtually all through fractures and other discontinuities with high permeability due to fractures in the bedrock[145].

9.5.32 Groundwater was encountered during the drilling of boreholes NN70NE2 at 130 m bgl and NN70NE8 at 128.2m bgl, located approximately 2.6 km and 2.5 km southeast of the Site, respectively, according to the BGS[116] borehole logs. Additionally, borehole log NN80NW1 located 2.46 km southeast of the Site recorded the initial water strike depth to be 30ft (9.14 m) below the well top, and the standing level of water inside the borehole to be 3ft (0.91 m) below the well top. It is not recorded if the well top is flush with the ground or raised. 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.

9.5.33 A review of the most recent GI (*Igne-Report on Ground Investigation, LT307 Braco West Sites 2 &3, 26 January 2024*) (Appended as part of desk study in **Appendix G Geo-environmental Desk Study**) has identified groundwater in three of the trial pits –TP07 (offsite) at 1.20 m bgl, TP09 (on-site) at 2.00 m bgl and TP13 New (off-site) at 1.50 m bgl, within bedrock and superficial deposits.

[144] BGS, 2015. *Scotland's aquifers and groundwater bodies* [online]. [Accessed 09 May 2024]. Available at: https://nora.nerc.ac.uk/id/eprint/511413/1/OR15028.pdf

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

9.5.34 It is likely that groundwater flow will likely be directed by the topography. However, there is not enough data to determine a flow direction.

9.5.35 The 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

9.5.36 There is one authorisation granted by SEPA under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) within the 1,000m Study Area, according to SEPA. This is shown in **Table 9-7**.

Table 9-7 CAR authorisations within the Study Area

Authorisation No	Site	NGR	Authorisation Usage	Distance to the Site (km)
CAR/R/1125865	New Braco Substation, Nr Braco --- New Braco Substation, Feddal Hill, Nr Braco FK15 9QZ	NN 79450 09450	Sewage (Private) Primary	0.28

9.5.37 There is no groundwater abstraction CAR licence recorded for the Site. Hence, no further consideration of groundwater abstractions is undertaken in this appraisal.

9.5.38 PWS data was received from PKC on 17 January 2024 and from Stirling Council on 31 January 2024. Overall, there are four PWS within 2,000 m of the Proposed Development, none of which are situated within the 1 km Study Area. **Table 9-8** lists out each of these PWS alongside the grid reference, source, and usage. **Appendix H Private Water Supply Assessment** outlines the potential impacts of the Proposed Development in relation to these supplies.

Table 9-8 Private Water Supplies within 2km

ID	Property as listed by HC	NGR	Source Type	Usage	Distance to Proposed Development (km)
PWS-B-01	Bentick Farm Supply	NN 80708 08820	Unknown	W13 PWS Type B Supply	1.53
PWS-B-02	Calziebeg Farm Supply	NN 81000 09000	Unknown	W13 PWS Type B Supply	1.78
PWS-B-03	Carsemeg Farm Supply	NN 81300 09200	Unknown	W13 PWS Type B Supply	2.06
PWS-B-03	Blairmore Supply	NN 80792 09925	Unknown-potentially spring	W18 New Regulated Supply	1.70

Groundwater Dependent Terrestrial Ecosystems

According to the basic hydrogeological assessment carried out, it was identified that there are potentially GWDTE identified within 250 m of the Proposed Development (see **Figure 5-4, Appendix A Figures**). The only NVC vegetation community identified within the survey area that is potentially ground water dependant is M23b. 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**.

Land Contamination

9.5.39 The earliest available OS map reviewed was dated 1862-1863, which shows the Site as undeveloped with mainly agricultural land and forestry across the Site, with three additional access tracks present within the south of the Site until 1978. An access track is shown to enter the Site from the southeast and runs parallel to Bullie Burn. An additional access track is shown at approximately 160 m northeast of the Site. New tracks were built within the east, centre and west of the Site from 2001.

9.5.40 The Site remained mostly undeveloped until the 2015 OS map, when the four pylons associated with the existing Braco West Substation were constructed in the west, centre and east of the site. A car park is associated with the existing Braco West Substation.

9.5.41 Surrounding areas are predominantly shown as agricultural land and forestry. Occasional access tracks and roads are present within 250 m from the Site since the 2001 OS map.

9.5.42 Sources of contamination which may impact the Study Area include:

Onsite

- Made Ground associated with the construction of the existing Braco West Substation, and associated car park, and construction of access road and tracks.
- Existing Braco West Substation with potential for contaminants such as hydrocarbons, heavy metals, inorganics (e.g. sulphates).

Offsite

- Made Ground associated with the access roads and tracks.

Summary of Sensitivities

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

Table 9-9 Sensitivity of Receptors

Parameter/Receptors	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 m^3/s <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.
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.
PWS	High	Drinking water supply.
Geology /Sensitive Sites	Not applicable	No geological conservation review sites (GCR) or other geology related designated sites are within proximity to the Proposed Development. Geological Conservation Review Sites are noted as areas of nationally and internationally important earth science sites in Great Britain.
Soil	Medium	According to BGS and the National Map of Scotland, there is peat on site and in the Study Area (**Section 9.5.16**). However, the Carbon Peatland Map, classes soils across the Site and surrounding area as Class 0, 4 and 5 hence not of nationally important resource (**Section 9.5.24**). For these reasons, peat is of medium sensitivity.
Receptors of Land Contamination; Human Health,	Low	Limited potential sources of contamination, associated with Made Ground on-site and off-site, existing Braco West Substation (on-site), car park (on-site), and

Parameter/Receptors	Sensitivity	Justification
Water Environment and the Built Environment		access tracks and roads (on-site/off-site) (**Section 9.5.42**).

9.6 Embedded Mitigation

Design Mitigation and Assumptions

Good practice measures

9.6.1 The adoption of the CEMP and applicable GEMPs will 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.

9.6.2 SSEN Transmission's GEMPs (**Appendix K GEMPs and SPPs**) applicable to this chapter are:

- Working In or Near Water GEMP;
- Contaminated Land GEMP;
- Watercourse Crossings GEMP;
- Private Water Supplies GEMP;
- Working with Concrete GEMP;
- Oil Storage and Refuelling GEMP;
- Waste Management GEMP;
- Soil Management GEMP;
- Dust Management GEMP;
- Restoration GEMP;
- Forestry GEMP;
- Working in Sensitive Habitats GEMP; and
- Bad Weather GEMP.

9.7 Appraisal

9.7.1 This appraisal assumes that good practice measures, including GEMPs, will be followed to manage potential effects. In addition, any authorisation requirements for CAR controlled activities, as well as any conditions or requirements of other authorisations / permits / licenses that may be relevant, will be adhered to, to manage potential effects. Potential effects may include sedimentation of watercourses, surface water and groundwater contamination, and hydromorphological impacts. The mitigation measures to prevent pollution and manage drainage will be addressed within a CEMP.

Construction Phase

9.7.2 During 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

9.7.3 During 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.

9.7.4 There is the potential for Made Ground associated with the existing Braco West Substation (on-site), the access roads and tracks (on-site and off-site) and the four pylon towers (on-site), 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 methyl-tert-butyl-ether (MTBE), semi volatile organic compounds (SVOCs), volatile organic compounds (VOCs), sulphates, sulphides and phenols.

9.7.5 Ground investigations undertaken to date on-site and in the Study Area indicate 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 accordance with the Unexpected Contaminated Land GEMP (**Appendix K GEMPs and SPPs**) to mitigate potential risks.

9.7.6 Potential contaminants are noted in **Section 9.7.4**. If these were to be present in ground which may be disturbed, this could impact nearby surface waters, underlying groundwater and soils. Potential effects are discussed in **Sections 9.7.7** to **9.7.35**.

Oils and Hydrocarbon

9.7.7 Sources 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 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 (on-site), the access roads and tracks (on-site and off-site) and of the pylon towers (on-site) may also be sources of hydrocarbon contaminants.

9.7.8 Such contaminants, if present, can affect the water quality of the nearby surface waters and underlying groundwater aquifers, also potentially impacting soils and bedrock.

