Alyth 275/400 kV Substation and Associated Infrastructure

Environmental Appraisal

October 2019

Scottish & Southern Electricity Networks

CONTENTS

Appendices

Figures

GLOSSARY AND ABBREVIATIONS

275 kV	275 kilovolt (275,000 volt) operating voltage electrical circuit
400 kV	400 kilovolt (400,000 volt) operating voltage electrical circuit
AAAC	All Aluminium Alloy Conductor
AC	Angus Council
ACAS	Aberdeenshire Council Archaeology Service
ACSR	Aluminium Conductor Steel Reinforced
AIS	Air Insulated Switchgear
ALDP	Angus Local Development Plan
AOD	Above Ordnance Datum
ASH	ASH design+assessment Ltd
AWI	Ancient Woodland Inventory
BAP	Biodiversity Action Plan
BGS	British Geological Survey
BoCC	Birds of Conservation Concern
BS	British Standard
BTO	British Trust for Ornithology
CAR	Controlled Activities Regulations
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
COSHH	Control of Substances Hazardous to Health
DTM	Digital Terrain Modelling
DWPA	Drinking Water Protection Area
DWS	Drinking Water Standards
EA	Environmental Appraisal
EC	European Commission
ECoW	Environmental Clerk of Works
ECU	Energy Consents Unit
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic Fields
EU	European Union
FRA	Flood Risk Assessment

FWPM	Freshwater Pearl Mussel
GDL	Garden and Designed Landscape, as listed on the Inventory of Gardens and Designed Landscapes held by Historic Environment Scotland
GEMPs	General Environmental Management Plans
GIS	Gas Insulated Switchgear
GPP	Guidance for Pollution Prevention
GPS	Global Positioning System
GVLIA3	Guidelines for Landscape and Visual Impact Assessment 3rd Edition
GWDTE	Groundwater Dependent Terrestrial Ecosystems
Ha	Hectare. An area measuring 10,000 square metres
HES	Historic Environment Scotland
HLAmap	Historic Land-Use Assessment Data for Scotland
HS	Historic Scotland
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plans
LCTs	Landscape Character Types
LLZs	Local Landscape Zones
LOD	Limits of Deviation
LVIA	Landscape and Visual Impact Assessment
MCIEEM	Member of the Chartered Institute of Ecology and Environmental Management
MSCDN	Mechanically Switched Capacitor with Damping Network
MSS	Marine Science Scotland
NBN	National Biodiversity Network
NGC	National Grid Company
NGR	National Grid Reference
NHZ	Natural Heritage Zone
NRHE	National Record of Historic Environment
OHL	Overhead Line. An electric line installed above ground, usually supported by lattice steel towers or wooden poles.
OS	Ordnance Survey
PAC	Pre-Application Consultation
PAN (Chapter 1)	Proposal of Application Notice
PAN (Chapter 7)	Planning Advice Note
PKC	Perth & Kinross Council
PKHT	Perth and Kinross Heritage Trust

PKLCP	Perth and Kinross Local Development Plan
Planning Application	An application for planning permission under the Town and Country Planning (Scotland) Act 1997, as amended by the Planning etc. (Scotland) Act 2006
PPG	Pollution Prevention Guidance Notes
PRF	Potential Roost Features
Proposed Development	The Proposed Development is taken to be the description of: the location of the development; the physical characteristics of the substation and OHL components, proposed access arrangements and any associated construction activities and land-use requirements.
PWS	Private Water Supply
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation – designated under Directive 92/42/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (known as – The Habitats Directive)
SBL	Scottish Biodiversity List
Section 37	An application for development consent under Section 37 of the Electricity Act 1989
SEPA	Scottish Environment Protection Agency
SHE Transmission	Scottish Hydro Electric Transmission plc – part of Scottish and Southern Electricity Networks, and the transmission licence holder for the transmission of electricity in the north of Scotland
SINC	Site of Importance for Nature Conservation
SNAWI	Semi-natural Ancient Woodland Inventory
SNH	Scottish Natural Heritage
SM	Scheduled Monument
SMR	Sites and Monuments Record
SPA	Special Protection Area – designated under Directive 2009/147/EC on the Conservation of Wild Birds (the Birds Directive)
SPAD	Scottish Palaeoecological Archive Database
SPPs	Species Protection Plans
SSEN	Scottish & Southern Electricity Networks
SSSI	Site of Special Scientific Interest – designated by SNH under the Nature Conservation (Scotland) Act 2004
STACOM	Static Synchronous Compensator
SuDS	Sustainable Drainage System
TDSFB	Tay District Salmon Fisheries Board
UKBAP	United Kingdom Biodiversity Action Plans
WEWS	Water Environment and Water Services

ZTV	Zone of Theoretical Visibility – the computer generated theoretical visibility of an object in the landscape

CONTENTS

1. INTRODUCTION AND SCOPE OF REPORT

1.1 Introduction

1.1.1 Scottish Hydro Electric Transmission plc (SHE Transmission) is a wholly owned subsidiary of the SSE plc group of companies. SHE Transmission owns and maintains the electricity transmission network across the north of Scotland, and holds a license under the Electricity Act 1989 to develop and maintain an efficient, co-ordinated and economical system of electricity transmission.

1.1.2 SHE Transmission is applying for consent to construct a new 275 / 400 kilovolt (kV) substation (Alyth substation) and associated infrastructure, hereafter referred to as the "Proposed Development", on land 450 metres (m) to the north-west of Haughend Farm, approximately 3.5 km southeast of the town of Alyth in Perth and Kinross. The Proposed Development is located in the Local Authority of Perth and Kinross Council (PKC), close to the boundary with Angus and its location is shown on **Figure 1.1**.

1.2 Need for the Project

1.2.1 A number of significant generation projects connecting to the transmission network has triggered the need for an upgrade to the East Coast transmission network. This upgrade will take place in two stages; stage 1 will include an upgrade of the existing 275 kV network to allow for early delivery of increased capacity on the network, and stage 2 will upgrade the existing 275 kV network to 400 kV operation to facilitate further increased capacity on the network to enable new generation connections.

1.2.2 The Proposed Development is proposed to be built at the point where the existing 275 kV overhead line (OHL) network converges on an existing OHL T-Junction. The current OHL arrangement leads to an unequal sharing of power flows on OHLs between the Fetteresso, Tealing and Kincardine substations, which limits the capacity of the OHLs and the ability of the network to accept new generation connections. Establishing a new substation at the T-Junction and connecting the OHLs into the substation will address this issue.

1.2.3 The substation will operate at 275 kV between 2023 and 2026 (stage 1) and, upon the installation of two 275 / 400 kV transformers within the Proposed Development footprint in 2026 (stage 2), the substation will thereafter operate at 275 / 400 kV.

1.2.4 The Proposed Development and associated infrastructure forms an integral part of the reinforcements to the transmission network in the east of Scotland to help balance power flow and enable new energy generation to link to the main transmission system and centres of demand.

1.3 Overview of the Proposed Development

1.3.1 The Proposed Development would comprise the following:

- a new 275 / 400 kV substation, approximately 6.7 hectares (ha) in area[1], centred at approximate National Grid Reference (NGR) NO 2880 4706 within the vicinity of the existing OHL T-Junction;
- diversion of the existing 275 kV OHLs into the proposed Alyth 275 / 400 kV substation including the Kintore to Kincardine 275 kV OHL and the Alyth to Tealing 275 kV OHL, consisting of the modification of the T-Junction tower, removal of one existing steel lattice tower and construction of three new steel lattice towers and associated conductors;
- downleads (i.e. the conductors connecting the OHL to the substation) would connect the diverted OHL into the new substation;

[1] Note that the planning application boundary is c. 14.40 ha in area.

- temporary creation and use of site compounds and laydown areas to the east and west of the proposed Alyth 275 / 400 kV substation during construction; and
- construction of a new substation access road to the north-west of the proposed Alyth 275 / 400 kV substation.

1.3.2 Improvements to the local public road network would be required ahead of construction, such as widening the junction and carriageway from the B954 to the entrance of the proposed substation. To enable delivery of the transformers to the substation site, a disused railway bridge would need to be dismantled. These improvement works will be captured under a separate planning application under the Town and Country (Scotland) Planning Act 1997, as amended.

1.3.3 Consent was previously granted by PKC for a new substation at Haughend Farm on 9th December 2012 (Application Reference: 12/00948/FLM). The permission was renewed in 2014 (Application Reference: 14/01949/FLM) and a Section 42 application (Application Reference: 18/00200/FLN) was made in December 2018 to amend the wording to Condition 3 – Landscaping to allow an extended consent to be granted. Due to a change in the design and layout, in particular the change from Air Insulated Switchgear (AIS) design to a hybrid substation including both AIS and Gas Insulated Switchgear (GIS), it is considered that this constitutes a material change and as such a new planning application is required for the Proposed Development.

1.4 Application for Planning Permission

1.4.1 Consent for construction of the Alyth 275 / 400 kV substation is being sought by way of a planning application to PKC under the Town and Country Planning (Scotland) Act 1997, as amended. As the substation would operate at a voltage in excess of 132 kV, it would be classified as 'National Development' under National Planning Framework 3, and as a consequence, under the Town and Country Planning (Hierarchy of Development) (Scotland) Regulations 2009 (the Hierarchy Regulations).

1.4.2 A Proposal of Application Notice (PAN) was submitted to Perth and Kinross Council on 10th June 2019, triggering a 12 week consultation period (PAN reference 19/0003/PAN). The PAN provided the Council with an outline of the application details, and confirmation of the site location and application boundary. A copy of the PAN is provided in the Pre-Application Consultation document which accompanies the planning application.

1.4.3 A Planning Statement has been prepared to accompany the planning application and considers the merits of the Proposed Development in the context of the Statutory Development Plan and relevant material considerations.

1.5 Application under Section 37 of The Electricity Act

1.5.1 Consent (and deemed planning permission) for construction of the OHL components and downleads of the Proposed Development is to be sought by way of an application to the Scottish Ministers under Section 37 of the Electricity Act 1989.

1.6 Consultation with the Local Community

1.6.1 Under the Hierarchy Regulations, there is a legal requirement for all national and major developments to consult with the public through pre-application consultations to inform local communities and interested members of the public about a proposed development.

1.6.2 SHE Transmission organised a public exhibition within the local area to allow members of the general public to obtain information and pass comment upon the Proposed Development. The exhibition was advertised in accordance with the guidelines as set out in the Hierarchy Regulations.

1.6.3 The public exhibition was held at Alyth Town Hall on 10th July 2019. Details of this exhibition event, and other pre-application consultations, are included in a Pre-Application Consultation (PAC) Report which accompanies the planning application and Environmental Appraisal (EA).

1.7 Environmental Impact Assessment

Substation

1.7.1 Applications made under the Town and Country Planning (Scotland) Act 1997, as amended, are subject to the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

1.7.2 A Screening Opinion was sought from Perth and Kinross Council as Local Authority on 24th June 2019 for consideration under the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 to determine whether the proposed substation would constitute 'EIA Development'.

1.7.3 The Screening Opinion was issued by Perth and Kinross Council (PKC) on 30th August 2019 (Reference 19/00921/SCRN) (see **Appendix 1.1**), concluding that the likely environmental impact of the Proposed Development is not significant to such an extent to warrant classification as 'EIA Development' and the submission of an EIA Report.

Overhead Lines and Downleads

1.7.4 Applications under Section 37 of the Electricity Act are subject to the requirements of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

1.7.5 A Screening Opinion was sought from the Scottish Ministers, as consenting authority for consideration under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 to determine whether the Section 37 application for the OHL elements of the Proposed Development would constitute 'EIA Development'.

1.7.6 The Screening Request was submitted on 31st May 2019 and a Screening Opinion was issued by the Scottish Ministers Energy Consents Unit (ECU) on 23rd August 2019 (Referenced ECU00001859) (see **Appendix 1.2**). This confirmed that the Proposed Development does not constitute EIA Development and therefore does not require to be accompanied by an EIA Report.

1.8 Environmental Appraisal

1.8.1 SHE Transmission recognises that the Proposed Development may give rise to some environmental effects. As such, a voluntary EA has been undertaken, including a number of specialist environmental studies, the results of which are detailed in this EA. The EA considers the potential environmental effects of all aspects of the Proposed Development.

