Scottish & Southern Electricity Networks

TRANSMISSION

# *Knocknagael Substation Extension*

# Environmental Appraisal

## April 2025

Scottish & Southern Electricity Networks
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# LIST OF ABBREVIATIONS

| | |
|---|---|
| AIS | Air Insulated Switchgear |
| AOD | Above Ordnance Datum |
| AWI | Ancient Woodland Inventory |
| AWIS | Ancient Woodland Inventory Site |
| BAP | Biodiversity Action Plan |
| BCT | Bat Conservation Trust |
| BGS | British Geological Survey |
| BNG | Biodiversity Net Gain |
| BoCC | Birds of Conservation Concern |
| CAR | Controlled Activities Regulations |
| CDM | Construction Design and Management |
| CEMP | Construction Environmental Management Plan |
| CIEEM | Chartered Institute of Ecology and Environmental Management |
| CIfA | Chartered Institute for Archaeologists |
| CIRIA | Construction Industry Research and Information Association |
| CTMP | Construction Traffic Management Plan |
| DIA | Drainage Impact Assessment |
| DMRB | Design Manual for Roads and Bridges |
| DPSG | Designation Policy and Selection Guidance |
| EA | Environmental Appraisal |
| ECoW | Ecological Clerk of Works |
| EIA | Environmental Impact Assessment |
| EMF | Electromagnetic Fields |
| EPS | European Protected Species |
| ERM | Environmental Resources Management Ltd |
| FEH | Flood Estimation Handbook |
| FRA | Flood Risk Assessment |
| GEMP | General Environmental Management Plan |
| GDL | Gardens and Designed Landscapes |
| GLVIA | Guidelines for Landscape and Visual Assessment' |
| GWDTE | Groundwater Dependent Terrestrial Ecosystems |
| HBRG | Highland Biological Recording Group |
| HEPS | Historic Environment Policy for Scotland |
| HER | Historic Environment Record |

| | |
|---|---|
| HGV | Heavy Goods Vehicle |
| HES | Historic Environment Scotland |
| HRA | Habitats Regulations Appraisal |
| HRSG | Highland Raptor Study Group |
| HwLDP | Highland-wide Local Development Plan |
| IED | Industrial Emissions Directive |
| IEMA | Institute of Environmental Management and Assessment |
| kV | Kilovolt |
| LCT | Landscape Character Type |
| LDP | Local Development Plan |
| LGV | Light Goods Vehicle |
| LNCS | Local Nature Conservation Sites |
| LVIA | Landscape and Visual Impact Assessment |
| MW | Megawatt |
| NBN | National Biodiversity Network |
| NPF4 | National Planning Framework 4 (Scotland) |
| NVC | National Vegetation Classification |
| NW | North-West |
| PAC | Pre-Application Consultation |
| PAN | Planning Advice Note |
| PAWS | Plantation on Ancient Woodland Site |
| PWS | Private Water Supply |
| RAG | Red, Amber, Green |
| RSPB | Royal Society for the Protection of Birds |
| SAC | Special Areas of Conservation |
| SBL | Scottish Biodiversity List |
| ScARF | Scottish Archaeological Research Framework |
| SEPA | Scottish Environment Protection Agency |
| SLA | Special Landscape Area |
| SNH | Scottish Natural Heritage |
| SPA | Special Protection Area |
| SPP | Species Protection Plan |
| SPP | Scottish Planning Policy |
| SSEN | Scottish and Southern Electricity Networks |
| SSSI | Site of Special Scientific Interest |
| SE | South-East |

| | |
|---|---|
| TCPA | Town and Country Planning (Scotland) Act 1997 |
| THC | The Highland Council |
| TPO | Tree Preservation Orders |
| UGC | Underground Cable |
| UKHab | UK Habitat Classification |
| UNESCO | United Nations Educational, Scientific and Cultural Organisation |
| VP | Viewpoint |
| WFD | Water Framework Directive |
| ZOI | Zone of Influence |
| ZTV | Zone of Theoretical Visibility |

# GLOSSARY

| Term | Definition |
|---|---|
| Amenity | The natural environment, cultural heritage, landscape and visual quality. Also includes the impact of SSEN Transmission's works on communities, such as the effects of noise and disturbance from construction activities. |
| Ancient Woodland Inventory (AWI) | A database of land that is currently wooded and has been continually wooded, at least since 1750. |
| Annex I (as listed on the EC Habitats Directive) | Annex I to the EC Habitats Directive lists the types of habitats and the animal and plant species whose conservation requires the designation of special areas of conservation. Some are defined as 'priority' habitats or species in danger of disappearing and for which there are specific rules. |
| Baseline Conditions | The physical, chemical, biological and cultural setting in which the Proposed Development is to be located, and where local impacts (both positive and adverse) might be expected to occur. |
| Bellmouth | Widened areas of access tracks at the junction of the track with the public road to facilitate turning of heavy vehicles into and out of the track. |
| Biodiversity Net Gain (BNG) | Biodiversity Net Gain (BNG) is an approach to development that aims to leave the natural environment in a measurably better state than it was pre-development. It focuses on the change in the biodiversity value of a site, comparing the pre and post construction biodiversity values to ensure a positive effect overall. |
| Birds of Conservation Concern (BoCC) | Birds of Conservation Concern (BoCC) provides the status of all regularly occurring birds in the UK, Channel Islands and Isle of Man. The current version is BoCC 5. Birds of highest conservation concern will appear on the Red List. |
| Broadleaved Woodland | Broadleaved woodland is characterised by trees which do not have needles. Their leaves are broad and vary in shape, and most of them are deciduous. Broadleaved woodlands have 10% or less conifer in the canopy. |
| Class 1 and Class 2 Peatland | Class 1 – Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value.<br>Class 2 – Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential. |
| Commercial Forestry | Plantation woodlands typically dominated by conifer species and managed predominantly for timber extraction |
| Coniferous Woodland | Woodland that has 10% or less broadleaved trees in the canopy |
| Construction Environmental Management Plan (CEMP) | A site specific environmental management plan setting out the environmental management procedures, legislation and requirements for a particular project and site. |
| Consultation | The dynamic process of dialogue between individuals or groups, based on a genuine exchange of views, normally, with the objective of influencing decisions, policies or programmes of action. |
| Contaminated Land | Land contaminated by harmful substances including Unexploded Ordnance |
| Drinking Water Protected Areas (DWPA) | The water in ditches, streams, lochs and possibly groundwater in these areas is protected and likely to be taken to water treatment works, where it is treated and provided to the public as drinking water. |
| Effect | The change in condition of an environmental receptor (beneficial or adverse) arising as a result of a change brought about by the construction or operation of the Proposed Development. |
| Embedded Mitigation | Measures to avoid or reduce environmental impacts which are developed as an inherent part of the design of a project or from adoption of specific design parameters (eg compliance with specific buffer distance from an environmental receptor). |

| Term | Definition |
|---|---|
| EIA Regulations | The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 |
| European Designated Site | An area of land subject to protection through European legislation, including Special Areas of Conservation (SAC) and Special Protection Areas (SPA). |
| European Protected Species (EPS) | Species of plants and animals (other than birds) protected by law throughout the European Union. |
| Gardens and Designed Landscapes (GDLs) | The Inventory of Gardens and Designed Landscapes lists those gardens or designed landscapes which are considered by a panel of experts to be of national importance. |
| General Environmental Management Plan (GEMP) | A series of standardised construction environmental management plans produced by SSEN Transmission. |
| Ground Water Dependent Terrestrial Ecosystem (GWDTE) | Wetlands which critically depend on groundwater flows. They are safeguarded by the Water Framework Directive (WFD) and are sensitive to hydrological and ecological changes. |
| Habitat | Term most accurately meaning the place in which a species lives, but also used to describe plant communities or agglomerations of plant communities. |
| Habitats Regulations Appraisal (HRA) | Appraisal to determine whether the Proposed Development will give rise to Likely Significant Effects on European designated sites in line with the Conservation (Natural Habitats, &c.) Regulations 1994. |
| Historic Environment Record (HER) | Sources of, and signposts to, information relating to landscapes, buildings, monuments, sites, places, areas and archaeological finds spanning more than 700,000 years. Based in mainly local authorities, they are used for planning and development control but also fulfil an educational role. |
| Historic Environment Scotland (HES) | Organisation responsible for investigating, caring for and promoting Scotland's historic environment. |
| Impact | Physical constructions or activities that may change or disturb the surrounding environment (eg erection of an OHL tower may impact the landscape resource). |
| Landscape Character Type (LCT) | A distinct, recognisable and consistent pattern of elements in a landscape that differentiate the area from another. |
| Listed Building | Building included on the list of buildings of special architectural or historic interest and afforded statutory protection under the 'Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997' and other planning legislation. Classified categories A – C(s). |
| Mitigation | Term used to indicate avoidance, remediation or reduction of adverse impacts. |
| Native Woodland | Woodland recorded on the Native Woodland Survey of Scotland (NWSS) . The NWSS identified and mapped the location, extent, type and condition of all of Scotland's native woodlands. Launched in 2014, it was the first authoritative inventory of Scotland's native woods and created a baseline for future monitoring of change |
| NatureScot | Scotland's statutory nature conservation agency (formerly Scottish Natural Heritage (SNH)). |
| Plantation Woodland | Woodland of any age that obviously originated from planting. |
| Ramsar | A wetland site designated to be of international importance under the Ramsar Convention. |
| Royal Society for the Protection of Birds (RSPB) | The RSPB is a non-statutory body incorporated by Royal Charter and registered as a charity since 1968. The RSPB works to protect and restore the natural world for birds and other wildlife. |
| Scottish Biodiversity List (SBL) | The Scottish Biodiversity List is a list of species and habitats of particular importance for the conservation of biodiversity in Scotland. |

| Term | Definition |
|---|---|
| Scottish Environment Protection Agency (SEPA) | Scotland's principal environmental regulator, protecting and improving Scotland's environment. |
| Scheduled Monument | A monument which has been scheduled by the Scottish Ministers as being of national importance under the terms of the 'Ancient Monuments and Archaeological Areas Act 1979'. |
| Semi-natural Woodland | Woodland that does not obviously originate from planting. The distribution of species will generally reflect the variations in the site and the soil. Planted trees must account for less than 30% of the canopy composition. |
| Sites of Special Scientific Interest (SSSI) | Areas of national importance. The aim of the SSSI network is to maintain an adequate representation of all natural and semi-natural habitats and native species across Britain. |
| Special Area of Conservation (SAC) | An area designated under the EC Habitats Directive to ensure that rare, endangered or vulnerable habitats or species of community interest are either maintained at or restored to a favourable conservation status. |
| Special Landscape Area (SLA) | Special Landscape Areas (SLAs) are regionally valuable landscapes identified by a local planning authority (The Highland Council) to protect and enhance landscape qualities and promote their enjoyment. |
| Special Protection Area (SPA) | An area designated under the Wild Birds Directive (Directive74/409/EEC) to protect important bird habitats. |
| Species Protection Plan (SPP) | Developed by the Applicant to document general procedures, legislation and requirements for ensuring protection to a variety of species. |
| SSEN Transmission | Scottish Hydro Electric Transmission plc is a wholly owned subsidiary of the SSE plc group of companies. Operating and known as Scottish and Southern Electricity Networks Transmission (SSEN Transmission) it owns and maintains the electricity transmission network across the north of Scotland and remote islands. It holds a licence under the Electricity Act 1989 to develop and maintain an efficient, co-ordinated and economical system of electricity transmission. |
| Stakeholders | Organisations and individuals who can affect or are affected by SSEN Transmission works. |
| Study Area | A defined area for the consideration of environmental effects (including direct, indirect and cumulative) on each relevant factor listed under Regulation 4(3) of the EIA Regulations. |
| Substation | A node on the network to allow safe control of the electricity network. This could include convergence of multiple circuits, transformation of voltage or other functions to maintain and operate the electricity network. |
| The National Grid | The electricity transmission network in Great Britain. |
| UK Habitat Survey (UKHab) | The UK Habitat Classification is a unified and comprehensive approach to classifying habitats, designed to provide a simple and robust approach to survey and monitoring for the 21st Century. |
| Underground Cable | An electric cable installed below ground, protected by insulating layers and marked closer to the surface to prevent accidental damage through later earthworks. |
| Zone of Theoretical Visibility (ZTV) | The computer generated plan showing the theoretical visibility of an object in the landscape. |

# 1. INTRODUCTION

## 1.1 Overview of the Proposed Development

1.1.1 This Environmental Appraisal (EA) has been prepared by Environmental Resources Management Ltd (ERM) on behalf of Scottish and Southern Electricity Networks Transmission (SSEN Transmission), operating under licence held by Scottish Hydro Electric Transmission plc, hereafter referred to as 'the Applicant', who own and maintain the electricity transmission network across the north of Scotland and hold a licence under the Electricity Act 1989 to *'develop and maintain an efficient, co-ordinated and economical electricity transmission system in its licensed area'*. The Applicant is a subsidiary of the SSE plc group of companies.

1.1.2 As part of the works required to connect the consented Loch na Cathrach (formerly known as Red John) 450 Megawatt (MW) Pumped Storage (hydro) Scheme into the wider electricity transmission grid, it is necessary to undertake an extension to the existing substation at Knocknagael.

1.1.3 The Applicant is seeking consent from The Highland Council (THC) under the Town and Country Planning (Scotland) Act 1997 (TCPA) (as amended), to construct and operate an extension to the existing Knocknagael Substation (hereby referred to as 'the Proposed Development').

## 1.2 Background to the Proposed Development

1.2.1 The Applicant, is the electricity transmission licence holder in the north of Scotland and has the following duties under Section 9 of the Electricity Act 1989:

- to develop and maintain an efficient, coordinated and economical system of electricity transmission; and
- to facilitate competition in the generation and supply of electricity.

1.2.2 The Proposed Development is necessary to fulfil the statutory and licence obligations of the Applicant as the onshore and offshore transmission licence holder. These obligations relate to developing the electricity transmission network to provide adequate transmission capacity, and to provide connections to customers who wish to connect to, and use the transmission system, to participate in the national wholesale electricity market.

1.2.3 The Applicant also has obligations to offer non-discriminatory terms for connection, to the electricity transmission system and, as such, has a legal duty to provide connections for new electricity generators wishing to connect to the transmission network in its licence area under the terms of its statutory and licence obligations.

1.2.4 The Proposed Development is in line with the Applicant's commitment, and licence obligation, to facilitate the connection of renewables generators to the grid, through an economical, efficient and coordinated approach to transmission reinforcement.

1.2.5 The Proposed Development is described in **Chapter 2: Description of the Proposed Development**.

## 1.3 Environmental Appraisal

1.3.1 The Applicant recognises that the Proposed Development has the potential for effects on the environment. As such, a number of environmental studies have been carried out, the results of which are detailed in this EA.

1.3.2 This document considers the potential for environmental effects associated with the Proposed Development. A separate planning statement has been prepared that considers the Proposed Development in the context of current planning policy.

1.3.3 The Proposed Development is not covered under the developments listed within Schedule 1 of The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (hereafter referred to as the

Environmental Impact Assessment (EIA) Regulations). Works to the electricity network including works to substations are not identified within Schedule 2 of the EIA Regulations. Nonetheless, a Screening Opinion was sought from THC to determine whether the Proposed Development falls within the remit of the regulations. A response was received in May 2024, confirming that EIA was not required.

### 1.4 Contents of the Environmental Appraisal

1.4.1 The EA is structured as follows:

- Chapter 1 – Introduction;
- Chapter 2 – Description of the Proposed Development;
- Chapter 3 – Site Selection Process and Alternatives;
- Chapter 4 – Methodology;
- Chapter 5 – Landscape and Visual Impact;
- Chapter 6 – Ecology and Ornithology;
- Chapter 7 – Cultural Heritage;
- Chapter 8 – Hydrology, Hydrogeology, Geology and Soils; and
- Chapter 9 – Schedule of Mitigation.

1.4.2 The following supporting information is provided in the following Appendices:

- Appendix A: Figures;
- Appendix B: General Environmental Management Plans (GEMPs);
- Appendix C: Species Protection Plans (SPPs);
- Appendix D: Photomontages;
- Appendix E: Landscape Mitigation Plan;
- Appendix F: Flood Risk Assessment and Drainage Strategy Report;
- Appendix G: Transport Statement;
- Appendix H: Habitat and Protected Species Survey Report;
- Appendix I: Breeding Bird Survey Reports;
- Appendix J: Bat Tree Assessment and Woodland NVC Survey;
- Appendix K: (Confidential): Schedule 1 Birds;
- Appendix L: Biodiversity Net Gain (BNG) Report;
- Appendix M: Cultural Heritage Fieldwork Survey Report; and
- Appendix N: Cultural Heritage Baseline.

# 2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

## 2.1 Introduction

2.1.1 This chapter provides a description of the main elements of the Proposed Development.

## 2.2 The Proposed Development

2.2.1 The Proposed Development is located approximately 6 km south of Inverness. The specific location is within an area of scattered trees, scrub and grassland, immediately adjacent to the eastern and southern boundary of the existing Knocknagael Substation at central grid reference NH 65390 38966 (see **Appendix A, Figure 2.1**). Throughout this EA report, the term 'site' is also used throughout, this refers to land adjacent to the existing Knocknagael Substation.

2.2.2 The Proposed Development would consist of (see **Appendix A, Figure 2.2**):

- Temporary site compound and construction laydown area;
- Extension of the existing Knocknagael 275 kV External Air Insulated Switchgear (AIS) double busbar to create a new 275 kV AIS bay to connect the new circuit from the Loch na Cathrach 275 kV Switching Station. The maximum height of which would be approximately the same as existing electrical equipment at the substation and no higher than 11.7 m;
- Platform size of approximately 90 m x 110 m along with associated earthworks;
- Upgrade of existing access tracks and drainage, in addition to construction of new access tracks and drainage, as required. The main access road within the substation and the temporary bellmouth from the public road will be tarmac, any other accesses to plant and apparatus will be stone surface;
- Existing 275 kV cable circuit re-route to allow sufficient room for the extension works;
- A new temporary construction entrance to the Proposed Development from the public road, located to the south of the existing substation main entrance. The temporary entrance and any temporary access tracks will be reinstated upon completion of construction of the Proposed Development;
- Landscaping and biodiversity enhancements; and
- Palisade perimeter fence of approximate maximum height of 2.4 m.

## 2.3 Construction Programme

2.3.1 It is anticipated that construction of the Proposed Development would take place over an approximately 32-month period following the granting of consents, with an anticipated completion date of Summer 2028.

2.3.2 The detailed construction programme is subject to change as the design progresses, and is subject to statutory consents being granted. Detailed programming works will be the responsibility of the Principal Contractor in agreement with SSEN Transmission.

## 2.4 Construction Environmental Management

*General Environmental Management Plans (GEMPs)*

2.4.1 GEMPs have been developed by the Applicant. The GEMPs considered relevant to this project are provided in **Appendix B** and all construction work will be undertaken in accordance with these.

*Species Protection Plans (SPPs)*

2.4.2 SPPs have been developed by the Applicant and have been agreed with NatureScot. These are provided in **Appendix C** and will be implemented during construction of the Proposed Development.

*2.4.3 Construction Environment Management Plan (CEMP)*

2.4.4 A CEMP will be prepared and implemented by the Principal Contractor following their appointment. This document will detail how the Principal Contractor will manage the Proposed Development in accordance with all commitments and mitigation detailed in the EA, statutory consents and authorisations, and industry best practice and guidance.

## 2.5 Construction Method and Phasing

*Phase 1 - Enabling works*

Road Improvements and Access

2.5.1 Detailed access proposals will be developed by the Principal Contractor (yet to be appointed). It is anticipated that construction access will be achieved from the existing road network from U1096.

2.5.2 Where possible, existing access tracks and roads will be used and upgraded, as required. New access tracks will be required. The plans submitted with the planning application indicate where access tracks will be temporary or permanent. Where ground conditions permit, it is preferable to construct the infrastructure without an access track (e.g. on dry and level pasture), although it is likely that access tracks would be required. Temporary matting may be used in sensitive areas, subject to an assessment of gradients and ground conditions.

2.5.3 New access tracks (permanent or temporary) would be constructed using a geotextile, with approximately 200 mm of crushed and compacted stone laid on top. Tracks are likely to use cut and fill approaches, subject to ground conditions and gradients. Permanent access tracks proposed within the substation, will be finished with a running surface of tarmac.

Temporary Site Compound

2.5.4 It is anticipated that a single main construction compound will be required, the location of which will be adjacent to the existing substation site entrance and public road but will be confirmed by the Principal Contractor.

*Phase 2 – Construction works*

2.5.5 This phase comprises:

- Installation of temporary construction drainage and access tracks;
- Creation of a level platform through cut and fill earthworks;
- Construction of civil engineering infrastructure;
- Construction of permanent access roads and drainage;
- Installation of permanent site drainage (inc. Sustainable Urban Drainage Systems (SuDS));
- Installation of mechanical/electrical equipment;
- Removal of temporary works; and
- Landscape design and Biodiversity Net Gain (BNG) implementation including restoration.

*Phase 3 - Commissioning*

2.5.6 The Proposed Development would be subject to an inspection and snagging process. This allows the Principal Contractor and the Applicant to check that the works have been built to specification and are fit to energise. The Proposed Development would also go through a commissioning procedure for the switchgear, communications, and protection controls through the substation. The circuit would then be energised so the Proposed Development can be connected to the National Grid.

*Phase 4 - Reinstatement*

2.5.7 Following commissioning of the Proposed Development, the construction site will be reinstated. Reinstatement will form part of the contract obligations for the Principal Contractor and will include the removal of all temporary access tracks and compound, all work sites and replanting in accordance with a Landscape Mitigation Plan and supporting landscape strategy and planting plan (see **Appendix E**) that will be submitted for approval as part of the application for planning permission.

2.5.8 The following principles will inform the approach to reinstatement of the site:

- Best practice will be followed for reinstatement of the site; and
- Reinstatement principles are detailed in the GEMPs (**Appendix B**).

Reinstatement of Construction Compound

2.5.9 The construction compound will be reinstated at the end of construction with all buildings and materials removed and all soils appropriately reinstated. The location will be revegetated, in line with the Landscape Mitigation Plan and supporting landscape strategy and planting plan (see **Appendix E**).

## 2.6 Construction Employment and Hours of Work

2.6.1 The Applicant takes community responsibilities seriously. The delivery of a major programme of capital investment provides the opportunity to maximise support of local communities.

2.6.2 Employment of construction staff will be the responsibility of the Principal Contractor, but the Applicant encourages the Principal Contractor to make use of suitable labour and resources from areas local to the location of the works.

2.6.3 It is envisaged that there will be a number of separate teams working at the same time within the Proposed Development. The resource levels will be dependent on the final construction sequence, and will be determined by the Principal Contractor.

2.6.4 Construction working is likely to be during daytime periods only. Working hours are anticipated between approximately 07.00 to 19.00 in summer and 07.30 to 17.00 (or within daylight hours) in winter Monday to Saturday. Any out-of-hours working would be agreed in advance with THC.

## 2.7 Construction Traffic

2.7.1 Construction of the Proposed Development will give rise to regular numbers of staff transport movements, with small work crews travelling to work site areas. It is anticipated that the Principal Contractor will identify a single main compound area, with a safe area for parking, away from the public highway.

2.7.2 Vehicle movements would be required to support the construction of new or upgraded access roads; deliver the foundation and substation components and materials to site; transport the workforce; deliver and collect materials and construction plant from the main site compound, and to the site.

## 2.8 Operation and Management

*Life of the Proposed Development*

2.8.1 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. These will be maintained or replaced as part of a regular maintenance and monitoring regime. Due to the nature of the Proposed Development, in that it is supporting the ongoing transmission of electricity in the wider area, it is treated as permanent, and, as such, decommissioning is not considered in this EA.

*Maintenance Programme*

2.8.2 Substations are not generally illuminated, other than sensor-activated security lighting for night-time access. Floodlights would be installed but only used in the event of a fault during the hours of darkness.

2.8.3 Once operational, it is likely that monthly site visits would be made to the Proposed Development by maintenance personnel to undertake routine checks and operational switching. Access for this will be from the U1096. More specialist works, such as maintenance repairs or environmental management may be subcontracted to specialists, as required.

## 2.9 Residues and Emissions

**Table 2.1** below provides a summary of the potential residues and emissions. This provides additional support to informing the scope of the EA.

**Table 2.1: Residues and Emissions**

| Topic | Potential residue/emission |
|---|---|
| Water | Construction:<br>Surface water runoff and discharge is likely during construction. Pollution sources may arise as a result of soil erosion or from oil/ fuel or chemical storage and use.<br>Operation:<br>No water emissions or pollution sources have been identified for the operational phase. |
| Air | Construction:<br>The construction phase would require the transport of people and materials by road, with associated emissions to the atmosphere. There are no air quality management areas within the vicinity of the Proposed Development. No significant air emissions are anticipated.<br>Operation:<br>Due to the nature of the Proposed Development, no significant point-source or diffuse air emissions would be produced during operation.<br>The Proposed Development would contribute to connecting renewable electricity generation capacity to the transmission network, in turn displacing emissions associated with fossil fuel-based electricity generation elsewhere. |
| Soil and subsoil | Construction:<br>Soil and subsoil excavation, handling and storage would be required during construction. All soil and subsoil would be stored temporarily for use in reinstatement.<br>Operation:<br>No requirement for soil or subsoil excavation or handling during the operation phase has been identified. No pollution sources have been identified for the operational phase. |
| Noise and Vibration | Construction:<br>Noise emissions will be generated from construction plant and traffic.<br>Operation:<br>Due to the nature of the Proposed Development, no significant noise emissions are likely during operation. |
| Light | Construction:<br>The temporary construction compound is likely to be equipped with lighting installations and passive infra-red sensor controlled security lighting, for use during low light conditions. . Any effect would be temporary and is not expected to be significant.<br>Operation:<br>The only light sources during normal operation of the Proposed Development would be sensor-activated security lighting for night-time access. Floodlights would also be installed but only used in the event of a fault during the hours of darkness. |

| Topic | Potential residue/emission |
|---|---|
| Heat, Radiation and Electromagnetic Fields (EMF) | Construction:<br>No heat or radiation sources have been identified during the construction phase. There will be no significant EMFs generated during construction.<br>Operation:<br>EMFs resulting from the Proposed Development will remain below the public and occupational exposure limits at the boundary of the substation. |
| Waste | Construction:<br>The construction stage will require vegetation removal. All waste will be disposed of at the time it arises and in line with current legislation and best practice.<br>Operation:<br>Limited waste may arise from operation and maintenance in the form of brash from vegetation maintenance or replacement of faulty / damaged equipment. All waste will be disposed of at the time it arises and in line with current legislation and best practice. |

## 2.10 Decommissioning

2.10.1 The Applicant is seeking in-perpetuity consent for the Proposed Development. As such, no separate assessment of decommissioning is presented in the EA report as it is a permanent facility.

# 3. SITE SELECTION PROCESS AND ALTERNATIVES

## 3.1 Introduction

This chapter describes the site selection process and consideration of alternatives, which has been undertaken following identification of the need for the Proposed Development (see **Chapter 1: Introduction**).

The following stages are described in this chapter, along with their respective outcomes:

- Stage 0: Strategic Options assessment;
- Stage 1: Initial site screening; and
- Stage 2: Detailed site selection.

## 3.2 Development Considerations

SSEN Transmission has obligations under section 9 of the Electricity Act 1989 Act to '*develop and maintain an efficient, co-ordinated and economical system of electricity transmission*'. Furthermore, the requirements of the Construction (Design and Management) Regulations 2015[1] (CDM Regulations) require that the project design aims to minimise hazards and reduce risks during construction.

Taking account of these obligations, SSEN Transmission has considered technical, economic and environmental factors in evaluating the reasonable alternatives for the Proposed Development. The objective of these considerations has been to identify a Proposed Option, which is technically feasible and economically viable, whilst minimising impacts on important resources or features of the environment and reducing disturbance to those living in it, working in it, visiting it or using it for recreational purposes.

## 3.3 Approach to Site Selection

The approach to site selection has been informed by SSEN Transmission's Substation Site Selection Procedures for Voltages at or above 132 kV guidance document[2] (hereafter referred to as SSEN Transmission's Substation Guidance). This guidance document describes the approach to identification and selection of new electricity transmission substation sites and also covers requirements to extend existing substations.

Each stage of site selection is an iterative process and involves an increasing level of detail and resolution, bringing cost, technical and environmental considerations together in a way which seeks to achieve the best balance at each stage. The stages that are carried out can vary depending on the type, nature of and size of a project and consultation is carried out at each stage of the process.

In accordance with the steps outlined in the Holford Rules (Supplementary Notes on the Siting of Substations) and SSEN Transmission guidance[3], the following principles were taken into account during the site selection stages of the Proposed Development:

- Respect areas of high amenity value and take advantage of the containment of natural features, such as woodland, fitting in with the landscape character of the area;
- Take advantage of ground form with the appropriate use of site layout and levels to avoid intrusion into surrounding areas;
- Use space effectively to limit the area required for development, minimising the effects on existing land use and rights of way;
- Alternative designs of substations may also be considered, e.g., 'enclosed', rather than 'open', where additional cost can be justified;

[1] http://www.legislation.gov.uk/uksi/2015/51/contents/made (accessed 23/02/2022)
[2] Scottish and Southern Electricity Networks (November 2020). PR-NET-ENV-502. Substation Site Selection Procedures for Voltages at or above 132 kV
[3] Scottish and Southern Energy Networks (SSEN) Transmission. (September 2022). *Substation Site Selection Guidelines for Voltages at or Above 132kV. PR-NET-ENV-502.*

- Consider the relationship of towers and substation structures with background and foreground features, to reduce the prominence of structures from main viewpoints; and
- When siting substations, take account of the effects of line connections that will need to be made.