9.7.9 The 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.

9.7.10 The unnamed water feature including pond and drain (WF10) listed on **Table 9-4** flows beneath the OHL. The drain is situated approximately 280 m south of tower 380R, 300 m south of tower 380T. There is unlikely to be any connected flow paths to the drain.

9.7.11 However, WF8 and WF9 are situated within the vicinity of tower 367 and approximately 200 m downgradient from tower 379T and 379.

9.7.12 There could also be narrow drains from historic forestry activity situated at the Site. These drains could spread contaminants downstream to larger watercourses.

9.7.13 The 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.

9.7.14 The 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.

9.7.15 As the Oil Storage and Refuelling GEMP will be implemented, impacts on water quality, soil and geology from routine construction activities are not considered likely to be significant. Additionally, the Contaminated Land GEMP and Waste Management GEMP will be implemented to mitigate potential risks from oils and hydrocarbons (see **Appendix K GEMPs and SPPs**).

Concrete and Cement

9.7.16 Concrete would be delivered to the Site pre-mixed for the construction of the Proposed Development.

9.7.17 In total there will be two new temporary tower foundations, so overall not a significant amount of concrete will be required, when considering the large catchment area.

9.7.18 Concrete and cement products are highly alkaline and their 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 (reinforced in-situ concrete).

9.7.19 Mobilization of concrete and cement products may occur during on-site concrete mixing and washing down of areas where mixing has taken place.

9.7.20 The major pathways for 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.

9.7.21 It is proposed that cement be brought to site ready-mixed and poured in-situ. Other elements would be pre-cast. These measures significantly reduce the potential impact from cement contamination to negligible.

9.7.22 Should it be necessary to mix concrete on-site, the measures within the Working with Concrete GEMP (see **Appendix K GEMPs and SPPs**) will be adhered to.

Modification of Groundwater Levels and Flows

9.7.23 There would only be shallow excavations (anticipated to be 5 m in depth) required for the construction of the Proposed Development. Therefore, it is unlikely there would be any impacts to groundwater levels and flows, other than potentially very locally to these excavations.

9.7.24 Rainwater entering excavations, may require to be pumped out and discharged to SUDs and onsite drainage, where it is uncontaminated.

9.7.25 The appraisal of impacts to GWDTE is included in **Chapter 5 Ecology and Nature Conservation** including necessary mitigation measures.

Site Water Resources and Foul Drainage

9.7.26 This includes water supply for construction and welfare facilities and disposal of wastewater.

9.7.27 Water supply for construction and welfare facilities is anticipated to be low volume. Water will be sourced from a borehole which will be drilled near the Site. The borehole would have to be registered as a PWS with the local authority which would either be PKC or

Stirling Council depending on the location of the borehole. An abstraction CAR licence would also need to be obtained from SEPA if greater than 10 m^3/d. Water abstracted would have to be tested regularly to ensure its quality. Abstracted water may require treatment before drinking to ensure safe quality.

9.7.28 Wastewater from construction welfare facilities will be discharged to an on-site septic tank, with the treated effluent discharged to ground via a soakaway, subject to suitable ground conditions being available and SEPA approval. Alternatively, wastewater will be discharged to the main sewer, either directly or via tanker, subject to agreement with Scottish Water.

9.7.29 A Construction Site CAR licence[146] will be required from SEPA for the discharge of water-run off to the water environment.

Public/Private Water Supplies

9.7.30 PKC and Stirling Council did not record any PWS within the 1 km Study Area. However, there are four PWS within 2 km of the Site, according to data provided by PKC and Stirling Council.

9.7.31 The 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.

9.7.32 **Table 9-10** below displays the distance of each of the PWSs from the Site. Any contaminated surface water runoff will likely be captured by the proposed drainage and SUDs basin on the site. Prior to works commencing, a PWS survey should be carried to confirm the exact locations of the below PWS and whether they are still in use. Overall, there are no pathways identified.

Table 9-10 Private Water Supply Assessment

ID	Source Type	Usage	Distance to Proposed Development (km)	Potential Pathway
PWS-B-01	Unknown	W13 PWS Type B Supply	1.40	No identified Pathway
PWS-B-02	Unknown	W13 PWS Type B Supply	1.41	No identified Pathway
PWS-B-03	Unknown	W13 PWS Type B Supply	1.56	No identified Pathway
PWS-B-04	Unknown-potentially spring	W18 New Regulated Supply	1.85	No identified Pathway

Soil Excavation and Waste

9.7.33 Disturbance of soil, peat, and Made Ground for the implementation of foundation excavations has the potential to release potential contamination, and impact surrounding

[146] SEPA, 2024. *Water run-off from construction sites* [online]. [Accessed 01 July 2024]. Available at: https://www.sepa.org.uk/regulations/water/pollution-control/water-run-off-from-construction-sites/

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 on-site will be undertaken in accordance with Soil Removal, Storage and Reinstatement GEMP and Waste Management GEMP (see **Appendix K GEMPs and SPPs**), which will minimise potential impacts to soil.

9.7.34 The Site is located within an area potentially underlain by peat and organic material. Care should be taken when excavating this material given the peat is a protected carbon capture source and to minimise the release of carbon and any other potential contaminants. Management of Peat will be undertaken in accordance with Working in Sensitive Habitats GEMP (see **Appendix K GEMPs and SPPs**). Additionally, the CEMP will include a Peat Management Plan and peat probing (a preliminary plan has been prepared and is included in **Appendix J Peat Management Plan**).

Operation Phase

9.7.35 There will be no further impacts during the operation phase from the Proposed Development on Hydrology, Hydrogeology, Geology and Soils.

9.8 Cumulative Effects

9.8.1 A cumulative appraisal was conducted for the 'Scoped-in' planning applications shown in **Section 11.1.2** and **Table 11-1**, these are listed below;

- Proposed Cambushinnie 400kV substation;
- Cambushinnie UGC between the existing Braco West substation and the Proposed Cambushinnie substation;
- 21/00756/FLM: 49.9MW energy storage facility; and
- 22/02231/FLM: 49.99MW energy storage facility compound.

9.8.2 The proposed Cambushinnie substation is adjacent to the immediate south of the Site and the proposed UGC route that will connect the proposed Cambushinnie substation to the existing Braco West Substation is located within the northeast of the Site. Additionally, two BESS sites (49.99 MW and 49.9 MW) would be located adjacent to the northeast and southeast of the Proposed Development respectively (**Figure 11-1, Appendix A Figures**). The construction impacts of the proposed Cambushinnie substation, proposed UGC route 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 in 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.

9.8.3 These potential effects will be managed through the SSEN Transmission CEMP and the following GEMPs - Soil Management, Unexpected Contaminated Land, Working In or Near Water, Private Water Supplies, Soil Management, Working with Concrete, Oil Storage and Refuelling, Waste Management, Working in Sensitive Habitats, Bad Weather (see **Appendix K GEMPs and SPPs**). Potentially silt laden run-off will be prevented from entering water courses and/or drainage channels through the use of straw bales, silt fences, cut off drains and drainage onto vegetated areas. If deemed necessary, an ECoW will supervise the construction works to ensure that the CEMP and associated mitigation measures are being implemented effectively.

9.8.4 Although, the proposed Cambushinnie substation and the proposed UGC route are adjacent and overlap (the northern sections) the Proposed Development, assuming their individual CEMPs and GEMPs are applied during the construction and operation it is unlikely that there will be any cumulative effects on geology, soils, and the water environment.

9.8.5 Similarly, the two battery storage facilities are at a close distance (adjacent to the north-east and adjacent to the southeast) from the Proposed Development. However, assuming their individual CEMPs and GEMPs are applied during the construction and operation it is unlikely they will cause any cumulative effects to human health, water environment, built environment, geology and soils receptors associated with the Proposed Development.

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

9.9 Recommendations and Mitigation

9.9.1 A summary of the mitigation measures will be provided to the Principal Contractor, who will ensure mitigation measures are implemented. The implementation of the mitigation measures would be managed by a suitably qualified and experienced ECoW.

9.9.2 Protection measures for watercourses, soils, geology and groundwater will 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 will be in accordance with SSEN Transmission's 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, Working in Sensitive Habitats GEMP, Dust Management GEMP, Restoration GEMP, Forestry GEMP and Bad Weather GEMP. All of these will be incorporated into a Water Protection Plan (WPP) and Discovery Strategy (a plan setting out the process for identifying and managing unforeseen contamination that may be encountered during construction) (see **Appendix K GEMPs and SPPs**).