1.8.2 The assessment of potential environmental effects and preparation of the EA has been co-ordinated by environmental and landscape consultants ASH design+assessment Ltd (ASH), on behalf of SHE Transmission. The core ASH team has been supported by sub-consultants providing specialist inputs on terrestrial ecology (habitats and mammals), ornithology, water environment, soils, noise, traffic and cultural heritage.

1.8.3 Other inputs relating to construction and future maintenance of the Proposed Development have been provided by SHE Transmission.

1.9 Structure of the Environmental Appraisal

1.9.1 The EA comprises text, appendices and figures, as listed on the table of contents.

1.9.2 The environmental topics considered comprise:

- Landscape Character and Visual Amenity (Chapter 4);
- Terrestrial Ecology (Chapter 5);
- Ornithology (Chapter 6);
- Water and Soils (Chapter 7); and

- Cultural Heritage (Chapter 8).

1.9.3 Potential impacts in relation to noise and traffic have also been considered and are reported in a series of technical appendices.

CONTENTS

Figures

2. CONSIDERATION OF ALTERNATIVES

2.1 Introduction

2.1.1 This Chapter describes the factors that were taken into consideration when determining the proposed substation site.

2.2 Identification of Potential Substation Locations

2.2.1 Prior to identifying the proposed substation site (as described in Chapter 3), a substation site selection exercise was undertaken by SHE Transmission in 2010 which considered a range of environmental factors, in combination with technical and economic considerations, prior to the identification of a preferred site.

2.2.2 The site selection exercise was undertaken within the vicinity of the T-Junction at Haughend as this area was deemed suitable on technical grounds given its proximity to the existing 275 kV OHL transmission infrastructure connecting Kintore, Tealing and Kincardine substations.

2.2.3 Potential options for substation sites were identified in accordance with SHETL Substation Site Selection Guidelines (PR-PS-453 December 2009), which are based on the original Holford Rules including reviews by SHETL in 2003 and the National Grid Company (NGC) in 1992. The sites took into account:

- Avoiding areas of environmental designation;
- Protecting areas of local amenity value;
- Seeking dry and firm ground conditions;
- Seeking areas where the substation may be concealed from view;
- Seeking flat areas;
- Avoiding close proximity to properties;
- Avoiding proximity to watercourses;
- Avoiding areas of high land value;
- Seeking sites where landowners are willing to sell land; and
- Referring to Local Council development plans.

2.2.4 A total of four potential substation sites were identified in proximity to the existing T-Junction location (see **Figure 2.1**).

- Site A: Relatively flat land which is currently undeveloped agricultural land. There are no structures present on the site. A line of mature trees is present along the northern and western site boundaries and an OHL is present along the southern boundary;
- Site B: Relatively flat land which is currently undeveloped agricultural land. There are no structures present except an existing low voltage OHL which transects the site from north-east to south-west. A railway embankment is present along the western boundary;
- Site C: Relatively flat land which is currently undeveloped agricultural land. There are no structures present on site; and
- Site D: Relatively flat land to the south of the River Isla on currently undeveloped agricultural land. There are no structures present except an OHL to the east of the site.

2.2.5 A thorough review of all potential substation sites was undertaken by specialist consultants and in discussion with local landowners and consultees including: PKC, Scottish Environment Protection Agency (SEPA), Scottish Natural Heritage (SNH), Royal Society of the Protection of Birds (RSPB), Perth and Kinross Heritage Trust, Historic Scotland[1] and Alyth Community Council.

[1] Now referred to as Historic Environment Scotland

2.3 Identification of Preferred Substation Site

Environmental

2.3.1 The site selection exercise considered Site A would have a reasonable fit with the existing landscape with partial enclosure from coniferous shelterbelts to the north and west. Potential constraints included the presence of cultural heritage sites within the footprint of the substation, including a Scheduled Monument, and the proximity to an osprey nest. This option would require the least amount of engineering works to connect a substation to the transmission network as it is located adjacent to the existing 275 kV T-Junction.

2.3.2 Site B near Mucketlands was preferred from a landscape perspective due to the enclosure created by the adjacent railway embankment and coniferous shelterbelts to the south, offering the best 'fit' with the existing landscape. No evidence of cultural heritage features was identified.

2.3.3 Site C falls within the SEPA's flood map 1 to 200 year flood extent, therefore the majority of the site may be at risk of flooding. There is evidence of archaeological remains; cropmarks of an enclosed settlement and rig and furrow cultivation within the substation footprint and the landscape review considered a substation at this site would have a poor fit with the existing landscape. It was considered that a substation at this site would result in the highest noise impacts on local residential buildings.

2.3.4 Whilst Site D was considered favourable from a visual perspective due to it being well contained on all sides from mature woodland and shelterbelts, it was considered to support the most evidence of protected species presence and ecologically important floral species. This site is located in a highly sensitive location between two scheduled sites; a Roman fort and a Roman camp, and several cultural heritage remains of Roman origin were identified within the substation footprint. It was considered that there is a high probability of unexcavated archaeology which would require extensive geophysical survey and archaeological investigations. This substation is located furthest away from the T-Junction, and would therefore require a longer span of OHL to connect a substation to the transmission network, which would include crossing the River Isla (part of the River Tay SAC).

Engineering

2.3.5 From an engineering perspective, all of the sites were anticipated to be relatively similar in terms of ground conditions and flatness, and therefore engineering and economic considerations were mainly focused on arrangements to connect to the existing transmission network.

Preferred Site

2.3.6 Site B was initially considered favourable from an environmental perspective in isolation. However, following discussions with the landowner and concerns about impact to their agricultural business, it was decided not to take this site further. Significant environmental limitations were identified during the study for Site C and Site D, and both scored less well from a technical and economic perspective, as such; Site A was the preferred option from an environmental perspective. Previous reservations relating to proximity to a Scheduled Monument and osprey nest from this site were considered further and measures put in place to avoid and protect, and to ensure there would be no impacts as a result of the proposed works. Site A was considered the most favourable overall from a technical and economic standpoint as it is the closest of all sites considered to the existing OHL T-junction, and would require the shortest span of OHL to complete the connection to the transmission network.

2.4 Conclusions

2.4.1 Following a review of substation site options undertaken by SHE Transmission in 2010, Site A identified to the north-west of Haughend Farm was taken forward as the preferred option, subject to more detailed engineering and environmental studies. Further to these studies, this site was previously granted planning consent by PKC in December 2012 (Application Reference: 12/00948/FLM) which was renewed in 2014 (Application Reference: 14/01949/FLM). To satisfy a condition of this consent, SHE Transmission installed an artificial nesting platform in March 2014 to relocate a pair of breeding osprey. Moving the pair to the new location increased the distance between the substation and the breeding pair, reducing the impact of disturbance. The nesting platform has been successful and therefore the environmental reservations associated with Site A and its proximity to the osprey nest has been reduced.

2.4.2 Since 2010, there have been no material changes to the site or surrounding area and therefore the preferred site remains as previously considered.

CONTENTS

Appendices

Figures

3. THE PROPOSED DEVELOPMENT

3.1 Introduction

3.1.1 This Chapter describes the elements that constitute the proposed Alyth 275 / 400 kV substation and associated infrastructure (the Proposed Development). It provides a description of the key components and information regarding the construction, operation and maintenance of the Proposed Development.

3.2 Description of the Proposed Development

3.2.1 The proposed works would involve the construction of a new electrical Gas Insulated Switchgear (GIS) / Air Insulated Switchgear (AIS) hybrid substation near Haughend, approximately 3.5 km southeast of the town of Alyth in Perth and Kinross, close to the boundary with Angus. The Proposed Development would be located on open agricultural land[1] comprising one large field currently planted with carrots. The western corner of the field currently has a strip of mature mixed woodland. The ground level across the site is relatively flat ranging between 40 m and 45 m Above Ordnance Datum (AOD) with the general topographic gradient of the surrounding land falling towards the River Isla, situated approximately 510 m to the south of the Proposed Development. The anticipated substation platform land take would be approximately 6.7 hectares (ha).

3.2.2 The Proposed Development is shown on **Figure 3.1**.

3.2.3 The elements of the Proposed Development subject to consent under the Town and Country Planning (Scotland) Act 1997, as amended, would comprise the following:

- a new 275 / 400 kV substation on a platform with a footprint of approximately 200 m x 380 m (centre point approximately National Grid Reference (NGR) NO 2880, 4706);
- one GIS control building with a maximum height of 13.5 m (crest);
- one Static Synchronous Compensator (STATCOM) building with a maximum height of 10 m (crest);
- temporary creation and use of site compounds and laydown areas to the east and west of the proposed Alyth 275 / 400 kV substation during construction; and
- a new permanent access track would need to be formed to gain access to the substation site.

3.2.4 The elements of the new overhead line (OHL) towers subject to consent under Section 37 of the Electricity Act 1989 would comprise the following:

- construction of three new steel lattice towers and removal of one steel lattice tower to facilitate the new connection arrangement into the proposed Alyth 275 / 400 kV substation;
- removal of 555 m of existing OHL conductors and installation of approximately 362 m of new OHL conductors;
- modification to the existing T-junction tower;
- installation of three sets of downleads, to connect the OHL conductors to the new substation;
- construction of a temporary wood pole OHL; and
- construction of temporary access tracks for installation and removal of steel lattice towers.

3.2.5 All hardcore and earthworks materials for the construction of the Proposed Development would either be won on site or imported locally.

[1] Identified as a mixture of Class 2 (land capable of producing a wide range of crops) and 3.2 (land capable of supporting a moderate range of crops) according to The James Hutton Institute, (2010). *Land Capability for Agriculture in Scotland.* [online] Available at: http://www.hutton.ac.uk/learning/exploringscotland/land-capability-agriculture-scotland [Accessed May 2019].

3.2.6 Improvements to the local road network would be required ahead of construction of the substation, such as widening of Balendoch public road and its junction from the B954, along with dismantling a disused railway bridge. These improvements will be captured under a separate planning application to PKC.

3.2.7 The key components of the Proposed Development are described in more detail in the following sections.

3.3 Substation

3.3.1 The proposed substation would be an AIS / GIS substation hybrid design.

3.3.2 The new operational substation requires a level area of approximately 200 m x 350 m. Ground works, including a cut-fill exercise, would be required at the proposed site to achieve a level area of this size. It is anticipated that the platform level would be at a ground level of approximately 41.5 m AOD.

3.3.3 The general arrangement of the proposed substation is shown in **Figure 3.1**. Landscape mitigation measures in the form of mounding and planting are proposed to provide partial visual screening and habitat diversity (as discussed in Section 3.8 and shown on **Figure 4.6**).

3.3.4 The substation would include a single storey GIS control building, with a maximum height of 13.5 m, to house the site services and control equipment. All buildings would comprise a steel portal frame with metal cladding and roof. There may be some un-housed electrical switchgear and plant located within the platform area. The maximum height of external infrastructure would be the gantries, at approximately 12.6 m above the platform level. The site would be surrounded by a security fence of palisade construction, with a maximum height of up to 2.4 m depending on the level of security required.

3.3.5 The largest plant items for the substation would be STATCOM transformers. These types of transformers are likely to weigh approximately 215 tonnes. Two future 275 / 400 kV transformers will not be installed until 2026 and these types of transformers are likely to weigh approximately 497 tonnes each once installed. Each transformer will be disassociated phase transformers so will be transported as three separate phases to site, each phase weighing 114 tonnes (without oil).

3.3.6 The substation would not be illuminated at night for normal operation. Floodlights would be installed but would only be used in the event of a fault during the hours of darkness; or during the over-run of planned works; or when sensor-activated as security lighting for night-time access.

3.3.7 The main noise source within the substation during operation would be the two future 275 / 400 kV transformers, Mechanically Switched Capacitor with Damping Network (MSCDN) and STATCOM areas. A noise assessment has been carried out to determine predicted noise levels during operation at the nearest noise sensitive receptors in the vicinity of the Proposed Development. The assessment, included in **Appendix 3.2** of this EA, concludes that with the implementation of comprehensive mitigation, the potential impacts can be controlled to within appropriate levels of significance and duration. The mitigation plan is based on the procurement of low noise equipment from suppliers and the installation of acoustic noise barriers around key noise producing equipment, in particular the MSCDN compound and STATCOM area.

3.3.8 Further details on access arrangements to the Proposed Development are provided in Section 3.5 below. A Transport Assessment is included in **Appendix 3.3**.