### 3.4 Strategic Options Assessment (Stage 0)

A strategic options assessment was undertaken by SSEN Transmission. The outcome of this strategic options assessment identified the following key requirements for the new site:

- Proximity to the existing 275 kV substation to minimise the amount of cabling required to connect to the network.
- Large enough to accommodate the Proposed Development footprint, together with associated landscaping, contractor compounds, access and new connection routes.
- Capacity for future connections.
- In areas which do not contain environmental designations and minimise impacts on local environmental receptors.
- Enables connection.

The outcome of the strategic options assessment informed the identification of sites to take forward as part of the Stage 1: Initial Site Screening Stage.

### 3.5 Initial Site Selection (Stage 1)

Stage 1 of the SSEN Transmission Site Selection Guidance requires a comprehensive list of feasible site options to be identified.

Due to the need for the connection into the existing Knocknagael Substation, five initial site extension options were identified on the periphery of the substation (see **Appendix A, Figure 3.1**).

Assessment of the five options was undertaken using the Red, Amber, Green (RAG) matrix in the SSEN Transmission's Substation Guidance. This resulted in three of the options being discounted from further assessment because the extension requires a close connection to the existing busbar sets, which were adjacent only to Options 1 and 3.

### 3.6 Detailed Site Selection (Stage 2)

This stage seeks to identify a preferred substation site from shortlisted options, which minimises where practicable physical, environmental and amenity constraints, and is likely to be acceptable to stakeholders and is viable (taking into account engineering and cost requirements). The connections into new and existing assets forms a crucial part of this assessment to reduce the need for additional new infrastructure.

Following the completion of the Stage 1 initial screening process, a total of two sites were identified and taken forward to Stage 2. Engineering then identified four 'micro-options' within each option (see **Appendix A, Figure 3.2**). An additional appraisal was completed to identify the preferred micro-option within each option. The micro-options identified in Substation Option 1 were referred to as options north-west (NW) 1, 2, 3 and 4. The micro-options identified in Substation Option 3 were referred to as options south-east (SE) 1, 2, 3 and 4.

*Preferred Site*

At the time of the Stage 2 appraisal, the Proposed Development required an extension to the existing Knocknagael Substation on two sides to allow a firm connection to be installed. The stage, therefore, included a comparison of four micro-options for each of the two site options progressed from Stage 1.

From an environmental perspective there were no significant differentiators between micro-options NW1, NW2, NW3 and NW4, in the Option 1 NW area (to the north-west of the existing Knocknaegal Substation). Based on the smallest proposed footprint, Option NW2, from an environmental perspective, was the preferred micro-option on the north-west boundary.

From an engineering perspective, Options NW1 and NW4 had more green ratings, however, Option NW3 had significantly fewer limitations in terms of future extension and outage requirements.

On balance, option NW3 was considered appropriate for progression to further design, predominately based on engineering and technical reasons. From an environmental perspective, all four NW options were similar in terms of environmental constraints.

Within the Option 3 (SE) area, there were no significant differentiators between Options SE1, SE2, SE3 and SE4 (to the south-east of the existing Knocknaegal Substation). Based on the smallest proposed footprint, Option SE1, from an environmental perspective, was the preferred micro-option on the south-east boundary.

From an engineering perspective, Options SE3 had the most benefits with a readily extendable site in a preferable area of land and a retaining wall would not be required.

On balance, SE3 was considered appropriate for progression to further design based on predominately engineering and technical reasons, as from an environmental perspective all four SE options were similar in terms of environmental constraints.

Overall, the preferred site options were NW3 for the north-west site option and option SE3 for the south-east option.

### 3.7 Firm to Non- Firm Connection

During the design stage of the Proposed Development, the initial connection arrangement was requested by the developer to be de-scoped, such that the offered connection became a non-firm connection rather than a firm connection. This has resulted in the need for a two-sided extension (double circuit) either side of the existing Knocknagael Substation to fall away and instead require only an extension on one side (single circuit). A firm connection provides unrestricted ability for a power generator to export the maximum amount of contracted power under any conditions, whilst a non-firm connection will include restrictions that limit a power generator being able to export their full capacity under certain conditions.

Technical and environment factors were reviewed, concluding micro-option SE3 the better option to progress rather than NW3. From an environmental perspective, the south-east option is preferable, due to the avoidance of tree felling and improved visual screening. From a technical perspective, the south-east option requires overall cut, rather than fill activities, thus reducing potential import of material to construct the platform and reduce the need for existing underground cable (UGC) relocation.

### 3.8 Consultation

3.8.1 The Applicant consulted on the Proposed Development between April 2022 and July 2024 seeking input from a range of statutory and non-statutory organisations on the Proposed Development. The consultation process comprised the following:

- Key statutory and non-statutory stakeholders were consulted by email in April 2022 ahead of a public consultation event with a request for comments. A link to the project website was shared in the email where a copy of the consultation booklet could be viewed; This was repeated for further public events;
- The April 2022 public event was held at Lochardil House Hotel, Inverness on 28 April 2022 between 14:00 and 19:00. A December 2022 public event was held at Green Drive Hall, Inverness on 7 December 2022 between 14:00 and 19:00. A further public event was held at the same venue on 17 April 2024 between 14:00 and 18:30, and a final public event was again held at the same venue on 12 June 2024 between 14:00 and 18:30;
- The associated Consultation Documents (supporting the events in April and December 2022) were made available on the SSEN Transmission website from April 2022 and November 2022 respectively at: https://www.ssen-transmission.co.uk/projects/red-john-pump-storage-scheme-275kv-connection/;
- Each public event had a corresponding consultation period after the event ,for which the Applicant invited feedback and comments. Responses were received via a variety of methods, including completed feedback

forms, emails and written letters. The feedback received was reported in a Report on Consultation, for both the April and December 2022 events. These were made available on the project website. Feedback from the April 2024 event and the Applicant's response was presented as part of the public event in June 2024. The feedback received from the June 2024 public event was incorporated into the design and this EA, where appropriate. A Pre-Application Consultation (PAC) Report accompanies the planning application and reports further on the consultation undertaken;

- Formal pre-application was undertaken with THC l in January 2023, with reference number 22/04161/PREMAJ, with a written response received from THC on 15 February 2023; and
- Further ad-hoc consultation has taken place with statutory and non-statutory parties throughout the development process, to inform specific topic areas, and is reported in this EA, where applicable.

3.8.2 Throughout the consultation process, local attendees were encouraged to fill in feedback forms or provide their comments directly to the Community Liaison Manager. A feedback form was created to provide respondents with the option to provide feedback regarding their areas of interest.

*Consultation Responses*

3.8.3 **Table 3.1** summarises the key themes raised, with reference to the Proposed Development and the SSEN Transmission response.

**Table 3.1: Summary of Consultation**

| Topic | SSEN Transmission Response |
|---|---|
| Landscape and Visual | SSEN Transmission have prepared a Zone of Theoretical Visibility (ZTV) for the substation extension and a list of viewpoints identified. Visualisations have been prepared to support the application, including those from the viewpoints recommended following consultation with THC (**Appendix D**).<br>In addition, SSEN Transmission have drafted a Landscape Mitigation Plan and supporting landscape strategy and planting plan that shows how landscaping and planting will be incorporated into the Proposed Development (**Appendix E**). |
| Forestry | The response on forestry was received when the Proposed Development required a firm connection (see **Section 3.7**). As the Proposed Development is now a non-firm connection, there would be no impact to the area of semi-natural broadleaved woodland to the north-west of the existing Knocknaegal Substation. Therefore, a Tree Protection Plan and Arboricultural Impact Assessment and Arboricultural Method Statement are not required for the Proposed Development. |
| Ecology | During the EA stage, a Habitat Regulations Appraisal (HRA) has been undertaken. The HRA has been reported on separately to this EA and will be submitted to THC alongside the planning application submission.<br>BNG assessment and reporting has been undertaken for the Environmental Appraisal stage.<br>A data request to the Royal Society for the Protection of Birds (RSPB) and the Highland Raptor Study Group (HRSG) has been submitted. The results are included in **Chapter 6: Ecology and Nature Conservation**.<br>SSEN Transmission have considered Biodiversity Enhancement and developed a BNG Management Plan in the Landscape Mitigation Plan and supporting landscape strategy and planting plan (**Appendix E**). |
| Hydrology and Hydrogeology | SSEN Transmission will submit a Flood Risk Assessment (FRA) and Drainage Strategy Report alongside the planning application for the substation extension (**Appendix F**).<br>During the EA stage of the project, SSEN Transmission have consulted with Scottish Water to identify the most appropriate mitigation to protect water quality. |
| Cultural Heritage | SSEN Transmission noted the potential need for Scheduled Monument Consent where appropriate. However, the Proposed Development would not result in any direct effects to Scheduled Monuments and, therefore, consent would not be required. |

| Topic | SSEN Transmission Response |
|---|---|
| | SSEN Transmission has undertaken a walkover survey, where a series of embedded mitigation methods are proposed, including the use of buffer zones, micro siting and demarcation. These are recommendations based on the current design. SSEN Transmission will consult with THC Historic Environment Team on a final mitigation strategy, ahead of any works taking place. |
| Traffic and Transport | A Transport Statement (**Appendix G**) has been produced to set out proposed traffic and transport details of the Proposed Development. A Construction Traffic Management Plan (CTMP) will be produced prior to construction. |

# 4. METHODOLOGY

## 4.1 Introduction

4.1.1 This chapter sets out the approach that has been taken to complete the EA of the Proposed Development, including reference to legal requirements, best practice and the assessment of parameters.

4.1.2 The approach to the assessment has been informed by current best practice guidance. The guidance and methodology adopted for each technical study is provided within the respective technical chapters of this EA Report (**Chapters 5-9**).

## 4.2 Identification of Baseline

4.2.1 To identify the scale of likely effects as a result of the Proposed Development, it is necessary to establish the existing baseline environmental conditions.

4.2.2 The baseline scenario was established through the following methods (where relevant):

- Desk-based studies;
- Review of existing information;
- Site visits and surveys;
- Review of relevant national and local planning policies;
- Consultation with the relevant statutory consultees and where appropriate, non-statutory consultees; and
- Identification of sensitive receptors.

## 4.3 Assessment of Environmental Effects

4.3.1 For the purposes of this EA, the terms used in the assessment of effects are generally defined as follows:

- 'Impact' is specific and defined as the action being taken, for example, cutting down trees;
- 'Effect' is defined as the change resulting from that action;
- 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;
- Direct - where the effect is a direct result (or primary effect) of the Proposed Development;
- Indirect - a knock-on (or secondary) effect which occurs within or between environmental components, may include effects on the environment which are not a direct result of the Proposed Development, often occurring away from the proposals or as a result of a complex biological or chemical pathway;
- 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 adverse, effect on one or more environmental receptors.

4.3.2 Where a more appropriate effect, duration, scale or definition of the above terms is applicable to a technical discipline, this is clearly outlined with the technical chapters of this EA Report (**Chapters 5-9**).

4.3.3 The result of the assessment is the determination of whether the likely effect of the Proposed Development on the receptor in the study area would be significant or not significant, and adverse or beneficial. 'Receptor' is defined as meaning the factors of the natural and built environment, including people and communities, that may be significantly affected by the Proposed Development. Examples include cultural heritage, landscapes, populations, animal and plant species, and the water environment.

4.3.4 Where no published standards exist, the assessments presented in the technical chapters describe the professional judgements (assumptions and value systems) that underpin the attribution of significance. For certain technical topics, e.g. ecology, widely recognised published significance criteria and terminology have been applied. These are presented in the technical chapters and associated appendices where relevant.

4.3.5 Whilst not a formal Environmental Impact Assessment (EIA) in accordance with the EIA Regulations, this appraisal has followed a similar approach. The assessment of significance has considered the magnitude of change (from the baseline conditions), the sensitivity of the affected environment/receptors and (in terms of determining residual effects) the extent to which mitigation and enhancement will reduce or reverse adverse effects. In addition, further influences, such as those listed below, have been factored into the assessment using professional judgement:

- Likelihood of occurrence;
- Geographical extent;
- The value of the affected resource;
- Adherence of the proposals to legislation and planning policy; and
- Reversibility and duration of the effect.

4.3.6 The magnitude (scale) of change for each effect has been identified and predicted as a deviation from the established baseline conditions, for the construction and operational phases of the Proposed Development. The scale used high, medium, low, and negligible criteria, as seen in **Table 4.1**.

4.3.7 The sensitivity of the receptor / receiving environment, to change, has been determined using professional judgement, consideration of existing designations (such as Sites of Special Scientific Interest (SSSIs)) and quantifiable data, where possible. The scale used high, medium, low, and negligible criteria, as seen in **Table 4.1**.

4.3.8 Each effect has been assessed taking account of the predicted magnitude of change and the sensitivity of the receptor, as shown in **Table 4.1** below to determine an overall significance.

**Table 4.1: Matrix for Determining the Significance of Effects**

| | | Sensitivity of Receptor/Receiving Environment to Change/Effect | | | |
|---|---|---|---|---|---|
| | | High | Medium | Low | Negligible |
| Magnitude of Change/Effect | High | Major | Major | Moderate | **Negligible** |
| | Medium | Major | Moderate | Minor | **Negligible** |
| | Low | Moderate | Minor | Minor | **Negligible** |
| | Negligible | **Negligible** | **Negligible** | **Negligible** | **Negligible** |

4.3.9 Major and moderate effects are considered to be significant in the context of the EIA Regulations. Minor and negligible effects are not considered significant. Although not a formal EIA, this convention is followed in this document.

4.3.10 Specific criteria have been adopted for certain technical assessments in accordance with widely recognised EIA guidelines published by professional bodies (such as for the assessment of ecological effects). Where applicable, these are provided in the respective technical chapters.

4.3.11 The characteristics of an effect will vary depending on the duration of the activity causing the effect, the sensitivity of the receptor and the resultant change. It is, therefore, necessary to assess whether the effect is temporary or permanent; beneficial and adverse, and indirect or direct. Effects that are temporary are usually reversible and generally confined to the construction period.

### 4.4 Approach to Mitigation

4.4.1 Mitigation measures are identified to prevent, reduce or remedy any potentially significant adverse environmental effects identified, beyond that already taken into account as normal good practice (i.e. embedded mitigation for example, the CEMP). Such measures will be implemented during detailed design, construction and/or operation of the Proposed Development. Each technical chapter of this EA Report details the measures recommended to mitigate any identified significant effects. A summary of the recommended mitigation measures are provided in **Chapter 9: Schedule of Environmental Mitigation**.

4.4.2 Any remaining predicted effects, after taking into account available mitigation measures, are known as 'residual effects'. This appraisal takes into account the mitigation, as specified in the EA Report, to identify the residual effects, based on the assumption that the identified mitigation is implemented. The residual predicted effects are discussed for each potential effect, that has not been scoped out and where a significance level has been identified.

### 4.5 Scoped-out Topics

4.5.1 The following topics were scoped out from further consideration within the EA. Where not all aspects of a topic were scoped out, a chapter is included in the EA Report, with appropriate explanation provided. Individual aspects scoped out of any particular topic are detailed in the relevant technical chapter.

*Air Quality*

4.5.2 The Proposed Development has limited potential to give rise to some localised and temporary construction related air quality impact associated with dust (foundation construction and passage of vehicles along access tracks) and construction plant exhaust emissions. The occurrence and significance of dust generated by construction activities is extremely difficult to estimate and depends on meteorological and ground conditions at the time and location of earthworks. The nature of the construction activities is deemed to be of relatively low impact. The potential for nuisance effects on residential or recreational amenity, will be limited and will be strictly controlled in accordance with a detailed CEMP. There is no potential for significant operational air quality impacts and, therefore, air quality is scoped out of further assessment.

*Land Use and Recreation*

4.5.3 The Proposed Development is within an area of scattered trees, scrub and grassland and no core paths or other recreational receptors will be affected by the Proposed Development. There is negligible potential for significant impact to land-use and recreation, and, as such, is scoped out of further assessment.

*Noise and Vibration*

4.5.4 THC confirmed that as the Proposed Development does not include any plant or equipment that could give rise to noise emissions, therefore, a noise assessment is not required. However, it was agreed with THC that baseline noise monitoring be undertaken to demonstrate the current baseline levels at the nearest properties.

*Climate Change*

4.5.5 The Proposed Development is not considered to represent a significant source of greenhouse gas emissions during construction or operation.

*Major Accidents and Disasters*

4.5.6 The construction and operation of the Proposed Development is not considered to present a risk of major accident or disaster. Construction activities will be controlled by SSEN Transmission's health and safety frameworks and policies, which are consistently deployed on its construction and operational sites.

## 4.6 Assumptions and Limitations

4.6.1 The key assumptions and limitations that have been identified in undertaking the EA are set out below. Assumptions and limitations specific to certain topics are identified in the appropriate technical chapters:

- Baseline conditions have been established from a variety of sources, including historical data. However, due to the dynamic nature of certain aspects of the environment, conditions will change during the construction and operation of the Proposed Development. Site surveys and desk-based data collection have been undertaken during the EA to supplement this data to bring it up-to-date for the assessments;
- Information received by third parties is complete and up-to-date. Further consultation has been undertaken during the EA, where relevant and appropriate, to verify existing data and collection additional information; and
- The design, construction and completed stages of the Proposed Development will satisfy minimum environmental standards, consistent with contemporary legislation, practice and knowledge.

# 5. LANDSCAPE AND VISUAL IMPACT

## 5.1 Introduction

5.1.1 This chapter provides details of the landscape and visual assessment of the proposed Knocknagael Substation extension (referred to as the Proposed Development) during construction and operation. The substation extension is to allow connection of the Loch na Cathrach Pumped Hydro Storage Scheme 275 kV Grid Connection. Photomontages are provided in **Appendix D**.

## 5.2 Impact Assessment Methodology

5.2.1 The assessment is carried out following the guidance included in the 'Guidelines for Landscape and Visual Assessment', Third Edition, 2013 (GLVIA 3)[4]. The landscape and visual assessments are separate but linked processes, which consider the potential effects of the Proposed Development on:

- The landscape as a resource in its own right (caused by changes to the constituent elements of the landscape, its specific aesthetic or perceptual qualities and the character of the landscape; and
- Views and visual amenity as experienced by people (caused by changes in the landscape).

5.2.2 Judging landscape and visual effects requires consideration of the nature of the receptors (sensitivity) and the nature of the effects on those receptors (magnitude). GLVIA-3 states that the sensitivity of receptors should be assessed in terms of the susceptibility of the receptor to the type of change proposed, and the value attached to the receptor. The magnitude of the effects on each receptor should be assessed in terms of its size and scale, geographical extent, duration and reversibility. Judgments on sensitivity and magnitude are combined to form a residual judgment regarding the overall level of effect and whether or not it is significant.

*Sensitivity*

5.2.3 The sensitivity of landscape and visual receptors is described as high, medium – high, medium, medium - low or low, depending on the following criteria (see **Table 5.1**):

- **Landscape** - The extent to which change can be accommodated without key characteristics being fundamentally altered (susceptibility); and
- **Landscape** - The value attributed to those key characteristics as determined with reference to landscape designations and the application of criteria that indicates value (such as scenic quality, rarity and recreational value), as described in GLVIA3. In addition, factors such as natural and cultural heritage, landscape condition, associations, distinctiveness, as well as perceptual, as described in Technical Guidance Note 02/21, Assessing landscape value outside national designations published by the Landscape Institute[5].
- **Susceptibility** – The ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape policies and strategies.
- **Visual** - The extent to which views contribute to the experience of the receptor e.g. residents, people engaged in outdoor recreation, visitors to heritage assets, and communities, will tend to have a higher susceptibility; and
- **Visual** - The level of value placed on those views e.g. as indicated through planning designations or appearance on maps and guidebooks, as well as the amenity or attractiveness of those views.
- **Susceptibility** – The susceptibility of different visual receptors to change in views and visual amenity is mainly a function of the occupation or activity of people experiencing the views at particular locations and the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations.

[4] Landscape Institute. (2013). Guidelines for Landscape and Visual Assessment, Third Edition
[5] Landscape Institute (2021) Assessing landscape value outside national designations. Technical Guidance Note 02/21

**Table 5.1: Matrix for Determining the Sensitivity**

| Value of Receptor | Susceptibility of Receptor | | | | |
|---|---|---|---|---|---|
| | High | High - Medium | Medium | Medium - Low | Low |
| High | High | High or Medium High | Medium - High | Medium | Medium - Low |
| Medium - High | High | Medium - High | Medium - High | Medium | Medium - Low |
| Medium | High or Medium High | Medium - High | Medium | Medium - Low | Low |
| Medium - Low | Medium | Medium | Medium - Low | Medium - Low | Low |
| Low | Medium | Medium - Low | Low | Low | Low |

5.2.4 Note, **Table 5.1** is used as guidance when making judgements regarding sensitivity. However, the assessment author can use different results with justification.

*Magnitude*

5.2.5 The magnitude of change is described as high, medium, low or negligible, with reference to the extent to which changes in landscape characteristics and views are likely to be discernible. This involves assessing the size and scale of the change, the geographical extent over which it will be experienced, and the duration and reversibility of the change.

*Level of Effect*

5.2.6 The evaluations of sensitivity and magnitude are considered together to provide an overall level (significance) of effect. The level of effect is identified as negligible, minor, moderate or major. As there is no fixed linear relationship between sensitivity and magnitude, the application of professional judgment and experience is used to reach conclusions on overall level of effect (see **Table 5.2**:**)**. **For this topic, moderate and major effects are considered to be significant effects** and are shown in bold in the table. Significant landscape and visual effects are likely to be associated with large changes to landscape character or views affecting receptors of high sensitivity.

**Table 5.2: Matrix for Determining the Level of Effect (Significant effects shown in bold)**

| Magnitude of Change | Sensitivity of Receptor | | | | |
|---|---|---|---|---|---|
| | High | High - Medium | Medium | Medium - Low | Low |
| High | **Major** | **Moderate or Major** | **Moderate** | Minor or **Moderate** | Minor |
| Medium | **Moderate or Major** | **Moderate** | Minor or **Moderate** | Minor | Negligible or Minor |
| Low | Minor or **Moderate** | Minor or **Moderate** | Minor | Negligible or Minor | Negligible |
| Negligible | Negligible or Minor | Negligible or Minor | Negligible | Negligible | Negligible |

5.2.7 Note, **Table 5.2** is used as guidance when making judgements regarding the level of effect. However, the assessment author can use different results with justification.

## 5.3 Data Sources and Fieldwork

5.3.1 The following have been used to obtain information on potential landscape and visual receptors:

- NatureScot (formerly Scottish Natural Heritage (SNH)) National Landscape Character Assessment 2019 – online data base with maps and supporting data as downloadable pdfs for each Landscape Character Type (LCT)[6];
- The Highland Council (THC) - Loch Ness and Duntelchaig Special Landscape Area (SLA) Citation; and
- Ordnance Survey (OS) mapping, aerial and street-level photography from online sources.

5.3.2 A visit to the Study Area to analyse the baseline and to take viewpoint photographs was undertaken in September 2023, with professional photography taken in April 2024 during clear weather.

## 5.4 Study Area

5.4.1 A 2 km radius Study Area was considered appropriate for the assessment of landscape and visual effects of the Proposed Development. This was informed by previous experience of similar projects and fieldwork, definitions of study areas included in LVIA Guidance for OHL, SSEN, and on the height of the tallest piece of equipment. The 2 km distance is measured from the red line boundary. Zones of Theoretical Visibility (ZTV) have been prepared also based on the tallest element of the Proposed Development (11.7 m) (see **Appendix A, Figures 5.2 & 5.3**).

## 5.5 Consultation

5.5.1 The extent of the Study Area, the ZTVs, the location of representative viewpoints and photomontages, were shared with THC in July 2022. THC responded in August 2022 confirming they were generally content with the proposed viewpoint locations. However. stated it would be beneficial if there was a viewpoint at the access point into the Proposed Development. An additional viewpoint (VP08) was, therefore, added.

## 5.6 Baseline Landscape Conditions

5.6.1 The existing Knocknagael Substation and the Proposed Development sit at an elevated location (approx. 176 m Above Ordnance Datum (AOD)) on a north-facing slope. Consequently, there are fairly open expansive views north towards the Moray Firth. The Proposed Development sits at the same elevation as the existing Knocknagael Substation. Most views to the north include overhead lines (OHL) and towers (commonly known as or referred to as pylons) as typical features. Topography continues to climb to the south up towards Creag Chlachan (365 m AOD). Ground levels slope quite steeply to the west and north down towards the Caledonian Canal.

5.6.2 The existing Knocknagael Substation sits on a platform and due to the surrounding slopes surrounded by embankments and cuttings. There is tree cover in the vicinity of the Proposed Development and the wider landscape contains forestry and woodland, including the area of native woodland to the north-west of the existing Knocknagael Substation. Hence the inclusion of the term ‘wooded’ in the names of local landscape character types. Gorse is a notable feature of the Site and its surroundings, particularly during early spring. A minor road (Eccles Road) passes the Site and climbs in elevation between Essich and Dunlichity to the south. The Site is accessed via this road.

**5.6.3** A small, enclosed compound with electricity transmission towers is located separately south-east of the existing Knocknagael Substation. These towers are the most obvious existing electrical infrastructure features in the landscape and are seen in close and medium distance views within the study area.

[6] Landscape Character Types (LCTs) SNH 2019 - online tool.

*Designations*

5.6.4 The boundary of the Loch Ness and Duntelchaig SLA is located approximately 3 km south of the Proposed Development and Leys Castle Gardens and Designed Landscape (GDL) is located approximately 2.2 km north-east of the Proposed Development (see **Appendix A, Figure 5.1**). These are both outside of the Study Area, with the Proposed Development unlikely to be visible from these receptors. Therefore, this designation is not considered further in the assessment. The effects of the Proposed Development on the setting of the GDL are addressed in **Chapter 8: Cultural Heritage**. There are no national or local landscape designations within the Study Area.

*Published Landscape Character Types / Areas*

5.6.5 There are two LCTs within the Study Area; the Rolling Farmland and Woodland LCT 228, as well as the Flat Moorland Plateau with Woodland LCT 223 (see **Figure 5.4** and **Table 5.3**). However, the Proposed Development is only located within the Rolling Farmland and Woodland LCT 228.

**Table 5.3: NatureScot Landscape Character Types**

| NatureScot LCT | Description |
|---|---|
| Rolling Farmland and Woodland LCT 228 | • *Varied landform of rolling, north-facing hill slopes and plateaux.*<br>• *Gently sloping, simple coastal edge with the firths, falling to well-defined raised beaches in places.*<br>• *Diverse mix of landcover and fairly even balance of open agricultural land and woodlands.*<br>• *Varying patterns of openness and enclosure, created by woodlands and hedgerows mixed with open fields and dense conifer forests with dark linear edges.*<br>• *Diversity added by open broadleaf woodlands along stream gorges, river banks, small woodlands, trees, hedgerows and designed landscapes.*<br>• *Settled landscape, mostly of small farms and isolated houses, interconnected by a network of major and minor roads.*<br>• *Other scattered settlements of old buildings in traditional layout, associated with road junctions and bridging points.*<br>• *Clusters of farm buildings and open fields are generally set against a wooded backdrop. Minor roads follow the geometric edges of field enclosures and conifer forests.*<br>• *Large number of relic prehistoric settlements and burial cairns indicating a continuing focal point of settlement.*<br>• *Sense of history and tradition around estates, due to stone walls, beech hedging, parkland and wooded policies.*<br>• *Limited visibility in wooded areas, focusing attention upon foreground detail. Distant views northwards over the firths in open areas on the upper slopes.*<br>• *An active, busy landscape, particularly in the vicinity of adjoining urban areas and major transport routes.* |
| Flat Moorland Plateau with Woodland LCT 223 | • *Flat to gently undulating and inclined, large scale plateau with a predominantly horizontal landform and skyline.*<br>• *Landcover of either heather moorland and gorse scrub or large scale conifer forests, with occasional trees and fragments of broad leaved woodlands.* |

| NatureScot LCT | Description |
|---|---|
| | • *Largely uninhabited, with settlements in no distinct pattern, mainly along outer edges.*<br>• *Man-made structures including pylons and poles are highly visible in the open landscape.*<br>• *A few historic landscape features from prehistoric to 19th Century periods.*<br>• *Vast and very exposed plateau top with unrestricted panoramic distant views, away from forests.*<br>• *Uniform ground cover and simple landscape with little diversity and few structures, making orientation and determination of distance and scale often difficult.*<br>• *Conifer forests create defined edges, enclosures and shapes contrasting with the openness and uniformity of their moorland surroundings.*<br>• *General lack of activity, artefacts and land management, in central areas and restricted visibility of adjoining settled lowlands creates an unexpected perception of remoteness.* |

5.6.6 The value of the Rolling Farmland and Woodland LCT 228 is considered to be **medium**, on account of its flat plateau characteristic, occasional trees and woodland and open views.

5.6.7 The local landscape character is considered of **medium - low** landscape value. This is due to the presence of the existing Knocknagael Substation, including electricity towers. Due to the heights of the towers and the elevated north-facing slope, these vertical structures are widely visible, particularly from the north. To the south and west, the wooded nature of the landscape and the direction of the slope towards the Great Glen, indicates that the existing infrastructure is less widely visible. This is clearly illustrated by the ZTVs, which shows little or no visibility due west of the proposed structures.

*Landscape Features*

5.6.8 There are no areas of vegetation located within the footprint of the existing Knocknagael Substation. However, there are areas of scrub, particularly gorse, located within the footprints of the Proposed Development. There are also areas of vegetation surrounding the existing Knocknagael Substation, which provide varying degrees of enclosure and screening, particularly between the existing site and the adjacent road (U1096). There is young tree planting to the north of the existing site, which will provide screening of the existing site from the north, when mature.