9.9.3 The Principal Contractor will 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 will be developed and agreed with the local property owners and SEPA. Depending on proximity to the works, water quality and/or quantity monitoring before, during pre-construction and construction may be required by the Principal Contractor. It is recommended that trigger levels for quality are set after pre-construction monitoring has been undertaken. If it were to be determined that any effects on PWS quality were due to construction, then the provision of an alternate supply would require to be provided.

9.9.4 The Principal Contractor will be required to be aware of nearby sources of contamination and will follow the Discovery Strategy. If contamination is identified at any point during construction work, then contact will be made with a suitably competent environmental consultant for further risk assessment to be undertaken.

9.9.5 The Principal Contractor will 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 will be kept to a high level of housekeeping and all fuel storage, if used for plant or equipment, will be bunded.

9.9.6 The appraisal has not identified any further requirement for additional mitigation measures.

10. CLIMATE CHANGE

10.1 Introduction

10.1.1 This chapter sets out the methodology, baseline conditions, assessment of effects, and mitigation considerations for the Proposed Development in relation to climate change.

10.1.2 The climate assessment has been carried out in accordance with the Institute of Environmental Management and Assessment (IEMA) 'Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance'[147] and 'Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation'[148]. Consideration is given to the following aspects of climate change assessment, detailed in **Table 10-1**.

Table 10-1 Definitions of climate change assessment elements

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 Change Impact (ICCI) Assessment	The combined impact of the Proposed Development and potential climate change on receptors in the receiving environment.

10.2 Information Sources

10.2.1 The following sources of information that help to define the Proposed Development have been reviewed and form the basis of this chapter:

- **Chapter 5 Ecology and Nature Conservation;**
- **Chapter 8 Traffic and Transport; and**
- **Chapter 9 Hydrology, Hydrogeology, Geology and Soils.**

Legislation, Policy, and Guidance

Legislation

10.2.2 Relevant legislation to the assessment of effects on the climate and the assessment of climate change impacts is presented in **Table 10-2**.

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

[148] IEMA, 2020. Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation [Online]. [Accessed 18 April 204]. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020

Table 10-2 Relevant Climate Change Legislation

Legislation	Legislation details
United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement	The Paris Agreement[149] is a legally binding agreement within the UNFCCC dealing with GHG emissions 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 2008 (2050 Target Amendment) Order 2019	In June 2019, the Climate Change Act[150] 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.
Carbon Budgets Order 2011 Carbon Budget Order 2016 Carbon Budget Order 2021	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 4th Carbon Budget period, from 2023 to 2027. 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 Sixth Carbon Budget[151], 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 ($MtCO_2e$) recommendation and laid the Carbon Budget Order 2021 before parliament. The CCC released their 7th Carbon Budget in February 2025 and advised the UK Carbon Budget to be set at 535 $MtCO_2e$, 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.
Climate Change (Emissions Reduction Targets) (Scotland) Act 2019	The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019[152] amends the Climate Change (Scotland) Act 2009, setting targets to reduce Scotland's emissions of all greenhouse gases to net-zero by 2045 at the latest. Further amendments to the Climate Change (Scotland) Act 2009 were made by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2024, which repealed the interim targets set by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

[149] UNFCC, 2015. *Paris Agreement* [Online]. [Accessed 11 April 2024]. Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf

[150] 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

[151] 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].

[152] The Scottish Government, 2020c. *Reducing Greenhouse Gas Emissions* [Online]. [Accessed 18 April 2024]. Available at: https://www.gov.scot/policies/climate-change/reducing-emissions/#:~:text=The%20Climate%20Change%20(Emissions%20Reduction,2030%2C%2090%25%20by%202040

Legislation	Legislation details
Town and Country Planning (Environmental Impact Assessment) Scotland) Regulations 2017[153] and Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017	The Environmental Impact Assessment (EIA) 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".*
Climate Change (Emissions Reduction Targets) (Scotland) Act 2024	The Climate Change (Emissions Reduction Targets) (Scotland) Act 2024 [154] 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

10.2.3 Policy relating to Climate Change and the assessment of potential effects of the Proposed Development is presented in **Table 10-3**.

Table 10-3 Relevant Climate Change Policy

Policy	Policy details
National Policy Statement for Energy	The National Policy Statement (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. 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[155] 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.

[153] Scottish Government (2017). T*he Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017* [Online] Available at: https://www.legislation.gov.uk/ssi/2017/102/introduction [Accessed 4 November 2024]

[154] The Scottish Government, 2024. *Climate Change (Emissions Reduction Targets (Scotland) Act 2024.*[Online] [Accessed 11 November 2024]. Available at: https://www.parliament.scot/bills-and-laws/bills/s6/climate-change-emissions-reduction-targets-scotland-bill

[155] Department of Energy Security and Net Zero (DESNZ), 2023. *National Policy Statement for Energy* [Online]. [Accessed 17 May 2024] Available at: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf

Policy	Policy details
National Planning Framework 4 (NPF4)[156]	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.
National Policy Statement for Electricity Networks Infrastructure (NPS EN-5)[157]	Section 2.3 of The National Policy Statement for Electricity Networks Infrastructure covers the importance of climate change adaptation and resilience and details the requirement for developments 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[158] 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[159]. 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.
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)[160]	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 (Scottish Government, 2019)[161]	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.

[156] Scottish Government (2023) *National Planning Framework 4*. [Online] [Accessed 17 May 2024] Available at: https://www.gov.scot/publications/national-planning-framework-4/

[157] DESNZ, 2023. *National Policy Statement for Electricity Networks Infrastructure* [Online]. [Accessed 11 April 2024]. Available at: https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf.

[158] UK Government. 2018. 'A G*reen Future: Our 25 Year Plan to Improve the Environment'*. [Online]. [Accessed 11 April 2024] Available at: https://assets.publishing.service.gov.uk/media/65fd6fd0a6c0f70011ef9263/CD1.H_HM_Government_A_Green_Future_Our_25_Year_Plan_to_Improve_the_Environment.pdf

[159] Department for Transport, 2021. *Decarbonising Transport: A Better, Greener Britain* [Online]. [Accessed 11 April 2024]. Available at: https://assets.publishing.service.gov.uk/media/610d63ffe90e0706d92fa282/decarbonising-transport-a-better-greener-britain.pdf

[160]Scottish Government, 2020. *Securing a green recovery on a path to net zero: climate change plan 2018–2032 – update* [Online]. [Accessed 18 April 2024]. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2020/12/securing-green-recovery-path-net-zero-update-climate-change-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/govscot%3Adocument/update-climate-change-plan-2018-2032-securing-green-recovery-path-net-zero.pdf

[161] Scottish Government, 2019. *Climate Ready Scotland: climate change adaptation programme 2019 – 2024* [Online]. [Accessed 17 May 2024]. Available at: https://www.gov.scot/publications/climate-ready-scotland-second-scottish-climate-change-adaptation-programme-2019-2024/pages/8/

Policy	Policy details
Draft Energy Strategy and Just Transition Plan (Scottish Government, 2023)[162]	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[163]	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

10.2.4 Relevant guidance for the assessment of climate change effects is presented in **Table 10-4**.

Table 10-4 Relevant Climate Change Guidance

Guidance	Guidance Detail
IEMA: Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance[147]	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[148]	The approach for assessing the significance of climate change risks on the Proposed Development has been undertaken in accordance with this guidance.
The GHG Protocol[164]	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 Standard (PAS) 2080:2023 Carbon Management in Buildings and Infrastructure[165]	PAS 2080 provides guidance on how to manage carbon emissions and promote sustainability in infrastructure projects. The standard outlines a framework for the management of GHG emissions throughout the project lifecycle, from planning and design to construction and operation.
British Standards[166]	The British Standards Institution (BSI) BS EN ISO 14064-1:2019 and 14064-2:2019 (2019a and b, respectively) provides

[162] Scottish Government, 2023. *Draft Energy Strategy and Just Transition Plan* [Online]. [Accessed 17 May 2024]. Available at: https://www.gov.scot/publications/draft-energy-strategy-transition-plan/documents/