Design and Access

3.3.9 Given the nature of the Proposed Development, the design principles of the substation have been largely technically driven, although certain design principles were adopted to ensure the Proposed Development is sensitively sited and designed (see Section 3.8). Mitigation, in the form of mounding and landscape planting, has been included in the final design (see **Figure 4.6)** to provide habitat biodiversity and minimise potential landscape and visual impacts. Construction access to the substation is discussed in Section 3.5. More details on this is covered-off in the supporting planning statement.

3.4 New Steel Lattice Towers and Downleads

3.4.1 On the existing Kincardine to Kintore 275 kV OHL, two new terminal towers (239A and 239B) would be constructed between existing towers 239 and 240, connecting into the proposed Alyth 275 / 400 kV substation from the south via downleads (up to 50 m in length). The existing conductors connecting towers 239 and 240 would be replaced with a shorter length of conductor connecting towers 239 and 239A only (see **Figure 3.1**).

3.4.2 On the Tealing to Alyth 275 kV OHL, the existing tower 641 would be dismantled and replaced with a new angle tower (tower 641R). Approximately 362 m of new conductors would be strung between tower 641R and tower 239B prior to connecting into the substation via downleads. The existing 315 m of conductors connecting tower 641 to tower 240 (plus an additional 29 m of conductor between tower 641 and 641R) would be removed as part of these works (see **Figure 3.1**).

3.4.3 The existing T-junction tower (tower 240) would be modified to include an additional crossarm, with new downleads (up to 58 m in length) to connect from this tower into the substation (see **Figure 3.1**).

3.4.4 The section of existing OHL between towers 240 and 242 will also be reconductored as part of the works, with approximately 580 m of existing Zebra Aluminium Conductor Steel Reinforced (ACSR) conductors replaced with the same length of Totara All Aluminium Alloy Conductor (AAAC).

3.4.5 The proposed tower details are shown in **Table 3-1.**

3.4.6 The proposed tower locations have been determined on the basis of environmental and technical considerations, including engineering analysis of ground conditions and suitability based on desk studies and site walkovers. Investigation of sub-surface and geotechnical conditions at proposed tower locations has not yet been undertaken. It is possible therefore that individual tower locations might alter following geotechnical investigation (referred to as micrositing). To strike a balance between providing certainty between the location of the Proposed Development and any environmental impacts, and the need for some flexibility over individual tower locations, horizontal and vertical Limits of Deviation (LoD) have been defined within which the Proposed Development would be constructed. No towers would be located outside the LoD described. The LoD therefore defines the maximum extent within which the towers can be built.

3.4.7 Consideration was given to the following general principles in defining the LoDs for the OHL towers:

- using the optimum LoD whilst providing flexibility for micro-siting during the detailed design phase;
- avoiding sensitive environmental features; and
- avoiding residential properties.

3.4.8 The horizontal LoD parameter specified allows the proposed towers to be relocated within a 50 m radius of their proposed locations, as shown on **Figure 3.1**. The vertical LoD parameter specified allows a height increase or decrease of up to 10% based on the proposed tower height.

Table 3-1: Proposed Tower Details

Tower Number	Tower Type	Tower Height (± 10%)	Coordinates		Comments
			X	Y	
239A	L8c DJT STD	48.235	328801.006	8746890.29	Two new towers between existing tower 239 (46.81 m) and tower 240 (48.235 m) on the Kincardine to Kintore OHL.
239B	L8c DJT STD	48.235	328875.169	746933.769	
641R	L8c D30 STD	46.81	329144.656	746695.244	One tower replacing tower 641 (46.81 m) on the Tealing to Alyth 275 kV OHL circuit.

3.4.9 Temporary OHL diversions would be required between towers 238 and 240 on the Kintore to Kincardine 275 kV OHL and between towers 640 and 240 on the Tealing to Alyth 275 kV OHL as shown on **Figure 3.1.** The temporary diversions would be required to facilitate the works and avoid the requirement for significant outages.

Electromagnetic Fields

3.4.10 SHE Transmission recognises the concerns regarding Electric and Magnetic Fields (EMFs) surrounding all of its developments and is committed to compliance with UK Government Regulations and Policy relating to public and occupational exposure. The substation will be designed to adhere to these regulations and guidance for EMF limits.

3.5 Access during Construction

3.5.1 Access to the substation site would utilise the single track Balendoch Road that connects the B954 (Alyth to Meigle road) to the west with the A926 near Ruthven to the north. To enable construction vehicles (including abnormal loads) to be able to utilise the road, improvement works will be required prior to construction of the new substation. Road improvement works would include widening of the junction with the B954, widening of the carriageway over the 1.8 km stretch of Balendoch road from the junction with the B954 to the proposed site, creation of passing places, and dismantling a disused railway bridge. The road improvement works will be subject to a separate planning application to PKC. To address potential impacts from construction traffic, the appointed Contractor would prepare a Traffic Management Plan which would be agreed in consultation with PKC and Transport Scotland, as outlined in the Transport Assessment (see **Appendix 3.3**).

3.5.2 Construction vehicles accessing the substation would utilise a new permanent access track adjoining Balendoch Road to the north-west of the proposed substation (see **Figure 3.1**). This track would be required during construction and to provide ongoing access and maintenance to the substation during its lifetime. The new track would be approximately 5.5 m in width, although it will be wider at the road junction.

3.5.3 Vehicle access would be required to each new tower location to allow for excavation and creation of foundations and lattice tower construction. Similarly, vehicle access would also be required to the tower to be removed for deconstruction, removal and reinstatement. This is likely to be achieved through the construction of temporary stone tracks or trackway panels which would be removed following completion of the works.

Construction Compounds

3.5.4 A temporary site compound is required during construction and would be located adjacent to the substation site to the east, as shown on **Figure 3.1**. This compound would provide welfare facilities for site staff, parking, laydown areas, holding and servicing space for construction plant. In addition, temporary laydown areas would be required during construction works to the west of the substation site.

Delivery of Structures and Materials

3.5.5 All materials would be delivered to the main construction compound.

3.5.6 It is anticipated that concrete would be delivered to site pre-mixed.

3.5.7 It is anticipated that there would be one abnormal load delivery to the proposed substation site during stage 1 of the works for delivery of one Super Grid Transformer. There would be two abnormal load deliveries during stage 2 of the works for delivery of two 275 / 400 kV transformers.

Construction Traffic Numbers and Traffic Management

3.5.8 An estimate of the type and volume of site traffic anticipated for a project of this scale is included in the Transport Assessment (see **Appendix 3.3)**.

3.5.9 A swept path analysis has been carried out. This would be updated by the Principal Contractor prior to delivery of the abnormal loads to the site to identify and confirm appropriate mitigation.

3.5.10 The Principal Contractor will prepare final Traffic Management Plans in consultation with SHE Transmission, and the local authority. Traffic Management Plans will describe all mitigation and signage measures that are proposed on the public road accesses.

3.6 Reinstatement

3.6.1 Following commissioning of the Proposed Development, all construction sites 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, all work sites around the tower locations and the re-vegetation of all construction compounds and decommissioned structures.

3.6.2 Reinstatement of temporary access tracks to tower locations would involve replacement of subsoil and topsoil, and grading and installation of drainage, as required, with turves replaced vegetation side up. Where there are insufficient turves the ground would be allowed to vegetate naturally, although some seeding may be required to stabilise sites and prevent erosion, or where landowner requirements dictate otherwise.

3.6.3 Construction compound sites would be reinstated at the end of construction with all buildings and materials removed and soils appropriately reinstated.

3.7 Tree Felling

3.7.1 To enable construction of the proposed access road into the substation, a number of roadside trees to the north-west of the Proposed Development would need to be felled. These trees have been surveyed and assessed in accordance with British Standard BS 5837: 2012 *"Trees in relation to design, demolition and construction – Recommendations";* the results are set out in **Appendix 3.4**. Protection measures would be applied to adjacent existing trees that would be retained.

3.7.2 The pruning or limited felling of trees within the vicinity of the existing OHL wayleave may be required to accommodate a temporary OHL diversion over the River Isla during construction of the new towers. The extent of tree works required would be determined by the appointed Contractor and agreed with PKC as required.

3.7.3 Planting would be proposed as part of the landscape mitigation design (see **Figure 4.6**). This would compensate for trees that would need to be removed to accommodate the Proposed Development.

3.8 Programme and Hours of Working

3.8.1 It is anticipated that, following the granting of consents, works would begin in 2021. Construction works would take place over a 24 to 30 month period (including 3 to 6 months for the OHL works), although detailed programming of the works would be the responsibility of the Principal Contractor in agreement with SHE Transmission. It is anticipated that two 400 / 275 kV transformers would be installed by 2026 within the Proposed Development footprint.

3.8.2 Construction activities would in general be undertaken during daytime periods. This would involve work between approximately 07:00 to 19:00 in the summer and 07:30 to 17:30 (or as daylight allows) in the winter, for 7 days a week. Any variation in these working hours would be agreed in advance with PKC on an as-required basis.

3.8.3 Every effort would be made to cause least disturbance to landowners and local residents during construction by providing regular updates on works via the on-site Construction Manager and Community Liaison Officer.

3.9 Construction Environmental Management

3.9.1 A contractual management requirement of the Principal Contractor would be the development and implementation of a Construction Environmental Management Plan (CEMP). This document would detail how the Principal Contractor would manage the site in accordance with all commitments and mitigation detailed in the EA, statutory consents and authorisations, industry best practise and guidance.

3.9.2 The CEMP will also reference General Environmental Management Plans (GEMPs) and Species Protection Plans (SPPs), which have been developed by the Applicant. SHE Transmission approved GEMPs and SPPs relevant to this project are included in **Appendix 3.5**. The implementation of the CEMP would be managed on site by a suitably qualified and experienced Environmental Clerk of Works (ECoW), with support from other environmental professionals as required.

3.9.3 A Construction Site Licence would be required and obtained in accordance with the Controlled Activity Regulations (CAR) from SEPA prior to any construction works commencing on site. The Licence would specify the controls and measures that would be used at site to safeguard the water environment.

3.10 Mitigation Proposals

3.10.1 The key mitigation measures that would be implemented to reduce the potential environmental effects of the Proposed Development include the following:

- programming construction activities to minimise any adverse effects on residents, birds and other wildlife where required;
- the development and implementation of site-specific CEMPs each for the construction of the substation and the OHL works. These would be developed by the Principal Contractor prior to construction commencing;
- advice by an ECoW on site specific issues during the construction of the Proposed Development, as required;
- site restoration proposals and landscape mitigation measures specific to the proposed substation, as described below and illustrated in **Figure 4.6**; and
- best practice restoration techniques would be adopted to ensure that disturbed ground is reinstated as quickly as possible on completion of the works. Such measures would be incorporated into the site specific CEMPs.

3.10.2 An outline drainage assessment has been prepared for the substation, which includes measures to control and manage surface water such as the provision of a Sustainable Drainage System (SuDS) pond (see **Appendix 7.2**).

3.10.3 A full table of mitigation measures is included in **Appendix 3.1** of this EA.

Landscape Mitigation Measures and Biodiversity Enhancement

3.10.4 Landscape mitigation measures specific to the proposed substation comprise planting and earthworks mounding to the north, east and west of the proposed substation platform, to complement existing mixed woodland to the north and west. This would comprise native mixed woodland species similar to those in the existing adjacent shelterbelts (e.g. Oak, Scots pine, Hazel, Holly, Alder, Hawthorn and Willows). This would be supplemented by species rich seeding in unplanted areas to further enhance biodiversity across the site. Where material is available, it is proposed that low landform mounding, involving the re-use of excavated soils, is incorporated to create shallow mounding around the proposed substation. The landscape mitigation measures are designed to provide partial visual screening of the Proposed Development; help assimilate it into the surrounding landscape; and provide habitat biodiversity and opportunities for enhancement. The provision of a SuDS pond also provides further opportunity for habitat enhancement.

3.10.5 Further details on landscape mitigation measures are provided in Chapter 4: Landscape and Visual, and a plan showing indicative landscaping measures is included in **Figure 4.6**.

3.10.6 During construction, it is proposed that a temporary mound would be formed around the periphery of the site which would help to reduce the visibility of some of the lower construction activities from nearby properties. To improve the appearance of mounds from properties, seeding with a native, low maintenance seed mix would be proposed.

3.10.7 Visualisations of the proposed substation and OHL infrastructure have been produced from four locations within the vicinity of the Proposed Development and are included in **Figures 4.7a-d, 4.8a-d, 4.9a-d and 4.10a-d**. These provide an illustration of how the Proposed Development would look from the local area immediately upon completion of the substation and after 10 years of substation operation.