*Visual Amenity*

5.6.9 This section identifies the extent of potential visibility of the Proposed Development from publicly accessible locations and identifies the visual receptors appraised. This section also includes the viewpoints that are used to appraise effects on visual receptors, including the reason for their selection. Two ZTV's have been prepared based on an infrastructure height of 11.7 m (see **Appendix A, Figures 5.2 and 5.3**). A bare-earth ZTV has been prepared which does not take into account any screening provided by existing woodland or buildings. This is the worst-case scenario. A second 'screened' ZTV has been prepared, which does take into account the screening effects of existing woodland and buildings. The bare-earth ZTV (**Appendix A, Figure 5.2**) indicates a fairly wide theoretical visibility of the Proposed Development, extending as far as the limit of the study area to the northeast and similarly to the south. This reflects the elevated nature of the Site and particularly the fact that it overlooks areas to the north. Views are more interrupted to the southwest due to intervening topography. To the west, views of the Proposed Development are much more limited to distances of approx. 1 km from the site reflecting the alignment of the Great Glen and its much lower topography.

5.6.10 The screened ZTV (**Appendix A**, **Figure 5.3)** takes existing trees and buildings and their screening abilities into account. Areas of woodland are shown in green, with buildings in grey. The screened ZTV indicates that much larger areas have no visibility of the Proposed Development, particularly to the north, north-east and the south, where plantations and woodland belts restrict visibility. The greatest visibility, taking into account screening, occurs mainly to the south-east, where it extends as far as the Study Area. In all other directions, the visibility is more local and generally restricted to approx. 1 km from the Site and in some directions to as little as 0.5 km. There is scattered visibility to the north, which extends up to the Study Area. However, fieldwork and further desktop work shows that visibility of the existing Knocknagael Substation is very restricted (< 300 m) in many locations by local topography, small areas of trees plus hedgerows. Hedgerows or scrub align many of the roads within the study area, particularly to the north, and many properties are surrounded by trees or shelterbelts.

5.6.11 There are no specific, recognised viewpoints within the Study Area from which the Proposed Development forms an important visual element.

*Settlements and Residential Receptors*

5.6.12 Due to the rural nature of the location, there are no settlements in the within the study area only isolated properties. The outskirts of Inverness to the north (Lochardill) are outside of the Study Area. However, it is feasible that some receptors at the periphery might have distant but fairly imperceptible views of the existing Knocknagael Substation due to its elevation. The closest properties are approx. 650 m north-west of the Proposed Development at Essich, as well as Balrobert 750 m to the north, with Torbreck at approx. 2 km, towards the northern edge of the Study Area. A farmstead at Cullaird sits approx. 1.9 km north-west. Both Laggan House located north of the B862 and Scaniport sit outside of the study area (Approx. 2.6 and 2.5 km respectively).

5.6.13 Midtown sits approx. 1.9 km due west of the existing Knocknagael Substation and to the rear of the large evergreen forest of Drumashie Plantation with a property at Achvraid Farm sitting closer to the Site at approx. 0.9 km accessed from Essich Road. The areas to the south, south-east and east of the existing Knocknagael Substation are fairly devoid of settlements within the Study Area. North-east of the existing Knocknagael Substation, there are properties at Balvonie of Leys and Balvonie Cottage at approx. 1.1 km distance. Most of the properties to the north-east are outside of the Study Area except for Knocknagael at approx. 1.8 km.

5.6.14 Most of the properties included above have trees or woodland belts adjacent to or surrounding their boundaries. These are likely to have been planted for shelter but are effective at providing screening of the existing Knocknagael Substation. The subtle changes in local topography also enhance the screening provided by existing vegetation, in addition to the screening provided by roadside hedgerows where they exist.

*Recreational Users*

5.6.15 A core path (INV12.06 / 12.05) runs through Drumashie Plantation where, due to the Intervening forestry, there are no views available towards the existing Knocknagael Substation. The core path exits the plantation close to the property at Drumashie and then runs to the rear of the property where it exits the Study Area. There is the potential for a view towards the existing Knocknagael Substation for recreational receptors where the core path exits the plantation, but this cannot be predicted with more certainty as the location is outside the area covered by the ZTVs. However, this location is at the very edge of the Study Area and to the rear of intervening forestry plantations (see **Appendix A, Figure 5.5**).

*Road Users*

5.6.16 Essich Road is a local road which crosses the Study Area. The road runs from the outskirts of Inverness to the north, at the edge of the Study Area, and south towards Loch Ashie. The road exits the Study Area close to Drumashie to the south. The southernmost section of the road is very straight and is referred to as a General

Wade's Military Road on OS maps. The road climbs as it travels south through the Study Area and is non-consistently bounded in parts by trees and hedgerows at lower elevations.

5.6.17 The existing Knocknagael Substation is accessed by a minor road (U1096) which travels south-east from Essich Road, at Essich, and climbs towards Main of Bunachton before crossing between Creg a Chlacain and Craig Shoilleir. The road exits the Study Area to the south, close to the large moss and forested areas of Drum Moss. The part of the road at the lower elevation close to the Site, is characterised by dense tall vegetation along its northern boundary, which continues up to the entrance to the substation. However, the last 500 m is predominantly scrub, permitting views towards the existing substation. Where the road crosses the entrance, road users have fairly clear views into the substation compound, with the existing towers appearing particularly prominent, due to the proximity and viewed at the horizon and against a sky background. The road user travelling further south has views along some sections of up to 15 towers and OHLs.

5.6.18 In contrast, road users travelling north along the minor road have views screened towards the existing Knocknagael Substation by local topography, although towers are a constant feature. Views of the existing Knocknagael Substation become more continuously visible within approx 0.5 km of the access track to the adjacent tower-cable sealing end compound (Knocknagael – Tomatin OHL connection). The various infrastructure, and particularly the towers, are visible for most of the journey south with local topography or scrub providing occasional screening.

5.6.19 A section of the B861 crosses the Study Area to the far north-east of the Study Area, climbing up from the outskirts of Inverness, where it eventually enters the Study Area near Braeton of Leys. The road leaves the Study Area in the vicinity of Black Wood of Leys. The landscape character of the journey for road users consists of restricted views of adjacent woodlands and hedgerows at the lower elevation with more open views to the west at higher elevations. There would appear to be views towards the Site at lower elevations according to the ZTVs, but these are generally blocked by existing roadside vegetation, intervening field boundary hedgerows or trees and woodland. At higher elevations, local topography is effective at restricting views towards the Site.

5.6.20 A relatively short section of the B862 also crosses the Study Area to the far north-west, between West Lodge and Scaniport. This road is also referenced as a General Wade's Military Road. The majority of the sides of this road, is lined with vegetation, either groups of trees or dense woodland, often on embankments. The vegetation and the embankments effectively block views towards the existing Knocknagael Substation. There are open views available along the transmission tower corridors, which are kept clear of vegetation. Further south along this road, there are no views available of the Site, due to intervening topography.

*Representative Viewpoints*

5.6.21 The following viewpoints (VPs) have been selected as being representative of a range of receptor types, viewing distances, directions and types of views available within the Study Area. The locations of these VPs have been determined using baseline data, in consultation with THC. Details of each VP are included in **Table 5.4** below, with locations shown on **Appendix A, Figures 5.2 and 5.3)**.

**Table 5.4: Representative Viewpoints**

| VP No | Location | Grid Reference | Distance and Reason for Selection |
|---|---|---|---|
| 1 | Minor road, (U1096) south-west of the Site | 65090 38793<br>194m AOD | 110 m – View from minor road which passes the site. Representative of views for road users. |
| 2 | B861 north-east of the Site near Braeton of Leys | 66897 39998<br>188m AOD | 1.5 km – View from minor road to the north-east. Representative of views for road users and nearby residential receptors. |

| VP No | Location | Grid Reference | Distance and Reason for Selection |
|---|---|---|---|
| 3 | Essich Road north-west of the Site | 64843 39343<br>153m AOD | 183 m – View from Essich. Representative of views for residential receptors and road users. |
| 4 | Essich Road south-west of the Site near Achvraid | 64626 38896<br>175m AOD | 431 m – View from minor road to the south -west. Military Road and close to Achvraid. View is representative of residential receptors and road users. |
| 5 | Minor road (U1096) south of the Site near cattle grid | 65341 38354<br>200m AOD | 371 m – View from minor road which passes the site. Representative of views for road users. |
| 6 | Core path (IN12.06) south-west of the Site near forestry | 63507 37861<br>211m AOD | 1.9 km – Representative of views for recreational receptors using the core path south-west of the Site. |
| 7 | Essich Road north of the Site near Knocknagael | 65557 40723<br>72m AOD | 1.4 km – Representative of views for road users to the north, traveling south along Essich Road. |
| 8 | Minor road (U1096) at proposed entrance to the Site | 65040 39069<br>179m AOD | 2 m – Representative of views obtained by road users at the proposed entrance to the Proposed Development. VP at the entrance requested by THC. |

## 5.7 Assessment of Construction and Operational Impacts

5.7.1 The assessment has been undertaken against the baseline described above. Unless stated otherwise, the effect on the landscape and visual amenity, by either construction or operation of the Proposed Development, is adverse.

## 5.8 Landscape Effects, Construction

5.8.1 The construction of the Proposed Development will last approximately 32 months and will include use of temporary laydown and construction compound located within the Proposed Development boundary. The construction compound and laydown areas will be located adjacent and south-east of the existing entrance. This is where there are flat areas and where construction activity and storage has already recently occurred. The compound will include temporary cabins and a carpark. A temporary haul road will be installed, to allow access to the proposed substation extension platform construction area. The haul road will be located to the side and rear of the large electricity tower compound, to the south of the existing Knocknagael Substation.

5.8.2 Vegetation clearance will be required either side of the existing entrance, to improve visibility when exiting onto the minor road (U1096). The affected vegetation largely consists of low to medium-sized scrub, which currently provides very little screening of the existing Knocknagael Substation from the minor road (U1096).

5.8.3 A temporary bund for soil storage during construction will be located to the north-west of the existing entrance. The maximum elevation of this bund will be 180m AOD.

5.8.4 The landscape character of the immediate area surrounding the existing Knocknagael Substation, is influenced by the presence and visibility of the existing electrical infrastructure, particularly as the structures are unenclosed. The adjacent three to four electricity towers also detract from the amenity of the area by extending the visibility of electrical infrastructure over a wider area. Construction activity and plant may be more visible from the north, due to the high elevation of the Site. It is unlikely that very tall construction equipment will be required due to the relatively low height (approx. 12 m) of the electrical equipment. There will be an increase in vehicle movement, particularly along the adjacent minor road (U1096), associated with deliveries of

construction material. Construction is unlikely to influence the wider landscape characteristics of the relevant LCTs.

5.8.5 Construction of the Proposed Development will require the removal of areas of scrub to accommodate both the platforms, as well as the earthworks necessary to create a level platform. These earthworks are likely to be fairly extensive due to the existing slopes in the vicinity of the substation. There will also be earthworks associated with the construction of the new access road to the Proposed Development. This construction activity will be most visible from the adjacent minor road (U1096), although wider visibility will be reduced due to the existing ground levels being of low elevation, in the vicinity of the works.

5.8.6 There will also be construction activity associated with the placement of materials and construction of the permanent bund, located to the south of the Site but within the Proposed Development boundary. This activity will be mainly visible from the south, in particular, from the minor road (U1096) which passes the Site entrance. There will also be construction activity occurring close to the adjacent minor road associated with the placement of the temporary bund and its presence during the construction period, and the construction of the temporary haul road as well as the loss of vegetation either side of the existing access.

5.8.7 It is considered that both the local landscape and the wider LCT have a **low** susceptibility to change due to the nature of the Proposed Development. This is an extension to the existing Knocknagael Substation and similar components are already present, which influence the character of the landscape. A combination of **medium - low** and **medium** value with a **medium – low** susceptibility, results in a **medium – low** level of sensitivity for both the local landscape and the LCTs.

5.8.8 The magnitude of change to the local landscape character due to construction is considered to be **low**, due to the presence of the existing Knocknagael Substation and the proposed construction work being carried out adjacent to similar structures. The removal of existing scrub will not be widely visible, as it is primarily located on sloping ground which is below the level of adjacent ground. The exception to this, is the vegetation to be removed at the entrance; the removal of which will be more noticeable, locally. However, the loss of such scrub will not change the character of the landscape to any great extent. It is not considered that the construction of the Proposed Development will influence the character of the landscape, due to its restricted visibility, its temporary nature and the infrastructure already in the area.

5.8.9 The overall level of construction effect on the local landscape character and the wider LCTs, is considered to be **negligible (not significant)**.

### 5.9 Landscape Effects, Operational

5.9.1 Landscape effects at year 12 are based on the successful implementation and establishment of the planting mitigation included on the Landscape Mitigation Plan and supporting landscape strategy and planting plan (**Appendix E)**.

5.9.2 Once operational, the Proposed Development will consist of a new 275 kV AIS bay to the existing Knocknagael Substation, located outside of the existing compound, to the south-east. The maximum height of the AIS bay will be approximately the same height as the existing electrical equipment at the substation (approx. 11.7 m). To the layperson, the additional equipment will look similar to the existing equipment. The equipment will sit on a level platform. This platform will require substantial earthworks, which include cuttings, in order to accommodate the platform, set against the surrounding slopes, of the existing Knocknagael Substation, as well as cut-and-fill, to accommodate a new temporary access track to the new platform.

5.9.3 At year 1, the Proposed Development or parts of the Proposed Development will be locally visible in most directions as illustrated on the screened ZTV (see **Appendix A, Fig 5.3**). The Proposed Development will be seen in the context of the existing Knocknagael Substation, in that it is an extension of the existing substation, with similar electrical components. The location to the side and rear of the existing Knocknagael Substation

means that it is less visible from the west, as it is seen through the existing Knocknagael Substation which will partially screen the Proposed Development. The new access road will be within the Proposed Development boundary, which is situated in front of the existing Knocknagael Substation, as well as the nearby enclosed electricity tower compound. However, it is unlikely that this new element will be widely visible, due to the intervening undulating topography.

5.9.4 A new permanent bund is being proposed to the south of the Proposed Development, which will provide a degree of screening of the Proposed Development, within the landscape at Year 1, particularly from the south. The maximum elevation of the proposed bund will be 95m AOD and approximately. 5 m above the existing road level. The difference in level will be greater on the substation side, as the existing ground slopes away. There are undulations and mounded areas in the local landscape surrounding the existing Knocknagael Substation. This bund will be a new feature of the landscape from Year 1, which will restrict longer views (over 1 km) to the north for road users along a section of the local road (U1096), which passes the Site. However, these views already include the existing substation in the view. By Year 12, planting will have established on the slopes and partially covered, on top of the bund. This will provide further help, in the integration of the extension, as well as the bund, into the landscape.

5.9.5 The susceptibility of the local landscape and the relevant LCTs are considered to be **medium – low**, due to a combination of the presence of electrical infrastructure in the landscape, taking into account the elevated nature of the Site, in addition to the potential for long views to the north. A combination of **medium low** and **medium** value with a **medium – low** susceptibility, results in a **medium – low** level of sensitivity for both the local landscape and the LCTs.

5.9.6 The magnitude of change to the local landscape and the wider LCTs during operation is considered to be **low**. Whilst the Proposed Development may increase the visibility of electrical infrastructure in the landscape, it consists of similar elements that are already present in the landscape. It is not introducing different elements into the local or wider landscape. The proposed bund will change the landscape character. However, this will only be seen for approximately 200 m whilst travelling along the minor road heading south past the Site.

5.9.7 The overall level of landscape effect during operation at Year 1 is considered to be **minor** based on a **medium – low** sensitivity in combination with a **low** magnitude of change.

5.9.8 At Year 12, the effectiveness of the planting mitigation to integrate the Proposed Development into the landscape will have increased. The level of effect is considered to reduce to **negligible** at Year 12.

### 5.10 Visual Effects - Construction and Operation

5.10.1 An assessment of visual effects is provided in **Table 5.5** below. Photomontages for VPs 1, 5 and 8 are available in **Appendix D**.

**Table 5.5: Visual Effects Assessment**

| VP No | Location | |
|---|---|---|
| 1 | Minor road, south-west of the Site | **Existing View**<br>This viewpoint represents views seen by road users along the minor road (U1096) which passes the Site to the west. The views towards the Site are expansive, which include distant hills on the horizon, as well as the Moray Firth and Inverness. However, such views are seen beyond the existing Knocknagael Substation, which is the main feature of the view. At the time of the viewpoint photography, gorse was also observed as a dominant natural feature surrounding the Site. Electricity towers are also a prominent feature in the foreground and middle ground. Although woodland and tree cover is abundant in the wider view, there is none adjacent to the Proposed Development. The value of this view is **medium** as e it includes a large number of detractors such as towers and substation electrical elements, albeit set against an expansive landscape.<br><br>*The existing view from the minor road* (U1096) *which passes the substation looking towards the Site*.<br>  <br>**Sensitivity of visual receptors**<br>Road users are of **low** susceptibility and in combination with the medium value are of **low** sensitivity.<br>**Magnitude of change**<br>During the construction period, there will be views of construction activity and equipment, from this VP. Construction activity will involve earthworks associated with forming the level platform. However, the majority of this will be hidden by the existing topography. The activity will be seen in close proximity to the existing Knocknagael Substation. The construction of a temporary haul road will also be visible, although the majority of its length will be in cutting resulting in it being less noticeable. As the bund is located between the site and the road, depending on when the permanent bund is installed, the majority of the construction activity associated with the platform will be located to the rear of the bund; therefore will not be visible from this VP. The construction of the permanent bund will be very noticeable, especially when earth-moving machinery occurs. It is considered that the magnitude of change will be **medium**, with the majority of the change associated with the construction activity of the permanent bund.<br>Once operational, the new electrical equipment will be seen in proximity to the existing equipment, which will be hidden from view by the permanent bund in the foreground. There will be a change in the character of the view, as a result of the landscape appearing less open. Views of the new electrical infrastructure will be reduced, as large parts of the existing substation will provide screening. The permanent bund will be a new noticeable feature of the view, before vegetation commences to establish. There may be views available of the northern periphery of the existing substation, but these views will be transitory. The magnitude of |

| VP No | Location | |
|---|---|---|
| | | change to this view is considered to be **medium** at Year 1. At Year 12 (see photomontage for VP1 in **Appendix D**, planting mitigation located on the bunded area to the south of the substation will have matured and will provide further screening to most of the Proposed Development, as well as a large proportion of the existing Knocknagael Substation. The magnitude of change at Year 12 will remain **medium** during operation. Despite the benefits of screening, which the existing substation and the Proposed Development will provide, there will remain a loss of open and expansive views towards the sea and the distant hills on the horizon.<br><br>**Level of Effect**<br>The level of visual effect during the construction period is considered to be **negligible** (**Not Significant**) and temporary.<br>The level of visual effect during the operational phase is considered to be **minor** at year 1 and year 12 (**Not Significant**) (See photomontage for VP 1). |
| 2 | B861 north-east of the Site near Braeton of Leys | **Existing View**<br>This VP represents distant views seen by road users on the B861 north-east of the Site. This is an expansive view across a sloping landscape. To the north are views of hills (Craig Leach) along the horizon. The landscape is well vegetated with tree belts and woodland cover reflecting the local landscape character. Electricity towers are a notable feature of the view with the Site, with its electrical components sitting low in the landscape, viewed against a wooded background, which helps to assimilate the Site into the landscape. It is noted that there is young tree planting (whips with tubes) in the vicinity of the Site. Once established, this will help to screen the existing Knocknagael Substation from this VP. The value of this view is **medium**, as it contains character features typical of the landscape, expansive outlook towards distant hills. albeit with some detractors. |

| VP No | Location | |
|---|---|---|
| | | *The existing view along the B861 north-east of the Site near Braeton of Leys*.<br>  <br>**Sensitivity of visual receptors**<br>Road-users are of **low** susceptibility and, in combination with the medium value view, are of **low** sensitivity.<br>**Magnitude of change**<br>During the construction period of the Proposed Development, there will be distant views of construction activity and equipment. This is predicted to be barely discernible, due to the distance from the VP, as well as the low-lying nature of the Site. It is considered that the magnitude of change will be low.<br>Once operational, new electrical equipment will be seen in the context of the existing equipment and at a distance (1.5 km). The equipment will be seen against a solid backdrop, rather than the sky, which will help reduce its visibility. The earthworks required to create the platforms, may be more visible than the existing surrounding ground, until vegetation establishes. The permanent bund will not be visible from this location. The magnitude of change to this view is considered to be low at Year 1. At Year 12, there will be a degree of screening provided by the existing tree planting to the rear (north) of the Proposed Development. Therefore, the magnitude of change at Year 12 will reduce to negligible during operation.<br>**Level of Effect**<br>The level of visual effect during the construction period is considered to be **negligible** (**Not Significant**) and temporary.<br>The level of visual effect during the operational phase is considered to be **minor** at year 1 and **negligible** at year 12 (both **Not significant**). |
| 3 | Essich Road north-west of the Site | **Existing View**<br>This VP represents road-users who are travelling along Essich Road and are passing or about to turn into the minor road (U1096) which leads to the Site. Adjacent properties are all generally surrounded by intervening vegetation, preventing views towards the Site. Where surrounding vegetation is absent, intervening woodland provides a similar function. The view includes the upper parts of a small number of existing Knocknagael Substation electrical features, as well as electricity towers at the horizon. The view includes woodland and gorse which runs parallel to the minor road (U1096) to the Site, but which is eventually hidden by the rising topography of the field in the middle ground. The view has a **medium** value, as it is typical of rural views in the area, however, does include glimpses of electrical infrastructure as well as taller skyline structures. |

| VP No | Location | |
|---|---|---|
| | | *The existing view at the junction of Essich Road and the minor road* (U1096) *which passes the Site*.<br>  <br>**Sensitivity of visual receptors**<br>Road users are of **low** susceptibility and, in combination with the medium value view, are of **low** sensitivity.<br>**Magnitude of change**<br>During the construction period it is considered that there will be no views of construction activity or equipment, due to the intervening rising topography. There will be a temporary increase in occasional traffic providing deliveries to the Site, which may create a slight temporary change in the rural character of the view. Therefore, it is considered that the magnitude of change will be **negligible**.<br>The screened ZTV indicates that it is unlikely that there will be any visibility of the Proposed Development at this VP, once operational. This has been anticipated, due to the location of the Proposed Development; situated to the east of the existing Knocknagael Substation, where topography is intervening. Therefore, the character of the view will not change, thus it is considered that the magnitude of change will be **negligible** at year 1 and 12.<br>**Level of Effect**<br>The level of visual effect during the construction period is considered to be **negligible (Not Significant)** and temporary.<br>The level of visual effect during the operational phase is considered to be **negligible (Not Significant)** at year 1 and year 12. |
| 4 | Essich Road south-west of the Site near Achvraid | **Existing View**<br>This VP represents road-users using Essich Road. The VP is close (approx. 130 m) to the residential property at Achvraid, which sits at a lower elevation than the viewpoint, and has tree belts nearby which provide an element of screening. The low elevation and existing trees would appear to limit views towards the existing Knocknagael Substation. There is a fairly new group of properties or single property further south (approx. 400 m) on higher ground, which are accessed from Essich Road. It appears that the existing Knocknagael Substation is screened from views from these new properties by the wooded areas to the south of the Site. At this representative location, a few of the taller components such as the overhead gantries, are visible above the rising ground at the horizon, in addition to several of the much taller electricity towers. However, some of the Towers are partially screened by existing trees. There is a large degree of vegetation in the view, particularly along the horizon. Rising ground prevents longer views towards the north. The VP has a **medium** value, which represents a typical rural view in this area, however, does include glimpses of electrical infrastructure. |

| VP No | Location | |
|---|---|---|
| | | *The existing view from Essich Road.*<br>  <br>**Sensitivity of visual receptors**<br>Residential receptors are of **high** susceptibility and, in combination with the **medium** value view, are of **high** sensitivity. Road-users are of **low** susceptibility and in combination with the **medium** value view are of **low** sensitivity.<br>**Magnitude of change**<br>During the construction period it will be difficult to discern construction activity, in particular, the equipment, due to the intervening topography and trees. Some of the taller construction equipment such as cranes may be partially visible above the smaller intervening vegetation.<br>It is unlikely that the adjacent residential receptors will be able to see any construction activity, including equipment, due to their low elevation and tree screening (Achvraid) or due to the intervening woodland. There will be little change in the landscape character of the view. It is considered that the magnitude of change will be **negligible** for the road-users and **negligible** for the residential properties.<br>The screened ZTV illustrates that it is unlikely that any component of the Proposed Development will be visible from this VP. This is due to either, or a combination of, intervening topography and existing vegetation. There will be no change in the landscape character of the view It is considered that the magnitude of change will be **negligible** for both road-users and residential receptors.<br>**Level of Effect**<br>The level of visual effect during the construction period is considered to be **negligible** (**Not significant**) and temporary.<br>The level of visual effect during the operational phase is considered to be **negligible** (**Not significant**) at year 1 and year 12. |
| 5 | Minor road(U1096) south of the Site, near cattle grid | **Existing View**<br>This VP represents road-users traveling along the minor road (U1096) which passes the Site. It is located to the south of the Site close to a field gate which appears to provide service access to a number of electricity towers. The view includes a compound and electricity towers, which were more recently installed to the south of the existing Knocknagael Substation. The electricity Towers are a detracting feature of an otherwise expansive view towards the Moray Firth and the hills and mountains in the far distance. The nearby compound sits on a more elevated platform than the existing Knocknagael Substation and, therefore, is more visible. The existing Knocknagael Substation is predominantly hidden behind the intervening topography. As road-users descend the minor road (U1096), |

| VP No | Location | |
|---|---|---|
| | | the existing Knocknagael Substation does appear intermittently at the horizon. This view has a **medium** value, as it is typical of views in the area, however, does include electrical infrastructure.<br><br>*The existing view from minor road south of the Site.*<br>  <br>**Sensitivity of visual receptors**<br>Road-users are of **low** susceptibility and, in combination with the medium value view, are of **low** sensitivity.<br>**Magnitude of change**<br>During the construction period, it will be difficult to discern construction activity at ground level. The intervening topography will screen much of the activity. Taller construction plant may be more visible but will be viewed in the context of existing tall structures such as electricity towers and overhead gantries. Therefore, it is considered that the magnitude of change will be **negligible**.<br>Once operational, it is unlikely that much of the proposed electrical components will be visible from the VP. The screened ZTV indicates visibility, but this is likely to be the taller components. It is possible that visibility will increase as road-users descend the road. However, this will be intermittent and will be viewed in the context of existing infrastructure. The character of the view will barely change. The permanent bund will not be visible from this location It is considered that the magnitude of change will be **negligible** at year 1 and 12.<br>**Level of Effect**<br>The level of visual effect during the construction period is considered to be **negligible** (**Not Significant**) and temporary.<br>The level of visual effect during the operational phase is considered to be **negligible** (**Not Significant**) at year 1 and year 12. (See photomontage for VP 5 in **Appendix D**). |
| 6 | Core path (IN12.06) south-west of the Site near forestry | **Existing View**<br>This VP represents views for recreational receptors using the core path (INV12.06/ INV12.05) to the south-west of the Site. The majority of the length of the core path (12.06), sits to the north, within the Drumashie Plantation. As such, users have no views towards the Site due to the height and width of intervening evergreen trees. At the location of the VP, the core path (12.05) heads south, after leaving the plantation, and travels along its southeastern edge. The core path also splits and heads towards the minor road (U1096) which passes the Site. Most of the core path (12.05) is outside of the 2 km Study Area. The majority of the electrical features of the existing Knocknagael Substation are not visible from this VP. This is supported by the screened ZTV, which illustrates that the Proposed Development will not be visible from the core path. Screening is provided, by a combination of rising topography and woodland/forestry areas. |

| VP No | Location | |
|---|---|---|
| | | However, the much taller electricity towers which are adjacent to the existing substation are visible above the forestry along the entire horizon. The view has a **medium** value, as it is typical of views in the area, which often include infrastructure such as electricity towers plus OHLs.<br><br>*The existing view from the core path*.<br>  <br>**Sensitivity of visual receptors**<br>Recreational receptors such as long-distance walkers and users of core paths are of **high** susceptibility and, in combination with the **medium** value view, are of **high** sensitivity.<br>**Magnitude of change**<br>During the construction period, there will be no views of construction activity, including equipment, due to intervening topography and vegetation. It is considered the magnitude of change will be **negligible**.<br>Once operational, there will be no views of electrical components, due to intervening topography and vegetation. It is considered the magnitude of change will be **negligible**.<br>**Level of Effect**<br>The level of visual effect during the construction period is considered to be **negligible (Not significant)** and temporary.<br>The level of visual effect during the operational phase is considered to be **negligible (Not significant)** at year 1 and year 12. |
| 7 | Essich Road, north of the Site near property at Knocknagael | **Existing View**<br>This VP represents road-users to the north of the Site, travelling south along Essich Road. There are several properties approx. 400 m further south at the edge of Drumdevan. However, these properties are screened from views of the existing Knocknagael Substation by rising topography to the south. The majority of views seen from Essich Road include a variety of features, such as hedgerows, trees, and raised earthen banks. This VP also include electricity towers, and a small, fenced compound with electrical equipment. The screened ZTV indicates that visibility along Essich Road would be very intermittent, which supports the understanding that it is unlikely that the existing Knocknagael Substation is visible from this VP. If it is, it will be very difficult to discern especially bearing in mind that road users are transient. The view has a **medium** value, as it is typical of views in the area which often include infrastructure such as towers and OHCs. |

| VP No | Location | |
|---|---|---|
| | | *The existing view from Essich Road to the north of the Site.*<br>  <br>**Sensitivity of visual receptors**<br>Road-users are of **low** susceptibility and, in combination with the **medium** value view, are of **low** sensitivity.<br>**Magnitude of change**<br>During the construction period, there will be no views of construction activity, including equipment, due to intervening topography and vegetation. It is considered the magnitude of change will be **negligible**.<br>Once operational, there will be no views of electrical components due to intervening topography and vegetation. It is considered the magnitude of change will be **negligible**.<br>**Level of Effect**<br>The level of visual effect during the construction period is considered to be **negligible (Not Significant)** and temporary.<br>The level of visual effect during the operational phase is considered to be **negligible (Not Significant)** at year 1 and year 12. |
| 8 | Minor road (U1096) at proposed entrance to Proposed Development | **Existing View**<br>This VP is representative of road-users passing the existing entrance to the Knocknagael Substation, looking towards the Proposed Development. The view is primarily of electrical infrastructure equipment including three electricity towers in proximity. The existing Knocknagael Substation is surrounded by steel palisade fencing, and the embankments, which were constructed to enable the building of the existing level platforms, are covered with flowering gorse. This is an attractive, seasonal landscape feature. There are temporary storage containers at the side of the existing entrance road. Longer views towards the south-east up to the extent of the study area, are screened by rising ground and the existing Knocknagael Substation. The VP has a **low** value, due to the presence of electrical infrastructure which is in close proximity and heavily influences the landscape character.<br><br>*The existing view from the Site entrance, looking south-east towards the* |

| VP No | Location | |
|---|---|---|
| | | *Proposed Development.*<br>  <br><br>**Sensitivity of visual receptors**<br>Road-users are of **low** susceptibility and, in combination with a **low** value view, are of **low** sensitivity.<br>**Magnitude of change**<br>During the construction period, there will be views to the southeast of construction activity and equipment, especially the construction compound, which include portacabins and a car park, adjacent to the existing entrance. To the northwest, there will be views of the temporary soil bund and activity associated with its use. The construction work and the construction equipment for the haul road and the platform, are unlikely to be visible, due to intervening topography and the screening provided by the existing Knocknagael Substation equipment. There may be limited visibility of the construction machinery involved in manoeuvring the permanent bund material, but this would only be temporary and occur when the permanent bund reaches its highest point. The removal of shrubs, scrub and grassland during construction for improving access junction visibility splays will be visible. It is also possible that some of the construction activity associated with the permanent bund, to the south of the Proposed Development may be visible. It is considered that the magnitude of change during construction will be **high**.<br>Once operational, the character of the view will be similar to the existing view. There will be additional electrical components, but these will be located to the rear of the existing equipment and therefore are unlikely to be visible. From this VP it is unlikely that the earthworks associated with the new platform, the vegetation removed during construction in particular, will be visible. However, such changes will be seen in the context of the existing Knocknagael Substation, which already instils an infrastructural character on the view; particularly in close proximity at the Site entrance. It is unlikely that the removal of the scrub at the side of the road for visibility improvements, during construction, will have a noticeable effect on the amenity of the view. The top of the permanent bund to the north will be visible to the rear of the existing higher ground. This will not significantly change the view. It is considered that the magnitude of change during operation will be **low** at year 1. At year 12, the restoration of grasslands will have ameliorated any obvious changes in the ground cover carried out during construction; the tree planting to the permanent bund will be more visible, therefore the magnitude of change will reduce to **negligible**.<br>The level of visual effect during the construction period is considered to be **minor** (**Not Significant**) and temporary.<br>The level of visual effect during the operational phase is considered to be **negligible** (**Not Significant**) at year 1 and year 12. |

## 5.11 Mitigation Measures

5.11.1 In order to mitigate the landscape and visual effects of the Proposed Development during construction and operation, it is recommended that existing trees adjacent to the works are protected during construction according to BS5837.