[164] 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]

[165] BSI Group, 2023. *Carbon Management in Infrastructure and Built Environment – PAS 2080* [Online]. [Accessed 20 May 2024]. Available at: https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/

Guidance	Guidance Detail
	specifications for organisational-level and project-level guidance for the quantification and reporting of GHG emissions and removals.
Scottish Government Windfarm Carbon Calculation Tool[167]	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 is used. This methodology is in line with the carbon calculator for wind farms on Scottish peatlands.
International Union for Conservation of Nature (IUCN) Peatland Code Carbon Calculator168	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_2e). 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.
SSEN Transmission 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.
Department for Energy Security and Net Zero Standards (DESNZ) Emissions Factors[169]	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[170]	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[171]	Think Hazard is an online tool developed by the United Nations Office for Disaster Risk Reduction (UNDRR) that provides

[165] BSI Group, 2023. *Carbon Management in Infrastructure and Built Environment – PAS 2080* [Online]. [Accessed 20 May 2024]. Available at: https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/

[166] BSI Group, 2023. *Carbon Management in Infrastructure and Built Environment – PAS 2080* [Online]. [Accessed 20 May 2024]. Available at: https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/

[167] Scottish Government, 2022. *Carbon calculator for wind farms on Scottish peatlands: factsheet* [Online]. [Accessed 20 May 2024]. Available at: https://www.gov.scot/publications/carbon-calculator-for-wind-farms-on-scottish-peatlands-factsheet/

[168] IUCN UK Peatland Programme, 2023. *Peatland Code Carbon Calculator*. [Online] Available at: <https://www.iucn-uk-peatlandprogramme.org/peatland-code> [Accessed 21 October 2024].

[169] Department for Energy Security and Net Zero, 2023. *Greenhouse gas reporting: conversion factors 2023* [Online]. [Accessed 20 May 2024]. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023

[170] Circular Ecology, 2019. *Inventory of Carbon and Energy V3.0 (ICE)* [Online]. [Accessed 18 April 2024]. Available at: https://circularecology.com/news/ice-database-v3-launched

[171] Think Hazard, 2023. *Scotland. Think Hazard* [online]. [Accessed 18 April 2024]. [Online] Available at: https://www.thinkhazard.org/en/report/3184-united-kingdom-scotland

Guidance	Guidance Detail
	information on natural hazards such as floods, earthquakes, and landslides.
Technical Guidance on Climate Proofing of Infrastructure in the Period 2021-2027[172]	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.
Royal Institute of Chartered Surveyors (RICS) Professional Statement Whole Life Carbon Assessment[173]	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).

10.3 Assessment Methodology and Significance Criteria

10.3.1 This section provides a summary of the assessment methodology. This includes the high-level qualitative Lifecycle GHG Impact Assessment and CCRA.

Extent of the Study Area

Lifecycle GHG Assessment

10.3.2 The Study Area for the Lifecycle GHG assessment includes:

- Direct GHG emissions arising through construction and operation works within the Site as shown on **Figures 2-2** and **2-3, Appendix A Figures**
- Indirect GHG emissions occurring offsite encompass embodied carbon in materials, transportation, upstream activities (such as well-to-tank processes and transmission and distribution losses), as well as the processing and disposal of waste.

CCRA

10.3.3 The CCRA Study Area encompasses the works that make up the Site as shown on **Figures 2-2** and **2-3, Appendix A Figures**.

Method of Baseline Data Collection

Lifecycle GHG Assessment

10.3.4 For the purposes of the GHG assessment, the baseline conditions are a 'business as usual' scenario where the Proposed Development does not go ahead.

10.3.5 The baseline comprises of existing carbon stocks and sources of GHGs within the boundary of the existing Proposed Development. The methodology for calculating GHG

[172] 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].

[173] RICS (2023) W*hole life carbon assessment for the built environment, 2nd edition*. [Online] Available at https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/construction-standards/whole-life-carbon-assessment [Accessed 7 August 2024].

emissions and removals was consistently used across the construction and operation of the Proposed Development.

CCRA

10.3.6 The current baseline for the CCRA was based on historic climate data obtained from the Met Office[174] 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 part of the CCRA, this was compared to the future baseline throughout the life of the Proposed Development.

10.3.7 The future baseline for the CCRA was based on future UK Climate Projections 2018[174] (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.

10.3.8 For 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.

10.3.9 UKCP18 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.

10.3.10 UKCP18 uses a range of possible scenarios, classified as Representative Concentration Pathways (RCPs)[175], 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 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.

10.3.11 As 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.

[174] Met Office. (2019). *UK Climate Projections 2018.* [Online] Available at https://www.metoffice.gov.uk/research/approach/collaboration/ukcp [Accessed 18/10/2024]

[175] 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 18/10/2024].

Assessment Modelling Methodology

10.3.12 This section sets out the scope and methodology for the assessment of the impacts of the Proposed Development on climate change.

Lifecycle GHG Assessment

10.3.13 To identify the magnitude of GHG impact over the lifecycle of the Proposed Development, GHG emissions are calculated in line with the PAS 2080:2023 Guidance[176] and the principles set out in the GHG Protocol[177]. GHG emissions from construction activities, embodied carbon in materials, and the operation of the Proposed Development have been quantified in this EA 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[147].

Emission factors were sourced from the DESNZ 2024 emission factor database, and the Bath University Inventory of Carbon and Energy database, both publicly available sources.

10.3.14 The SSEN Transmission peat calculator used across ASTI framework projects was adopted to estimate the GHG emissions associated with peat excavation and management. The methodology from Scottish Government Windfarm Carbon Calculator and IUCN Peatland Code Calculator[168] 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 on-site. Appropriate assumptions were sourced from the RICS Guidance for whole life GHG assessments.

10.3.15 In line with the GHG Protocol guidelines[178], the GHG assessment is reported as tonnes of carbon dioxide equivalent (tCO_2e) and has considered the seven Kyoto Protocol gases:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Sulphur hexafluoride (SF_6);
- Hydro fluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Nitrogen trifluoride (NF_3).

10.3.16 These gases are broadly referred to in this EA under an encompassing definition of 'GHGs', with the unit of tCO_2e (tonnes CO_2 equivalent) or $MtCO_2e$ (mega tonnes of CO_2 equivalent).

[176] 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]

[177] 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]

[178] 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]

10.3.17 **Table 10-5** summarises the key anticipated GHG emissions sources to the Proposed Development by lifecycle stage, in line with PAS 2080:2023 Guidance[179]. Additionally, the RICS Guidance for whole life GHG assessments have been integrated to inform the scope and reporting framework of the GHG assessment.

Table 10-5 Potential GHG emissions arising from the Proposed Development

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.
	A5	On-site construction activity. Transport of construction workers. Disposal of any waste generated during the construction processes. Land Clearance Enabling works	GHG emissions from energy (electricity, fuel, etc.) consumption for plant and vehicles, and generators on site. Fuel consumption from transport of materials to site (where these are not included in embodied GHG emissions). GHG emissions from fuel use for worker commuting. GHG emissions from disposal of waste. GHG emissions from fuel consumption for transportation of waste.

[179] 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]

Life cycle stage	PAS 2080:2023 Module	Activity	Primary emission sources
			Disturbance of peat during construction.
Operation stage	B1-B8	Energy use from the operation of the Proposed Development. Maintenance activities	Carbon sequestration associated with the restored peat. GHG emissions from grid electricity use and transmission and distribution losses. GHG emissions associated with maintenance activities (e.g. replacement components and fuel use).

10.3.18 To account for uncertainties in the project whole life carbon results of the Proposed Development, uplifts have been applied in line with RICS guidance. Uncertainty factor uplifts have been applied to each of the lifecycle stages in line with contingency factors, carbon data uncertainty and quantities uncertainty. **Table 10-6** defines the percentage uplifts applied for each uncertainty factor to give a 20% overall uplift to the Proposed Development.