3.11 Future Maintenance of the Substation

3.11.1 The proposed substation would be unmanned, with operations being controlled remotely from SHE Transmission's control centre in Perth.

3.11.2 Substation plant requires maintenance and inspection at regular intervals. Most substations have a monthly inspection, whilst varying degrees of maintenance would be undertaken annually. There would be other visits as required for operational duties.

3.12 Decommissioning

3.12.1 Should the substation be decommissioned the site would be restored as follows:

- the substation infrastructure would be removed;
- where removal of infrastructure such as substation foundations would result in more damage than leaving them in place, they would be left in-situ; and
- disturbed ground would be reinstated.

3.12.2 Full details of the decommissioning plan would be agreed with the appropriate authorities and the landowners prior to any decommissioning works commencing.

3.13 Construction Employment

3.13.1 The Applicant takes community responsibilities seriously. The delivery of a major programme of capital investment provides the opportunity to maximise support of local communities. Employment of construction staff will be the responsibility of the Principal Contractor but SHE Transmission encourages the Principal Contractor to make use of suitable labour and resources from areas local to the location of the works.

CONTENTS

Appendices

Figures

4. LANDSCAPE AND VISUAL

4.1 Introduction

4.1.1 This Chapter presents the findings of the Landscape and Visual Impact Assessment (LVIA) for the Proposed Development. The purpose of the LVIA is to identify and describe potential significant effects which may occur as a result of the Proposed Development to views obtained by those living, working and visiting in the area, and the wider landscape resource.

4.1.2 The LVIA has been undertaken by Chartered Landscape Architects at ASH design + assessment Ltd (ASH).

4.2 Scope of Assessment

4.2.1 The LVIA considers all aspects of the Proposed Development during the construction phase and during operation, as described in Chapter 3 of this Environmental Appraisal. It gives consideration to potential effects on the character of the landscape and also the visual amenity of those present within the landscape.

4.2.2 To provide consideration of a full range of effects over time, the assessment has considered the following stages of development:

- During Construction;
- During Operation - Year 1, following completion; and
- During Operation – Year 10, once mitigation planting has fully established.

Defining the Zone of Theoretical Visibility (ZTV)

4.2.3 The ZTV is a computer-generated diagram which uses a terrain model to indicate areas from which the Proposed Development would theoretically be visible. ZTVs for the Proposed Development have been generated using ESRI ArcGIS software based on a terrain modelled using Ordnance Survey (OS) T5 DTM data. Separate ZTVs have been produced for the Proposed Development indicating theoretical visibility of the proposed substation and the proposed towers and are shown on **Figures 4.1 to 4.3**.

4.2.4 To get a more accurate picture of potential visibility, woodland has been modelled into the terrain model. Woodland has been extracted from Ordnance Survey's VectorMap District Mapping (downloaded 2018). This dataset has been modified to take account of woodland which would be removed as a result of the Proposed Development. Woodland has been modelled into the terrain model at the following representative heights:

- Existing woodland – 10 m;
- Mitigation woodland – 5 m; and
- Mitigation scrub – 2 m.

4.2.5 The ZTVs have been produced assuming a platform height of 41.5 m AOD. Following best practice, a height of 2 m has been assumed for the viewer. To give an accurate picture of overall visibility, ZTVs have been run for a distance of 5 km.

4.2.6 Whilst the ZTV is a useful tool for the identification of potential effects, it is not indicative of an effect in itself. The ZTV does not take into account the potential screening effects of localised features, buildings or smaller areas of vegetation which are not included on the OS VectorMap District dataset. It should also be noted that it does not give an indication of where filtered views through vegetation may be obtained. Nor does it give indication of the way in which a development may relate to its broader landscape context. However, consideration of these aspects is taken into account during the assessment.

Substation ZTVs

4.2.7 Two ZTVs have been produced for the proposed substation representing theoretical visibility before and after mitigation planting has fully established (approximately 10 years). These are presented on **Figures 4.1 and 4.2**. The substation ZTVs have been produced from points representative of the heights of key pieces of infrastructure which would be present on the substation platform as follows:

- Gantries – 12.6 m;
- Transformers – 12 m;
- Busbars – 11.3 m;
- STATCOM – 10 m;
- MSCDN – 6.5 m; and
- Building – 13.5 m (crest) and 8.6 m (lean-to).

Towers ZTV

4.2.8 The ZTV for the proposed OHL towers has been produced assuming a top height of 53.1 m, which comprises the worst case height if the full 10 % limit of deviation were applied.

4.2.9 This ZTV is shown on **Figure 4.3** and is compared with a ZTV for existing towers within the vicinity of the Proposed Development site, including two towers within the red line boundary and one tower to be dismantled and replaced.

Study Area

4.2.10 A Study Area of 2 km from the Planning Boundary has been adopted for the LVIA, as shown on **Figure 4.1**. The Study Area comprises the area within which any potential significant landscape or visual effects would be expected to be contained. The Study Area has been established following review of the ZTV and initial site survey.

Consultation

4.2.11 A Screening Request for the different aspects of the Proposed Development was submitted in June 2019. Screening Opinions for the proposed substation and proposed towers issued by Perth and Kinross Council and the Scottish Government Energy Consent Unit respectively determined that neither aspect of the Proposed Development comprises EIA development. However, key points raised by consultees which are of relevance to the subject areas of landscape and visual amenity are detailed in **Table 4-1**:

Table 4-1: Screening and Consultation Reponses of Relevance to Landscape and Visual Amenity

Consultee	Issue	Action
Scottish Government	Note that there are few local residences likely to be adversely affected by the proposed towers and that the towers would be seen in the context of existing infrastructure.	The landscape and visual effects of the proposed towers are fully considered in this LVIA.
Perth and Kinross Council	Requested an additional visualisation to three already proposed on the Meigle / Cardean road through the existing wayleave.	This visualisation is included as Figure 4.10 (a-d).

Consultee	Issue	Action
	Noted that the Proposed Development may be out of scale with the existing environment and should be considered and managed in term of landscape and visual impact.	The LVIA has considered the scale of the Proposed Development in relation to the surrounding landscape character and in terms of visual amenity. Appropriate mitigation is proposed to address potential landscape and visual effects as described in Section 4.6.
	Noted potential effects on neighbouring residential properties and a requirement for mitigation.	Potential visual effects on neighbouring properties are addressed in Section 4.5 and mitigation is discussed in Section 4.6 and Figure 4.6.
	Noted that trees would be lost but not considered significant with proposed tree planting.	Potential removal of trees is considered throughout the LVIA. Proposals for new planting are discussed in paragraphs 4.6.8 to 4.6.11.

Visualisations

4.2.12 This assessment is supported by four photomontages of the Proposed Development, included as **Figures 4.7 – 4.10**. These have been produced from publicly accessible locations in order to give a representative depiction of how the Proposed Development may appear. Visualisations represent the operational appearance of the substation. Two visualisations have been prepared for each location to show the Proposed Development at year 1, prior to any planting being implemented, and after 10 years, once mitigation planting has fully established.

4.2.13 Visualisations have been produced from the following locations which are indicated on **Figure 4.5**:

- Visualisation 1: Haughend Farm road-end (NO 29005 47322) – representative of views from Balendoch Road and nearby properties from the east side of the Proposed Development (**Figure 4.7 (a-d)**);
- Visualisation 2: Near Railway Bridge on Balendoch Road (NO 27902 46178) – representative of views from Balendoch Road and nearby properties from the west side of the Proposed Development (**Figure 4.8 (a-d)**); and
- Visualisation 3: Gate entrance on Balendoch road (NO 28316 46759) – representative of more distant views from Balendoch Road on the western approach towards the Proposed Development (**Figure 4.9 (a-d)**);
- Visualisation 4: Public Road near Wester Cardean (NO 29340 46351) – representative of glimpsed views from Meigle / Cardean Road to the south of the Proposed Development (**Figure 4.10 (a-d)**).

4.2.14 Visualisations 1-3 are representative of views from Balendoch Road. This is considered as Route Receptor Location R4 in this LVIA. Visualisation 4 is representative of a glimpsed view from Meigle / Cardean Road which is considered as Route Receptor Location R5 in this LVIA.

Mitigation Measures

4.2.15 Mitigation measures are proposed to help offset landscape and visual effects resulting from the Proposed Development. These are fully discussed in Section 4.6.

Issues Scoped Out of the Assessment

4.2.16 Effects arising from the process of decommissioning are considered to be of a similar nature and duration to those arising from the construction process and therefore have not been considered separately in this Chapter. Where this assessment refers to potential construction impacts, these are also representative of predicted decommissioning impacts.

4.2.17 This LVIA considers the potential landscape and visual effects arising from the proposed substation and OHL transmission towers and their associated construction. However, it does not include proposed works to public roads which would be carried out under a separate planning application.

4.3 Method of Assessment

Assessment Guidance

4.3.1 The LVIA has been prepared with reference to the Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3)[1] and Landscape Character Assessment: Guidance for England and Scotland[2].

Professional Judgement

4.3.2 GLVIA3 places a strong emphasis on the importance of professional judgement in identifying and defining the significance of landscape and visual effects. As part of this assessment, professional judgement has been used in combination with structured methods and criteria to evaluate landscape value and landscape and visual sensitivity, magnitude and significance of effect. The assessment has been undertaken and verified by two Landscape Professionals (Chartered Landscape Architects) to provide a robust and consistent approach.

Key Stages of the Assessment

4.3.3 GLVIA3 suggests that landscape and visual effects are assessed from a clear understanding of the development proposed and any mitigation measures which are being adopted.

4.3.4 The GLVIA3 methodology for landscape assessment involves an appreciation of the existing landscape resource, the susceptibility of its key components to accept the change proposed, and an understanding of the potential effects which could occur and how these could affect these key components.

4.3.5 Familiarity with the site and the extent, nature and expectation of existing views is a key factor in establishing the visual sensitivity in terms of the development proposed. The guidelines require evaluation of magnitude of change to views experienced by sensitive receptors, comprising individuals living, working, travelling and carrying out other activities within the landscape, and subsequent evaluation of effect significance.

4.3.6 The potential to mitigate adverse effects should also be considered for both landscape and visual assessment.

4.3.7 There are five key stages to the assessment:

- establishment of the baseline;
- appreciation of the development proposed;
- identification of key landscape and visual receptors;
- identification of potential effects; and
- assessment of effect significance.

4.3.8 Detailed methods and criteria for the above key stages are included under the relevant methodology sections for landscape and visual amenity in Sections 4.4 and 4.5.

Limitations of the Assessment and Assumptions

4.3.9 The prominence of the Proposed Development in the landscape would vary according to the prevailing weather conditions. The assessment has been carried out, as is best practice, by assuming the 'worst case' scenario i.e. on a clear,

[1] Landscape Institute and Institute of Environmental Management and Assessment. (2013). *Guidelines for Landscape and Visual Impact Assessment, Third Edition*.
[2] Scottish Natural Heritage, The Countryside Agency. (2002). *Landscape Character Assessment: Guidance for England and Scotland*.

bright day in winter, when neither foreground deciduous foliage nor haze can interfere with the clarity of the view obtained.

4.3.10 The assessment of visual effects has been undertaken from the nearest public road, footpath or open space to each property and assumptions have been made about the types of rooms, and about the types and importance of views obtained from these rooms.

4.3.11 The limitations of the ZTV are discussed in paragraph 4.2.6.

4.4 Landscape Character

Landscape Character: Introduction

4.4.1 This section assesses the potential impacts on landscape character of the Proposed Development. The character of the landscape relates to the natural processes and human activities that have been at work for a long time to shape the land to its present form. Factors contributing to landscape character include topography, vegetation cover, sense of space or enclosure and past and present land use. Landscape character and resources are considered to have an importance in their own right and are valued for their intrinsic qualities. The aim of the assessment is to determine the effect of the Proposed Development on the landscape character of the area and the elements which contribute to its values and sensitivity.

Landscape Character: Methodology

Establishment of the Baseline

4.4.2 Establishment of the baseline conditions has been undertaken through combination of desk study and site appraisal. The following specific tasks have been undertaken:

- a review of the TAYplan Strategic Development Plan 2016 - 2036 (TAYplan)[3], the Perth and Kinross Local Development Plan (PKLDP)[4] and the Angus Local Development Plan 2016 (ALDP)[5] and relevant supplementary planning guidance, as described in the accompanying Planning Statement; and
- review of SNH National Landscape Character Types (LCTs) and Descriptions[6] and site identification and appraisal of defined Local Landscape Zones (LLZs).