5.11.2 A Landscape Mitigation Plan and supporting landscape strategy and planting plan has been prepared (**Appendix E)**. The following residual effects presented at year 12, assume that this plan will be implemented in full.

5.11.3 A Lighting Plan will be developed during detailed design, in order to limit light pollution during construction and operation.

## 5.12 Residual Impacts and Summary

**Table 5.6** provides a summary of the assessment of landscape and visual impacts and the residual impacts remaining at year 12, following the maturing and further establishment of planting mitigation. **Table 5.7** outlines the proposed mitigation for the Proposed Development.

### Table 5.6: Summary of Landscape and Visual Assessment

| Environmental Feature | Proposed Development Interaction | Mitigation Measures | Receptor Sensitivity | Magnitude of Change/Effect | Level of Effect at Year 1 for construction and year 12 for landscape and visual effects |
|---|---|---|---|---|---|
| Landscape Character | Plant activity and equipment from construction. | Best practice construction methods. | Medium – Low (Local and LCTs) | Low | Negligible (Not significant) |
| Landscape Character | Introduction of Proposed Development during operation. | Placement of new structures within, or adjacent to, existing Knocknagael Substation. Planting mitigation. | Medium – Low (Local and LCTs) | Low | Negligible (Not significant) |
| Visual receptors (8 representative VPs in total) | Effects on views during construction phase | Existing trees adjacent to the works are protected during construction, according to BS 5837:2012 - Trees in relation to design, demolition and construction. Lighting Plan | High (Residential and recreational) Low (Road-user) | VPs 3 to 7 - Negligible VP 2 – Low VPs 1 - Medium VP 8 – High | VPs 1 to 7 - Negligible (Not significant) VP 8 – Minor (Not significant) |
| Visual receptors (8 representative VPs in total) | Effects on views during operation | Planting mitigation Lighting Plan | High (Residential and recreational) Low (Road user) | VPs 2 to 8 – Negligible VP 1 - Medium | VPs 2 to 8 Negligible (Not significant) |

| Environmental Feature | Proposed Development Interaction | Mitigation Measures | Receptor Sensitivity | Magnitude of Change/Effect | Level of Effect at Year 1 for construction and year 12 for landscape and visual effects |
|---|---|---|---|---|---|
| | | | | | VP 1 Minor |

**Table 5.7 Summary Landscape and Visual Mitigation**

| Ref. | Mitigation |
|---|---|
| **LV1** | It is recommended that existing trees adjacent to the works are protected during construction, according to BS 5837. |
| **LV2** | A Landscape Mitigation Plan and supporting landscape strategy and planting plan has been prepared to promote screening of the Proposed Development. |

# 6. ECOLOGY AND ORNITHOLOGY

## 6.1 Introduction

6.1.1 This chapter provides an appraisal of the potential effect of the Proposed Development on ecology and ornithology, including impacts on designated sites, habitats, flora and fauna. Supporting ecological survey information is presented in the following figures and technical appendices:

- **Appendix A, Figure 6.1**: Designated Sites and Ancient Woodland Inventory (AWI) Sites;
- **Appendix A, Figure 6.2**: UK Habitat Classification;
- **Appendix A, Figure 6.3**: UK Habitat Classification and Project Infrastructure;
- **Appendix H**: Habitat and Protected Species Survey Report;
- **Appendix I**: Breeding Bird Survey Reports;
- **Appendix J**: Bat Tree Assessment and Woodland NVC Survey;
- **Appendix K:** (Confidential): Schedule 1 Birds; and
- **Appendix L:** Biodiversity Net Gain (BNG) Report.

6.1.2 Surveys for the Proposed Development were carried out alongside those for the associated underground cable (UGC) (see paragraph 6.3.3 and **Appendix A, Figure 6.1** for further information on the Survey Area). The UGC is assessed separately, however, the survey reports cover both proposed projects. The Habitats Regulations Appraisal (HRA) considers both the UGC and substation site. The HRA has been reported on separately to this EA and will be submitted to THC alongside the planning application submission.

6.1.3 The specific objectives of this chapter are to:

- Describe the ecological baseline;
- Describe the potential effects, including direct and indirect effects, on ecological features;
- Describe the mitigation measures proposed to address likely significant effects (if any); and,
- Assess the significance of any residual effects, following the implementation of mitigation.

## 6.2 Legislation, Policy and Guidance

6.2.1 The legislation, policy and guidance relevant to this chapter includes:

- The Conservation of Natural Habitats and Wild Flora and Fauna (the Habitats Directive) 1992 (92/43/3EEC);
- The Wildlife and Natural Environment (Scotland) Act 2011;
- Nature Conservation (Scotland) Act 2004;
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- The Wildlife and Countryside Act 1981 (as amended);
- The Protection of Badgers Act 1992;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017;
- Environmental Impact Assessment Directive 2014/52/EU4;

- Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, and Coastal[7];
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2013). Guidelines for Preliminary Ecological Appraisals;
- Institute of Environmental Management and Assessment (IEMA) (2005). Guidelines for Environmental Impact Assessment;
- Scottish Natural Heritage (2018)[8] Environmental Impact Assessment Handbook;
- NatureScot (2023) Advising on Peatland, Carbon-Rich Soils and Priority Peatland Habitats in Development Management;
- NatureScot (2024) Developing with Nature;
- National Planning Framework 4 (NPF4) (Scottish Government, 2023); and
- The Highland Council (THC) Local Development Plan (LDP): Policy 58 Protected Species.

## 6.3 Assessment Methodology and Significance Criteria

*Scope of the Assessment*

6.3.1 The ecology and ornithology assessment considers the potential effects of the Proposed Development on designated nature conservation sites, woodland listed on the Ancient Woodland Inventory (AWI), habitats and protected species.

6.3.2 BNG calculations using SSEN Biodiversity Project Toolkit were undertaken, with a summary provided in this report (**Section 6.7**). For the detailed BNG assessment please see **Appendix L**.

*Method of Baseline Data Collection and Extent of the Study Area*

6.3.3 The ecology and ornithology baseline for the Proposed Development has been informed through a combination of desk-based study and field surveys, over a Study Area that comprises:

- a 2 km Study Area (shown in **Appendix A**, **Figure 6.2**) from the Proposed Development's boundary for identifying statutory and locally designated nature conservation sites, woodland listed on the AWI, tree preservation orders and records of protected species; and
- a 250 m Survey Area from the Proposed Development's boundary for surveying habitats and protected species in the local area (extended to 500 m for the breeding bird survey).

6.3.4 The Study Area for designated sites was based on the likely Zone of Influence (ZoI), considering the construction and operation activities for the Proposed Development. The need to consider designated sites in excess of 2 km was deemed unnecessary as the areas of suitable habitat anticipated to be lost within the Proposed Development were small. The area of habitat loss is located next to the existing Knocknagael Substation and considered unlikely to have a significant effect on the foraging behaviour of any mobile bird species from designated sites in the wider area.

<u>Desk Based Study</u>

6.3.5 The desk-based Study Area described in **Section 6.3.3** above was informed by a range of published and publicly available data including:

- NatureScot SiteLink[9] - data on designated sites and notable species in Scotland;

[7] CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.2. Chartered Institute of Ecology and Environmental Management, Winchester (as amended in April 2022).
[8] Scottish Natural Heritage has since been rebranded NatureScot in August 2020.
(9) NatureScot SiteLink. Available at https://www.nature.scot/information-hub/snhi-data-services

- NatureScot Scottish Biodiversity List (SBL)[10] - a list of species which are important for Scotland's biodiversity;
- National Biodiversity Network (NBN) Atlas[11] - a national interactive map that shows biodiversity areas;
- The Highland Biological Recording Group (HBRG) and The Royal Society for the Protection of Birds (RSPB) data searches requested in May 2022, for records from the last 10 years within a 2 km radius of the Proposed Development;
- The Highland Raptor Study Group (HRSG) – data request for raptor species records within a 10 km radius of the Proposed Development (October 2024); and
- Information available from previous SSEN Transmission projects in the local area.

Ecological Surveys

6.3.6 The following surveys have been undertaken to establish the baseline and inform the ecological assessment:

- UK Habitat Classification (UKHab) survey[12], in April and June 2022;
- Woodland National Vegetation Classification (NVC) survey[13][14] in July 2023;
- A walkover survey for protected and priority species (including European Protected Species (EPS)) in April and June 2022;
- Breeding bird surveys in April, June and July 2022; and
- A Preliminary Bat Roost Assessment (PBRA) in July 2023.

6.3.7 The requirement for NVC surveys for Groundwater Dependent Terrestrial Ecosystems (GWDTE) was assessed, but no habitats with the potential of being GWDTE were identified during the UKHab survey.

6.3.8 The Survey Area comprised the Proposed Development and a 250 m buffer zone for the majority of surveys. The 250 m Survey Area was extended to 500 m for the breeding bird survey. The woodland NVC and PBRA survey focussed on an area of woodland to the immediate north-west of the existing Knocknagael Substation. The specific methods for each survey type are detailed in the relevant reports (see **Appendices H - L**).

*Impact Assessment*

6.3.9 This ecology assessment uses the methodology outlined in **Chapter 4: Methodology** to determine magnitude of change. This impact assessment follows an approach whereby the sensitivity of an ecological receptor has been determined and assessed against the magnitude of the effect the activities associated with the Proposed Development may have on that receptor, and the subsequent significance of effect/impact. The approach takes into account the latest CIEEM Guidelines, which refers to the term "not significant", rather than "negligible".

6.3.10 Mitigation for the Proposed Development is split into three categories; design mitigation, embedded mitigation and additional mitigation. The Proposed Development was selected via an iterative design process as described in **Chapter 3: Site Selection Process and Alternatives.** This ensured that the mitigation hierarchy was applied and impacts to sensitive receptors were avoided, where feasible. Embedded mitigation will comprise of SSEN Transmission's General Environmental Management Plans (GEMPs) and Species Protection Plans (SPPs) (see **Appendices B** and **C**) as well as a pre-commencement Construction Environmental Management Plan (CEMP) and Construction Traffic Management Plan (CTMP). Additional mitigation sets out any further mitigation required, to reduce the residual impact to "not significant".

(10) NatureScot Scottish Biodiversity List. Available at https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy/scottish-biodiversity-list

(11) National Biodiversity Network Atlas. Available at https://nbnatlas.org/

[12] UK Habitat Classification Working Group (2020) UK Habitat Classification User Manual at https://ukhab.org/. Version 1.1. V2.0 was not published at the time of survey.

[13] Rodwell, J. S. (ed.) (1991-2000) British Plant Communities. Volumes 1-5. Cambridge University Press.

[14] JNCC (2004) National Vegetation Classification: Field guide to woodland.

6.3.11 Given the Proposed Development will be an extension of the existing Knocknagael Substation, it is considered that there will be little or no effects on habitats and species in the surrounding area during the operational phase of the Proposed Development. As such, the focus of the assessment is largely concentrated on the construction effects identified, as a result of the Proposed Development.

*Limitations and Assumptions*

6.3.12 The following limitations were noted during the field surveys:

- No access was available for surveys in areas of land in the south and eastern edges of the Survey Area buffer zone (i.e. within the 250 m buffer, as shown on **Appendix A, Figure 6.3**). The habitats appeared to include a mix of gorse scrub, heathland, neutral and modified grassland and a burn, based on a review of aerial imagery on Google Earth from May 2023. This survey limitation may have resulted in signs for GWDTE and protected species including otter and badger could not be assessed at the time of survey. A survey visit will be required in the future (if access permits), to confirm the habitats present and their potential to support protected species.
- The majority of surveys were completed in 2022. Good practice guidance recommends that surveys between 18 months and three years old may require further surveys, alongside updates to the desk-based study information, by a suitably qualified ecologist[15]. Aerial imagery dating from May 2023 (available via Google Earth) was reviewed in January 2025, to confirm any significant changes in habitat, or land management, since the surveys were undertaken. No significant habitat changes were identified in the Survey Area. Additionally, a visit to Knocknagael Substation in May 2023 did not identify any significant changes to habitats within the Survey Area in the immediate surroundings of the substation. A survey visit prior to construction will be undertaken to confirm that there have been no significant changes to habitats which will be impacted by the Proposed Development.
- Areas of the coniferous woodland plantations to the south of the RLB (shown in **Appendix A**, **Figure 6.3**) were densely planted, making access unsafe and impractical. Protected species surveys could not be undertaken in such areas of this habitat.
- Tall-grown grassland made it difficult to spot potential signs of species, such as scats and old/inactive badger setts. This can be a common limitation during survey, and it is possible that field signs for badgers, red squirrel, pine marten and wildcat could be present within the Survey Area, but not recorded as they had been covered over by vegetation growth.

6.3.13 Due to survey coverage and access being generally good across the Survey Area, overall characterisation of habitats and likely species present was possible. These limitations, both individually and in combination, are, therefore, not considered to be significant and do not undermine the validity of the survey.

*Sensitive Receptors*

6.3.14 Designated sites, priority habitats[16] and protected species[17] are sensitive receptors. Assessment of sensitive receptors were undertaken using the following distances from the Proposed Development:

- Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar and Sites of Special Scientific Interest (SSSI) designated sites within 2 km;
- Local Nature Conservation Sites (LNCS) within 2 km;

[15] Chartered Institute for Ecology and Environmental Management (CIEEM) 2019. Advice Note: On the Lifespan of Ecological Reports & Surveys. Available at https://cieem.net/resource/advice-note-on-the-lifespan-of-ecological-reports-and-surveys

[16] Habitats listed on the Scottish Biodiversity List, a list of animals, plants and habitats considered to be of principal importance for biodiversity conservation in Scotland. Available at: https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy-and-cop15/scottish-biodiversity-list

[17] Certain species are afforded specific legal protections, meaning it can be illegal to disturb, harass, capture, or kill, injure animals or birds or to pick or damage certain wild plants. An overview of relevant protected species and the legal framework that applies in Scotland is available at: https://www.nature.scot/professional-advice/protected-areas-and-species/protected-species.

- Woodland listed on the AWI, Plantation on Ancient Woodland Site (PAWS) and Tree Preservation Orders (TPOs) within 2 km;
- Priority habitats and GWDTEs within the Survey Area**;** and
- Desk-based study of protected species records within 2 km and protected species survey data within the Survey Area. This includes EPS, species protected under the Wildlife and Countryside Act 1981, species found on the SBL and Birds of Conservation Concern (BoCC) [18] red-listed species within 2 km.

## 6.4 Baseline Conditions

*General Ecological Context*

6.4.1 The Proposed Development is located approximately 6 km south of Inverness near Essich. It lies within an area of grassland, scrub and rough grazing, surrounding the existing Knocknagael Substation. Local habitats include scattered trees, woodland, scrub, grassland and agricultural fields. There is an unnamed burn within the east of the Proposed Development. A burn called Big Burn is approximately 0.14 km east of the Proposed Development and the River Ness runs approximately 2 km to the north-west of the Proposed Development.

*Designated Sites and Ancient Woodland*

6.4.2 There are no statutory or non-statutory designated sites within 2 km of the Proposed Development. The nearest designated site is Torvean Landforms SSSI, which lies approximately 2.5 km to the north-west of the Proposed Development. This SSSI is designated for its geological interest and will not be affected at this distance.

6.4.3 There are six Ancient Woodland Inventory Sites (AWIS) within 2 km of Proposed Development, as illustrated on **Appendix A, Figure 6.2**. The nearest AWIS is approximately 500 m to the north-east of the Proposed Development. Due to the distance from the Proposed Development, none of the AWIS will be affected by the Proposed Development.

*Habitats and Flora Species*

6.4.4 UKHab classifications recorded within the Survey Area are listed in **Table 6.1** (and illustrated in **Appendix A, Figure 6.3**). They are listed by classification grouping order, as set out in the UK Habitat Classification User Manual (2020), not in order of ecological value.

**Table 6.1: UKHab Habitats within the Survey Area**

| Broad Habitat Type | UKHab Code | Habitat Name |
|---|---|---|
| Grassland | g3c | Other neutral grassland |
| | g3c6 | *Lolium-Cynosurus* neutral grassland |
| | g4 | Modified grassland |
| Woodland | w1g | Other woodland; broadleaved |
| | w1g6 | Line of trees |
| | w2c | Other coniferous woodland |
| Heathland and shrub | h3e | Gorse scrub |
| Wetland | f1a | Blanket bog |
| | f2c | Upland flushes, fens and swamps |
| Cropland | c1c | Cereal crops |
| Urban | u1b | Developed land; sealed surface |
| | u1b5 | Buildings |

[18] Birds of Conservation Concern 5. Available at https://www.bto.org/sites/default/files/publications/bocc-5-a5-4pp-single-pages.pdf. Addendum Sept 2024 available at https://britishbirds.co.uk/seabird-bocc5a

| Broad Habitat Type | UKHab Code | Habitat Name |
|---|---|---|
| | u1c | Artificial unvegetated, unsealed surface |
| | u1e | Built linear features |
| Rivers and Lakes | r2 | Rivers and streams |

Grassland

6.4.5 Habitats within the Proposed Development were predominantly neutral and modified grassland fields, some grazed by sheep or cattle. These included modified grassland, other neutral grassland and *Lolium-Cynosurus* neutral grassland. The majority of the grassland within the Proposed Development were classified as other neutral grassland, which was dominated by sweet vernal grass (*Anthoxanthum odoratum*) with a range of other herbaceous species present. The *Lolium-Cynosurus* neutral grassland was dominated by crested dog's-tail (*Cynosurus cristatus),* frequent perennial rye-grass (*Lolium perenne),* red fescue (*Festuca rubera*) and white clover (*Trifolium repens).* Lastly, the modified grassland was dominated by perennial rye-grass. All three types of grassland also occurred within the wider Survey Area. These habitats are common and widespread and of low ecological value.

Woodland

6.4.6 There was a section of semi-natural broadleaved woodland adjacent to the north-west edge of the Proposed Development boundary, a small part of which lies within the boundary of the Proposed Development. The woodland is dominated by rowan (*Sorbus aucuparia*) with abundant downy birch (*Betula pubescens*). The woodland has been heavily grazed, which has resulted in few tree saplings and open woodland cover. A NVC survey undertaken in May 2023 found that the woodland supports a W11b *Quercus petraea – Betula pubescens – Oxalis acetosella* woodland *Blechnum spicant* sub-community. The woodland is considered to be of local value as the Highland Biodiversity Action Plan (BAP) aims to conserve natural and semi-natural woodlands.

6.4.7 An area of broadleaved plantation woodland was present within the site boundary, bordering the north of the existing Knocknagael Substation. This woodland contained a mix of hawthorn (*Crataegus monogyna*), rowan, oak (*Quercus robur*), birch (*Betula spp.)*, cherry (*Prunus*) spp. and some individuals of coniferous species, such as Scots pine (*Pinus sylvestris*). A coniferous plantation woodland was also present within the Survey Area. The plantation woodlands are considered to have low ecological value. Lines of birch trees were present on the north of the site. This habitat is common and widespread and considered to have low ecological value.

Heathland and Shrub

6.4.8 Large sections of continuous gorse (*ulex europaeus*) were present within the Proposed Development and in the Survey Area. This habitat is common and widespread and considered to have low ecological value.

Wetland

6.4.9 A section of blanket bog was recorded on the south-west edge of the Survey Area (as shown in **Appendix A**, **Figure 6.3**). More dominant species include common heather (*Erica tetralix*), cotton-grass (*Eriophorum vaginatum*) and Acute-leaved Bogmoss (*Sphagnum capillifolium)*. No blanket bog was present within the Proposed Development. Blanket bog is an EU Annex 1 habitat and, as such, considered to have international importance. It is also a priority habitat on the SBL and the Highland BAP.

6.4.10 A small section of upland fen was located to the southwest of the Survey Area. Bottle sedge (*Carex rostrata*) was dominant here, with pale sedge (*Carex pallescens*) and *Sphagnum fallax* frequently observed. This habitat is a SBL priority habitat and, as such, considered to have national importance.

Cropland

6.4.11 Small parcels of cereal crop were present within the Survey Area. This type of habitat is common and widespread and considered to have low ecological value.

Urban

6.4.12 Urban habitats, in the form of developed sealed surface, buildings, and roads, were present within the site and the surrounding Survey Area. These habitats are common and widespread and considered to have negligible ecological value.

Rivers and Lakes

6.4.13 Ditches were present within the site. This type of habitat is common and widespread and considered to have low ecological value.

GWDTE

6.4.14 No habitats, with the potential to be GWDTE, were recorded within the Survey Area.

Habitat Summary

6.4.15 The majority of habitats recorded within the Proposed Development are common and widespread, with low ecological value. Common habitats included neutral and modified grasslands, plantation woodland, gorse scrub, cropland and ditches. The semi-natural broadleaved woodland to the west of the existing Knocknagael Substation is considered to be of local value as the Highland BAP aims to conserve natural and semi-natural woodlands.

6.4.16 Habitats with higher ecological value were recorded within the Survey Area but will not be lost as part of the Proposed Development. Such habitats include small sections of blanket bog (an EU Annex 1 habitat with international importance) and upland fen (a SBL priority habitat with national importance). No habitats with the potential to be GWDTE were recorded.

6.4.17 Further detail regarding the habitats identified during the survey, are included in the Habitat and Protected Species Survey Report (**Appendix H**).

*Birds*

Breeding by Species Afforded Additional Protections (Schedule 1/Annex 1 Birds, BoCC, SBL species)

6.4.18 A review of desk records provided by HRSG, identified the following raptor records:

- One kestrel (Falco tinnunculus) territory on site;
- Two osprey (*Pandion haliaetus*) territories within 2 km; and
- One tawny owl (*Strix aluco*) territory within 2 km.

6.4.19 One record of red-kite territory within 2 km of the Proposed Development was obtained from RSPB. Records of all Wildlife and Countryside Act 1981 Schedule 1 raptor species, are included in **Appendix K (Confidential)**.

6.4.20 Within the Proposed Development boundary and the extended 500 m Survey Area, breeding was confirmed probable or possible for:

- curlew, house sparrow, lesser redpoll, skylark and yellowhammer (BoCC Red List and SBL);
- common gull and greenfinch (BoCC Red List); and
- bullfinch, kestrel, song thrush and siskin (SBL).

6.4.21 Of these species, only yellow hammer was recorded breeding within the extended 500 m Survey Area, with two possible territories recorded. Yellowhammer were common throughout the grassland and farmland in the Survey Area. The other species listed above were recorded in low numbers within the extended 500 m Survey Area.

6.4.22 A kestrel *(Falco tinnunculus*) nest box was identified in the extended 500 m Survey Area. The nest box was located 160 m from the Proposed Development and approximately 25 m west of a small track and 150 m east of a small road leading towards the Proposed Development. Kestrel were not recorded breeding during the breeding bird surveys undertaken in 2022. There was an incidental sighting of a kestrel (seen on a branch next to the nest box) by an ecologist in April 2024.

Breeding by Other Species

6.4.23 A total of 18 other species were confirmed probable or possible breeding species within the Survey Area. Results are presented in **Table 6.2**. Full details of the Breeding Bird Survey results are listed in **Appendix I**.

6.4.24 Within the Proposed Development's Red Line Boundary (RLB), the bird species recorded included yellowhammer (BoCC Red list), bullfinch, song thrush, whitethroat, willow warbler, wren (BoCC Amber list), blackbird, carrion crow, chaffinch, chiffchaff, robin and stonechat (BoCC Green list).

6.4.25 All other birds were recorded in the extended 500 m Survey Area, mainly associated with woodland to the north and west, in addition to areas of scrub and a pond to the south.

**Table 6.2: Breeding bird species recorded as probable or possible breeders within the extended 500 m Survey Area**

| Species | Latin Name | Conservation Status (BoCC, SBL) |
|---|---|---|
| Curlew | *Numenius arquata* | BoCC Red list, SBL |
| Common gull | *Larus canus* | BoCC Red list |
| Greenfinch | *Carduelis chloris* | BoCC Red list |
| House sparrow | *Passer domesticus* | BoCC Red list, SBL |
| Lesser redpoll | *Carduelis cabaret* | BoCC Red list, SBL |
| Skylark | *Alauda arvensis* | BoCC Red list, SBL |
| Yellowhammer | *Emberiza citrinella* | BoCC Red list, SBL |
| Bullfinch | *Pyrrhula pyrrhula* | BoCC Amber list, SBL |
| Common whitethroat | *Sylvia communis* | BoCC Amber list |
| Kestrel | *Falco tinnunculus* | BoCC Amber list, SBL |
| Mallard | *Anas platyrhynchos* | BoCC Amber list |
| Song thrush | *Turdus philomelos* | BoCC Amber list, SBL |
| Willow warbler | *Phylloscopus trochilus* | BoCC Amber list |
| Woodpigeon | *Columba palumbus* | BoCC Amber list |
| Wren | *Troglodytes troglodytes* | BoCC Amber list |
| Blackbird | *Turdus merula* | BoCC Green list |
| Blue tit | *Cyanistes caeruleus* | BoCC Green list |
| Carrion crow | *Corvus corone* | BoCC Green list |
| Chaffinch | *Fringilla coelebs* | BoCC Green list |
| Chiffchaff | *Phylloscopus collybita* | BoCC Green list |
| Coal tit | *Periparus ater* | BoCC Green list |
| Coot | *Fulica atra* | BoCC Green list |
| Goldcrest | *Regulus regulus* | BoCC Green list |
| Goldfinch | *Carduelis carduelis* | BoCC Green list |
| Great tit | *Parus major* | BoCC Green list |

| Species | Latin Name | Conservation Status (BoCC, SBL) |
|---|---|---|
| Pied wagtail | *Motacilla alba* | BoCC Green list |
| Robin | *Erithacus rubecula* | BoCC Green list |
| Siskin | *Carduelis spinus* | BoCC Green list, SBL |
| Stonechat | *Saxicola rubicola* | BoCC Green list |

*Other Protected Species*

Bats

6.4.26 All bat species found in Scotland are classed as EPS. They are protected in Europe under the EC Habitats Directive (92/43/EEC), applied in Scotland under the *Conservation (Natural Habitats, &c.) Regulations, 1994* as amended (known as the Habitats Regulations). Nine species of bats are listed on the SBL[19] as priority species.