Table 10-6 RICS Guidance Uncertainty in Whole Life Carbon Analysis (WLCAs)

RICS Uncertainty category	% uplift applied
Contingency factor – early design	15%
Carbon data uncertainty factor	2%
Quantities uncertainty factor	3%
Total	20%

Determining magnitude of change

10.3.19 In line with IEMA GHG guidance[147], the Proposed Development's predicted impact on 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.

10.3.20 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 4th Carbon Budget period, from 2023 to 2027, as detailed in **Table 10-7**. 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 $MtCO_2e$, 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.

10.3.21 This GHG assessment, therefore, uses the IEMA GHG guidance[147] 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 10-7** and **Table 10-8**.

Table 10-7 UK Carbon Budgets and indicative budgets based upon Climate Change Committee balanced Net Zero Pathway

Carbon budget	Electricity Generation Carbon Budget based upon the Carbon Budget Delivery Plan ($MtCO_2e$)	UK Carbon Budget ($MtCO_2e$)	Indicative Carbon Budgets based upon the CCC's balanced Net-Zero Pathway ($MtCO_2e$)
3rd (2018-2022)	-	2,544	-
4th (2023-2027)	143	1,950	-
5th (2028-2032)	63	1,752	-
6th (2033-2037)	42	965	-
7th (2038-2042)	23	-	535
8th (2043-2047)	12.4	-	195
9th (2048-2050)	4	-	17

10.3.22 To illustrate the Proposed Development's contribution to the Project's trajectory towards net-zero by 2050, it is recommended that the CCC's[180] balanced Net-Zero pathway is utilised post-2037, in the absence of any nationally legally binding carbon budgets after using the subsequent 6th carbon budget. Beyond 2050, the UK is expected to remain at net-zero.

10.3.23 The CCC Balanced Net-Zero Pathway is recommended to be divided into 5-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.

10.3.24 However, 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.

10.3.25 Besides 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 target[181], which are detailed in **Table 10-8**. These (now repealed) targets were derived from annual percentage reductions relative to Scotland's 1990 GHG emissions baseline.

[180] 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/ [Accessed 4 November 2024]

[181] 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]

Table 10-8 Scottish Government Annual Targets

Year	Scotland Annual Target ($MtCO_2e$)	Year	Scotland Annual Target ($MtCO_2e$)
2024	31	2035	14.9
2025	29.4	2036	13.6
2026	27.8	2037	12.3
2027	26.1	2038	11.1
2028	24.5	2039	9.8
2029	22.9	2040	8.5
2030	21.3	2041	6.8
2031	20	2042	5.1
2032	18.7	2043	3.4
2033	17.4	2044	1.7
2034	16.2	2045	0

10.3.26 The Scottish Government recently passed legislation abandoning the statutory annual targets (**Table 10-8**) 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 to quantitatively assess the magnitude of GHG emissions associated with the Proposed Development.

Significance of Effects

10.3.27 The IEMA guidance 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. Following IEMA Guidance,[147] which states that mitigation should be considered from the outset and throughout the project's lifetime, will help to deliver an EA that is proportionate, and properly assesses the GHG and climate change impacts associated with the Proposed Development.

10.3.28 **Table 10-9** states the significance criteria that will be applied to the Proposed Development. Once the magnitude of emissions is determined, mitigation measures should be proposed.

10.3.29 A 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.

Table 10-9 Definition of Levels of Significance

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.
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	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

Significance Level	Effects	Description	Example in the guidance
		of transition required by nationally set policy commitments.	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

10.3.30 The methodology for the CCRA has been developed in line with IEMA CCRA Guidance[182] and in accordance with the EU Technical Guidance on Climate Proofing Infrastructure.

10.3.31 The CCRA considered the impact of future climate change on the Proposed Development. The assessment uses UKCP18 projections and the Think Hazard tool to identify potential climate hazards impacting the construction and operation of the Proposed Development from 2020 to 2099.

10.3.32 Climate parameters considered in the CCRA include the following:

- Extreme weather events;
- Temperature change; and
- Precipitation change.

10.3.33 The 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.

10.3.34 The 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.

10.3.35 The 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.

[182] IEMA, 2020. *Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation* [Online]. [Accessed 18 April 204]. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020

10.3.36 UKCP18 projections, historical climate data and other climate data such as the Think Hazard Tool were assessed to understand the likelihood of the climate hazard occurring.

10.3.37 The 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 10-10** are applied to understand the likelihood of a climate impact occurring.

Table 10-10 Likelihood of a Climate Change 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%

10.3.38 The consequences were assessed according to **Table 10-11**. The categories and descriptions provided are based on the IEMA CCRA guidance and EU Technical Guidance on Climate Proofing Infrastructure.

Table 10-11 Level of Consequence of a Climate Change Impact Occurring

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	Significant harm with widespread effect. Recovery longer than one year. Limited prospect of full recovery

Risk areas	Insignificant	Minor	Moderate	Major	Catastrophic
				environmental regulations / consent	
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 cultural premises	Insignificant impact	Short term impact. Recovery or repair.	Serious damage with wider impact to tourism industry	Significant damage with national and international impact	Permanent loss with resulting impact on society

(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

10.3.39 The 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 10-12** sets out how the significance was assessed. The assessment has considered confirmed design and adaptation measures.

Table 10-12 Significance of Effect Matrix for CCRA

Likelihood	Consequence					
		Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
	Rare	Low (Not Significant)	Low (Not Significant)	Medium (Not Significant)	High (Significant)	Extreme (Significant)
	Unlikely	Low (Not Significant)	Low (Not Significant)	Medium (Not Significant)	High (Significant)	Extreme (Significant)
	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)

Limitations and Assumptions

Lifecycle GHG Assessment

10.3.40 In 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.

10.3.41 Key assumptions applied in the GHG assessment are presented in **Table 10-13**. The life cycle modules are labelled in accordance with PAS 2080:2023 Guidance. Key sources of assumptions include the RICS Guidance for whole life GHG assessments and SSEN Transmission's Carbon Calculator.

Table 10-13 Key assumption applied in the GHG Assessment

Life cycle module		Emission Source	Key assumptions
Baseline Conditions		Carbon sequestration 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 IUCN Peatland Code Emission Calculator and the Scottish Government Wind Farm Carbon Assessment Tool – Version 2.14.1. 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 was assumed with restoration expected to result in a re-wetted modified bog. 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 manufacture	Embodied GHG emissions from the substation civils and access track were estimated using construction data provided by SSEN Transmission. To account for material waste, an uplift was applied to the data based on RICS waste assumptions.

Life cycle module		Emission Source	Key assumptions
	A4-5 Construction 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.
		A5.2 Construction activities	GHG emissions from construction plant were estimated based on a benchmark based on previous AECOM projects and the embodied carbon from the list of temporary equipment, using indicative fuel consumption assumptions.
		A5.3 Waste	RICS wastage rates and assumptions applied for end-of-life scenarios per material type.
		A5.4 Worker transport	Assume an average 100 km round trip commute. One employee per average-sized car (fuel type unknown). This assumption is based on AECOM projects of a similar type and assumes a worst-case scenario, using professional judgement, in the absence of available data.
B: Use Stage	B1-8 Use Stage	B2 Maintenance	RICS assumptions applied to estimate maintenance GHG emissions. Maintenance GHG emissions are estimated as 1% of A1-A5 GHG emissions.
		B3 Repair	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.

Climate Change Risk Assessment

10.3.42 Climate 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.

10.3.43 To account for this uncertainty, a 'high' emissions scenario (RCP 8.5) has been used in this assessment, which is consistent with the precautionary principle.

10.4 Sensitive Receptors

GHG Assessment

10.4.1 The 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 Plan[183] 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;

[183] UK Government (2021). *The Carbon Budget Order 2021. S2021/750.*[Online] Available at: The Carbon Budget Order 2021 (legislation.gov.uk) [Accessed 4 November 2024]

- 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 Agreement[149] and a recent report by the Intergovernmental Panel on Climate Change (IPCC) 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.

CCRA

10.4.2 The receptor for the CCRA is the Proposed Development itself, including workers, infrastructure, and visitors.

10.5 Baseline Environment

Lifecycle GHG Assessment

Existing and Future Baseline

10.5.1 The 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.

10.5.2 The current land use within the Site and the local area consists predominantly of peatlands and access tracks. The abundance of peat within and around the Proposed Development site suggests a carbon sink potential.