Relative Landscape Value

4.4.3 The relative value of the landscape is an important consideration in informing later judgement of the significance of effects. Value concerns the perceived importance of the landscape, when considered as a whole and within the context of the Study Area. Landscape value is established through consideration of the following factors:

- presence of landscape designations, other inventory or registered landscapes / landscape features or identified planning constraints;
- the scenic quality of the landscape;
- perceptual aspects, such as wildness or tranquillity;
- conservation interests such as cultural heritage features or associations, or if the landscape supports notable habitats or species;

[3] TAYplan Strategic Development Planning Authority. (2017). *TAYplan Strategic Development Plan 2016-2036.* [online] Available at: https://www.tayplan-sdpa.gov.uk/strategic_development_plan [accessed 28th June 2019].

[4] Perth and Kinross Council. (2014) *Perth and Kinross Local Development Plan*. [online] Available at: https://www.pkc.gov.uk/article/15041/Adopted-Local-Development-Plan [accessed 28th June 2019]

[5] Angus Council. (2016). *Angus Local Development Plan.* [online] Available at: https://www.angus.gov.uk/directories/document_category/development_plan [accessed 28th June 2019].

[6] Scottish Natural Heritage. (2019). Scottish Landscape Character Types Map and Descriptions [online] Available at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions [accessed 28th June 2019].

- recreational value; and
- rarity, either in the national or local context or if it is considered to be a particularly important example of a specific landscape type.

4.4.4 It should be noted that absence of a designation does not necessarily mean that a landscape or component is not highly valued as factors such as accessibility and local scarcity can render areas of nationally unremarkable quality highly valuable as a local resource. Criteria for the allocation of perceived landscape value are outlined below:

- High:
  - the landscape is closely associated with features of international or national importance which are rare within the wider context;
  - the landscape is of high scenic quality and forms a key part of an important designated landscape or planning constraint; and / or
  - the landscape is an example of a scarce resource within the local context and is of considerable local importance for its, scenic quality, recreational opportunities or cultural heritage associations.
- Medium:
  - the landscape is associated with features of national or regional importance which are relatively common within the wider context;
  - the landscape forms part of a designated landscape or is associated with other features of importance but is not rare or distinctive within the local context; and / or
  - the landscape is one of a number within the local context appreciated for its scenic quality, recreational opportunities or cultural heritage associations.
- Low:
  - the landscape characteristics are common within the local and regional context and the landscape is not associated with any particular features or attributes considered to be important; and / or
  - the landscape is of poor scenic quality and is not appreciated for any recreational or cultural associations.

Appreciation of the Proposed Development

4.4.5 Appreciation of the Proposed Development involves the accumulation of a thorough knowledge of the proposal, its nature, scale and location within the baseline landscape, and any peripheral or ancillary features proposed, as detailed in Chapter 3 of this Environmental Appraisal. Analysis of the proposed activities and changes which would take place leads to an understanding of the potential effects that may occur on the landscape resource. As part of this process, the ZTVs have been consulted to inform the potential range of effects.

Identification of Key Landscape Receptors

4.4.6 The identification of landscape receptors is the first step in the analysis of the potential for significant landscape effects to take place. Landscape receptors comprise key characteristics or individual features which contribute to the value of the landscape and have the potential to be affected by the Proposed Development. Landscape receptors are identified through analysis of baseline characteristics when considered in relation to the impacts which might result from a development of the type proposed.

Landscape Sensitivity

4.4.7 Landscape sensitivity considers the nature of the landscape and its ability to accommodate development of the type proposed without compromising its key characteristics and components. The appraisal of landscape sensitivity involves consideration of the sensitivity of individual landscape receptors. There are two aspects which are considered when establishing the landscape sensitivity:

- **Value:** the baseline value of the landscape and the contributory value of individual landscape receptors to the landscape as a whole; and

- **Susceptibility to change:** the ability of landscape receptors to accommodate development of the type proposed without changing the intrinsic qualities of the landscape as a whole.

4.4.8 Landscape sensitivity has been evaluated with reference to the subject areas above. A three-point scale is used as follows:

- **High** – a highly valued landscape of particularly distinctive character susceptible to relatively small changes of the type proposed;
- **Medium** – a reasonably valued landscape with a composition and characteristics tolerant of some degree of change of the type proposed; and
- **Low** – a relatively unimportant landscape which is potentially tolerant of a large degree of change of the type proposed.

Identification of Potential Effects

4.4.9 The second step in the assessment process involves the identification of potential effects which may occur as a result of the interaction of the impacts of the Proposed Development with the identified landscape receptors. The assessment takes into account direct effects upon existing landscape elements, features and key characteristics and also indirect effects which may occur secondary to changes affecting another landscape component or area. The ZTV is used as a tool to gauge the extent of potential indirect change, supported by targeted field surveys.

Magnitude of Change

4.4.10 Magnitude of change concerns the degree to which the Proposed Development would alter the existing characteristics of the landscape. The appraisal of magnitude involves consideration of the nature and scale of the change which would occur in relation to the identified potential effects and also the duration and potential reversibility of the effect. These changes are then combined to evaluate a magnitude rating for the LCT as a whole.

4.4.11 Magnitude is categorised on a four point scale as follows:

- **High** – notable change in landscape characteristics over an extensive area ranging to a very intensive change over a more limited area;
- **Medium** – perceptible change in landscape characteristics over an extensive area ranging to notable change in a localised area;
- **Low** – virtually imperceptible change in landscape characteristics over an extensive area or perceptible change in a localised area; and
- **Negligible** – no discernible change in any landscape characteristics or components.

4.4.12 In recognition of the differing changes that would occur during construction works and in the longer term, three ratings for magnitude of change have been included: during the construction of the Proposed Development, year one following completion, and during operation after 10 years, once mitigation planting has matured.

Assessment of Effect Significance

4.4.13 Evaluation of the predicted significance of effect has been carried out through analysis of the anticipated magnitude of change in relation to the identified landscape sensitivity and using a degree of professional judgement. The assessment takes into account identified effects upon existing landscape receptors and assesses the extent to which these would be lost or modified in the context of their importance in determining the existing baseline character.

4.4.14 Effect significance has been evaluated using a four point scale and using the following criteria:

- **Major** – the Proposed Development is at considerable variance with the landform, scale and pattern of the landscape and would be a dominant feature, resulting in considerable reduction in scenic quality and large scale change to the intrinsic landscape character of the area;

- **Moderate** – the Proposed Development is out of scale with the landscape, or inconsistent with the local pattern and landform and may be locally dominant and / or result in a noticeable reduction in scenic quality and a degree of change to the intrinsic landscape character of the area;
- **Minor** – the Proposed Development does not quite fit with the scale, landform or local pattern of the landscape and may be locally intrusive but would result in an inappreciable reduction in scenic quality or change to the intrinsic landscape character of the area; and
- **Negligible** – the Proposed Development sits well within the scale, landform and pattern of the landscape and would not result in any discernible reduction in scenic quality or change to the intrinsic landscape character of the area.

4.4.15 As for magnitude of change, the differing potential effects have been considered during the construction of the Proposed Development, following completion, and during operation after 10 years.

4.4.16 For the purposes of the assessment, effects with a rating of Moderate or above are considered to be significant.

Landscape Character: Baseline Conditions

Overview

4.4.17 The Study Area is set in an area of low-lying valley floor at the confluence of the River Isla and Dean Water. This is an area characterised by lush farmland, interspersed with frequent shelterbelts and woodlands of mature, mixed and deciduous trees. The terrain is relatively flat within the Study Area, rising into low rolling fields towards the north of the Study Area. More notable hills establish the valley sides around 2 – 3 km to the north and south of the Study Area, which often provide a focus and termination to views obtained from open areas. The farmland is composed of medium sized rectilinear fields with a mix of arable and pastureland. Fruit production is common and many fields are laid with rows of fruit bushes. Poly-tunnels are a common characteristic of the wider landscape. Fields are often defined and separated by the many shelterbelts and copses of mature woodland which contribute to a verdant, shady quality. The farmland is scattered with frequent farm houses and cottages, mostly of a traditional style, built of stone or with a roughcast finish. Groups of large modern farm buildings are also a common feature of the landscape. Properties are served by a network of minor single track roads and unsurfaced tracks between the fields, connecting a larger scale network of more direct single-carriageway routes, the principle ones being the A94 in the south of the Study Area, A926 in the north of the Study Area and B954 in the west of the Study Area, connecting the two A routes. A dismantled railway on an embankment colonised by scrub and trees also crosses the Study Area to the west of the Proposed Development. Overhead transmission lines are an established feature of the landscape within the Study Area with two existing lines of steel lattice towers coming together at the Proposed Development site.

Designated and Protected Landscapes

National Context

4.4.18 There are no statutory designated landscapes at the national level within or close to the Study Area.

4.4.19 Although not a formal designation, Inventory Gardens and Designed Landscapes (GDLs) comprise a material consideration in any planning application. These sites comprise those gardens and designed landscapes which have been considered by a panel of experts to be of national importance and are therefore included on the Inventory of Gardens and Designed Landscapes, maintained by Historic Environment Scotland (HES).

4.4.20 One GDL falls within the LVIA Study Area: Drumkilbo.

4.4.21 This is a small 19th Century landscape with gardens dating from the 1920s. Only a very small portion of the access drive to the GDL falls within the Study Area and site survey has established that there would be unlikely to be any intervisibility with the Proposed Development due to its woodland setting. The GDL has therefore been scoped out of further assessment.

Regional Context

4.4.22 Planning authorities are able to designate particular landscapes considered to be of regional or local importance through the development planning process. Such areas are not considered to be statutory designations but are a material consideration to planning decisions. There are no locally designated landscapes within the Study Area. However, it is noted that an area to the east of the Proposed Development has been the subject of an Angus Council consultation process for Local Landscape Areas. However, at this stage any potential designated area is not yet defined and therefore this has not been considered as part of this assessment.

Landscape Character

4.4.23 SNH in conjunction with partner Councils, has undertaken detailed review and classification of various landscape areas and types of Scotland. This study has recently been updated to identify LCTs on a consistent basis across Scotland. The Study Area for the Proposed Development falls within a single LCT: Broad Valley Lowlands – Tayside.

4.4.24 A description of the Broad Valley Lowlands LCT is included in **Appendix 4.1**.

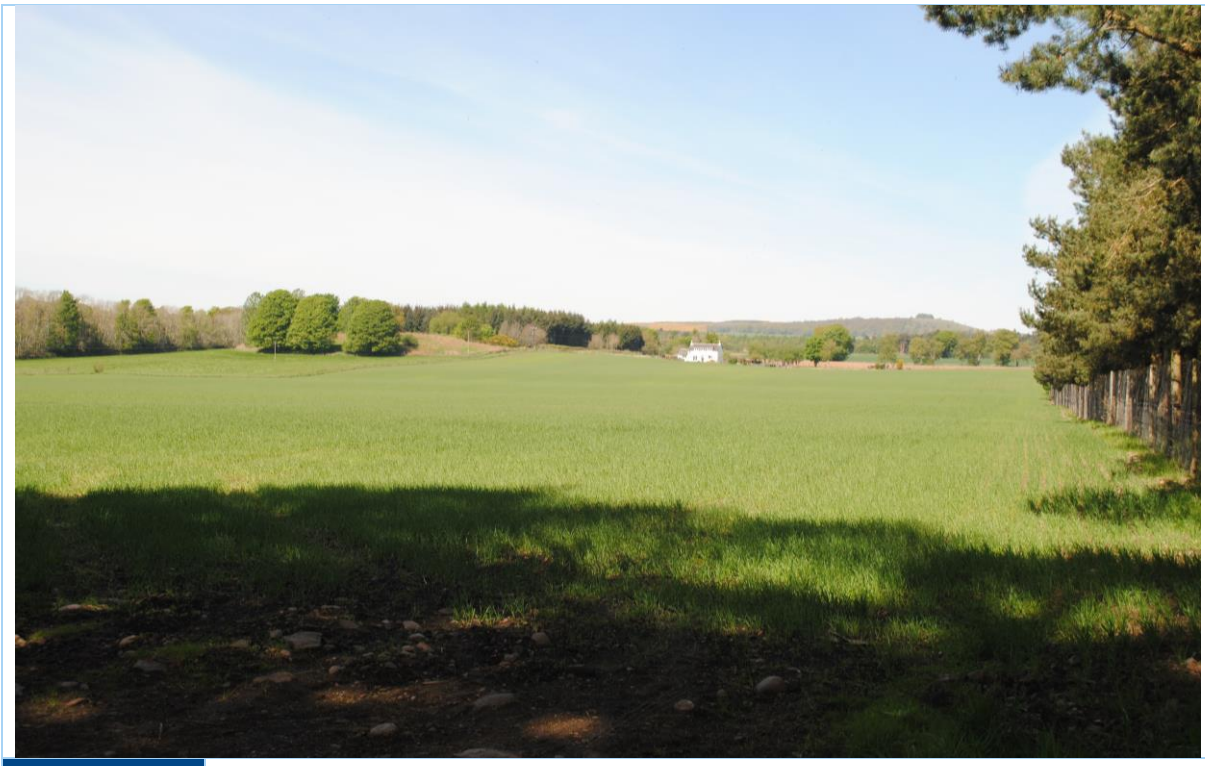
4.4.25 As this LCT has been defined at the National level, it does not necessarily correspond to the more fine-grained changes in character within the Study Area. The National LCTs have therefore been used as a basis for the identification of LLZs for the purposes of this assessment. These LLZs comprise areas of more localised character which relate more directly to the scale and context of the landscape of the Study Area and the Proposed Development.