6.4.27 As discussed within **Appendix J**, broadleaved woodland and scrub within the Survey Area provide foraging and commuting habitat for bats. The majority of the site comprises open and exposed habitat, such as urban habitats and grasslands. The main habitats likely to be used by bats are the woodland and lines of trees (shown in **Appendix A**, **Figure 6.3**) which offer low suitability for foraging and commuting bats.

6.4.28 The bat roost assessment survey focussed on an area of woodland to the immediate north-west of the existing Knocknagael Substation. The survey identified feeding remains and droppings of *Plecotus spp*. or *Myotis spp*., in the existing Knocknagael Substation building within the RLB. It was, therefore, considered the Knocknagael Substation is likely used as a feeding perch/roost. This differs to other roosts, such as day roosts, maternity roosts, or hibernation roosts, however, all roosts are afforded the same legal protection. The building also had breeze block walls which provides a potential hibernation space for bats between the joints and structures within the building.

6.4.29 Areas of woodland with mature trees occur within the Survey Area were identified which were considered likely to include roosting features for bats within the mature, damaged, and dead or decaying trees. In May 2023 a preliminary bat roost assessment[20] was undertaken for these trees (shown in **Appendix J, Figure 1 and 2**). The survey identified eight trees as having features with bat roosting potential, of which:

- four were classified as **high** potential;
- two as **moderate** potential;
- one as **low** potential; and
- one with **negligible** potential.

6.4.30 The full report is presented in **Appendix J**.

6.4.31 All other trees recorded within the wider Survey Area were considered to have **negligible** potential as they were not of sufficient age, and / or did not have features present which could support roosting bats.

6.4.32 The woodland continues on beyond the Proposed Development boundary. As it contains mature trees it is expected that there may be more trees with bat potential in the remainder of the woodland. These trees will not be directly affected by the Proposed Development.

Otter

6.4.33 Eurasian Otter (*Lutra lutra*) is an EPS under the Habitats Regulations and is listed on the SBL as a priority species. During the survey undertaken in May 2022, no suitable habitat for otter was recorded within 200 m[21] of

[19] NatureScot. Scottish Biodiversity List (2020) Available online at: https://jncc.gov.uk/our-work/uk-bap-priority-species/
[20] •Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust. London
[21] Distance as defined within the Species Protection Plans (SPPs) (see Appendix C)

the Proposed Development and no signs of otter were recorded in areas accessible during the survey. A burn running through the south-eastern edge of the Survey Area may provide otter commuting or feeding habitat but was not accessible. Otters are known to occur in the wider area as signs were recorded approximately 4 km to the south of the Survey Area during the surveys for the UGC.

Water Vole

6.4.34 Water voles (*Arvicola amphibius*) are protected under the Wildlife and Countryside Act 1981 (as amended) and is listed on the SBL as a priority species. No evidence was identified during the protected species walkover survey undertaken in May 2022 and no suitable habitat was identified along the watercourses in the Survey Area. The small burns and ditches around the Proposed Development were deemed unsuitable to support water vole due to their lack of bankside, shallow water depth, likely variation in water flows and small width. Therefore, it is considered unlikely that water voles are present in the Survey Area.

Badger

6.4.35 European Badgers (*Meles meles*) are protected under the Protection of Badgers Act 1992[22]. The habitats around the Proposed Development, such as woodland, scrub and grasslands provide suitable badger habitat. No badger setts were recorded, but evidence of badger activity was recorded during the 2022 protected species walkover survey. Signs of badger foraging were found in grassland close to the substation (see **Appendix H** for further detail). Additionally, a badger latrine and track were found on the edge of a strip of coniferous woodland just outside Survey Area of the Proposed Development.

Other Mammals

6.4.36 European Pine marten (*Martes martes*) is protected under the Wildlife and Countryside Act 1981 (as amended) and is a SBL priority species. The commercial forestry and broadleaved woodland in and around the Survey Area provide suitable habitat for this highly transient species. No dens or other evidence of pine marten were recorded in the Survey Area during the 2022 protected species walkover survey.

6.4.37 Red squirrels (*Sciurus vulgaris*) are protected under the under the Wildlife and Countryside Act 1981 (as amended) and are a SBL priority species. Little suitable habitat was identified in the Survey Area and no evidence was recorded.

6.4.38 European Wildcat (*Felis silvestris*) is an EPS under the Habitats Regulations and a SBL priority species. They are native to Scotland and are known to be present in the county of Inverness-shire[23]. Wildcats have a preference for woodland edges, uplands with rough grazing and moorlands with limited pastures. Extensive areas of coniferous woodland, as well as areas of broadleaved and mixed woodland occur in and around the Survey Area, however, no evidence of wildcat was identified during the survey.

Amphibians and Reptiles

6.4.39 Reptiles are protected under the Wildlife and Countryside Act 1981 (as amended). Common toad (*Bufo bufo*), slow worm (*Angius fragilis*), adder (*Vipera berus*) and common lizard (*Zootoca vivipara*) are SBL priority species. No waterbodies suitable for breeding amphibians were recorded during the survey. The grassland, gorse scrub and woodland clearings in the Survey Area provide suitable habitat for foraging, basking and commuting reptiles. No amphibians or reptiles were observed during the walkover survey.

6.4.40 Full details of the protected species findings are listed in **Appendix H**.

[22] Protection of Badgers Act 1992. Available online at: https://www.legislation.gov.uk/ukpga/1992/51/contents

[23] Breitenmoser, U., Lanz, T. and Breitenmoser-Würsten, C., 2019. Conservation of the wildcat (*Felis silvestris*) in Scotland: review of the conservation status and assessment of conservation activities. IUCN SSC Cat Specialist Group.

Incidental Species

6.4.41 Roe deer (*Capreolus capreolus*) were observed in the woodland to the north-west of the existing Knocknagael Substation. Red fox (*Vulpes vulpes*) scat was also recorded in the Survey Area.

Protected Species Summary

6.4.42 A bat roost (*Plecotus* or *Myotis* spp) was found in the existing Knocknagael Substation control building within the Proposed Development boundary. The woodland and lines of trees to the north of the existing substation offer low suitability for foraging and commuting bats. There are seven trees within this woodland which have features with bat roosting potential (four with high potential, two with moderate potential and one with low potential). An additional surveyed tree was considered to have Negligible potential to support roosting bats

6.4.43 There was evidence of badger activity with foraging signs found in grassland within the Proposed Development. No setts were identified. No signs of other protected species were recorded within the Survey Area.

## 6.5 Issues Scoped Out

6.5.1 There is limited potential for the Proposed Development to give rise to localised and temporary air quality impacts from dust during construction, which will be strictly controlled in accordance with a detailed CEMP. There is also no potential for significant air quality impacts during operation. The Proposed Development does not include any plant or equipment that could give rise to significant noise emissions (see **Section 4.5**).

6.5.2 Potential effects in relation to hydrology such as an increase in surface run-off and pollution were assessed within **Chapter 8: Hydrology, Hydrogeology, Geology and Soils.** Chapter 8 summarises that through the implementation of embedded mitigation measures, and additional measures detailed in the chapter, the assessment concludes that the Proposed Development will not give rise to significant effects on Hydrology, Hydrogeology, Geology and Soils receptors.

6.5.3 Consequently, potential impacts (including impacts via air emissions, noise or hydrology) to protected sites designated for habitat interest features, at distances more than 250 m from the Proposed Development, have been scoped out for construction and operation.

6.5.4 Given the Proposed Development will be an extension of the existing Knocknagael Substation, there will be little or no effects on habitats and species in the surrounding area during the operational phase of the Proposed Development. Therefore, operational activities such as routine maintenance visits have been scoped out of further assessment.

## 6.6 Assessment of Effects, Mitigation and Residual Effects

6.6.1 The assessment considers the potential impacts on designated sites, habitats, GWDTE, and protected species that could occur from the Proposed Development during design, construction and operation, for example:

- direct habitat loss due to permanent and temporary facilities;
- effects on habitats in the surroundings (e.g., from incursion by workforce, lighting, pollution / spillages, dust, effects on surface / groundwater);
- direct effects on fauna, including their killing and injury and the destruction of their places of shelter; and
- indirect effects on fauna species including disturbance / displacement.

Decommissioning is not included within the scope of this assessment, as it is expected that whilst there will be a design life associated with the Proposed Development, it will be required in perpetuity with the infrastructure maintained and replaced in situ, as required.

*Mitigation by Design*

6.6.2 The Proposed Development was selected and developed via an iterative design process, as described in **Chapter 3: Site Selection Process and Alternatives**. This applied the mitigation hierarchy, where impacts to sensitive receptors were avoided where feasible and, in balance, with other competing interests (see **Section 3.6** for more detail).

*Embedded Mitigation*

6.6.3 The Proposed Development has been designed to reduce potential impacts, as far as reasonably practicable. This includes mitigation that is embedded into the design of the project, in accordance with industry standard methods and procedures, which will reduce impacts from construction and operation. Embedded mitigation measures will be further implemented, as both the detailed design continues, and the construction phase commences. This includes the timing of installation and careful siting of permanent and temporary structures, in order to avoid or minimise interaction with sensitive ecological receptors.

6.6.4 Compliance with project-wide and site-specific environmental management procedures, with reference to the Proposed Development's CEMP, will also be implemented. This will describe the proposed approach to construction methods and environmental protection, adopted/employed during the construction of the Proposed Development, including (but not limited to) details of ecological constraints and measures (e.g., site working hours, control of light spill, noise emissions, pollution, dust management, avoiding incursion into habitats to be retained), procedures for surface water management and pollution prevention guidelines.

6.6.5 SSEN Transmission have established GEMPs (see **Appendix B**) which will be implemented through the CEMP. Based on ecologically sensitive receptors identified in this assessment, relevant GEMPs include, but are not limited to:

- Oil Storage and Refuelling;
- Soil Management;
- Working In or Near Water;
- Working in Sensitive Habitats;
- Working with Concrete;
- Watercourse Crossings;
- Waste Management;
- Forestry;
- Dust Management;
- Biosecurity (On Land);
- Restoration; and
- Bad Weather.

6.6.6 The GEMPs are generic, therefore, not all measures will be applicable to the Proposed Development. The contractor will review the GEMPs, and in discussion with the Ecological Clerk of Works (ECoW), agree the relevant measures.

SSEN Transmission have well-established SPPs for a number of protected species, which have been developed in consultation with NatureScot, which are currently being implemented across other SSEN Transmission projects (See **Appendix C**). Each SPP provides details on what actions are required. should species be encountered during the construction of the Proposed Development. Based on the ecologically sensitive receptors identified in this assessment, relevant protection plans include, but are not limited to:

- Badger SPP;

- Bat SPP;
- Otter SPP;
- Red squirrel SPP;
- Bird SPP;
- Wildcat SPP; and
- Pine marten SPP.

6.6.7 Embedded measures to protect biodiversity, will include a pre-construction site survey of the Proposed Development boundary, by a suitably qualified ECoW, focussing on habitats and species, which are anticipated to be directly and indirectly impacted by the Proposed Development. The purpose of the survey is to confirm any changes to the baseline, and update where relevant, to confirm that the data on which this assessment is based, is still true. Should a new species be identified, the appropriate SPPs (included within the CEMP) would be followed during construction of the Proposed Development. An assessment would be undertaken to understand the impacts the Proposed Development may have on that particular species, as well as any further measures that should be put in place, for example, protected species licencing.

*Assessment - Construction Effects*

Designated Sites and Ancient Woodland

6.6.8 No sites designated for their nature conservation importance, or woodlands listed on the AWI, will be directly affected by the Proposed Development. There are no statutory or non-statutory designated sites within the Study Area.

6.6.9 The nearest AWIS to the Proposed Development is at a distance of approximately 0.5 km, with five other AWIS within 2 km. At these distances, no significant effect on AWIS woodlands are expected, as no indirect effects to habitats outside of 250 m from the Proposed Development are predicted.

Habitats and Flora

6.6.10 The permanent and temporary loss of habitats due to the construction of the Proposed Development are shown in **Table 6.3** and presented in **Appendix A**, **Figure 6.3** and **6.4**.

**Table 6.3: Permanent and Temporary Habitat Loss due to the Proposed Development**

| Habitat Type | Importance | Total Area | Permanent Loss | Temporary Loss | Retained |
|---|---|---|---|---|---|
| Grassland - Other neutral grassland | Local* | 8.32 ha | 2.84 ha | 0.48 ha | 5.00 ha |
| Woodland and forest - Other woodland; broadleaved (semi-natural) | Local* | 0.81 ha | 0.18 ha | - | 0.63 ha |
| Woodland and forest - Other woodland; broadleaved (plantation) | Negligible | 3.54 ha | - | - | 3.54 ha |
| Woodland and forest – Line of trees | Negligible | 0.22 ha | - | - | 0.22 ha |

| Habitat Type | Importance | Total Area | Permanent Loss | Temporary Loss | Retained |
|---|---|---|---|---|---|
| Heathland and shrub - Gorse scrub | Negligible | 1.81 ha | 0.84 ha | - | 0.97 ha |
| Grassland - Modified grassland | Negligible | 0.05 ha | - | - | 0.05 ha |
| Urban - Artificial unvegetated, unsealed surface | Negligible | 0.60 ha | 0.12 ha | 0.02 ha | 0.46 ha |
| Urban - Built linear features | Negligible | 0.56 ha | - | 0.03 ha | 0.53 ha |
| Urban - Developed land; sealed surface | Negligible | 5.57 ha | 0.05 ha | - | 0.51 ha |
| Rivers and Lakes - Other rivers and streams (Medium) | Low | 659.54 m | | 185.98 m | 473.56 m |
| *Other neutral grassland and semi-natural woodland are considered to be of local value, as they are semi-natural habitats that help provide connectivity between natural habitats. | | | | | |

6.6.11 The Proposed Development will result in the permanent and/or temporary loss of small areas of heathland neutral grassland, semi natural broadleaved woodland and gorse scrub, as detailed in **Table 6.3**.The habitats that will be lost are common and widespread habitat types in the local area.

6.6.12 Diversion of a field drain (a watercourse not visible on 1:50,000 scale OS mapping) will be required as part of the temporary access tracks and earthworks (see **Chapter 8: Hydrology, Hydrogeology, Geology and Soils** for further detail). The drain subject to diversion flows through the proposed cut-and-fill (earthworks) area to the east with the diversion from NGR NH 65447 38899 to NH 65379 39068, with a small extension of the drain also being diverted (shown in **Figure 2.2**). The watercourse diversion will be designed on a like-for-like basis which includes No Net Loss in the total watercourse length within a water body. The designs will incorporate measures which enhance the in-channel and riparian habitat quality, through the provision of a multistage channel and marginal planting, using natural routing and as such no significant impact is predicted.

6.6.13 An area of 0.18ha habitat recorded as semi-natural broadleaved woodland will be lost under the footprint of the Proposed Temporary Bund (See **Appendix A**, **Figure 6.3**). This area is between an existing road and access track, beside an area of bare ground. As outlined in **Section 6.4.6**, the wider broadleaved woodland is considered to be of local value see **Section 6.4.15**. During the 2022 habitat survey, the whole woodland parcel was recorded to be dominated by rowan with abundant downy birch. However the woodland has been heavily grazed, which has resulted in few tree saplings and open woodland cover. Following a review of aerial imagery, the footprint of the Proposed Temporary Bund is considered to overlap an area of open woodland cover dominated by grassland/scrub with few trees. As such, the construction of the Proposed Temporary Bund will result in the loss of one tree and not significantly impact the woodland.

6.6.14 Given the low botanical value of the habitats affected by the Proposed Development, and the relatively small area of their respective footprints, no significant effects are predicted.

Protected Species

Birds

6.6.15 Previous SSEN Transmission work identified the presence of Schedule 1 osprey and red kite nest sites in the local area. The osprey nest is approximately 1 km from the Proposed Development. NatureScot published a review of disturbance distances[24] and in 2022 found that the likely disturbance distance for osprey range from 350 – 750 m, during the breeding season. As the nest is located outside of this distance, no significant disturbance to breeding osprey is expected. Similarly, the red kite nest location was approximately 550 m from the Proposed Development. The likely disturbance distance for red kite ranges from 150 – 300 m. As the nest is located outside of the likely disturbance distance, no significant effects on breeding red kite are expected. Additional check surveys will be undertaken prior to construction, to confirm that there are no Schedule 1 Birds nests that could be disturbed by the works. Surveys will also ensure the appropriate disturbance distance buffer zones will be applied during works, where required, in line with the bird SPP.

6.6.16 During the surveys, suitable habitat to support breeding bird species was recorded. A kestrel (BoCC Amber list) nest box was identified approximately 150 m from a small road leading towards the Proposed Development at NH65431 38562. A kestrel was seen near the nest in April 2024, indicating possible breeding activity. This road is not part of the expected route of construction traffic to the Proposed Development, which will enter from the public road via a new temporary access junction from the same road as the existing Knocknagael Substation site entrance. The HRSG data showed a pair of kestrels nested within the Study Area between 2014 to 2022 on the edge of the existing Knocknagael Substation.

6.6.17 Any kestrels breeding close to the existing Knocknagael Substation will be habituated to activity there. Traffic is not expected to increase significantly in their vicinity. NatureScot guidance suggests a buffer of 100 – 200 m around a kestrel nest, with a buffer zone at the lower end of the range, sufficient where birds have some habituation to human presence, as in this case. A buffer of 150 m around the nest box will be maintained during works where there is evidence of birds nesting. Check surveys will be undertaken for breeding birds prior to construction, with works undertaken in line with SSEN Transmission's Bird SPP.

6.6.18 A range of SBL, BoCC Red and Amber-listed bird species were recorded during the Breeding Bird Survey that were typical of farmland, woodland and grassland habitats. The birds which were recorded are detailed within the report and include red-listed species such as curlew, greenfinch, house sparrow and yellowhammer. The Proposed Development has a relativity small footprint and embedded mitigations measures of SSEN Transmission's SPPs will be adhered to during construction. The main impact to the breeding bird assemblage is temporary or permanent displacement caused by habitat loss and disturbance. However, there is suitable alternative habitats available, locally, which is not expected to have a significant effect. Works should be undertaken out with the breeding bird season as much as possible. Where work must be undertaken during the breeding bird season, nesting bird checks, prior to vegetation removal, will be undertaken by an ECoW no more than 48hrs prior to vegetation removal. If birds are found to be nesting, any works which may affect them should be delayed until the young have fledged and the nest abandoned naturally. With such measures in place, no significant effects on bird species from the Proposed Development are predicted.

Bats

6.6.19 Broadleaved woodland and scrub around the Proposed Development provides low suitability for foraging and commuting habitats for bats. There are seven trees within woodland adjacent to the Proposed Development which have roosting potential. These trees will not be directly affected by the Proposed Development; however, if felling of any of the seven trees are to be carried out, they must be rechecked by a bat licenced ECoW. If torpid or hibernating bats are uncovered at any time during the works, the works must cease immediately and

[24] Goodship, N.M. and Furness, R.W. (MacArthur Green) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

further advice should be sought. One bat roost, belonging to *Plecotus* or *Myotis spp*., was found in the existing Knocknagael Substation control building within the Proposed Development boundary. This roost was considered to be a feeding perch/roost, where a small number of bats rest or feed during the night, but are rarely present in the day. Works must avoid disturbing the roost at Knocknagael Substation through light, noise or vibration. To ensure that is the case, a competent ecologist will review plans including proposed activities, timings and proposed illumination. If it is deemed that there is a risk of disturbing the roost, a bat survey, in line with the Bat Conservation Trust (BCT) guidelines, must be undertaken prior to the start of work, to determine the status of the roost. Appropriate mitigation measures must be put in place to prevent disturbance, where SSEN's SPP for bats will be followed. If disturbance is unavoidable a NatureScot European Protected Species (EPS) licence application would be required. With mitigation in place, no significant effects on roosting bats are predicted. Some foraging and commuting habitat for bats will be lost, but there is abundant alternative foraging and commuting habitat in the local area, therefore, no significant effects on foraging or commuting bats are predicted.

Other Protected Species

6.6.20 There was suitable habitat present in the Survey Area for protected species such as badgers, pine marten, wildcat and red squirrel. Signs of badger activity (such as feeding signs, latrine and tracks) were recorded around the Proposed Development, but no signs of other protected species were recorded.

6.6.21 Additional check surveys of all suitable habitat will be undertaken a minimum of 48 hours prior to construction to confirm the current status of these species in the Survey Area.

6.6.22 In line with the SPPs, works will, when possible, avoid causing disturbance to these species, by maintaining an appropriate protection zones from any setts / dens identified during pre-construction checks;

- 30 m of active badger setts or 100 m for high noise / vibration activities such as pile driving or blasting;
- 50 m of breeding dreys and 5 m, or to the nearest neighbouring tree, for non-breeding dreys;
- 200 m of wildcat dens and natal otter holts; and
- 100 m of pine martens during the breeding season (March to June inclusive) and 30 m outside the breeding season.

6.6.23 Any works that must take place within the protection zone will be done under a licence from NatureScot. Destruction of setts or dens will only be done as a last resort and only under licence.

During construction works, the following practices in line with the SPPs will be implemented:

- Any temporarily exposed pipe system should be capped when not being used, to prevent badgers, other protected species and other animals from gaining access.
- All exposed trenches and holes should be provided with mammal exit ramps e.g. wooden planks or earth ramps when Contractors are off site.
- An emergency procedure should be implemented by site workers if badger / badger setts are unexpectedly encountered. All work within 30 m (100 m for high noise/vibration activities) should cease until a suitably qualified and experienced ECoW has inspected the site and determined the appropriate course of action.
- An emergency procedure will be implemented by site workers if wildcat dens are encountered. All work within 200 m will cease, and the ECoW will inspect the site and define mitigation (if required) in line with this SPP.
- An exceptional circumstance procedure will be implemented, should mitigation options not prove satisfactory in a particular case. Works will be halted whilst mitigation is determined (under consultation with the NatureScot licensing team, if required).

- Appropriately-sized protection zones will be marked and signed on the ground by the ECoW, with appropriate material, around any red squirrel dreys identified. If works within protection zones boundaries cannot be avoided, a licence for disturbance from NatureScot will be required. Destruction of dreys must only be undertaken as a last resort and requires a licence from NatureScot

6.6.24 SSEN Transmission's SPPs will be followed throughout construction and operation of the scheme. Considering the application of the SPPs and the above measures in place, no significant effects on badger, pine marten, otter, wildcat or red squirrel are expected.

Reptiles

6.6.25 Suitable reptile habitat was present on site. No ponds suitable for breeding amphibians were noted. While reptiles were not recorded on site, it is likely they are widespread and occur in low numbers in the wider area. There are no licensing provisions to allow for the killing or injuring of reptiles, therefore, measures must be put in place to minimise the risk of this happening, to avoid an offence being committed. Pre-clearance checks of areas of vegetation removal, by an appropriately qualified and experienced ECoW, will reduce the likelihood of injury or direct mortality. Vegetation clearance will be done in a staged approach, to allow egress of any remaining reptiles. Any refugia, such as brash or debris piles, will be manually disassembled under ECoW supervision. Implementation of measures to avoid the killing of reptiles will also confer protection to any amphibian species present. Combined with SSEN Transmission's embedded mitigation measures, no significant effects on reptiles or amphibians are predicted.

## 6.7 Biodiversity Net Gain

SSEN Transmission has a business commitment to ensure all projects gaining consent result in a 10% BNG. This is aligned to the Scottish Government's National Planning Framework 4 (NPF4) Policy 3 aim for proposed developments to contribute to the enhancement of biodiversity. SSEN Transmission have developed specific guidance and toolkits to measure BNG, based on the Natural England Biodiversity Metric 3.1 and adapted to reflect the requirements of Scottish Habitats. A BNG Assessment using the SSEN Transmission toolkit has been undertaken with full details provided in the BNG report (**Appendix L**). The BNG assessment sets out the results of the BNG baseline assessment and the approach to deliver the Applicant's BNG commitments for the Proposed Development.

## 6.8 Summary

6.8.1 The ecology and ornithology assessment considered the potential effects of the Proposed Development on designated sites, habitats and protected species. No designated sites or AWIS will be affected by the Proposed Development. Nests of two Schedule 1 birds (osprey and red kite) were identified within 1 km of the Proposed Development, however, the nests lie outside of the published disturbance distance buffer for each species, therefore, no significant effects are predicted.

6.8.2 The Survey Area supports a range of bird species typical of woodland, farmland and grassland habitats, including a number of SBL species and those on the BoCC Red, Amber or Green List. A bat roost was identified in the existing control building at Knocknagael Substation. Signs of badgers foraging were recorded around the Proposed Development and there was suitable habitat present for other protected species including bats, pine marten, red squirrel, wildcat and reptiles. The assessment concluded that, with embedded mitigation in place, there will be no significant effects on designated sites, habitats or protected species as a result of the Proposed Development. Pre-construction surveys will provide updated information on the presence of protected species around the Proposed Development and SSEN Transmission's SPPs will be followed throughout construction and operation of the scheme.

6.8.3 As no significant impacts are predicted, no additional mitigation measures are required.

# 7. CULTURAL HERITAGE

## 7.1 Introduction

7.1.1 This Chapter provides an appraisal of the potential effects of the Proposed Development on archaeology and cultural heritage receptors.

## 7.2 Legislation Policy and Guidance

7.2.1 The assessment is conducted with reference to the relevant statutory and planning frameworks for cultural heritage, which include:

- The Historic Environment Scotland (HES) Act 2014[25];
- The Ancient Monuments and Archaeological Areas Act 1979[26];
- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997[27].
- Scottish Planning Policy (SPP) (Revised 2020): Valuing the Historic Environment, Paragraphs 135-151[28];
- Historic Environment Policy for Scotland (HEPS)[29];
- Our Place in Time: The Historic Environment Strategy for Scotland[30];
- Highland-wide Local Development Plan (H-wLDP)[31];
- Planning Advice Note (PAN) 2/2011: Planning and Archaeology[32];
- Chartered Institute for Archaeologists (CIfA) Standards and Guidance for Desk-Based Assessments[33]; and
- HES Managing Change in the Historic Environment Series, specifically 'Managing Change in the Historic Environment: Setting'[34].

7.2.2 Statutory protection for archaeology is principally outlined in the Ancient Monuments and Archaeological Areas Act 1979[35], as amended by the National Heritage Act 1983[36], with nationally important sites listed in a Schedule of Monuments. Both the 1979 and 1983 Acts make no reference to the settings of Scheduled Monuments. However, setting is now deemed to be integral to the value of a Scheduled Monument.

[25] Scottish Government (2014) *Historic Environment Scotland Act 2014*. Available at http://www.legislation.gov.uk/asp/2014/19/pdfs/asp_20140019_en.pdf (Accessed 28/06/2023)

[26] UK Government (1979) *The Ancient Monuments and Archaeological Areas Act* [Online]. Available at https://www.legislation.gov.uk/ukpga/1979/46 (Accessed 28/06/2023)

[27] UK Government (1997) *The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997* [Online]. Available at https://www.legislation.gov.uk/ukpga/1997/9/contents (Accessed 28/06/2023)

[28] Scottish Government (2020) *Scottish Planning Policy* [Online]. Available at https://www.gov.scot/publications/scottish-planning-policy/pages/5/ (Accessed 28/06/2023)

[29] Historic Environment Scotland (2019) *Historic Environment Policy for Scotland* [Online]. Available at

https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=1bcfa7b1-28fb-4d4b-b1e6-aa2500f942e7 (Accessed 28/06/2023)

[30] Scottish Government (2014) *Our Place in Time: The Historic Environment Strategy for Scotland* [Online]. Available at https://www.gov.scot/publications/place-time-historic-environment-strategy-scotland/ (Accessed 28/06/2023)

[31] The Highland Council, *Highland-wide Local Development Plan.* Available at https://www.highland.gov.uk/info/178/development_plans/199/highland-wide_local_development_plan (Accessed 26/08/2022)

[32] Scottish Government (2011) *Planning Advice Note 2/2011* [Online]. Available at https://www.gov.scot/publications/pan-2-2011-planning-archaeology/ (Accessed 28/06/2023)

[33] Chartered Institute for Archaeologists (2020) *Standard and Guidance for Historic Environment Desk-Based Assessment.* Available at https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf (Accessed 28/06/2023)

[34] Historic Environment Scotland (2020) *Managing Change in the Historic Environment: Setting* [Online]. Available at https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549 (Accessed 28/06/2023)

[35] UK Government (1979) *Ancient Monuments and Archaeological Areas Act*. Available at www.legislation.gov.uk/ukpga/1979/46 (Accessed 28/06/2023)

[36] UK Government (1983) *National Heritage Act.* Available at http://www.legislation.gov.uk/ukpga/1983/47 (Accessed 28/06/2023)

7.2.3 Listed Buildings and Conservation Areas receive protection under the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997[37], as amended by the Enterprise and Regulatory Reform Act 2013[38]. The 1997 Act places a duty on the Local Planning Authority (LPA) with respect to Listed Buildings and Conservation Areas, and their settings. Section 59 of the 1997 Act states (in part):

"*In considering whether to grant planning permission for development which affects a Listed Building or its setting, a planning authority or the Secretary of State… shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses."*

7.2.4 Section 64 states:

*"In the exercise, with respect to any buildings or other land in a Conservation Area, of any powers under any of the provisions in subsection (2), special attention shall be paid to the desirability of preserving or enhancing the character or appearance of that area."*

7.2.5 The Historic Environment Scotland Act 2014[39] defines the role of HES and the processes for the designation of heritage assets, consents and rights of appeal. Specifically, this pertains to Category A Listed Buildings, Scheduled Monuments, Inventoried Gardens and Designed Landscape, as well as Inventoried Historic Battlefields which sit within the remit of HES. Similarly, local authorities have remit over non-designated assets and Category B and C Listed Buildings.