10.5.3 The GHG sequestration associated with peat carbon sequestration in the current baseline was estimated based on the annual GHG sequestered by the in-situ peat. It was estimated that the carbon sequestered within the peat is 3,1251.7 tCO_2e.These estimates are derived from the peat volumes reported in **Appendix J Peat Management Plan & Peat Landslide Hazard** .

10.5.4 In 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 479 tCO_2e would be emitted during this timeframe.

10.5.5 These GHG emissions were calculated based on the peat volumes reported in **Appendix J Peat Management Plan & Peat Landslide Hazard** For the assessment, it was assumed that the peat is in good condition. This assumption was confirmed by the technical specialists involved in developing the Peat Management Plan (PMP).

CCRA

Existing and Future Baseline

10.5.6 The CCRA of climate change risks to the Proposed Development was based on historical climate data from the closest weather station to the Proposed Development (Stirling, located approximately 20 km south of the Site, for the period 1981-2010), as summarised in **Table 10-14**.

Table 10-14 Historic Climate Data

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

10.5.7 In 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 19 July 2022[184];
- Lowest recorded temperature was -15.9°C on the 29 December 1995[184];
- Highest 24-hour rainfall total for a rainfall day was 238 mm and was recorded on 17 January 1974[184];
- The highest gust speed recorded was 142 mph and was recorded on 13 February 1989[184]; and
- Recent storm events in the west of Scotland, including Storms Babet[185], Jocelyn[186], and Kathleen[187], caused severe flooding, travel disruptions, and infrastructure damage.

10.5.8 The 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

[184] 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].

[185] 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].

[186] 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].

[187] 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].

Development is located (Stirling, approximately 20 km to the south of the development).[188] Baseline climate change projections are highlighted in **Table 10-15.**

10.5.9 Major 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.

10.5.10 During 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.

[188] UK Met Office, 2019. *UK Climate Projections 2018 (UKCP18)* [Online]. [Accessed 11 April 2024]. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp

Table 10-15 Climate Change Baseline and Projection Data

Climatic Variable	Baseline data	Projection (change)				Projected Trend	Climate projection source
	1981-2010	2020 - 2049	2040 - 2069	2070-2099	Beyond 2100		
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 available, trend towards increasing temperatures expected to continue	↑	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		↑	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		↑	UKCP18 RCP8.5
Number of days of air frost per annum	53					↓	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 increasing temperatures expected to continue	↑	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		↑	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	↑	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 decrease in summer rainfall trend to continue	↓	UKCP18 RCP8.5

Climatic Variable	Baseline data	Projection (change)				Projected Trend	Climate projection source
	1981-2010	2020 - 2049	2040 - 2069	2070-2099	Beyond 2100		
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	↑	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	↑	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	↓	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.					↑↓	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.					↑	UKCP18 RCP8.5
Wildfires	The wildfire hazard is classified as medium according to the information that is currently available to the Think Hazard tool. This means that there is between a 10% and 50% chance of experiencing weather that could support a hazardous wildfire that may pose some risk of life and property loss in any given year.					↑	Think Hazard

10.6 Issues Scoped Out

10.6.1 A separate ICCI assessment has been excluded from the Climate Change assessment on the basis that this is a proportionate approach for an EA.

10.6.2 Sea level rise as an environmental risk has been scoped out of the assessment as the Proposed Development would be situated in an upland location.

10.6.3 Decommissioning has been scoped out of the assessment as the Proposed Development is being treated as permanent.

10.6.4 A0 lifecycle module is the preconstruction stage and represents the preliminary studies and works such as strategy and brief development, design efforts and cost planning. 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 guidance[147], 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.

10.7 Embedded Mitigation

10.7.1 Mitigation 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.

10.7.2 Standard 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 K GEMPs and SPPs**).

10.7.3 A Construction Environment Management Plan (CEMP) will be developed for the project and adopted by the successful contractor during the construction phase. This will 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

10.7.4 The 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.

10.7.5 Science-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 SBTi[189], 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 55% by 2033 from a 2020 baseline; and
- Committing to working closely with its supply chain so that 35% of its suppliers will have a Science-based target (SBT) set by 2026.

10.7.6 SSEN Transmission Sustainable Supplier Code[190] sets out its Sustainable Procurement Goals, which are aligned with the UN's Sustainable Development Goals. Implementation of

[189] SSEN, 2021. SSEN Distribution becomes the first electricity network to set 1.5C-aligned science-based targets. [Online]. [Accessed 11 April 2024] Available at: Science based targets - SSEN

[190] SSEN, 2023. *Sustainable Supplier Code* [online]. [Accessed 11 April 2024]. Available at: https://www.ssen.co.uk/globalassets/about-us/sustainability/documents/ssen-distribution---scsc-supplier-code-4-pager-v5.pdf

these measures will 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

10.7.7 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.

10.7.8 SSEN Transmission's Climate Resilience Strategy[191] 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 actions including those relevant to overhead line conductors, underground cable systems, substations, transformers, and switchgears in relation to a number of extreme weather events.

10.7.9 A CEMP will be developed which will aid in avoiding, minimising, and controlling adverse environmental impacts from extreme weather events, such as storms, droughts, and increased temperatures, associated to the Proposed Development. Best practice approaches and specific actions to implement mitigation measures will be included.

10.7.10 Relevant GEMPs have been outlined in **Chapter 9 Hydrology, Hydrogeology, Geology 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.

10.8 Appraisal

Lifecycle GHG Assessment

Construction Phase

10.8.1 For the purposed of the climate assessment, the construction phase of the Proposed Development is assumed to start in 2028 and take approximately 19 months.

10.8.2 The 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 10.3**. The results are provided in **Table 10-16**. The life cycle modules are labelled in accordance with PAS 2080:2023 guidelines.

[191]SSEN, 2023. *Climate Resilience Strategy* [online]. [Accessed 20 May 2024]. Available at: https://www.ssen.co.uk/globalassets/about-us/sustainability/documents/ssen-climate-resilience-strategy-progress-report-2023.pdf

Table 10-16 Construction phase GHG emissions

Life cycle Module		Emission Source	GHG Emissions (tCO_2e)
A: Before Use Stage	A1-3 Product Stage	A1-3 Raw materials supply and manufacture	**2,350**
	A4-5 Construction Process Stage	A4 Material transport	**1,158**
		A5.2 Construction activities	**774**
		A5.3 Waste	**330**
		A5.4 Worker transport	**56**
Total tCO_2e over the Construction period			**4,669**
Total Carbon Storage Loss (Biogenic Carbon) (A5.1)[192]			**8,563**
Total tCO_2e over the Construction phase (including biogenic carbon)			**13,232**

10.8.3 The total GHG emissions associated with the Proposed Development in the construction phase are 13,232 tCO_2e as detailed in **Table 10-16**. The majority of construction-phase GHG emissions are attributed to peat waste. As a worst-case scenario, it is assumed that the 9,998 m^3 of peat intended for reuse under the PMP (**Appendix J Peat Management Plan & Peat Landslide Hazard**) is instead lost, applying a 65% carbon content and a bulk density of 300 kg/m^3, 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 possible.

10.8.4 The second-largest source of emissions is the embodied carbon within construction materials. As outlined in the embedded measures section, SSEN has implemented a CEMP to reduce emissions. Additionally, SSEN has committed to the SBTi, ensuring that only suppliers aligned with net-zero requirements are utilized.

10.8.5 To 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 10-17**. 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 10-18** and **Table 10-19**.

10.8.6 The potential construction GHG emissions of the Proposed Development are estimated to contribute less than 0.03% 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 10-17 Comparison of construction phase GHG emissions with UK carbon budgets

UK Carbon Budget Period	UK Carbon Budget (tCO_2e)	Construction GHG Emissions (tCO_2e)	Construction GHG Emissions as a proportion of UK Carbon Budget
5th (2028 – 2032)	1,725,000,000	13,232	0.0008%

[192] 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.