4.4.26 The Study Area has been divided into two LLZs as follows:

- LLZ1: Rolling Fields and Policy Woodland; and
- LLZ2: Open Agricultural Land with Shelterbelts.

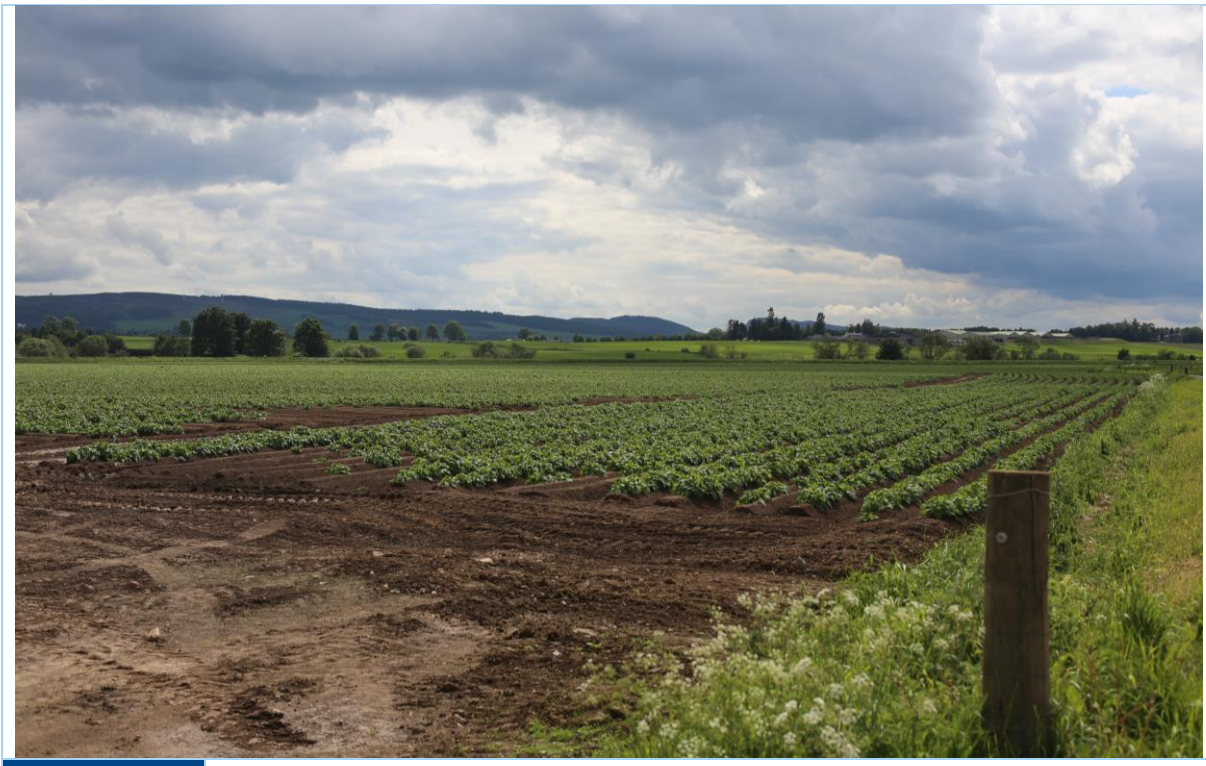
4.4.27 The above LLZs are illustrated on **Figure 4.4** and described in **Table** 4-2 and **Table 4-3**:

Table 4-2: LLZ1 – Rolling Fields and Policy Woodland: Baseline Description



Description	This LLZ covers the more elevated and rolling northern part of the Study Area. This area is characterised by a patchwork of fields enclosed by a pattern of mature policy woodlands and shelterbelts, predominantly of oak and beech, and a gentle, rural atmosphere. Fields are mostly in arable use or used for fruit farming. Estate and farm properties are set into the edges of woodlands and shelterbelts. Buildings are mostly of traditional style with large farmhouses or estate houses set in landscaped grounds surrounded by collections of stables, outbuildings, cottages and walled gardens. Narrow single-track surfaced and unsurfaced lanes provide access to these properties, often lined by avenues of large mature trees. There is a strong sense of heritage about these areas although this contrasts with more modern features of fruit farming such as polytunnels and modern agricultural buildings. The deciduous woodland and arable fields give strong variation to this landscape through the seasons with deep shady qualities and lush growth giving a sense of enclosure during the summer. Contrasting muted browns and beiges of scalped fields of stubble, ploughed areas and bare trees during the winter months give a greater sense of openness. The slight elevation of this landscape in contrast to the flatter valley lowlands to the south results in some extending views towards the southern Sidlaw Hills.
Key Positive Components	• Large degree of mature deciduous trees, comprising avenue planting, mature policy woodlands and shelterbelts; • Sense of lush, green growth during the summer months, contrasting with muted colours and bare trees in the winter; • Sense of heritage and gentle, rural atmosphere from traditional farmhouses, cottages and estate buildings and policy and designed landscape features such as woodlands, walled gardens and avenues; and • Slight elevation gives views towards the Sidlaw Hills, particularly during winter when trees are bare.
Key Negative Components	• Some modern features associated with fruit farming, such as polytunnels create distraction from the sense of heritage and are out of scale with the landscape patterns.
Landscape Value	This landscape does not fall within any areas designated for their landscape importance. However, the mature policy woodlands have value in their own right and as a setting for other heritage features and buildings. It is also likely to be valued for its rural, countryside feel, although is relatively common within the regional context. Landscape value is considered to be **Medium**.

Table 4-3: LLZ2 – Open Agricultural Land with Shelterbelts: Baseline Description



Description	This LLZ covers the lower-lying, flatter valley floor areas within the southern part of the Study Area. This area is characterised by extensive large, flat fields, predominantly used for arable crops, root crops or fruit production. The River Isla and Dean Water flow through these fields enclosed by earth banks and sometimes short steep bluffs occasionally colonised by scrub and woodland. Due to the low, flat terrain, the rivers have little visual influence on the wider landscape. Fields are enclosed by post and wire fences with some hedgerows, shelterbelts and lines of trees along the field boundaries. Small areas of policy woodland also have influence on the landscape but generally this is a more open landscape than LLZ1 with a more exposed feel. Farms and cottages are scattered across the landscape with traditional farm houses and farm-buildings often accompanied by large expansive modern buildings. These are served by a network of single carriageway roads with small surfaced and unsurfaced lanes leading to individual farms. Main routes combine around the small village of Meigle which is composed of 1 – 2 storey houses and a small church. The Sidlaw Hills provide a backdrop to this landscape with open views towards the hills often obtained. Existing OHLs are a feature of the landscape with two steel lattice lines crossing the landscape, often appearing prominent.
Key Positive Components	• Open character with long views, particularly towards the Sidlaw Hills; • Lines of field boundary trees, riparian woodland and scrub and small areas of policy woodland add diversity; and • Agricultural character with sense of rural, working landscape.
Key Negative Components	• Modern farm buildings and features can form distracting features in some locations; and • Existing steel lattice towers and prominent features in the flat, open landscape.
Landscape Value	This landscape does not fall within any areas designated for landscape importance. However, it has some value as a rural working landscape, with views towards the hills, woodland and trees providing some attractive diversity likely to be of value locally. Nevertheless it is relatively common of its type within the regional context. Landscape value is considered to be **Medium**.

Landscape Character: Assessment of Effects

4.4.28 The extent to which the Proposed Development would affect the existing landscape character varies depending on the individual components of the Proposed Development and the capacity of the existing landscape to accommodate these various components.

4.4.29 The following section provides an assessment of the effects that the Proposed Development would have on the LLZs during construction and also in the longer term during the operational phase, in accordance with the effects criteria outlined in the methodology above.

Table 4-4: LLZ1 – Rolling Fields and Policy Woodland: Assessment of Effects

Landscape Receptors	The principal aspects of this landscape which could be affected by the Proposed Development comprise: • Mature deciduous trees including avenue planting, mature policy woodlands and shelterbelts; • Sense of lush, green growth during the summer months and contrasting muted colours and bare trees in the winter; • Gentle rural atmosphere; • Sense of heritage relating to traditional buildings, policy and designed landscape features; and • Views towards the Sidlaw Hills.
Landscape Sensitivity	This is a moderately valued landscape. It is sensitive to changes which may result in loss of woodland although the wooded character would also help to limit the visual extent of any change. However, the relatively small spatial pattern of the landscape could lead to large development (such as that proposed) becoming dominant locally. Sensitivity to development of the type proposed is considered to be **Medium**.
Potential Effects	• Removal of trees to accommodate new features or access could alter the balance of woodland and open space and reduce sense of enclosure; • Construction activities and loss of open field space and trees could deplete the sense of lush growth and rural qualities; • Appearance of new modern structures within the context could diminish the influence of traditional buildings and reduce sense of heritage landscape; and • Proposed structures and construction activities could form new features within views to Sidlaw Hills backdrop.
Effects Magnitude	The Proposed Development would be located on the transition between LLZ 1 and LLZ 2. There would be removal of a small number of trees within the existing tree belt to enable the new access and construction of new substation and towers on the boundary of the LLZ. Construction of the Proposed Development would lead to potential indirect change across more open parts of the LLZ to the north and west. The existing woodland would constrain intervisibility of the lower, substation features to some degree although the towers would be more widely visible. Mitigation proposals would also result in planting of new trees around the substation leading to a net increase in woodland cover once mature and reducing the degree of indirect change evident within the wider landscape in the longer term. The magnitude of effect is anticipated to be Medium during construction and would reduce to Low after completion and Negligible during operation after 10 years.
Effects Significance	<u>Substation</u> During construction, there would be a degree of direct effect on the transitional edge of this LLZ as a result of small-scale tree loss and localised intensive activity associated with construction works. This would lead to a loss of the gentle, rural atmosphere in the local area and may indirectly influence a wider area, although existing farming activities may result in similar types of noise and movement. Localised loss of trees would fragment the existing tree belt adjacent to the site and a more large-scale industrial type of development is likely to more closely associate the Proposed Development site with LLZ 2: Open Agricultural Land with Shelterbelts. However, as mitigation planting establishes and matures, this would compensate for the temporary loss and fit well within the more enclosed character of LLZ 1. The increasing growth of mitigation planting over time would

	also minimise the indirect effects of the substation elements across the wider LLZ to the north. The landscape effect of the substation is anticipated to be **Moderate Adverse** and <u>significant</u> during construction. However, this is anticipated to reduce to **Minor Adverse** (not significant) following completion of the Proposed Development and would further reduce to **Negligible** after 10 years. This is due to the anticipated effect of mitigation planting which would minimise the intervisibility of the Proposed Development across the landscape to the north, to an extent that it is considered that there would be no noticeable deterioration or change to the key characteristics of the LLZ. <u>Towers</u> The towers would be taller than substation elements potentially forming new features within views towards the Sidlaw Hills. However, they would appear similar to existing towers and more closely associated with LLZ2 leading to a more indirect effect. The new towers would result in a perceptible increase in towers within this part of the landscape and if they were the full 53.1 m LoD height, they would appear perceptibly taller than existing towers. However, this is considered unlikely to lead to a noticeable long-term change in landscape characteristics as towers are already a recognised feature within this part of the landscape context. The landscape effect of the towers is also anticipated to be **Moderate Adverse** and significant during construction, but reducing to **Negligible** during operation and after 10 years as the new towers are considered unlikely to lead to any change in the wider context which would affect the character of this LLZ. <u>Combined Effect</u> The combined effect on this LLZ of both the substation and towers would be **Moderate Adverse** and significant during construction, reducing to **Minor Adverse** (not significant) after construction. After 10 years the effect would be **Negligible**.