*National Planning Policy*

7.2.6 National Planning Framework 4[40] (NPF4) is the national spatial strategy for Scotland. It sets out the Scottish Government's spatial principles, regional priorities, national developments, and national planning policy, which includes consideration of tangible and intangible cultural heritage and historical environments, with an enhanced approach to setting consideration.

7.2.7 An assessment of the potential impacts on the cultural heritage resource is required, as the Proposed Development lies within a landscape of potential archaeological interest.

*Regional and Local Planning Policy*

7.2.8 Regarding regional and local policy, the Highland-wide Local Development Plan (HwLDP)[41], adopted in 2016, is in effect for the next 20 years. It is to be read in conjunction with NPF4, to supplement management of the heritage environment. In particular, Policy 57 details the approach to assets of local and regional importance and associated setting guidelines.

7.2.9 The HwLDP states that regional, local, nationally, and internationally important sites, must be given due consideration during planning stages of projects. It states it is essential to address impacts on cultural heritage features, when considering and assessing development proposals. Background maps set out the locations of all these different features, in so far as they have been mapped, digitally on their system.

[37] UK Government (1997) *(Listed Buildings and Conservation Areas) (Scotland) Act 1997*. Available at http://www.legislation.gov.uk/ukpga/1979/46/pdfs/ukpga_19790046_en.pdf (Accessed 28/06/2023)

[38] UK Government (2013) *Enterprise and Regulatory Reform Act 2013.* Available at http://www.legislation.gov.uk/ukpga/2013/24/contents/enacted (Accessed 28/06/2023)

[39] Scottish Government (2014) *Historic Environment Scotland Act 2014*. Available at http://www.legislation.gov.uk/asp/2014/19/pdfs/asp_20140019_en.pdf (Accessed 28/06/2023)

[40] Scottish Government (2022) Scottish Planning Policy. Available at https://www.gov.scot/publications/national-planning-framework-4-revised-draft/pages/3/ (Accessed 28/06/2023)

[41] Highland-wide Local Development Plan | Highland-wide Local Development Plan | The Highland Council

*Guidance*

7.2.10 Planning Advice Note (PAN) 2/2011: Planning and Archaeology[42] provides advice on dealing with archaeological remains. Whilst it covers a range of issues, of particular relevance, is the planning balance associated with the preservation of archaeological remains and the benefits of development; the circumstances under which developers may be required to provide further information or field evaluation to inform decisions; and measures that can be taken to mitigate adverse effects.

7.2.11 Designation Policy and Selection Guidance (DPSG, 2019) accompanies HEPS, which details the policy and selection guidance used by HES when designating heritage assets of national importance.

7.2.12 Guidance on how to apply the policies set out in the SPP is set out in HES's 'Managing Change in the Historic Environment Series'.

7.2.13 Standards and Guidance published by the Chartered Institute for Archaeologists (CIfA) have been followed, in particular the 'Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment[43]' as well as the 'Standard and guidance for historic environment desk-based assessment'[44].

*Consultation*

7.2.14 The Highland Council (THC) responded 15th February 2023 with a pre-application advice note. This included HES noting that the Knocknagael Substation extension options, were not likely to introduce significant effects and raised no specific concerns. However, direct impact to the wider prehistoric landscape and potential for further unknown buried material was highlighted by THC.

## 7.3 Assessment Methodology and Significance Criteria

*Scope of the Assessment*

7.3.1 This cultural heritage assessment considers the potential to impact designated and non-designated sites. Designated sites include World Heritage Sites, registered Battlefields, Gardens and Designed Landscapes, Scheduled Monuments, Listed Buildings and Conservation Areas. Non-designated sites will consider such sites listed in the Canmore database and Historic Environment Record (HER).

*Study Area*

7.3.2 The extent of the Study Area is:

- 2 km Study Area from the Proposed Development boundary for identifying designated cultural heritage assets (see **Appendix A, Figure 7.1**); and
- 250 m Study Area from the Proposed Development boundary for identifying non-designated cultural heritage assets (see **Appendix A, Figure 7.2**).

*Methodology for Assessment of Effects*

7.3.3 Potential impacts of the Proposed Development on cultural heritage resources comprise:

[42] Scottish Government (2011) *Planning Advice Note 2/2011* [Online]. Available at https://www.gov.scot/publications/pan-2-2011-planning-archaeology/ (Accessed 28/06/2023)

[43] Chartered Institute for Archaeologists (2014) *Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment.* Available at https://www.archaeologists.net/sites/default/files/CIfAS%26GCommissioning_2.pdf (Accessed 28/06/2023)

[44] Chartered Institute for Archaeologists (2020) *Standard and Guidance for Historic Environment Desk-Based Assessment.* Available at https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf (Accessed 28/06/2023)

- direct physical damage to the fabric of cultural heritage resources, generally resulting from groundworks associated with the construction phase of the Proposed Development, but also potential secondary impacts from changes to groundwater levels or soil chemistry;
- indirect adverse impacts on the setting of cultural heritage resources, largely as the result of visual impacts;
- adverse impacts upon the historic landscape; and
- Non-designated cultural heritage resources, in addition to Scheduled Monuments, Listed Buildings, World Heritage Sites, Conservation Areas, Gardens and Designed Landscapes and Registered Battlefields.

7.3.4 This assessment considers effects from both potential direct and indirect impacts (i.e., on settings) on cultural heritage resources caused by the different phases of the Proposed Development (see **Table 7.1**). This also considers effects to both designated and non-designated assets.

**Table 7.1: Scope of the Assessment and Proposed Development Study Area**

| Proposed Development Phase | Activity with Potential Impact | Proposed Development Study Area |
|---|---|---|
| Construction | Physical ground disturbance through earthworks has the potential to partially or wholly remove cultural heritage resources.<br>Introduction of intrusive visual, acoustic and dust elements to the physical environment or 'setting' where a resource draws its value from its surroundings.<br>Restriction zones associated with the construction phase have the potential to temporarily or permanently restrict access to existing cultural heritage resources. | 2 km for designated cultural heritage resources.<br>250 m for non-designated cultural heritage resources. |
| Operation | Introduction of acoustic elements to the physical environment or 'setting', where a resource draws value from its surroundings.<br>Restriction zones associated with the operation phase have the potential to permanently restrict access to existing cultural heritage resources. | 2 km for designated cultural Heritage resources.<br>250 m for non-designated cultural heritage resources |

*Direct (Physical) Impacts*

7.3.5 The assessment of physical impacts on cultural heritage resources considers direct effects on resources of cultural heritage interest where sites or potential sites / buried archaeology are in danger of being disturbed or destroyed. Ground disturbances due to excavations, piling and earthworks are the most likely sources of direct physical impacts on known and unknown cultural heritage resources, with the potential to partially or wholly remove these resources. Direct impacts have the potential to be one off, non-reversible and permanent. Unless the principle of avoidance is adopted in the first instance, mitigation measures will not significantly reduce the predicted residual effect of this impact on the cultural heritage. Potential direct physical effects are discussed in **Section 7.7** of this chapter.

*Indirect (Effect on Setting) Impacts*

7.3.6 Indirect effects can occur during construction, operation and decommissioning phases. This assessment takes account of the potential for effects on the settings of internationally and nationally important designated cultural heritage resources that are situated within 2 km of the Proposed Development. 'Setting' is considered more than the immediate surroundings of a site or place, which extends to include how a site was designed to function, how it was used, or how it was intended to fit within a landscape or townscape, as well as how it was

meant to be seen or to allow areas to be seen. This definition also identifies that setting can include "areas that are important to the protection of the place, site or building". It must be noted that setting is not a fixed standard, instead, it evolves over time.

7.3.7 The setting of a nationally important designated monument, building or landscape, is defined by the way in which surroundings of a historic asset, or place, contribute to how it is experienced, understood and appreciated. This can incorporate a range of factors, including views to, from and across the historic asset or place, key vistas, relationships between both built and natural features, aesthetic qualities, character of the surrounding landscape, as well as non-visual factors such as sensory, historical or artistic factors.

7.3.8 Setting can be tangible, such as a defined boundary, or intangible, such as atmosphere or ambience. The main concern for visual effects on a cultural heritage setting, is the potential for the Proposed Development to fragment the historic landscape, separate connectivity between historic sites, and impinge on views to and from sites, with important landscape settings. Potential indirect effects are discussed in **Section 7.7** of this chapter.

*Assessment Criteria*

Determining Sensitivity of Receptors and Magnitude of Change

7.3.9 To determine sensitivity of receptors, the assessment will use the methodology as outlined in **Chapter 4: Methodology of** this EA. In general, designated heritage assets with Grade A Listed Buildings, are considered high sensitivity, Grade's B and C are considered medium sensitivity, meanwhile, historical context and professional judgement is incorporated and used to ascertain the sensitivity of non-designated assets.

7.3.10 Sensitive receptors for this assessment include designated and non-designated cultural heritage resources. Designated heritage assets are cultural heritage resources that are nationally protected under the relevant legislation (Listed Buildings, Scheduled Monuments, Gardens and Designed Landscapes and registered Battlefields), World Heritage Sites, which are designated by UNESCO (United Nations Educational, Scientific and Cultural Organisation), and Conservation Areas, which are designated by a Local Planning Authority (LPA). Designated assets have more protections than non-designated assets. Non-designated assets are cultural heritage resources which include locally identified buildings, monuments, sites, places, areas or landscapes that are recognised as having an amount of heritage significance that warrants consideration in planning decisions, but do not meet the criteria for statutory designation[45].

7.3.11 To determine magnitude of change, the assessment will use the methodology as outlined in **Chapter 4** of this EA.

*Sensitivity of Receptors*

7.3.12 Sensitivities were assessed following the guidelines in **Chapter 4** but are also summarized in **Table 7.2** below.

**Table 7.2: Cultural Heritage Sensitivity**

| Importance of Receptor | Definition |
|---|---|
| High | Heritage assets valued at an international or national level. These may include Scheduled Monuments, Category A Listed Buildings, Registered Battlefields, Gardens and Designed Landscapes, and nationally important archaeological features and Conservation Areas (as defined in the Council's HER). |
| Medium | Heritage assets valued at a regional level. These may include Category B and some Category C Listed Buildings, as well as regionally important archaeological features and Conservation Areas. |

[45] Lancashire Local List. A Project to identify our local heritage. Available at: What is a Heritage Asset? - Lancashire Local List (local-heritage-list.org.uk). Accessed 06/07/2023

| Importance of Receptor | Definition |
|---|---|
| Low | Heritage assets valued at a local level. These may include Category C Listed Buildings, some Conservation Areas and non-designated assets of local value. |
| Negligible | Badly preserved and/or damaged or very common archaeological features and buildings of little or no value at local or any other scale. |

*Magnitude of Change*

7.3.13 Magnitude of change is a measure of the nature of the expected effect and for direct and indirect effects on heritage assets, is classified, based on the definitions in **Table 7.3**. For the purposes of visual assessment, proximity to the Proposed Development has been considered as one of the determining attributes. Within **Section 7.4.5**, distances are given from the resource to the nearest part of the Proposed Development.

**Table 7.3: Cultural Heritage Magnitude of Change**

| Level of Magnitude | Definition |
|---|---|
| High | Total loss of or major damage to or significant alteration to a site, building or other feature.<br>Extensive change to the setting of a feature (e.g. Blocking or severance of key visual or other relationship, loss of dominance, intrusion on key view or sightline). |
| Medium | Damage or alteration to a site, building or other feature. Encroachment on an area considered to have a high archaeological potential for buried remains.<br>Change in the setting of a feature, e.g. intrusion on designed sightlines and vistas. |
| Low | Minor damage or alteration to a site, building or other feature. Encroachment on an area where it is considered there is low potential for buried archaeological remains to exist.<br>Minor change in the setting of a feature (e.g. above historic skylines or in designed vistas). |
| Negligible | No physical impact.<br>Slight or no change in setting. |

*Significance of Effect*

7.3.14 The assessment has taken an approach in which the sensitivity of a feature is set against the magnitude of the effect of the Proposed Development. This calculation is made for both direct and indirect impacts. Where Moderate or Major effects are predicted, this will typically represent a significant effect, although, where a Moderate effect is identified, professional judgment will be applied in each instance, taking into account the asset's specific circumstances and context.

7.3.15 The general approach to the assessment of effects, is based on the design envelope for the Proposed Development which is discussed in **Chapter 4: Methodology**. This assessment proceeds from a consideration of the sensitivity of a cultural heritage feature against the potential for any magnitude of change, to arrive at the significance of the effect (see **Chapter 4, Table 4.1**).

7.3.16 Where potential scores of Moderate or Major significance have been predicted using the matrix-based approach shown in **Table 4.1,** consideration for mitigation is presented.

7.3.17 This includes a definition of the setting of each feature affected indirectly, considering its designation status and essential attributes. An assessment is made using professional judgement of the extent to which that setting is affected by the Proposed Development, where an assessment of significance is given. Effects of Minor significance are considered to be Not Significant and are not discussed in further detail.

*Assessment Limitations*

7.3.18 This assessment has the following limitations:

- The information from externally-procured databases may contain errors relating to locational accuracy, outdated information, incompleteness and representative reductionism (such as linear features as points);
- Areas that were inaccessible during the initial site visit (see **Section 7.4.4**) may contain previously unidentified archaeology. This may be mitigated by a qualified archaeologist conducting additional site visits as needed / possible or watching briefs during the construction phase; and
- Assigning sensitivity is an inherently subjective task and to mitigate potential errors arising from subjectivity, this assessment utilised the prescribed methods as established in **Section 7.3** to support professional judgment.

## 7.4 Baseline Conditions

*Topography and Geology*

7.4.1 The Proposed Development is located approximately 4 km to the north-east of Loch Ness and is on a relatively flat upland, with an average elevation of 184 m AOD. The bedrock geology consists of the Inshes Flagstone formation; a sandstone and sedimentary rock type formed between 393.3 and 382.7 million years ago, during the Devonian period. This is overlain by Till, Devensian – Diamicton; a sedimentary superficial deposit formed between 116 and 118 thousand years ago during the Quaternary period. The groundcover consists of ferns, gorse, shrubs, and grasses with sparsely occurring deciduous trees. The Proposed Development is undeveloped and in a rural setting, where it is bounded by the existing Knocknagael Substation to the west and the associated OHLs extending from the substation already present, that cross the skyline.

*Method of Baseline Data Collation*

7.4.2 The proposed Study Areas outlined in **Section 7.3.2** above are considered appropriate for this appraisal, due to the need to understand the archaeological and landscape context and potential for an area with existing substation infrastructure in-place.

7.4.3 This desk study was supported by previous experience of similar developments and cartographic analysis. Due to the rural and industrialised landscape character of the Study Area, an additional cartographic analysis of historical mapping was conducted to understand the previous buildings erected within the footprint of Proposed Development Study Area, in addition to understand the potential for subsurface structures in the vicinity.

*Historical Background*

Prehistory (12,700 BC – 400AD)

7.4.4 From the commencement of the Holocene Period, around 11,500 years ago, Scotland underwent a rapid deglaciation, permitting the re-succession of flora and fauna for habitable zones (Mitchen, 2017). It is anticipated that numerous routes were used to repopulate and expand north into Scotland, via land, coastal tracking as well as island hopping, taking advantage of both marine and terrestrial resources (Ibid). Exploitation of lithic sources, and emergent woodland, permitted the development of the palaeolithic 'toolkit', and continuity of a highly mobile lifestyle. At this time, despite fluctuations in population densities until the transition to (semi-)sedentary Neolithization, the population appears to remain coastally-oriented in the Highlands, with early sites at South Cuidrach and An Corran on Skye and Inchnadamph in Sutherland (Wickam-Jones and Krus, 2023)[46].

7.4.5 Highland Mesolithic sites are rare, and when they are located, they consist primarily of cave and rock shelters, middens, and surface scatters. All sites identified, thus far, seem to be temporary, multi-activity sites and

[46] Wickham-Jones, Caroline and Susan Kruse. (2023) Palaeolithic and Mesolithic. Settlement. Available at: 4. Palaeolithic and Mesolithic | The Scottish Archaeological Research Framework (scarf.scot). Accessed 07/07/2023

archaeological evidence is sparce. Due to climatic and taphonomic processes, the Mesolithic remains are primarily stone artefacture (Ibid). There is only a low probability of identifying Palaeolithic or Mesolithic sites in the Proposed Development area.

7.4.6 The Neolithic Period c.4100 BC to 2500 BC, saw the adoption of new lifeways, specifically agricultural and animal husbandry. This change from hunter-gathering to ago-pastoralism, was coincident with the arrival of new communities from the European continent. With these changes, new technologies were also utilised in the area, including pottery. New practices also appear in the area, including the construction of megalithic chambered tombs and cairn mortuary activity. Despite the technological changes from the Mesolithic to Neolithic , continuity from the Mesolithic is common beyond the Neolithic transition, with hunting and gathering still being performed. Apart from megalithic tombs, little is known about the Highlands during the Neolithic, as settlement sites are difficult to identify, and more research is needed (Sheridan, 2023) [47]. Despite this paucity of data, there are several Neolithic sites near the Proposed Development, including Kinbeachie, Black Isle, which is approximately 22 km north and contains a possible Neolithic house and pits. Additionally, there is a Neolithic site at Culduthel, approximately 7 km northeast, where there are four settlement sites. Slackbuie is roughly 9 km north of the Proposed Development and has produced three settlement sites. At Castle Hill in Inverness, a neolithic pit was identified roughly 15 km north of the Proposed Development. Milton of Leys has also yielded Neolithic remains, approximately 11 km north-east of the Proposed Development. As such, there may be additional unknown Neolithic sites in the Proposed Development.

7.4.7 During the Bronze Age (*c*.2500BC to 800 BC) more people inhabited the Highlands, and this may have been related to an influx of new people and technology. Despite there being more people, archaeological evidence from the Bronze Age is unevenly distributed across the Highlands where regions such as Moray, Cromarty, Dornorch firths, and Aberdeenshire became the area's primary production centres of bronze (Sheridan, 2023)[48]. Archaeologically, the Bronze Age is represented by an increase and change in funerary monument construction and personal possessions. These changes included the construction of round cairns for important people, conspicuous consumption of Beaker-style pottery, and lavish grave goods. Current archaeological understanding of this period is primarily limited to elite and funerary traditions, where little is understood about general lifeways, due to the scarcity of known settlement sites. The Clava Cairns are well known Bronze Age burial grounds, located approximately 10.5 km to the north-east of the Proposed Development, which contain a range of prehistoric burial monuments and a later medieval chapel (HES, 2023)[49]. There are seven Scheduled Monuments consisting of hut circles located within 4 km of the Proposed Development. Such monuments are significant, as they could provide valuable information about life in the region, during this period.

7.4.8 The Iron Age in the Highlands is not demarcated, as in many parts of the UK by the arrival of the Romans, as the Romans did not create permanent settlements in the region (Kruse, 2023[50]). Although scholars debate the period's beginning, a tentative definition of the period which can be used is 1–299 AD – 300-1000 AD. The period is marked by the introduction of iron working technologies and additional settlement types, including brochs, duns, wheelhouses, timber and stone-built roundhouse settlements, unenclosed platform settlements, crannogs, enclosed farmsteads and hillforts. Near the Proposed Development (roughly 9 km north) at Culduthel, there have been intensive archaeological investigations of a major Iron Age craft working centre[51]. This major settlement suggests there may be additional contemporaneous sites in the surrounding areas.

[47] Sheridan, Alison (2023) Neolithic: Settlement. Available at: https://scarf.scot/regional/higharf/neolithic/. Accessed 07/07/2023.

48 Sheridan, Alison (2023) Chalcolithic and Bronze Age. Available at: 6.1 Introduction | The Scottish Archaeological Research Framework (scarf.scot). Accessed: 07/07/2023.

[49] Historic Environment Scotland, (2023). Clava Cairns. Available at: Clava Cairns | Leading Public Body for Scotland's Historic Environment. Accessed 07/07/2023.

[50] Kruse, Susan (2023) Iron Age Introduction. Available at 7.1 Introduction | The Scottish Archaeological Research Framework (scarf.scot). Accessed 07/07/2023.

[51] Hatherly, Candy and Ross Murray (2022) Culduthel: An Iron Age Craftworking Centre in North-East Scotland. Edenborough: Society of Antiquities of Scotland. Available at: Culduthel: An Iron Age Craftworking Centre in North-East Scotland | Open Access E-Books (socantscot.org). Accessed 07/07/2023.

Medieval

7.4.9 The Medieval period (400-1600 AD) in the Highlands differs from other parts of Scotland. It was a contested zone with primarily three external influences from the Norse, Scottish Kings, and the King of the Isles. The Norse were dominant in northern Scotland until the 11th century. The following centuries were then marked by feuding kingdoms and clans; vying for control of the region. Medieval rural settlements are rare in the Highlands. The national Scottish Archaeological Research Framework (ScARF) noted that there were fewer than ten medieval houses on the mainland, dated between 400–1100 AD. However, there are documented castles; in the north and eastern Highlands, where Norse-style structures have been documented. Evidence for medieval occupation around the area of the Proposed Development is comparatively sparce.This paucity of data suggests there is only a low probability of finding Medieval sites near the Proposed Development .

Post-medieval (AD1600 to the Present)

7.4.10 The post-medieval period in the Highlands dates (1600 AD to the Present). There have been enormous changes in the landscape of Scotland from the 17th century. By the 17th century, the multitudinous and joint occupancy farmsteads changed to single ownership farms and state-owned forests, whilst people moved into towns. The post-medieval period in the Highlands was characterised by numerous battles such as the Battle of Culloden. The battlefield is located approximately 9 km northeast of the Proposed Development.

7.4.11 Industrialisation and Clearances in the 18th century changed the way the landscape was used and traversed in Scotland. Large parts of the Highlands were cleared for converting, the already predominately rural lands, into lands strictly devoted to sheep pastoralism.

7.4.12 Rapid industrialisation in the 18th century resulted in the construction of a wide variety of structures, including those that result from military campaigning, such as the network of roads constructed under the auspices of Major General George Wade and his successor Major William Caulfeild, two of which roads are present in the Proposed Development area. In the 19th century, a booming population in Inverness for the thriving shipbuilding, tanning and wool industries, resulted in the mass construction of houses in the region. There are three Listed Buildings within 3 km of the Proposed Development, which are likely the result of this economic boom. In addition to the aforementioned industries, by the 20th century, the population of Inverness continued to grow to provide labour for the growing distilling, tweed, and engineering industries. Tourism in the area also became a more viable industry, with the spotting of the cryptid Nessie in Loch Ness, 3 km west of the Proposed Development.

*Cartographic Analysis*

7.4.13 Analysis of historical maps which are freely available online was undertaken. Any significant archaeological findings or changes over time will be illustrated in the reporting below. Otherwise, no images will be shown, and a relevant description will be outlined in **Table 7.4** showing changes though time for an appropriate narrative of the Proposed Development Area landscape.

7.4.14 Cartographic Analysis shows that the area has remained undeveloped pastoral land and gorse, since the late 1800's (**Table 7.4**). A single structure (likely building or foundation) was present at the southern fork in the road from 1885 until the 1940's. However, it was no longer present in the mapping, or aerial imagery. Aerial imagery shows the existing Knocknagael Substation that is situated adjacent to the Proposed Development was connected to the grid in 2013, whilst the Proposed Development remained as pasture and gorse fields that were undeveloped.

**Table 7.4: Summary of Representative Maps Available of the Proposed Development Area**

| | Changes in map over time | | |
|---|---|---|---|
| Proposed Development | OS One Inch 1885-1990 | OS six Inch 1888-1913 | OS 1:1 to 1:63K, 1920s-1940's |
| | Shows a structure at the fork in the former road has been modified. Depicts a walking trail throughout pasture. Otherwise, area is pasture fields. | Area remains the same but now specified as pasture and furze (gorse). | The structure at the fork in the road is no longer present. |

*Field Visit*

7.4.15 An archaeological walkover survey was conducted by AOC Archaeology Group on 26-27 April 2022. The objectives of the walkover were as follows:

- Establish the presence, or absence, of known archaeological remains within the Proposed Development and near surroundings and record their condition and extent, input into project baseline;
- Establish the presence, or absence, of previously unknown archaeological remains within the Proposed Development and near surroundings, and to develop a baseline of heritage constraints and input into the Proposed Development design;
- Assist in the formulation of recommendations for further measures necessary to mitigate the impact of the development on the archaeological resource; and
- Aid the development of a proposal for further archaeological investigation, within a programme of research.

7.4.16 A further site visit was undertaken between 6 - 8 June 2022 during which an additional walkover of part of the Proposed Development was undertaken. Further information regarding fieldwork has been included as part the planning application.

*Designated Assets*

7.4.17 There are no designated assets within the Proposed Development (see **Appendix A, Figure 7.1** and **Appendices M and N**. There are no World Heritage Sites, Conservation Areas, Battlefields, or Gardens and Designed Landscapes within 2 km of the Proposed Development. There are four Scheduled Monuments within 2 km of the Proposed Development:

- SM2392 Carn Glas, chambered cairns 815m SE of Achvraid is located 460 m south;
- SM11786 Achvraid, hut circles 800m SE is located 560 m south;
- SM11561 Achvraid, hut circles 1030m SSE is located 960 m south; and
- SM3098 Torbreck, stone circle SW is located 1.3 km north-west.

7.4.18 There is one Listed Building within 2 km of the Proposed Development; Drumdevan House (LB8045) Category C, located 1.9 km north.

7.4.19 A further Listed Building and Garden and Designed Landscape (GDL) were included in this assessment, due to them being close to the edge of the 2 km Study Area. The Listed Building is Ness Castle and Glasshouses (LB8056, Category B) which is located 2.15 km north of the Proposed Development. The Leys Castle GDL (GDL 00264) is located 2.2 km north of the Proposed Development at its closest point.

*Non-designated Assets*

7.4.20 There are four non-designated assets within the Proposed Development:

- Hut circles – Prehistoric (CanID 365384);
- Hut circles – Prehistoric (MHG3498, CanID 13131, AOC_1, 2);
- Boundary Stone – 19th century (MHG54926 [CanID 370890, AOC_17]); and
- Boundary Stone – 19th century (MHG52760)

7.4.21 There are 13 non-designated assets within 250 m of the Proposed Development:

- Farmstead located 69 m south (MHG26103 [CanID 115093, AOC_6, 7]);
- Cairnfield, field system, and hut circle located 46 m north (MHG50593 [CanID 288349]);
- Hut circle – Achvraid located 229 m southwest (MHG61664);
- Cairnfield and hut circle located 60 m west (MHG26104 [CanID 115094, AOC_3, 4, 5]));
- Possible hut circle – 540 m east of Achvraid, Essich located 62 m west (MHG62768);
- Field system – Achvraid (MHG40368) located 223 m south (MHG40368);
- Possible hut circle – Achvraid located 41 m west (MHG62784);
- Dyke, Farmstead, Field System, Hut Circle, and Quarry located 36 m west (CanID 369902);
- Township, Big Burn located 247 m southeast (MHG25426 [CanID 115095]);
- Military Road located 160 m northwest (85525);
- Location of possible old dyke or bank recorded by HAS 2020 located 11 m south (AoC_18);
- Location of an area of field clearance recorded by HAS 2020 located 33 m west (AoC_19); and
- Location of a possible dyke recorded by HAS 2020 located 173 m west (AoC_20).

## 7.5 Other Sensitive Receptors

7.5.1 Other sensitive receptors which were identified, include four non-designated assets which will be directly impacted (see **Table 7.5).** Sensitive receptors have been identified through field survey, desk-based assessment, HES listings, LPA comments and consultation.

**Table 7.5: Sensitive Receptors**

| Name | Type | Description | HES / HER PrefRef or Field ID | Distance from the Proposed Development (m) |
|---|---|---|---|---|
| Hut circles – Prehistoric | Non-designated | Possible prehistoric hut circle. | CanID 365384 | Within the Proposed Development boundary |
| Hut circles – Prehistoric | Non-designated | Possible prehistoric hut circle. | MHG3498, CanID 13131, AOC_1, 2 | Partially within the Proposed Development boundary |
| Boundary Stone – 19th century | Non-designated | A stone boundary marker was located in the fence line of the substation field. It is probably 19th century or possibly early 20th century. | CanID 370890 | Within the Proposed Development boundary |
| Boundary Stone – 19th century | Non-designated | A stone boundary marker located nearby CanID 370890. | MHG52760 | Within the Proposed Development boundary |

## 7.6 Issues Scoped Out

7.6.1 All designated assets within 2 km were considered for an assessment of changes to their setting by the Proposed Development, which could potentially affect their cultural heritage significance. During this assessment, no designated assets were determined to have adverse setting effects, as a result of the Proposed Development. This is due to existing screening in the direction of the designated assets, limiting the visibility of the Proposed Development The existing Knocknagael Substation already formed the baseline condition of the environment which was assessed, and the limited value derived from setting for the assets identified, when related to the Proposed Development. Therefore, such designated assets have been scoped out of further consideration for this EA Report, which include the following:

- SM3098 - Torbreck, stone circle;
- SM11786 - Achvraid, hut circles;
- SM11561 - Achvraid, hut circles;
- SM2392 – Carn Glas, chambered cairns; and
- LB8045 – Drumdevan House.