Table 10-18 Scottish GHG reduction targets relevant to the construction period

Relevant GHG Reduction Period	GHG Reduction Allowance (tCO_2e)	Estimated total (tCO_2e) over carbon reduction period	% of GHG reduction period
2021-2030	112,500,000	13,232	0.001%

Table 10-19 Sector specific electricity generation carbon budgets relevant to the construction period

UK Carbon Budget Period	Sectoral Carbon Budget (tCO_2e)	Estimated total (tCO_2e) over the carbon budget period	% of Sectoral Budget for Electricity Generation.
5th (2028 – 2032)	63,000,000	13,232	0.02%

Operation Phase

10.8.7 It is expected that development will remain in perpetuity. However, for the purposes of the climate assessment a reference operational period of 60 years was assumed, in accordance with asset lifespans.

10.8.8 GHG emissions associated with the operational phase of the Proposed Development have been calculated in line with the methodology, assumptions and limitations outlined in **Section 10.3**. The results are provided in **Table 10-20**. The life cycle modules are labelled in accordance with PAS 2080:2023 Guidance.

Table 10-20 Operation phase GHG emissions

Life cycle Module	Emission Source	GHG Emissions (tCO_2e)
B: Use Stage	B2 Maintenance	47
	B3 Repair	46
Total B2 and B3 (tCO_2e)		93
Total tCO_2e over the Operational phase		93

10.8.9 The total GHG emissions associated with the Proposed Development in the operational phase are 93 tCO_2e as detailed in **Table 10-20**, with the majority of emissions arising from maintenance and repair activities.

10.8.10 No 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.

10.8.11 To 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 10-21**. 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 10-22** and **Table 10-23**.

10.8.12 The potential operational GHG emissions of the Proposed Development are estimated to contribute less than 0.00005% 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.

Table 10-21 Comparison of operation phase GHG emissions with UK carbon budgets

UK Carbon Budget Period	UK Carbon Budget (tCO_2e)	Operational GHG Emissions (tCO_2e)	Operation GHG Emissions as a proportion of the UK Carbon Budget
5th (2028 – 2032)	1,725,000,000	7.7	0.0000004%
6th (2033 – 2037)	965,000,000	7.7	0.000001%
7th (2038 – 2042)	535,000,000	7.7	0.000001%
8th (2043 – 2047)	195,000,000	7.7	0.000004%
9th (2048 – 2050)	17,000,000	4.6	0.00003%

Table 10-22 Scottish GHG reduction targets relevant to the operational period

Relevant GHG Reduction Period	GHG Reduction Allowance (tCO_2e)	Estimated total (tCO_2e) over carbon reduction period	% of GHG reduction period
2021-2030	67,954,788	4.6	0.00001%
2031-2040	173,303,100	15.5	0.00001%
2041-2044[193]	116,394,400	6.2	0.00004%

Table 10-23 Table 2-1 Design Environmental Embedded Mitigation MeasuresSector specific electricity generation carbon budgets relevant to the operational period.

Relevant UK Carbon Budget	Annualised UK Carbon Budget (tCO_2e)	Estimated total (tCO_2e) over the carbon budget period	% of Sectoral Budget for Electricity Generation.
5th (2028 – 2032)	63,000,000	7.7	0.00001%
6th (2033 – 2037)	420,000,000	7.7	0.000002%

[193] Excludes 2045 as no GHG emissions can be emitted from 2045 onwards.

Lifecycle GHG Assessment

10.8.13 Although 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 impact on the climate.

10.8.14 The 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 achieving a fossil fuel-independent electricity system by 2035.

10.8.15 Embedded mitigation measures, such as the PMP, 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.

10.8.16 As discussed in **Sections 10.8.5** and **10.8.7**, 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 guidance, 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.

10.8.17 In addition, SSEN Transmission's commitment to the Science-Based Targets initiative (SBTi) provides effective management of minor residual GHG emissions, aligning with policy requirements and supporting the project's contribution to the net-zero transition. The Applicant's Net Zero Transition Plan 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 Agreement[149]. 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

10.8.18 The 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 19 months and commence in 2028. 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.

10.8.19 During 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.

10.8.20 Over 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.

10.8.21 Climate 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.

10.8.22 These 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.

10.8.23 This 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.

10.8.24 The effect of climate change risk on the Proposed Development during the construction and operation phase is therefore deemed to be **Not Significant.**

10.9 Cumulative Effects

10.9.1 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.

10.9.2 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.

10.10 Recommendations and Additional Mitigation

10.10.1 Overall, in line with IEMA guidance[147,148] 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.

10.10.2 Consequently, 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.

11. CUMULATIVE DEVELOPMENTS

11.1.1 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 4-10**. 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.

11.1.2 The following developments outlined as 'scoped in' shown on **Table 11-1** 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 11-1 Appendix A Figures**.

Table 11-1 Developments Considered in Cumulative Appraisal

Planning Application Reference/Name	Description	Location	Status	Anticipated Construction Timeframe	Scoped in / out
23/02147/SCRN Proposed Cambushinnie 400kV substation.	Formation of a 400kV substation comprising erection of ancillary buildings, hardstand, plant and machinery access laydown/work compound areas.	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 underground cable circuits that will connect back to the existing Braco West Substation. These will connect the new 400kV AIS substation to the existing substation. Each underground cable 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 track adjacent to Braco Village.	Approximately 3.3 km southeast of the Site. The haul track 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 track 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 track 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 800 m of unbound type 1 material. A temporary works compound will be required to enable construction works; this will be located adjacent to the A8033 for office, welfare and storage space. There will be riverbank reinforcement	Land adjacent to Braco village between the A822 and B033. Approximately 3.3km southeast of the Site.	Intended for planning	Prior to October 2025.	Scoped out as the construction periods of the developments will not overlap.

Planning Application Reference/Name	Description	Location	Status	Anticipated Construction Timeframe	Scoped in / out
	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 forestry track to allow for continued forestry operations.	Shindour Feddal Hill Braco.	In operation	N/A	Scoped out as the development is currently in operation and construction periods will not overlap.
21/00756/FLM: 49.9MW battery 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 south 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

11.2 Appraisal

11.2.1 A cumulative effects assessment was undertaken for the Proposed Development, in combination with the developments summarised above. This assessment is summarised in **Table 11-2** below.

Table 11-2 Cumulative Assessment

Topic	Potential Cumulative Effects	Mitigation Measures
Landscape and visual	In line with good practice guidance[14,15,16] the cumulative appraisal is undertaken on a targeted basis focused on the most significant cumulative effects. The following two cumulative scenarios have been considered as part of this appraisal: • Cumulative Scenario 1: The cumulative baseline for this scenario includes schemes which have been consented and/or are under construction in addition to existing operational schemes; and, • Cumulative Scenario 2: The cumulative baseline for this scenario includes schemes at application stage in addition to existing operational schemes and those which have been consented and/or are under construction. Potential change on the character of the LCTs found within the Study Area would be limited given the nature of the Proposed Development which would largely involve replacement of an existing OHL tower with a new terminal tower and associated connections. The appraisal has identified that the majority of LCTs will receive a negligible adverse level of effect during construction, with no discernible change and a neutral level of effect during operation. Slightly greater change is anticipated for the Lowland Hills – Tayside LCT, within which the Proposed Development would be located. The increased movement and activity during construction would result in a minor adverse level of effect, reducing to negligible adverse during operation, when there will be little perceptual change. Cumulative change on this LCT is also anticipated to be negligible adverse in relation to both cumulative scenarios. In relation to visual amenity, the appraisal has identified that each of the viewpoints would experience relatively limited change to a small part of the view, resulting in a minor adverse level of effect at construction. At operation, the impression of change would be reduced and although perceptible would not influence the overall composition of impression of the view and as such the level of effects would be negligible adverse. Cumulative change on each of the viewpoints is also anticipated to be negligible adverse in relation to both cumulative scenarios, although with no cumulative change experienced from	None required as no significant cumulative effects are anticipated.