Table 4-5: LLZ2: Open Agricultural Land with Shelterbelts: Assessment of Effects

Landscape Receptors	The principal aspects of this landscape which could be affected by the Proposed Development comprise: • Open character with long views, particularly towards the Sidlaw Hills; • Lines of field boundary trees, riparian woodland and scrub and small areas of policy woodland; and • Rural, agricultural character.
Landscape Sensitivity	This is a moderately valued landscape. Its open character is susceptible to new structures which have the potential to be widely visible, although similar exiting development already exists to some degree in the form of steel lattice towers and its large scale is theoretically able to accommodate larger scale development. It is also susceptible to development which may result in tree loss. Sensitivity to development of the type proposed is considered to be **Medium**.
Potential Effects	• New features and construction activities could form new distractions within views; • Removal of trees to accommodate new features or access could reduce perceived ratio of tree cover and sense of diversity; and • Construction activities and loss of open field space and trees could lead to a reduction in the experience of a rural, agricultural character.
Effects Magnitude	The Proposed Development would be located on the transition between LLZ 1 and LLZ 2. Construction activities and permanent features would be evident in the northern part of the LLZ and wold be potentially widely visible across open fields to south and east. However, this intervisibility would be limited somewhat by the existing tree belt, the bluff slopes around the river to the south and east, and a railway embankment to the west. Towers would be more widely evident in the landscape and would be similar in appearance to existing towers, though potentially slightly taller, if at the upper end of the LoD. A small amount of tree loss would also take place to accommodate temporary OHLs during construction. Over time, the proposed mitigation planting would further reduce the intervisibility of the substation to the east and west. However, both the substation, and towers would remain prominent within localised parts of the landscape to the south. The magnitude of effect is anticipated to be Medium during construction and initially during operation, but reducing to Low during operation after 10 years.

Effects Significance	Substation During construction, there would be a degree of direct effect on the transitional edge of this LLZ as a result of localised intensive activity associated with construction works. This may be similar to intensive agricultural activities which take place but likely to be greater in scale and more prolonged, leading to a temporary loss of the rural agricultural atmosphere. Once construction works had ceased, the effect would reduce, although the permanent structures would remain as new prominent features. However, the influence of these features would be relatively localised within 500 m to 1 km. After 10 years, mitigation planting would limit the degree of intervisibility slightly to the east and west. Whilst this would not provide mitigation for visibility to the south, the setting of the substation within the framework of woodland would be likely to reduce the prominence of the substation features to some degree. The landscape effect of the substation is anticipated to be **Moderate Adverse** and significant during construction. This would reduce to **Minor Adverse** (not significant) following completion of the Proposed Development both during the initial period, and longer term, after 10 years as the permanent features are anticipated to be locally intrusive, but not sufficiently prominent so as to reduce the overall scenic quality or character of the LLZ overall. Towers During construction, works to construct the towers would be similar in character to those for the substation although the taller structures likely to be involved would be evident over a larger area. During operation, the towers are anticipated to appear similar to those existing, though would be perceptibly taller if at the upper end of the LoD. They would therefore not form a new landscape characteristic although would increase the prominence of steel lattice towers in this part of the LLZ. The small amount of tree loss is considered unlikely to lead to any noticeable effect on landscape character, particularly once new woodland associated with the substation grows and matures. The landscape effect of the towers is also anticipated to be **Moderate Adverse** and significant during construction, reducing to **Minor Adverse** (not significant) after completion and after 10 years. Combined Effect The combined effect on this LLZ of both the substation and towers would be **Moderate Adverse** and significant during construction, reducing to **Minor Adverse** (not significant) after construction, continuing to be **Minor Adverse** after 10 years.

Summary of Effects on Landscape Character

4.4.30 Anticipated effects to LCTs are summarised in **Table 4-6** to **Table 4-8**. For the purposes of this assessment, effects with a Moderate rating or greater are considered to be significant.

Summary of Effects of Substation

Table 4-6: Summary of Effects on Landscape Character - Substation

LCT	Effect During Construction				Effect During Operation (winter yr 1)				Effect During Operation (summer yr 10)			
	Not significant		**Significant**		Not significant		**Significant**		Not significant		**Significant**	
	Negligible	Minor	**Moderate**	**Major**	Negligible	Minor	**Moderate**	**Major**	Negligible	Minor	**Moderate**	**Major**
LLZ 1: Rolling Fields and Policy Woodland			■			■			■			
LLZ 2: Open Agricultural Land with Shelterbelts			■			■				■		

4.4.31 As shown in **Table 4-6**, a temporary significant Moderate Adverse effect is anticipated to the landscape character within the Study Area during the construction of the substation. This would relate largely to the degree of construction activity which would be on-going, likely to be disruptive and distracting within the rural environment. The loss of a small number of trees and appearance of large scale construction activities within the wider area would also contribute to this effect. Following completion of the construction activities and commissioning of the substation, this effect is anticipated to reduce to a Minor Adverse effect which is not considered to be significant. Whilst the Proposed Development would remain a new and in some cases prominent feature within the landscape, the reduction of activity and noise is considered likely to reduce the effect to a relatively localised area which is unlikely to result in a very noticeable reduction in overall scenic quality of either LLZ. After 10 years, once mitigation planting has had an opportunity to mature, the visual influence of the substation would reduce, particularly to the north within LLZ1, becoming contained by the woodland areas. New planting would have a similar character to exiting policy plantations and as such, the long term effect on LLZ 1, within the north of the Study Area is anticipated to be Negligible. The long term effect on LLZ2 would remain as Minor Adverse as the substation would continue to be a visible feature within this landscape.

Summary of Effects of Towers

Table 4-7: Summary of Effects on Landscape Character - Towers

LCT	Effect During Construction				Effect During Operation (winter yr 1)				Effect During Operation (summer yr 10)			
	Not significant		**Significant**		Not significant		**Significant**		Not significant		**Significant**	
	Negligible	Minor	**Moderate**	**Major**	Negligible	Minor	**Moderate**	**Major**	Negligible	Minor	**Moderate**	**Major**
LLZ 1: Rolling Fields and Policy Woodland			■		■				■			
LLZ 2: Open Agricultural Land with Shelterbelts			■			■				■		

4.4.32 **Table 4-7** shows that significant Moderate Adverse effects are anticipated to the landscape resource within the Study Area during construction of the proposed towers, resulting from the degree of activity anticipated to be on-going. This would reduce once construction works had been completed. Whilst the new towers would form new features within the landscape, these would be similar in appearance to existing towers, though potentially slightly taller. The new towers would have a comparable degree of intervisibility across the landscape and would not introduce a new component to the landscape fabric. The landscape effect during operation is therefore anticipated to be Negligible for LLZ 1 (Rolling Fields and Policy Woodland), and Minor Adverse for LLZ 2 (Open Agricultural Land with Shelterbelts). The operational effect of the towers would therefore be not significant.

Summary of Effects – Combined Effect (Substation and Towers)

Table 4-8: Summary of Effects on Landscape Character – Combined Effect

LCT	Effect During Construction				Effect During Operation (winter yr 1)				Effect During Operation (summer yr 10)			
	Not significant		**Significant**		Not significant		**Significant**		Not significant		**Significant**	
	Negligible	Minor	**Moderate**	**Major**	Negligible	Minor	**Moderate**	**Major**	Negligible	Minor	**Moderate**	**Major**
LLZ 1: Rolling Fields and Policy Woodland			■			■			■			
LLZ 2: Open Agricultural Land with Shelterbelts			■			■				■		

4.4.33 When the substation and towers are considered in combination, the effect of the substation is generally anticipated to result in the greater level of landscape effect. This is due to the presence of existing towers which create a precedent for these structures within the landscape. The substation would occupy a larger footprint and lead to greater changes in the landscape fabric. During construction however, the activities involved for both elements are anticipated to be similar, leading to a similar degree of effect. The combined effect of these activities is not anticipated to be any greater as they would both take place in a similar area. A Moderate Adverse significant effect is therefore anticipated during construction. During operation, before mitigation planting has established, the combined effect of a Negligible or Minor Adverse effect for the towers and a Minor Adverse effect of the substation is anticipated to lead to a Minor Adverse effect overall for both LLZs. After 10 years, this is anticipated to reduce to Negligible for LLZ 1 but would remain Minor Adverse for LLZ 2 as the character of new woodland would accommodate the substation area well with the landscape character to the north, although the combined towers and substation would continue to influence the landscape character to some degree to the south. Overall, the long term combined effect with the incorporation of successful mitigation planting is not anticipated to be significant.

4.5 Visual Amenity

Visual Amenity: Introduction

4.5.1 This section discusses the findings of the detailed visual assessment undertaken for the Proposed Development. It describes and evaluates the potential change in existing views obtained from residential properties, places of work, routes, popular destinations and strategic vantage points during the construction and operational phases of the Proposed Development, and the extent to which these would affect residents, visitors and users of the landscape.

4.5.2 Visual amenity relates to the way in which people visually experience the surrounding landscape. Adverse visual effects may occur through the intrusion into established views of new features, out of keeping with the existing structure, scale and composition of the view. However, visual effects may also be beneficial where an attractive focus is created in a previously unremarkable view or the influence of previously detracting features is reduced. The significance of effects will vary, depending on the nature and degree of change experienced and the perceived value and composition of the existing view.

Visual Amenity: Methodology

Establishment of the Baseline

4.5.3 Establishment of the baseline conditions has been undertaken through combination of desk study and site appraisal. The following specific tasks have been undertaken:

- a review of the relevant development plans;
- generation and review of ZTV diagrams;
- identification of sensitive visual receptors; and
- field survey to establish the nature and context of individual visual receptors / viewpoints and the key elements and qualities of the existing view.

Appreciation of the Proposed Development

4.5.4 Appreciation of the Proposed Development involves the accumulation of a thorough knowledge of the proposal, its nature, scale and location within the baseline visual context, and any peripheral or ancillary features proposed. As part of this process, the ZTVs have been consulted to inform the potential range of effects.

Identification of Key Visual Receptors

4.5.5 For there to be a visual effect there is the need for a viewer. Individuals experiencing views from locations such as buildings, recognised routeways and popular viewpoints used by the public have been included in the assessment. Those experiencing views are referred to as visual receptors.

4.5.6 Potential visual receptors have been identified through analysis of the ZTV in combination with targeted field survey.

Identification of Potential Effects

4.5.7 Preparation of the visual baseline is followed by the systematic identification of likely effects on the potential visual receptors. This is a two-fold process, giving consideration to how effects may arise from aspects of the Proposed Development, and how these changes may be accommodated in the existing baseline view.

4.5.8 Locations of visual receptors identified for inclusion in the assessment were visited and key information on the nature, composition and characteristics of the existing view experienced recorded. Consideration is given to the likely perceived value of a particular view to the viewer, taking into account the nature of the receptor and the potential activity they may be involved in, and factors such as elevation, extent and key features or attractions which may feature in the view.

Visual Receptor Sensitivity

4.5.9 The evaluation of visual sensitivity considers both the perceived value of the existing view and the susceptibility of the visual receptor to change. It is important to note that the judgement of visual sensitivity is considered in relation to an understanding of both the existing view and the development proposed and therefore perceived value of the area of change as a part of the view as a whole contributes to the sensitivity evaluation.

4.5.10 Visual sensitivity to the change proposed has been evaluated using a three-point scale as follows:

- **High**
  - dwellings where the changed aspect is an important element in the view; and
  - footpaths, tracks and vantage points where the changed aspect is an important element in the view.
- **Medium**
  - dwellings where the changed aspect is a less important element in the view;
  - footpaths, tracks and vantage points where the changed aspect is a less important element in the view;
  - roads where the changed aspect is an important element in the view; and

- farm buildings not used as dwellings and industrial buildings where the changed aspect is an important element in the view.