7.6.2 LB8056 (Ness Castle and Glasshouses) and GDL00264 (The Leys Castle GDL) are located within 2.2 km of the Proposed Development, and are also scoped out of further consideration. Additionally, all non-designated assets out with the Proposed Development have been scoped out for direct impact. However, as there are multiple non-designated assets located within 250 m of the Proposed Development (see **Appendix A, Figure 7.2**), any changes to the layout of the site (i.e. changes to access roads etc.) may result in direct impacts to those assets. Therefore, the consideration for previously unknown buried material must be considered.

7.6.3 Indirect effects a have been scoped out of further assessment. Indirect impacts resulting from changes in noise, vibration, hydrology and setting, are not anticipated during either the construction or operation phase for any designated or non-designated assets.

7.6.4 Operational activities have been scoped out of further assessment, as routine maintenance is not anticipated to introduce new or different effects, however, non-routine activities outwith the development footprint, may require cultural heritage assessment.

## 7.7 Assessment of Effects, Mitigation and Residual Effects

*Mitigation by Design*

7.7.1 National planning policies and planning guidance, SPP (Scottish Government 2014), PAN2/2011 (Scottish Government 2011) and NPF4 (Scottish Government 2024) apply. These require a mitigation response that takes account of the potential for archaeological remains within the site to be impacted upon, enabling the preservation or recording of any significant remains, which may be present.

7.7.2 The potential to encounter buried archaeological remains, is considered to be Moderate and cannot be discounted. Consequently, a programme to mitigate the effects of any direct impacts is recommended in accordance with national and local planning policies on heritage. Any archaeological remains encountered within the Proposed Development area would likely be agricultural in nature and of low archaeological interest. However, due to the presence of prehistoric archaeology in the area, potential discoveries of higher archaeological value within the Proposed Development are also possible.

7.7.3 Any mitigation strategy developed should involve consultation with THC , as the regulatory authority, while concerns for designated assets necessitates consultation with HES.

7.7.4 In the first instance, mitigation measures should include, where possible and proportionate, avoidance of direct impacts to assets. The Proposed Development contains one non-designated asset which should be avoided (see **Appendix A, Figure 7.2**).

7.7.5 The Proposed Development has screened out setting impacts that extend beyond 2 km, due to the Proposed Development being adjacent to the existing Knocknagael Substation. All mitigation should be approved by the Local Authority before work commences.

*Construction Phase*

7.7.6 Ground disturbance, due to earthworks, are the most likely source of direct, physical impacts to known and unknown cultural heritage resources, with the potential to partially or wholly remove these resources. Direct impacts have the potential to be once off, non-reversible and permanent. Unless the principle of avoidance is adopted in the first instance, mitigation measures will not significantly reduce the predicted residual effect of this impact on the cultural heritage.

7.7.7 Avoidance is required for Boundary Stones – 19$^{th}$ century (CanID 370890 and MHG52760), which should be demarcated with a minimum 10 m exclusion zone to avoid contact and disturbance. Additionally, one hut circle (MHG3498) lies on the southwestern boundary of the Proposed Development site and should be identified, and demarcated with a minimum 10 m exclusion zone, implemented before construction to avoid direct impact.

7.7.8 Given the potential for unknown buried archaeology within the Proposed Development site and proximity to known prehistoric archaeology, a watching brief should be undertaken during all ground disturbance works in previously undeveloped areas, where the identified archaeology can be suitably assessed and mitigated.

7.7.9 Watching briefs should include the prehistoric potential of the Proposed Development , especially the areas surrounding the two hut circles (CanID 365384 and MHG3498). CanID 365384 was observed during Ground Investigation (GI) works conducted by Demay and Peteranna in 2018 (unrelated to the Proposed Development) and as such, have previously been identified and excavated subject to an archaeological walkover by an ACoW. Although this investigation suggests that part of the asset may be a natural feature in the landscape, the potential for prehistoric archaeology should be noted and understood.

7.7.10 The temporary bund area should be subject to an archaeological walkover prior to use, in conjunction with vegetation clearance, to identify any extant above-ground remains not observed during the walkover due to vegetation coverage.

7.7.11 All mitigation should be approved by the Local Authority before work commences.

7.7.12 **Table 7.6** below identifies the assets that have the potential to be directly impacted by the Proposed Development during construction. This provides the suggested mitigation measures, whilst additionally determining the residual impact following the implementation of the mitigation. There is a possibility of encountering unknown archaeology, within the footprint of the Proposed Development, with potential for damage to archaeological sites a once-off and permanent in nature. Thus, an archaeological watching brief should be conducted during any ground-disturbing activities.

**Table 7.6: Mitigation and Residual Impact during the Construction Phase**

| Environmental Feature | Development Interaction | Mitigation Measures | Receptor sensitivity | Magnitude of effect | Significance of effect |
|---|---|---|---|---|---|
| Hut circles – Prehistoric (CanID 365384) | Direct | Presence and extent of the asset should be confirmed, and a watching brief should be undertaken by a suitably | Low | Moderate | Minor Adverse |

| Environmental Feature | Development Interaction | Mitigation Measures | Receptor sensitivity | Magnitude of effect | Significance of effect |
|---|---|---|---|---|---|
| | | qualified archaeologist prior to construction. Watching brief should be informed of the possibility of encountering prehistoric archaeology in this area. | | | |
| Hut circles – Prehistoric (MHG3498) | Direct | Presence and extent of the asset should be confirmed by a suitably qualified archaeologist. Asset is on the boundary of the Proposed Development and should be demarcated and avoided, through the implementation of a 10-15 m buffer zone after identification. | Low | Low | Negligible Adverse |
| Boundary Stone – 19th century (CanID 370890) | Direct | A suitable buffer zone of 10-15 m is to be demarcated around the asset, if works are to be carried out in near proximity, to avoid disturbing the fabric of the asset. To be supervised by a suitably qualified archaeologist. Plant movement is to be monitored around the asset, to ensure avoidance. | Low | Low | Negligible Adverse |
| Boundary Stone – 19th century (MHG52760) | Direct | Asset is on the boundary of the Proposed Development and should be barricaded and avoided; implementing a 10-15 m buffer zone after identification.<br>To be supervised by a suitably qualified archaeologist. Plant movement is to be monitored around the asset to ensure avoidance. | Low | Low | Negligible Adverse |
| Unknown buried archaeology | Direct | Watching brief should be conducted during construction phase by a suitably qualified archaeologist. Archaeologist to also conduct a walkover of temporary bund area alongside vegetation clearance. | Unknown | High | Unknown |

## 7.8 Summary

7.8.1 This chapter has assessed the likely effects of the Proposed Development on cultural heritage assets.

7.8.2 During the construction phase, there are four assets within the Proposed Development that have the potential to experience a direct impact. However, following the implementation of mitigation works, including establishing exclusion zones, managing construction traffic and plant movement, in addition to conducting a watching brief, reduces the significance of effect to hut circle (CanID 365384) to Minor adverse. While hut circle (MHG3498) and both Boundary Stones (CanID 370890, MHG52760) will be reduced to Negligible adverse. No setting impacts have been identified as a result of the Proposed Development.

7.8.3 Due to the possibility of encountering unknown archaeology within the Proposed Development's footprint, a watching brief should be conducted during all ground-disturbing activities, in conjunction with the mitigation methods, as defined in **Table 7.6**.

# 8. HYDROLOGY, HYDROGEOLOGY, GEOLOGY AND SOILS

## 8.1 Introduction

8.1.1 This chapter provides an appraisal of potential effects on Hydrology, Hydrogeology, Geology and Soils resulting from the Proposed Development. It presents the baseline environment, identifies and assesses effects on receptors and, where appropriate, sets out proposed mitigation.

8.1.2 Additional detail supporting this chapter is presented in the following figures and technical appendices:

- **Appendix A, Figure 8.1**: Hydrology, Hydrogeology, Geology and Soils Study Area;
- **Appendix B**: General Environmental Management Plans (GEMPs); and
- **Appendix F**: FRA and Drainage Strategy Report.

## 8.2 Assessment Methodology and Significance Criteria

*Scope of the Assessment*

8.2.1 The assessment and methodology of the Hydrology, Hydrogeology, Geology and Soils chapter has been carried out in accordance with the requirements and principles within the following legislation, policy and guidance detailed below (listed in chronological order from oldest to newest).

*Legislation*

- The Water Framework Directive (WFD) (2000/60/EC)[52] (as implemented in Scotland via the Water Environment and Water Services (Scotland) Act 2003)[53];
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011[54];
- Industrial Emissions Directive (IED)[55];
- Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013[56]; and
- The Water Intended for Human Consumption (Private Water Supplies) (Scotland) Regulations 2017[57].

*Policy*

- Scottish Planning Policy (SPP)[58];
- National Planning Framework 4(NPF4)[59]; and
- The Highland-wide Local Development Plan (HwLDP) (Policy 63 Water Environment, Policy 64 Flood Risk and Policy 66 Surface Water Drainage)[60].

Guidance

[52] European Parliament (2000) Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy ("The Water Framework Directive"). Available online at: http://ec.europa.eu/environment/water/water-framework/index_en.html
[53] Scottish Government (2003). Water Environment and Water Services (Scotland) Act 2003. Available online at: https://www.legislation.gov.uk/asp/2003/3/contents
[54] Scottish Government (2011). The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Available online at: https://www.legislation.gov.uk/ssi/2011/209/contents/made
[55] Scottish Government (2013). The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013. Available online at: https://www.legislation.gov.uk/ssi/2013/29/made
[56] Scottish Government (2013). The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013. Available online at: https://www.legislation.gov.uk/ssi/2013/29/made
[57] Scottish Government (2017) the Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 Available online at: https://www.legislation.gov.uk/ssi/2017/282/note/made
[58] Scottish Government (2014). Scottish Planning Policy. Available online at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2014/06/scottish-planning-policy/documents/scottish-planning-policy/scottish-planning-policy/govscot%3Adocument/scottish-planning-policy.pdf
[59] Scottish Government (2023). National Planning Framework 4. Available online at: https://www.gov.scot/publications/national-planning-framework-4/
[60] The Highland Council (2012). Highland Wide Local Development Plan. Available online at: https://www.highland.gov.uk/info/178/development_plans/199/highland-wide_local_development_plan

- Planning Advice Note (PAN) 61: Planning and Sustainable Urban Drainage Systems (SUDS)[61];
- Construction Industry Research and Information Association (CIRIA) Control of Water Pollution from Construction Sites (C532)[62];
- CIRIA Development and flood risk: guidance to the construction industry, C624D[63];
- PAN 79: Water and Drainage[64];
- British Standard Code of Practice for Earthworks BS 6031 200928[65];
- Scottish Environment Protection Agency (SEPA) Engineering in the Water Environment Good Practice Guide: River Crossings[66];
- SEPA Land Use Planning System Guidance Note 31, Version 2. Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (GWDTEs)[67];
- SEPA Controlled Activities Regulations (CAR) – A Practice Guide, Version 7.2[68];
- CIRIA The SuDS Manual (C753)[69];
- CIRIA Environmental Good Practice on Site (C741)[70];
- Highways Agency's Design Manual for Roads and Bridges (DMRB) LA 113 – Road drainage and the water environment, formerly HD45/09, Revision 1, 2020[71];
- SEPA Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Water Runoff from Construction Sites[72]; and
- SEPA Guidance for Pollution Prevention[73].

*Extent of the Study Area*

8.2.2 The Hydrology, Hydrogeology, Geology and Soils study area, here, now referred to as the Study Area is defined by the Zone of Influence (ZoI) of the Proposed Development, up to a distance of 1 km, and is shown in **Appendix A, Figure 8.1.** At distances greater than 1 km within catchments, based on professional judgement and experience on other infrastructure projects of a similar nature, it is considered that the Proposed Development is unlikely to contribute to a hydrological effect, in terms of chemical or sedimentation effects, due to dilution and attenuation of potentially polluting chemicals.

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61 Scottish Government (2001). Planning Advice Note 61: Sustainable urban drainage systems. Available online at: https://www.gov.scot/publications/pan-61-sustainable-urban-drainage-systems/

62 CIRIA (2001). Control of water pollution from construction sites. Guidance for consultants and contractors (C532). Available online at: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C532&Category=BOOK

63 CIRIA (2004). Development and flood risk – guidance for the construction industry (C624D). Available online at: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C624&Category=BOOK

64 Scottish Government (2006). Planning Advice Note 79: Water and Drainage. Available online at: https://www.gov.scot/publications/planning-advice-note-pan-79-water-drainage/

65 The British Standards Institute (BSI) (2009). BS 6031:2009 Code of Practice for Earthworks. Available online at: https://knowledge.bsigroup.com/products/code-of-practice-for-earthworks/standard

66 SEPA and Natural Scotland (2010). Engineering in the Water Environment Good Practice Guide: River Crossings, Second edition. Available online at: https://www.sepa.org.uk/media/151036/wat-sg-25.pdf

67 SEPA (2014). Land Use Planning System Guidance Note 31. Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems . Version 2. Available online at: https://www.sepa.org.uk/media/143868/lupsgu31_planning_guidance_on_groundwater_abstractions.pdf

68 SEPA (2015). Controlled Activities Regulations - A Practical Guide, Version 7.2. Available online at: http://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf

69 CIRIA (2015). The SuDS Manual (C753). Available at: https://www.susdrain.org/resources/SuDS_Manual.html

70 CIRIA (2015). C741 Environmental good practice on site guide. 4th edition. Available online at: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductcode=C741&Category=BOOK

71 Highways Agency (2020). Design Manual for Roads and Bridges (DMRB) LA 113 – Road drainage and the water environment, formerly HD45/09, Revision 1. Available online at: https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727.

72 SEPA (2021). Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Water Runoff from Construction Sites. Available online at: https://www.sepa.org.uk/media/340359/wat-sg-75.pdf

73 SEPA (various). Available online at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/

*Consultation Undertaken to Date*

8.2.3 Consultations undertaken in support of the production of this chapter are summarised in **Table 8.1**.

**Table 8.1: Hydrology, Hydrogeology, Geology and Soils Consultation Responses**

| Consultee | Consultation Type | Response | How the Response is Considered |
|---|---|---|---|
| NatureScot | General Enquiry | "The proposal is to for a 275 underground connection for the Red John Pump Storage Scheme… We do not have any comments to make on the substations." | No further response is required. |
| Scottish Water | General Enquiry | "Drinking Water Protected Areas<br>I can confirm after reviewing our records that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive (WFD), in the area where the substation is to be located."<br>"Scottish Water Assets<br>There are no assets that appear to be affected by the proposed substation location." | No further response is required. |
| Scottish Environment Protection Agency (SEPA) | General Enquiry | "SEPA has no site specific comments on this proposal at this time and refers you to our standing advice." | No further response is required. |
| The Highland Council (THC) Flood Risk Management Team | Formal Pre-application Advice | "OS mapping shows small watercourses to the east of site (not included in SEPA's online Flood Maps due to their small catchment size) which may present a flood risk to the development. As the site covers a large area it may be possible to locate the infrastructure a suitable distance from, and/or elevation above, the waterbodies. If any new infrastructure is located at a position potentially at risk of flooding a Flood Risk Assessment (FRA) should be submitted to demonstrate that the infrastructure will not be at risk (or will remain operational during a flood) and that the development will not increase flood risk elsewhere. The FRA shall consider the impact of a 1 in 200 year plus climate change return period flood event.<br>If any new or upgraded watercourse crossings are required, small watercourse crossings should be oversized and larger scale watercourse crossings should be demonstrated to be adequately designed to accommodate the 1 in 200-year flow (including an allowance for climate change and freeboard) to avoid increasing the risk of flooding.<br>A minimum buffer strip of 6 m should be kept free from development, measured from the top of bank(s) of any watercourse or waterbody. | An FRA has been produced for the Proposed Development by Mott MacDonald and is provided in **Appendix F.**<br>Potential effects and mitigation relating to watercourse crossings are discussed in Section 0.<br>A minimum of a 6 m buffer around watercourses during construction, where practicable will be implemented as part of the embedded mitigation, within which no storage or construction works will take place. |

| Consultee | Consultation Type | Response | How the Response is Considered |
|---|---|---|---|
| | | Storage of materials within this area during construction is not permitted." | |
| THC Drainage Flood Risk Management Team | Formal Pre-application Advice | "A Drainage Impact Assessment (DIA) written in accordance with our Supplementary Guidance: Flood Risk and Drainage Impact Assessment, is required to be submitted with the planning application.<br>The DIA will need to detail the proposed surface water drainage and include appropriate drawings and calculations. An allowance for climate change should be included in the calculations and runoff from storms up to and including the 1 in 200 year plus climate change event should be managed within the site boundary without flooding to essential infrastructure, buildings or critical infrastructure. Clear exceedance routing plans should be provided with the planning application.<br>Surface water discharge from the site to any receiving watercourse should be limited to the equivalent pre-development greenfield rate for a range of storms up to and including the 1 in 200 year plus climate change event.<br>Supporting evidence in the DIA should include (but not be limited to) calculations showing drainage network details, contributing area summary, control / storage structure details and simulation results tables for any new network. A site plan showing the type of treatment and location on site, where this will be discharged to, and proposed maintenance arrangements must be submitted in support of the application. The drainage should be designed in line with Sustainable Drainage Systems (SuDS) principles. The Applicant should demonstrate, within the proposals submitted, any mitigation measures to manage the residual risk of overland flow/pluvial flooding." | A Drainage Strategy Report has been produced for the Proposed Development by Mott MacDonald and is provided in **Appendix F**. |

*Method of Baseline Data Collation*

8.2.4 A desk-based study has been conducted as part of the production of the Hydrology, Hydrogeology, Geology and Soils chapter. This involves the collection, analysis and interpretation of a range of data and information sourced from published documents and datasets and consultations with NatureScot, THC, SEPA and Scottish Water, relating to the water environment.

8.2.5 The desk-based study was supported by a reconnaissance survey undertaken in January 2022. The reconnaissance survey focused on verifying the findings of the desk-based study, identifying key hydrological receptors, and visiting Groundwater Dependent Terrestrial Ecosystems (GWDTEs) that were identified by the project ecology team.

*Determining Magnitude of Change and Sensitivity of Receptors*

8.2.6 Receptor sensitivity is determined using professional judgement, making use of environmental designations and quantifiable data from reputable sources (e.g., regulatory bodies and research organisations) where available. The criteria which is used to determine receptor sensitivity is detailed in **Table 8.2**.

**Table 8.2: Hydrology, Hydrogeology, Geology and Soils Receptor Sensitivity Definition Criteria**

| Sensitivity | Description | Example |
|---|---|---|
| High | An attribute of high quality and rarity with little potential for substitution, which is highly sensitive to change. | WFD designated watercourse with a High or Good ecological potential.<br>A protected site under EU or UK wildlife legislation (Sites of Special Scientific Interest) (SSSI), (Special Area of Conservation) (SAC).<br>Species and / or habitats protected under EU or UK wildlife legislation (GWDTE).<br>Public water supply and associated sources supplying areas at a regional scale. |
| Medium | An attribute of medium quality and rarity with limited potential for substitution, which is somewhat tolerant to change. | WFD-designated watercourse, with a moderate ecological potential. |
| Low | An attribute of low quality and rarity with some potential for substitution, which is tolerant to change. | WFD-designated watercourse, with a poor ecological potential.<br>Unlicensed potable surface water abstraction e.g., Private Water Supply (PWS). |
| Negligible | An attribute of very low quality and rarity, with good potential for substitution which is tolerant to change. | A non-WFD-designated watercourse not associated with any downstream WFD watercourse / waterbody.<br>Unlicensed non-potable surface water abstraction e.g., livestock supply. |

*Magnitude of Change*

8.2.7 The magnitude of change is established by assessing the potential extent and degree of the impact relative to the extent of the Proposed Development, considering the sensitivity of the receptor, longevity of the effect and hazards arising from direct and secondary effects of the impact. The criteria used to define the magnitude of impact is shown in **Table 8.3**.

**Table 8.3: Hydrology, Hydrogeology, Geology and Soils Magnitude of Change Definition Criteria**

| Magnitude of Change | Description | Example |
|---|---|---|
| Major | Results in a fundamental long-term or permanent change to the baseline of a receptor which results in wholesale impacts on the integrity or loss of the receptor. | Permanent loss of water supply.<br>Long term or permanent changes in the quality of surface water, leading to a change in WFD status or prevention of attaining a target status.<br>Floodplain loss, due to construction within identified flood risk areas/zones.<br>Major deterioration or total loss of designated geological, hydrogeological, or hydrological designated sites. |
| Moderate | Results in a material, short to medium term, change to the baseline of a receptor which | Temporary loss of water supply.<br>Temporary medium-term changes in the quality of surface water leading to a change in WFD status or prevention of attaining a target status. |

| Magnitude of Change | Description | Example |
|---|---|---|
| | results in partial impacts on the integrity or partial loss of the receptor. | Increase in impermeable surfaces which can increase surface water runoff.<br>Moderate deterioration or partial loss of designated geological, hydrogeological, or hydrological designated sites. |
| Minor | Results in a non-material transitory change to the baseline of a receptor which has minor impacts on the use or integrity of the receptor. | Short-term changes in the quality of surface water leading to a change in WFD status or prevention of attaining a target status.<br>Increase in impermeable surfaces which can increase surface water runoff.<br>Small deterioration or loss of designated geological, hydrogeological, or hydrological designated sites. |
| Negligible | Results in an imperceptible change to the baseline of a receptor which is of insufficient magnitude to affects its use or integrity. | Negligible change to surface water quality with no detectable impact on ecological value.<br>Minor changes in impermeable surfaces, resulting in negligible variations in surface water runoff.<br>Undetectable or no deterioration or loss of designated geological, hydrogeological, or hydrological designated sites. |

*Significance*

8.2.8 The sensitivity of the asset and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects based on the matrix detailed in **Table 8.4**. Through this assessment, potential effects are defined to be of as Major, Moderate, Minor or Negligible significance.

**Table 8.4: Hydrology, Hydrogeology, Geology and Soils Significance Matrix**

| Significance of Effect | | Receptor Sensitivity | | | |
|---|---|---|---|---|---|
| | | **High** | **Medium** | **Low** | **Negligible** |
| **Magnitude of Change** | **Major** | **Major** | **Major** | Negligible | Negligible |
| | **Moderate** | **Major** | **Moderate** | Negligible | Negligible |
| | **Low** | **Moderate** | Minor | Negligible | Negligible |
| | **Negligible** | Negligible | Negligible | Negligible | Negligible |

*Limitations and Assumptions*

8.2.9 The baseline conditions have been identified from a range of sources, including historical and third-party data, however, due to the dynamic nature of the Study Area certain aspects of the water environment conditions, such as the quantity and quality of water conditions, may alter during the construction and operation phases of the Proposed Development.

## 8.3 Sensitive Receptors

8.3.1 The sensitivities of the identified receptors are detailed in **Table 8.5**.

**Table 8.5: Hydrology, Hydrogeology, Geology and Soils Receptor Sensitivity**

| Receptor | Sensitivity | Sensitivity Description |
|---|---|---|
| Surface Hydrology (watercourses) | Medium | The watercourses hydrologically connected to the Proposed Development are the River Ness, Big Burn, Essich Burn and a network of field drains. |

| Receptor | Sensitivity | Sensitivity Description |
|---|---|---|
| Designated Receptors | Low | No designated receptors are hydrologically connected to the Proposed Development. |
| PWSs | High | PWSs are of high sensitivity, due to the supply of potable water to properties and businesses. |
| GWDTEs | Low | No National Vegetation Classification (NVC) habitats with potential GWDTE were recorded within the Survey Area during the habitat surveys. |
| Soils and Peat | Low | There are no known areas of Class 1 or Class 2 Peatland at the Proposed Development. |
| Coastal Waters | Low | The Proposed Development is not directly hydrologically connected to a coastal waterbody. |
| Hydrogeology (groundwater) | Medium | The Study Area is underlain by a moderately productive Middle Old Red Sandstone aquifer. |

## 8.4 Baseline Conditions

*Surface Hydrology*

8.4.1 SEPA River and Loch catchment mapping[74] shows the Proposed Development is located within the River Ness catchment and in the sub-catchment of Big Burn. The hydrological catchments and watercourses associated with the Proposed Development are shown in **Appendix A, Figure 8.1**.

8.4.2 Big Burn flows north-east of the Proposed Development boundary and appears beneath the U1096 Essich - Bunachton Road, Torbreck Road and the B862, downstream of the Proposed Development, before discharging into the River Ness. The Big Burn waterbody (ID: 20260) has a SEPA water quality classification (created for the WFD) of 'Good' but has been designated as a heavily modified waterbody due to physical alterations.

8.4.3 Essich Burn is a non-WFD designated watercourse located approximately 220 m west of the Proposed Development and flows from south to north, to the west of the Essich Road. The watercourse does not naturally meander and has a network of ponds before discharging into Big Burn.

8.4.4 A network of surface water drains is located to the east of the Study Area, which are connected to a pond to the south of the Proposed Development. Topographical data indicates that the surface water drains predominantly flow east towards Big Burn, with observations from the walkover survey indicating a drain runs north, approximately 125 m east of the Proposed Development. Generally, the watercourses are small and have correspondingly low volumes of water draining the surrounding agricultural land.

8.4.5 During the reconnaissance survey completed by ERM in January 2022, the characteristics of the unnamed watercourse to the east of the Proposed Development were observed**.** Observations from the survey show that the watercourse has low water levels; of less than 50 millimetres, a stone-based channel bed and no signs of out-of-bank flows (e.g., sediment deposits on riparian ground, compressed reeds in direction of flow). The watercourse flows in a northerly direction and is fed by a network of upstream surface water bodies, which were identified as a mixture of bogland and standing surface water during the reconnaissance survey.

*Flood Risk*

8.4.6 A FRA has been produced for the Proposed Development by Mott MacDonald and is provided in **Appendix F**. The FRA concludes, that following an assessment of multiple sources of flood risk, the Proposed Development is not considered to be at risk of flooding from groundwater, artificial drainage systems, coastal or fluvial

74 SEPA (2014) Water Environment Hub [online] Available at https://www.sepa.org.uk/data-visualisation/water-environment-hub/ (Accessed 31/07/2023)

sources. The FRA states that the SEPA pluvial flood map found small areas of flooding within the existing substation facility and within the channel of the unnamed watercourse to the east, but no flooding of the extension which makes up the Proposed Development.

8.4.7 The FRA states that "minor watercourses in closest proximity to the Proposed Development are at a greater level than the level of the platform on which the existing infrastructure sits upon, which may pose a flood risk, but there is high ground between the minor watercourse and the Proposed Development, which is confirmed from the detailed topographic survey".

8.4.8 The FRA concludes that the SEPA flood maps show that pluvial flooding is contained within the existing watercourses and low ground to the east of the Site, with pluvial flood water being separated from the Site via reinstated high ground.

8.4.9 The UK Centre for Ecology and Hydrology Flood Estimation Handbook (FEH) catchment mapping[75] indicates the unnamed watercourse to the east drains a sub catchment 0.5 km² upstream of the culvert beneath the U1096 downstream of the Proposed Development. As this drainage catchment is based from a point downstream of the Proposed Development, the catchment area at the location of the Proposed Development will be less, therefore, is unlikely to convey significant flows.

*Designated Sites*

8.4.10 NatureScot Geographic Information System (GIS) datasets[76] show there are no statutory designated sites related to the water and the geological environment within the Study Area.

*Geology, Soils and Peat*

8.4.11 The British Geological Survey (BGS)[77] 1:50,000 superficial deposit mapping, shows the superficial deposits underlying the Proposed Development, consisting of diamicton, sand and gravel of the Hummocky Glacial Deposits formation. The BGS 1:50,000 bedrock mapping shows that the underlying bedrock comprises entirely of sandstone of the Inshes Flagstone formation.

8.4.12 The National Soils Map of Scotland mapping[78], indicates that most soils present throughout the Proposed Development are mineral podzols.

8.4.13 The NatureScot Carbon and Peatland dataset[79] indicates that the Proposed Development is located on mineral soils, where peatland habitats are not typically found and there are no known areas of Class 1 or Class 2 Peatland.

*Hydrogeology*

8.4.14 The groundwater underlying the Study Area comprises the Inverness groundwater body (ID: 150670), which has an overall SEPA classification of 'Good'.

8.4.15 The BGS 1:625,000 scale digital hydrogeology mapping indicates the Study Area is underlain by a moderately productive Middle Old Red Sandstone aquifer.

75 UK Centre for Ecology and Hydrology. Flood Estimation Handbook Web Service. Available online at: https://fehweb.ceh.ac.uk/Map

76 NatureScot (2021) SiteLink Map [online] Available at: https://sitelink.nature.scot/map (Accessed 01/08/2023)

77 British Geological Survey (BGS) Geoindex Onshore [online]. Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html (Accessed on 31/07/2023)

78 Scotland's Soils National Soil Map of Scotland [online]. Available at: https://soils.environment.gov.scot/maps/soil-maps/national-soil-map-of-scotland/ (Accessed on 31/07/2023)

79 NatureScot Carbon and Peat (2016) [online]. Available at: https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/ (Accessed 01/08/2023)

*Public and Private Water Supplies*

8.4.16 Consultation with Scottish Water confirmed that the Proposed Development is not located in a catchment which may impact Scottish Water drinking water catchments or abstraction points.

8.4.17 THC PWS open-source data set[80] indicates the only PWS within the Study Area is at Achvraid Farm; approximately 575 m south-west of the Proposed Development at E264483, N 838864. The PWS is a Type A supply, meaning that it serves 50 or more persons or has commercial usage.

*Groundwater Dependent Terrestrial Ecosystems*

8.4.18 A UK Habitat survey was undertaken in April and June 2022. No habitat types with potential GWDTE were recorded within the Survey Area during the habitat surveys, and therefore no NVC survey, including GWDTE identification, was deemed necessary.

*Future Baseline*

8.4.19 The Hydrology, Hydrogeology, Geology and Soils conditions identified within the Study Area, are likely to continue to be present in their current form, in the absence of the Proposed Development.