Topic	Potential Cumulative Effects	Mitigation Measures
	viewpoint 3 in relation to scenario 1 due to no potential visibility of the cumulative schemes.	
Ecology	No in-combination effects.	None required as no significant cumulative effects are anticipated.
Ornithology	No in-combination effects.	None required as no significant cumulative effects are anticipated.
Cultural Heritage	Cumulative effects on heritage assets, both physical and on setting, are not predicted due to the limited nature of the works. No significant effects are predicted.	None required as no significant cumulative effects are anticipated.
Traffic and Transport	Cumulative construction traffic effects on the public road network are not predicted. No significant effects are predicted.	None required beyond CTMP as no significant cumulative effects are anticipated.
Hydrology, Hydrogeology, Geology and Soils	The construction impacts in-combination with the new substation development, proposed UGC route and battery storage facilities would likely be related to potential contamination of underlying groundwater, nearby surface waters and soils from oils, fuel stored in mobile tanks, plant & equipment used, cement, concrete, waste, and wastewater, and also potentially from Made Ground and soil disturbance associated with excavations for foundations. The potential effects will be managed through the SSEN Transmission CEMP and the following GEMPs- Soil Management, Contaminated Land, Working with Concrete, Oil Storage and Refuelling, Waste Management, Working in Sensitive Habitats (see **Appendix K GEMPs and SPPs**). Potentially silt laden run-off will be prevented from entering water courses and/or drainage channels using straw bales, silt fences, cut off drains and drainage onto vegetated areas. If deemed necessary, an ECoW 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 battery storage projects. The CEMP will include a peat management plan which will be in place during construction and operation.	None required as no significant cumulative effects anticipated.

Topic	Potential Cumulative Effects	Mitigation Measures
	Although, the new substation development and the proposed UGC route are adjacent to the Proposed Development, assuming their individual CEMPs and GEMPs are applied during the construction and operation it is unlikely that there will be any cumulative effects on geology, soils, and the water environment. Furthermore, as the proposed BESS developments are located adjacent to the northeast and southeast of the Proposed Development, it is unlikely these will cause any cumulative effects to 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 and sustainability	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. 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.	None required as no significant cumulative effects anticipated.

Topic	Potential Cumulative Effects	Mitigation Measures
	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. 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.	

12. SUMMARY OF MITIGATION MEASURES

12.1.1 **Chapters 4-10** above highlight the potential environmental risks and present mitigation measures for managing these risks.

12.1.2 The embedded and additional mitigation proposed within this EA is listed below in **Table 12-1**. The CEMP will include these protection measures.

Table 12-1 Schedule of Mitigation

Mitigation Reference	Title of Mitigation	Description
EM1	Lighting requirements	The structures of the Proposed Development would not be illuminated at night during normal operation. Floodlights may be installed but would only be used in the event of a fault during darkness or during the overrun of planned works, or when sensor activated as security lighting for night-time access. 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 currently anticipated between 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.
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 locally sourced and site won materials. There will be a volume of surplus excavated material arising from the foundation works and it is envisaged this could be spread around the base of the tower to reduce the amount of road haulage to and from the Site. Site won materials would be prioritised over imported materials to reduce the impact on local roads and the environment.
EM3	Screening of the Proposed Development	All landscape and visual mitigation are embedded and covered in detail in **Chapter 4 Landscape Character and Visual Impact,** and **Appendix F Landscape and Habitat Management Plan** Key embedded mitigation measures relevant to landscape and visual impacts include: • Siting of the OHL corridor and ties to the proposed Cambushinnie substation and within the context of existing plantation forestry and adjacent to the existing Braco West Substation, therefore limiting wider landscape fragmentation.

Mitigation Reference	Title of Mitigation	Description
		• Other planting measures such as woodland planting and peatland restoration are associated with the proposed Cambushinnie substation planning application so not considered in this appraisal but taken account of in the cumulative appraisal.
EM4	Construction Traffic Management Plan (CTMP)	A CTMP would operate throughout the duration of the construction programme. **Appendix I Transport Statement** contains a draft 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 and 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.
EM5	Construction Environmental Management Plan (CEMP and General Environmental Management Plans (GEMPs)	Mitigation measures will be implemented through the use of a CEMP 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 K GEMPs and SPPs**.
EM6	Biodiversity Net Gain (BNG) Landscape and Habitat Management Plan (LHMP)	A BNG assessment has been undertaken for the Proposed Development, proposed Cambushinnie substation and UGC. A BNG Report (**Appendix E Biodiversity Net Gain Report**) and a Landscape and Habitat Management Plan (**Appendix F Landscape and Habitat Management Plan)** have been prepared to demonstrate how SSEN Transmission's target BNG figures could be achieved.

Mitigation Reference	Title of Mitigation	Description
		The Landscape and Habitat Management Plan (LHMP) details specific requirements for enhancement measures (e.g. blanket bog restoration, woodland creation/enhancement).
EM7	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.
EM8	Science Based Targets initiatives	Science-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 have committed to the following verified SBTi , 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 55% by 2033 from a 2020 baseline; and • Committing to working closely with its supply chain so that 35% of its suppliers will have a Science-based target (SBT) set by 2026.
EM9	SSEN Transmission Sustainable Supplier Code[194]	SSEN Transmission Sustainable Supplier Code sets out its Sustainable Procurement Goals, aligned the UN's Sustainable Development Goals. Implementation of these measures will ensure the project mitigates GHG emissions and contribute towards Scotland's Net Zero targets. The following 2025 targets include (but 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.
EM10	Climate Change Risk Assessment	SSEN Transmission's Climate Resilience Strategy[195] 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

[194] SSEN, 2023. *Sustainable Supplier Code* [online]. [Accessed on 11 April 2024]. Available at: https://www.ssen.co.uk/globalassets/about-us/sustainability/documents/ssen-distribution---scsc-supplier-code-4-pager-v5.pdf

[195] SSEN, 2023. *Climate Resilience Strategy* [online]. [Accessed 20 May 2024]. Available at: https://www.ssen.co.uk/globalassets/about-us/sustainability/documents/ssen-climate-resilience-strategy-progress-report-2023.pdf

Mitigation Reference	Title of Mitigation	Description
		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.
ECO1	Opportunities for ecological enhancement	The following enhancement could also be considered to 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 habitat, as advised by an ecologist, which would function as refuges for the benefit of common lizard.
ORN1	Opportunities for ornithological enhancement	The following enhancement for biodiversity would work towards achievement of 'biodiversity benefits' under NPF4: • Installation of bird boxes on suitably mature trees in the local area (e.g. in the area of the Bullie Burn) subject to landowner agreement.
CH1	Avoidance of historic landscape features	Mitigation will include avoiding historic landscape features (such as drystone walls, gateposts, etc) where possible to avoid accidental damage. Any sections of drystone wall that need to be removed for construction should be reinstated. If the wall cannot be reinstated because a permanent access is needed, the wall ends should be 'made good' and finished in a way that will avoid further damage through collapse.

APPENDIX A FIGURES

Figure 2-1 Site Location Plan

Figure 2-2 Site Location Plan – Temporary

Figure 2-3 Site Location Plan – Final

Figure 3-1a Environmental Constraints

Figure 3-1b Environmental Constraints

Figure 3-1c Environmental Constraints

Figure 3-1d Environmental Constraints

Figure 4-1 Zone of Theoretical Visibility

Figure 4-2 Landscape Character Types

Figure 4-3 Viewpoints and Recreational Routes

Figure 4-4 Cumulative Developments

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 Groundwater Dependent Terrestrial Ecosystems

Figure 5-5 Mammal and Other Notable Species Survey Results

Figure 6-1 Statutory and Non-Statutory Designated Sites

Figure 7-1 Known Heritage Assets within the 1km Study Area adopted for the Baseline Study

Figure 7-2 Known Heritage Assets within 1km of the Site

Figure 7-3 Designated Heritage Assets within the 2km Study Area adopted for Setting Impacts

Figure 7-4 Designated Heritage Assets within 2km of the Site

Figure 7-5 Designated Heritage Assets within 2km of the Site with Zone of Theoretical Visibility Analysis

Figure 9-1 Surface Water Features

Figure 11-1 Cumulative Developments

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 GEO-ENVIRONMENTAL DESK STUDY

APPENDIX H PRIVATE WATER SUPPLY ASSESSMENT

APPENDIX I TRANSPORT STATEMENT

APPENDIX J PEAT MANAGEMENT PLAN & PEAT LANDSLIDE HAZARD

Scottish & Southern Electricity Networks
TRANSMISSION

APPENDIX K GEMPS AND SPPS

APPENDIX L EIA SCREENING OPINION