8.4.20 There is the potential for climate change to impact future baseline conditions, through an increase in winter precipitation and decrease in summer precipitation, in addition to high average temperatures which may increase pressures on PWS's during the summer.

8.4.21 Summer storms are predicted to be of greater intensity; increasing peak fluvial flows, volumes and velocities within watercourses. Such changes could lead to an increase in areas identified as being at risk of flooding by SEPA and increases in surface water runoff.

Climate change factors have been accounted for when considering the potential for likely significant effects.

## 8.5 Issues Scoped Out

8.5.1 The issues which have been scoped out of the assessment and details on the rationale for scoping them out are detailed below.

*Migration of Pollutants from Contaminated Land*

8.5.2 Historical mapping from the Historic Environment Scotland (HES) Pastmap viewer[81] indicates there is no history of land-use within the Site which has the potential to lead to contaminated land (e.g., landfill, chemical works).

*Impacts Relating to Public Water Supplies*

8.5.3 Consultation with Scottish Water confirmed that the Proposed Development is not located in a catchment which may impact Scottish Water public drinking water catchments or abstraction points.

*Impacts Relating to Peat Stability*

8.5.4 The NatureScot Carbon and Peatland dataset, indicates that the Proposed Development is located on mineral soils, where peatland habitats are not typically found and there are no known areas of Class 1 or Class 2 Peatland.

80 Highland Council, Private Water Supplies within The Highland Council Area. Available online at: https://www.data.gov.uk/dataset/6e78286f-2014-4a2c-aefa-c1379b9f7199/private-water-supplies-within-the-highland-council-area (Accessed 21/12/2023)

81 Historic Environment Scotland, Pastmap OS Mapping 1995-1961 and 1843 to 1882. Available online at: https://www.pastmap.org.uk/map (Accessed 05/05/2024)

*Impacts to Water Framework Directive Watercourses and Waterbodies*

8.5.5 The construction of the Proposed Development will be undertaken following the methods outlined in the SSEN Transmission General Environmental Management Plans (GEMP). This construction methodology has been adopted as embedded mitigation, to ensure that there is no deterioration in the current ecological status of the WFD waterbodies, as a result of the Proposed Development. As such, impacts to WFD-designated watercourses and waterbodies, as well as a standalone WFD compliance assessment, are scoped out.

*Modifications to Groundwater Levels and GWDTEs*

8.5.6 A NVC survey was undertaken in the Study Area in May and June 2022. No NVC habitats with potential GWDTE were recorded within the Survey Area during the habitat surveys.

## 8.6 Assessment of Effects, Mitigation and Residual Effects

*Mitigation by Design*

8.6.1 The Proposed Development has been designed to reduce potential impacts, as far as reasonably practicable. This includes mitigation that is embedded into the design of the Proposed Development, in accordance with industry standard methods and procedures, which will reduce impacts from construction and operation. The following mitigation measures relating to the hydrological environment, are embedded into the design and construction of the Proposed Development, where practicable:

- 50 m watercourse buffers for construction works, except for watercourse crossings along access tracks (where feasible);
- A 6 m buffer around watercourses during construction, within which no storage or construction works will take place; and
- The Proposed Development will utilise much of the existing access track already in place at this location, which will help to minimise ground disturbance and requirement for watercourse crossings.

*Construction Phase*

Design Solutions and Assumptions

8.6.2 Vehicular access to each support structure location will be required during construction, to enable the construction works. Existing access tracks would be used, where feasible, and, as required. Construction methodologies are detailed in **Chapter 2: Description of the Proposed Development** and include:

- Temporary site compound and construction laydown area
- Extension of the existing Knocknagael 275 kV External Air Insulated Switchgear (AIS) double busbar, to create a new 275 kV AIS bay to connect the new circuit from the Loch na Cathrach 275 kV Switching Station;
- Indicative platform size of 90 m x 110 m (on south-east side) along with associated earthworks;
- Upgrade of existing access tracks and drainage, in addition to construction of new access tracks and drainage, as required. The main access road within the substation and the temporary bellmouth from the public road will be tarmac, any other accesses to plant and apparatus will be stone surface and a mix of permanent and temporary;
- Existing 275 kV cable circuit re-route to allow sufficient room for the extension works;
- A new temporary construction entrance to the Proposed Development from the public road located to the south of the existing Knocknagael Substation main entrance. The temporary entrance will be reinstated upon completion of the Proposed Development's construction;
- Landscaping and biodiversity requirements; and
- Palisade perimeter fence of approximate maximum height of 2.4 m.

8.6.3 Prior to construction, it is anticipated that additional information, over and above what has been provided within this chapter, would be required to inform the detailed design of crossings for flow conveyance and ecological provision. This would be informed by consultation with SEPA and THC.

8.6.4 Relevant sections of the SSEN Transmission GEMPs will inform that a CEMP is implemented by the Principal Contractor, post submission. GEMPs are included as **Appendix B** and relevant GEMPs include the following:

- PWS;
- Working in or Near Water;
- Watercourse Crossings;
- Soil Management;
- Contaminated Land;
- Oil Storage and Refuelling;
- Forestry;
- Bad Weather; and
- Working with concrete.

8.6.5 The assessment of effects within this chapter assumes that embedded mitigation measures, including those detailed within the CEMP, and relevant GEMPs, are implemented.

*Description of Effects*

8.6.6 The nature of effects that could result from construction activities, based on the Proposed Development detailed in **Chapter 4: Methodology**, and the assessment methodology detailed in **Section 4.3** are outlined below.

Impediments to and Modification of Surface Water Drainage Patterns

8.6.7 Construction activities in, or adjacent to, watercourse channels, the location of watercourse crossings in constrained channels or inadequately designed crossings could impede flows within watercourses and cause blockages, resulting in flooding upstream.

8.6.8 The introduction of new or upgraded access tracks can disrupt the natural drainage regime, by concentrating flows and altering the infiltration capacity of soils.

8.6.9 As part of the drainage regime at the Proposed Development, a new land drain will be installed along the eastern edge of the temporary construction access track to drain the runoff from the road and embankments.

8.6.10 The Proposed Development includes the installation of a temporary construction access track from U1096. Where possible, existing access tracks will be used and upgraded, as required, limiting the extent of watercourse crossings. Any watercourse crossings installed as part of the Proposed Development will be subject to CAR authorisation as long as the crossed watercourse is shown on 1:50,000 scale OS mapping. Where watercourses are crossed which are not shown on 1:50,000 scale mapping (e.g., small headwater channels, field and forestry drains) structures appropriate to the localised conditions, will be installed and anticipated to be designed as over-sized culverts in line with SEPA's good practice guidance, SEPA CAR Practical Guidance (In particular the General Binding Rules)[82] and the GEMPs.

8.6.11 The adoption of good practice measures detailed in the GEMP, would reduce the impact of modification to drainage flow patterns, with artificial drainage only installed, where necessary, and would be installed in advance of ground being cleared, where practicable. All crossing structures would be designed and constructed

[82] SEPA, The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) A Practical Guide. Available online at: https://www.sepa.org.uk/media/r3cmimzy/car-a-practical-guide-v93-final.pdf

following good practice techniques in accordance with the GEMPs, and be of sufficient capacity to facilitate flows to a 1 in 200-year event, with an appropriate allowance accounting for increases in flows due to climate change, in accordance with SEPA guidance.

8.6.12 Diversion of a minor watercourse at the Site (i.e., a watercourse not visible on 1:50,000 scale OS mapping) will be required as part of the temporary access tracks and earthworks. The diversion of a watercourse has the potential to displace surface water drainage patterns, where appropriate compensatory drainage is not provided, whilst also interfering with drainage characterises through altering surface water flow routes across the Proposed Development. The field drain subject to diversion flows through the proposed cut-and-fill (earthworks) area to the east with the diversion from NGR NH 65447 38899 to NH 65379 39068, with a small extension of the drain also being diverted, as shown in **Appendix F**. Observations from the ERM reconnaissance survey, indicate that the watercourse is approximately 300 mm wide with grassy banks, with both flows and water levels at the time of the survey being low. Images of the watercourse are shown in **Plate 8.1**.

**Plate 8.1: Watercourse Proposed for Diversion**

8.6.13 The watercourse diversion will be designed on a like-for-like basis which includes No Net Loss in the total watercourse length within a water body. The designs will incorporate measures which enhance the in-channel and riparian habitat quality, through the provision of a multistage channel and marginal planting, using natural routing. The diversion will be subject to a SEPA CAR Simple Licence (as the watercourse width is less than 3 m wide), and will be completed in accordance with the following diversions and realignments measures set out in CAR Flood Risk Standing Advice[83]:

- Minimising sharp bends and changes to slope which will affect velocity;
- To minimise detrimental changes to the channel the proposed channel dimensions/ characteristics will be kept similar to existing channel dimensions, i.e. mimic existing channel plan form;
- The proposed channel will not be located closer to infrastructure or property compared to the existing channel as it can increase the risk of flooding to existing infrastructure or property;
- The channel will follow the natural topography of the land to ensure floodwater is returned to the watercourse, thus, limiting flooding elsewhere; and

[83] SEPA, CAR Flood Risk Standing Advice for Engineering, Discharge and Impoundment Activities. Available online at: https://www.sepa.org.uk/media/94134/car-flood-risk-standing-advice-for-engineering-discharge-and-impoundment-activities.pdf

- Regular monitoring of the post engineering work will be undertaken.

8.6.14 Accounting for the design and embedded mitigation, the Magnitude of Impact on drainage patterns of surface hydrology (Medium sensitivity) is **Negligible** and the Magnitude of Change is **Minor**, therefore, the Significance of Effect is **Negligible**.

Increase in Surface Water Runoff and Flood Risk

8.6.15 The introduction of hardstanding surface on existing greenfield land, as part of the Proposed Development, has the potential to reduce the infiltration capacity of underlying soils and increase the rate of surface water runoff entering watercourses and drainage features.

8.6.16 A surface water drainage system design has been produced for the Proposed Development by Mott MacDonald and is provided in **Appendix F**. The drainage system comprises a network of filter drains in combination with a permeable platform and attenuation basin, which will attenuate surface water runoff from the Proposed Development to a 1 in 200-year event, with a n appropriate climate change allowance in accordance with SEPA guidance[84], whilst limiting discharge rates to the calculated greenfield runoff rate.

8.6.17 Accounting for the implementation of a surface water drainage strategy, which will limit discharge rates to the existing greenfield runoff rate, the Proposed Development will not lead to an increase in surface water runoff. Therefore, accounting for the design and embedded mitigation, the Magnitude of Impact of an increase on surface water runoff on downstream receptors (High sensitivity) is **Negligible** and the Magnitude of Change is **Minor**, therefore, the Significance of Effect is **Negligible**.

Pollution Incidents

8.6.18 During construction a number of pollutants will be present onsite to facilitate construction activities, including oil, fuels, chemicals, concrete and waste. Any pollution spillage or incident could have a detrimental effect on the water quality of nearby surface watercourses, groundwater and soils.

8.6.19 Construction good practice methods, outlined within the CEMP and based on the GEMPs, will limit the potential risk of spillages and contamination, to reduce the potential for chemical pollutants to be transferred to the water environment and protect watercourses from impacts related to construction works.

8.6.20 Additional measures, such as absorbent spill pads / kits and other measures highlighted within a CEMP, will effectively limit the uncontained release of chemicals to minor localised releases. These would be minimised through best practice construction methods, such as vehicle speed limits and regular vehicle and machine maintenance. Routine training practices, such as staff inductions and toolbox talks will be conducted throughout construction.

8.6.21 Accounting for the design and embedded mitigation, the Magnitude of Impact of pollution on surface watercourses, groundwater and soils (Medium and Low sensitivity) is **Negligible** and the Magnitude of Change is **Minor**, therefore, the Significance of Effect is **Negligible**.

Erosion and Sedimentation

8.6.22 Erosion and sedimentation can occur from excavations, stone winning, ground disturbance and overburden stockpiling. Sediment entering watercourses has the potential to affect water quality and flows of surface watercourses. This can have subsequent impacts on designated hydrological receptors, hydrologically connected to an impacted watercourse, through either an increase or decrease in nutrients and flows.

[84] SEPA, Climate Change Allowances for Flood Risk Assessment in Land Use Planning. Available online at: https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.sepa.org.uk%2Fmedia%2Ffxjgfjmf%2Fclimate-change-allowances-guidance.docx&wdOrigin=BROWSELINK

8.6.23 Good practice site environmental management measures set out in the Soil Management GEMP will reduce any potential effects of soil erosion and sedimentation.

8.6.24 Accounting for the design and embedded mitigation, the Magnitude of Impact of erosion and sedimentation on surface watercourses (Medium sensitivity) is **Negligible** and the Magnitude of Change is **Minor**, therefore, the Significance of Effect is **Negligible**.

Modifications to Hydrogeology and Groundwater Levels

**8.6.25** Cutting of ground (earthworks) at the Site will be required as part of the platform extension, access road and attenuation basin, with the approximate cut volumes summarised in **Table 8.6**.

**Table 8.6: Earthworks Cut Summary**

| Infrastructure | Bedrock Cut Volume ($m^3$) | Superficial Soil Cut Volume ($m^3$) | Topsoil Cut Volume ($m^3$) |
|---|---|---|---|
| Platform Extension and Access Road | 27,100 | 49,150 | 7,290 |
| Attenuation Basin | 0 | 4,320 | 990 |

8.6.26 Excavations, foundations and hardstanding areas 2 m or deeper have the potential to divert shallow groundwater flows through de-watering if implemented or change sub-surface water flow by creating physical barriers within superficial deposits. Excavations which are more than 5 m below the ground surface, have the potential to divert and interrupt deeper groundwater flow paths and deposits.

8.6.27 Prior to excavation works, Ground Investigations (GI) will be conducted by an appointed contractor, which will include the identification of groundwater levels within the areas of excavation. Where groundwater is identified, dewatering or groundwater diversion, will be conducted with mitigation and control measures in accordance with best practice guidance (e.g., CIRIA Groundwater Control[85]). Measures relating to the identification and protection of groundwater will be detailed and secured within the CEMP.

8.6.28 Accounting for the design and embedded mitigation the magnitude of impact of modifications to hydrogeology (Medium sensitivity) is **Negligible** and the Magnitude of Change is **Minor** and therefore the Significance of Effect is **Negligible**.

Reduction in the Quality and Quantity of Private Water Supplies

8.6.29 There is one PWS located within the Proposed Development at approximately 600 m south-west of the Proposed Development at E264483, N838864. No PWS are located within 250 m of the Proposed Development and, as such, there is no requirement for a standalone detailed PWS Risk Assessment, in accordance with SEPA Landuse Planning System (LUPS) Guidance 31.

8.6.30 Considering the distance of the PWS from the Proposed Development and measures set out in the PWS GEMP, the Magnitude of Impact to PWSs (High sensitivity) is **Negligible** and the Magnitude of Change is **Minor**, therefore, the Significance of Effect is **Negligible**.

Loss and Compaction of Soils

8.6.31 Plant and vehicle movements, as well as soil storage and stripping, can impact the formation and nature of soils. The movement of vehicles and plant is likely to result in soil compaction. The stripping, transportation and

[85] CIRIA, Groundwater Control: Design and Practice (C750). 2016.

storage of soils will have the potential to cause soil erosion and loss of soils, leading to a degradation in the quality and storage capability of soils.

8.6.32 The measures set out in the Soil Management GEMP, will limit potential impacts on soil compaction and quantities. Traffic routes will be clearly defined throughout construction, with vehicles not permitted to route through ground out with the defined access. Access to unstripped grounds, will be limited to low weight and tracked vehicles. A defined working area, where soil stripping will take place, will be set for construction, with the number of working areas planned for and managed, to ensure that soil transportation within the Proposed Development is limited. Stripping will be undertaken with care, in accordance with industry standard best practice measures, with topsoil and sub-soils being removed and stored in clearly separated bunds on unstripped grounds.

8.6.33 Accounting for the design and embedded mitigation, the Magnitude of Impact of the loss and erosion of soils (Low sensitivity) is **Negligible,** and the Magnitude of Change is **Minor**, therefore, the Significance of Effect is **Negligible**.

8.6.34 Operational Phase

Activities that could be potentially detrimental to the hydrological environment are greatly reduced during the operational phase of developments (e.g. excavation works, concrete pouring etc.). The receptors with potential to be impacted during the operation and maintenance phase of the Proposed Development, will be the same as those identified to be potentially impacted during the construction phase. Therefore, the sensitivity of the receptors remains the same as the construction.

## 8.7 Summary

8.7.1 This assessment considered the potential effects of the Proposed Development on the following receptors within the Study Area:

- Surface Hydrology;
- Designated Sites;
- Geology;
- Soils and Peat;
- Hydrogeology; and
- PWS .

8.7.2 Through the implementation of embedded mitigation measures, and additional measures detailed in this chapter, the assessment concludes that the Proposed Development will not give rise to significant effects on Hydrology, Hydrogeology, Geology and Soils receptors. A summary of the mitigation proposed within this Chapter is provided in **Table 8.7**.

**Table 8.7: Geology, Hydrogeology, Hydrology and Soils Mitigation**

| Potential Effect | Activity Causing Effect | Receptor | Mitigation | How Mitigation Will be Secured |
|---|---|---|---|---|
| Impediments to and Modification of Surface Water Drainage Patterns | Introduction of temporary, new or upgraded access tracks. | Surface watercourses. | 6 m buffer around watercourses during construction.<br>Measures set out in GEMPS. | CEMP and GEMPs. |
| | Installation of new land drain. | Surface watercourses. | Measures set out in the Working in or Near Water GEMP. | CEMP and GEMPs. |

| Potential Effect | Activity Causing Effect | Receptor | Mitigation | How Mitigation Will be Secured |
|---|---|---|---|---|
| | | | Measures in accordance with SEPA CAR Flood Risk Standing Advice. | |
| | Watercourse crossings. | Surface watercourses. | Measures set out in Watercourse Crossing GEMP.<br>Crossings will be of sufficient capacity to facilitate flows to a 1 in 200-year event with an appropriate climate change allowance. | CEMP and GEMPs. |
| | Watercourse diversion. | Surface watercourses. | Measures set out in GEMPS.<br>Measures in accordance with SEPA CAR Flood Risk Standing Advice. | CEMP and GEMPs. |
| Increase in Surface Water Runoff and Flood Risk | Increase in impermeable surfaces. | Surface watercourses.<br>Connected downstream receptors. | Installation of a drainage system as set out in **Appendix F**. | CEMP. |
| Pollution Incidents | Pollution or spillage of chemical pollutants. | Surface water, groundwater and soils. | Best practice measures based on the Oil Storage and Refuelling GEMP. | CEMP and GEMPs. |
| Erosion and Sedimentation | Excavations, stone winning, ground disturbance and overburden stockpiling | Surface watercourses | Best practice measures based on the Soil Management GEMP. | CEMP and GEMPs. |
| Modifications to Hydrogeology and Groundwater Levels | Ground cutting | Groundwater | Best practice measures based on the CEMP.<br>GI to be conducted prior to excavations by the appointed contractor. | CEMP. |
| Reduction in the Quality and Quantity of PWS | Construction | PWS | Best practice measures based on the PWS GEMP. | CEMP and GEMPs. |
| Loss and Compaction of Soils | Plant and vehicle movements and soil storage and stripping | Soils | Best practice measures based on the Soil Management GEMP. | CEMP and GEMPs. |

# 9. SCHEDULE OF MITIGATION

## 9.1 Introduction

9.1.1 The purpose of this Chapter is to provide a summary of the key mitigation measures proposed throughout this EA, to minimise or offset the potential effects of the Proposed Development on the receiving environment.

9.1.2 During the construction and operational phases of the Proposed Development, relevant mitigation measures will be detailed within and implemented through a CEMP.

## 9.2 Summary of Measures

9.2.1 **Table 9.1** provides a summary of those mitigation measures identified. The following mitigation codes are used in this section:

- GE - General
- LV – Landscape and Visual Impact Assessment
- EO – Ecology and Ornithology
- CH – Cultural Heritage
- HG – Hydrology, Hydrogeology, Geology and Soils
- TT - Traffic and Transport

**Table 9.1: Schedule of Environmental Mitigation**

| Ref. | Mitigation |
|---|---|
| **GE1** | Implementation of a Construction Environmental Management Plan (CEMP) |
| **GE2** | Implementation of SSEN Transmission's General Environmental Management Plans (GEMPs) through the CEMP |
| **LV1** | It is recommended that existing trees adjacent to the works are protected during construction according to BS 5837 |
| **LV2** | A landscape mitigation plan and supporting landscape strategy and planting plan has been prepared to promote screening of the Proposed Development. |
| **EO1** | Implementation of the SSEN Transmission Badger Species Protection Plan |
| **EO2** | Implementation of the SSEN Transmission Bat Species Protection Plan |
| **EO3** | Implementation of the SSEN Transmission Red Squirrel Species Protection Plan |
| **EO4** | Implementation of the SSEN Transmission Bird Species Protection Plan |
| **EO5** | Implementation of the SSEN Transmission Otter Species Protection Plan |
| **EO6** | Implementation of the SSEN Transmission Pine Marten Species Protection Plan |
| **EO7** | Implementation of the SSEN Transmission Wildcat Species Protection Plan |
| **EO8** | Pre-construction site survey of the Proposed Development boundary by a suitably qualified Ecological Clerk of Works (ECoW), focussing on habitats and species to be directly and indirectly impacted by the Proposed Development. |
| **EO9** | A buffer of 150 m around the nest box will be maintained during works where there is evidence of kestrels nesting. |
| **EO10** | Works should be undertaken out with the breeding bird season as much as possible. Where work must be undertaken during the breeding bird season, nesting bird checks, prior to vegetation removal, will be undertaken by an ECoW no more than 48hrs prior to vegetation removal. If birds are found to be |

| Ref. | Mitigation |
|---|---|
| | nesting, any works which may affect them should be delayed until the young have fledged and the nest abandoned naturally. |
| **EO11** | If felling of any of the seven trees identified as having low suitability for foraging and commuting habitats for bats are to be carried out, they must be rechecked by a bat licenced ECoW. If torpid or hibernating bats are uncovered at any time during the works, the works must cease immediately and further advice should be sought. |
| **EO12** | Works must avoid disturbing the roost at Knocknagael Substation through light, noise or vibration. To ensure that is the case, a competent ecologist will review plans including proposed activities, timings and proposed illumination. If it is deemed that there is a risk of disturbing the roost, a bat survey, in line with the Bat Conservation Trust (BCT) guidelines, must be undertaken prior to the start of work to determine the status of the roost. Appropriate mitigation measures must be put in place to prevent disturbance, where SSEN's SPP for bats will be followed. If disturbance is unavoidable a NatureScot European Protected Species (EPS) licence application would be required. |
| **EO13** | Additional check surveys of all suitable habitat will be undertaken a minimum of 48 hours prior to construction to confirm the current status of these species in the Survey Area |
| **EO14** | In line with SPPs, any works that must take place within the protection zone, will be done under a licence from NatureScot. Destruction of setts or dens will only be done as a last resort and only under licence. |
| **EO15** | Any temporarily exposed pipe system should be capped when staff are off-site, to prevent badgers from gaining access |
| **EO16** | All exposed trenches and holes should be provided with mammal exit ramps e.g. wooden planks or earth ramps when Contractors are off-site. |
| **EO17** | An emergency procedure should be implemented by site workers if badger / badger setts are unexpectedly encountered. All work within 30 m (100 m for high noise/vibration activities) should cease until a suitably qualified and experienced ecologist and experienced ECoW has inspected the site and determined the appropriate course of action. |
| **EO18** | An emergency procedure will be implemented by site workers if wildcat dens are encountered. All work within 200 m will cease, and the ECoW will inspect the site and define mitigation (if required), in line with this SPP. |
| **EO19** | An exceptional circumstance procedure will be implemented, should mitigation options not prove satisfactory in a particular case. Works will be halted whilst mitigation is determined (under consultation with the NatureScot licensing team, if required). |
| **EO20** | Appropriately sized protection zones will be marked and signed on the ground by the ECoW, with appropriate material, around any squirrel dreys identified. If works within protection zones boundaries cannot be avoided, a licence for disturbance from NatureScot will be required. Destruction of dreys must only be undertaken as a last resort and requires a licence from NatureScot. |
| **EO21** | Pre-clearance checks of areas of vegetation removal for reptiles and amphibians, by an appropriately qualified and experienced ECoW. Vegetation clearance will be done in a staged approach, to allow egress of any remaining reptiles. Any refugia, such as brash or debris piles, will be manually disassembled under ECoW supervision. |
| **CH1** | Hut circles – Prehistoric (CanID 365384) - presence and extent of the asset should be confirmed, and a watching brief should be undertaken by a suitably qualified archaeologist prior to construction. Watching brief should be informed of the possibility of encountering prehistoric archaeology in this area. |
| **CH2** | Hut circles – Prehistoric (MHG3498) - Presence and extent of the asset should be confirmed by a suitably qualified archaeologist. The asset is on the boundary of the development and should be demarcated and avoided; implementing a 10 m buffer zone after identification. |
| **CH3** | Boundary Stone – 19th century (CanID 370890) - A suitable buffer zone of 10-15 m is to be demarcated around the asset if works are to be carried out in near proximity to avoid disturbing the fabric of the |

| Ref. | Mitigation |
|---|---|
| | asset. To be supervised by a suitably qualified archaeologist. Plant movement is to be monitored around the asset to ensure avoidance. |
| **CH4** | Boundary Stone – 19th century (MHG52760) – The asset is on the boundary of the Proposed Development and should be barricaded and avoided; implementing a 10-15 m buffer zone after identification.<br>To be supervised by a suitably qualified archaeologist. Plant movement is to be monitored around the asset to ensure avoidance. |
| **CH5** | Unknown buried archaeology – Watching brief should be conducted during construction phase by a suitably qualified archaeologist. |
| **HG1** | A 50 m watercourse buffer will be implemented for construction works, except for watercourse crossings along access tracks (where feasible). |
| **HG2** | A 6 m buffer around watercourses during construction, within which no storage or construction works will take place. |
| **HG3** | The Proposed Development will utilise much of the existing access track already in place at this location, which will help to minimise ground disturbance and requirement for watercourse crossings. |
| **HG4** | Absorbent spill pads / kits and other measures to limit the uncontained release of chemicals to minor localised releases. |
| **HG5** | Prior to excavation works, GI will be conducted by an appointed contractor, which will include the identification of groundwater levels within the areas of excavation. Where groundwater is identified, dewatering or groundwater diversion, will be conducted with mitigation and control measures in accordance with best practice guidance (e.g., CIRIA Groundwater Control). |
| **TT1** | A CTMP will be prepared and submitted to THC for approval. It is assumed the requirement for the CTMP would be secured by an appropriately worded planning condition. This CTMP will provide specific timings of construction phases and will consider the specific details of how construction will be managed. |
| **TT2** | Drivers of all delivery vehicles will be provided with a driver's card clearly showing the approved route to the Site, and any restrictions. Drivers of HGVs and other vehicles will be made aware that only the approved route is to be used and that access from non-approved routes is prohibited. |
| **TT3** | All AILs will be delivered to the Site under escort in accordance with permits issued by the appropriate authorities and an abnormal load route assessment study will be undertaken to support the permit application. It is assumed the requirement for the abnormal load route assessment study would be secured by an appropriately worded planning condition. |
| **TT4** | A pre/post road condition survey will be carried out for the carriageway on the routes to the Site (C1064 and U1096) in conjunction with the THC Road Maintenance Department to identify and defects and how they will be rectified.<br>Sections of the C1064 and U1096 are deemed too narrow to allow for two opposing HGVs to pass each other, or for a farm vehicle e.g. tractor or car to pass an HGV. Therefore, in order to prevent the risk of obstruction of these routes due to construction traffic, additional passing places might be required. These will be reviewed as part of the pre/post condition survey of the delivery route which could be included as a condition of any such planning permission. |
| **TT5** | Deliveries associated with the Proposed Development will be prearranged with Site management and are to be booked for arrival onto the Site at a specific time to ensure opposing vehicles, including third parties, do not meet on the C1064 and C1096 where practicable. |
| **TT6** | Implementation of delivery vehicle hold-off areas. A safe area (for example a service station or lay-by) where approaching delivery vehicles can pull over and contact the Site manager to obtain clearance to make a final approach to the Site. The Site manager will control the approach and departure of HGVs to ensure they cannot meet on the C1064 and C1096 |

| Ref. | Mitigation |
|---|---|
| **TT7** | To warn approaching drivers of the increased number of HGVs during the construction phase, the Principal Contractor will install and maintain warning signage at the proposed access junction and on the route to the Site for the duration of construction. Directional signage will be installed on the route to the Site to prompt delivery drivers to use the correct route to the Site, and to enforce the proposed traffic management procedures. |
| **TT8** | During the construction phase of the Proposed Development, it is proposed that the appointed contractor consider the services of a banksman at the Site access to manage the entrance and egress of vehicles at the Site. The banksman will be responsible for administering the delivery vehicle booking system, communicating with the hold off area, and for ensuring that vehicles arriving and departing the site have a clear route. A banksman would ensure that HGVs only leave the Site when the road is clear. Vehicles associated with the Proposed Development must not park on the public road and banksmen should ensure that vehicles do not have to wait on the main road before turning onto the Site. |
| **TT9** | If required, to prevent the deposition of mud on the public highway, the appointed Principal Contractor would install and operate wheel washing facilities at the Site entrance junction during construction. These facilities will remain in place for the duration of the construction phase of the Proposed Development. Steps should be taken to prevent the deposition of mud and debris on the public road, and if this occurs then road cleaning should immediately be undertaken. |