- **Low**
  - dwellings where the changed aspect is an unimportant element in the view;
  - footpaths, tracks and vantage points where the changed aspect is an unimportant element in the view;
  - roads where the changed aspect is a less important element in the view; and
  - farm buildings not used as dwellings and industrial buildings where the changed aspect is a less important element in the view.

Magnitude of Change

4.5.11 Magnitude of change concerns the extent to which the existing view would be altered by the Proposed Development. The evaluation of magnitude gives consideration to factors such as the scale or extent of the changes within the view, the extent to which this may alter the composition or focus of the view and the duration and reversibility of these changes.

4.5.12 Magnitude of change has been evaluated using a four point scale comprised of the following criteria:

- **High** – where the Proposed Development would result in a very noticeable change in the existing view;
- **Medium** – where the Proposed Development would result in a noticeable change in the existing view;
- **Low** – where the Proposed Development would result in a perceptible change in the existing view; and
- **Negligible** – where the Proposed Development would result in a barely perceptible change in the existing view.

4.5.13 In recognition of the differing changes that would occur during construction works and in the longer term, three ratings for magnitude of change have been included: during the construction of the Proposed Development, year one following completion, and during operation after 10 years, once mitigation planting has matured.

Assessment of Effect Significance

4.5.14 The level of effect identified concerns the importance of changes resulting from the Proposed Development. Evaluation of the visual effect is based on consideration of the magnitude of change in relation to visual sensitivity, taking into account proposed mitigation measures, and is established using professional judgement. The assessment takes into account likely changes to the visual composition, including the extent to which new features would distract or screen existing elements in the view or disrupt the scale, structure or focus of the existing view.

4.5.15 Effect significance has been evaluated using a four point scale and using the following criteria:

- **Major** – the Proposed Development would become a prominent and very detracting feature and would result in a very noticeable deterioration to an existing highly valued and well composed view;
- **Moderate** – the Proposed Development would introduce some detracting features to an existing highly valued and well composed view, or would be prominent within a pleasing or less well composed view, resulting in a noticeable deterioration of the view;
- **Minor** – the Proposed Development would form a perceptible but not detracting feature within a pleasing or valued view or would be a more prominent feature within a poorly composed view of limited value, resulting in a small deterioration to the existing view; and
- **Negligible** – the Proposed Development would form a barely perceptible feature within the existing view and would not result in any discernible deterioration to the view.

4.5.16 As for magnitude of change, the differing potential effects have been considered during the construction of the Proposed Development, following completion, and during operation after 10 years.

4.5.17 For the purposes of the assessment effects with a rating of Moderate or above are considered to be significant.

Visual Amenity: Baseline

4.5.18 The baseline landscape and its broad visual context are described in Section 4.4.

Interpretation of the ZTVs

4.5.19 The pre- and post-mitigation ZTVs are shown on **Figures 4.1** to **4.3**.

4.5.20 The pre-mitigation substation ZTV (**Figure 4.1**) suggests that despite the relatively flat terrain, trees and woodland would reduce the potential visibility of the Proposed Development. The greatest degree of potential visibility is suggested to be within around 1 km to east and north-east and 500 m to south and west where largely open fields provide a relatively unobstructed view of all or part of the Proposed Development. This has the potential to affect views from a small number of residential properties around Haughend, Ballendoch and Brigton. Beyond this area theoretical visibility is shown to be more fragmented with potential views through or over the tops of trees suggested from areas around Jordanstone, Hallyards, Wester Cardean and Ruthven. The ZTV suggests that there would be no views obtained from Meigle.

4.5.21 The post mitigation substation ZTV (**Figure 4.2**) which takes into account the screening potential of mitigation planting shows that views would still be obtained from most areas. However, the number of potentially visible elements is shown to be noticeably decreased, particularly to the north-east and east of the Proposed Development. This theoretical visibility would continue to decrease over time as the planting continues to grow.

4.5.22 The ZTV for the proposed towers (**Figure 4.3**) shows that theoretical visibility of these structures would be fairly widespread across the study area but would be affected by the frequent woodland and mature tree belts that are present. Potential visibility of the proposed towers is shown to be fairly similar to that of existing towers which are in close proximity. Slightly increased visibility of the new towers in some locations is likely to be due to the potential 10% LoD increase in height compared to existing towers. If towers were of similar height to existing towers these areas of increased visibility would be reduced. However, there would still be small areas of increased visibility where the position of towers would allow them to be seen through vegetation where existing towers are hidden. Conversely, very small areas of decreased visibility of towers are shown to the south-east of the Proposed Development where the relocation of one tower would result in it being removed from the view.

4.5.23 For all ZTVs it should be noted that theoretical visibility would change with the seasons with potentially more filtered views obtained during winter than is suggested. This would be more likely closer to the Proposed Development as with greater distance bare trees would layer up, increasing their screening effect.

Visual Receptors

4.5.24 Visual receptors included in the assessment are indicated on **Figure 4.5** and described in **Appendices 4.2 and 4.3**.

4.5.25 The visual receptors identified can be subdivided into two separate categories:

- those obtaining views from building locations; and
- those obtaining views from routes.

Views from Buildings

4.5.26 Eighteen building or building group receptor locations have been identified within the Study Area for the Proposed Development and are numbered 1 - 18. These locations are described fully in **Appendices 4.2 and 4.3** and are shown on **Figure 4.5**. Properties generally comprise farm, cottage or estate properties which are scattered throughout the site. The exception is Meigle which comprises a small village. In most cases, views from properties are somewhat restricted by vegetation, with many set within landscaped or wooded grounds. Tree-lined lanes, field boundaries and shelterbelts also provide some filtering and screening of views, often in the mid-ground. A small number of properties have more open views, across open fields, but these are also restricted in their extent beyond the middle distance, due to the frequency

of mature woodland within the Study Area. Towards the north of the Study Area, around areas such as Jordanstone, Balendoch and Ruthven, views are more elevated. However, the greater quantities of woodland in these areas restricts the extent of these views. Through the centre and southern parts of the study area, views are sometimes more open. However, the lower elevation means that trees in the mid-ground have a greater influence as potential screening.

Views from Routes

4.5.27 Nine established routes have been identified within the Study Area and are included in the assessment. These comprise six roads and three Core Path networks.

4.5.28 Roads comprise two A roads, the A94 (**Route Receptor Location R1**) and the A926 (**Route Receptor Location R2**); one B road, the B954 (**Route Receptor Location R3**); and three minor roads, Balendoch Road (**Route Receptor Location R4**), Meigle / Cardean Road (**Route Receptor Location R5**) and Minor Road past Ruthven House (**Route Receptor Location R6**). Views from these routes vary along their lengths, often being enclosed by hedgerows and roadside trees but sometimes more open across surrounding fields and towards the Sidlaw Hills although woodland within the mid-ground often restricts more open views.

4.5.29 Core paths within the Study Area have been grouped into three groups these are defined as follows:

- Core Paths around Easter Jordanstone and Damend (**Route Receptor Location R7**);
- Core Paths around Ruthven and Ruthven House (**Route Receptor Location R8**); and
- Core Paths around Meigle (**Route Receptor Location R9**).

4.5.30 These routes, often through woodland or tree and hedge-lined lanes, have similarly restricted views although where open views are obtainable these are considered more likely to be valued by recreational users.

Visual Amenity: Assessment of Effects

4.5.31 The following section gives a description of predicted effects on receptors identified within the Study Area resulting from the proposed substation and towers. For the purpose of this assessment significant effects are those considered to be Moderate or greater. Individual receptor references relate to those indicated on **Figure 4.5** and described in **Appendix 4.2** (effect of substation) and **Appendix 4.3** (effect of towers) which also provides further information on distances of receptors from the Proposed Development and the nature of the predicted effect.

<u>Views from Buildings</u>

4.5.32 Of the eighteen visual receptor groupings assessed, five were identified as having potential for significant visual effects resulting from either aspect of the Proposed Development (the proposed substation, the proposed towers or both) as follows:

- **Receptor Location 1** (Mucketlands);
- **Receptor Location 3** (Gamekeeper's Cottage);
- **Receptor Location 4** (Haughend Farm Cottage);
- **Receptor Location 5 (**Haughend Farm) and
- **Receptor Location 12** (Ruthven House).

4.5.33 Three of these locations: **Receptor Location 1** (Mucketlands); **Receptor Location 5** (Haughend Farm); and **Receptor Location 12** (Ruthven House) are anticipated to experience this significant effect on a temporary basis only, during the construction period for the Proposed Development.

4.5.34 The remaining two receptor locations: R**eceptor Location 3** (Gamekeeper's Cottage) and **Receptor Location 4** (Haughend Farm Cottage) are predicted to have a significant visual effect which would continue into the operational phase of the Proposed Development.

4.5.35 The potential effect for those properties where a significant effect is anticipated is described below:

Receptor Location 1 (Mucketlands)

4.5.36 Mucketlands comprises a 1.5 storey house in an open field location around 480 m to the north of the Proposed Development with a slightly elevated view across fields. A significant effect is anticipated to the view from this property during construction works from both the proposed substation and towers.

4.5.37 Works to construct the substation would appear through trees within the main view from the property. The new access which would be created through the trees would open up the view towards works at the western part of the substation construction. Once complete, this effect is anticipated to reduce as construction works are ceased and over time would be further reduced by the growth of mitigation planting. The effect is anticipated to be **Moderate Adverse** (significant) during construction, reducing to **Minor – Moderate Adverse** (not significant) after completion and **Minor Adverse** (not significant) after 10 years.

4.5.38 Works to construct the towers wold be seen filtered through trees and above tree tops within the main view from the property. The towers would remain present throughout the operational phase but they would appear similar to towers already present, although would increase the number of these towers in the view, and would be perceptibly taller than the other towers if at the upper end of the LoD. The effect is anticipated to be **Moderate Adverse** (significant) during construction, reducing to **Minor Adverse** (not significant) after completion and after 10 years.

4.5.39 The combined effect of the Proposed Development for this receptor location is anticipated to be **Moderate Adverse** (significant) during construction, reducing to **Minor to Moderate Adverse** (not significant) after completion and **Minor Adverse** (not significant) after 10 years.

Receptor Location 3 (Gamekeeper's Cottage)

4.5.40 Gamekeeper's Cottage comprises a single storey cottage in a low position adjacent to a minor road with a conservatory on its west side and open, low vantage views across fields. A steel lattice tower is already prominent in the view. A significant effect is anticipated to the view from this property during construction, and also during the short term operational phase for both the proposed substation and towers.

4.5.41 Works to construct the substation would be direct within the main view and very prominent. Although temporary mounding would reduce visibility of some of the construction infrastructure, this would also form a new obstruction to the existing, open view. Once constructed there would be oblique but close views of the proposed substation at around 150 m. The appearance of this would reduce with time as proposed mitigation planting grows with only the tops of taller features anticipated to be visible after 10 years. The planting would result in the longer term view being less expansive, but open views to the south would still exist. The effect is anticipated to be **Major Adverse** (significant) during construction, reducing to **Moderate Adverse** (significant) after completion and **Minor Adverse** (not significant) after 10 years.

4.5.42 Works to construct the towers would also be close with works on the tower to be modified within the main view and oblique views of construction of other towers. Longer term, although towers are already prominent within the view, the new towers, would be potentially perceptibly taller than existing towers, and would occupy a greater part of the view. After 10 years, mitigation for the substation would help to filter and hide the lower parts of the new towers. Similar to the substation, the effect is anticipated to be **Major Adverse** (significant) during construction, reducing to **Moderate Adverse** (significant) after completion and **Minor Adverse** (not significant) after 10 years.

4.5.43 The combined effect of the Proposed Development for this receptor location is anticipated to be **Major Adverse** (significant) during construction, reducing to **Moderate Adverse** (significant) after completion and **Minor Adverse** (not significant) after 10 years.

Receptor Location 4 (Haughend Farm Cottage)

4.5.44 Haughend Farm Cottage comprises a single storey cottage set in a low position adjacent to a farm track with an open view across fields. A steel lattice tower is already prominent in the view. A significant effect is anticipated to the view from this property for both the substation and towers during construction and also following completion. This significant effect is anticipated to continue after 10 years for the proposed towers.

4.5.45 Works to construct the substation would be direct and close throughout the main view from this property, seen through and between small trees. Temporary mounding would reduce the visibility of some of these activities, but would also enclose the existing, open view from this property. During operation, the extent of works would be reduced but the proposed substation would remain prominent. Mitigation planting would help to reduce the appearance of the permanent structures after 10 years but the original open view across fields would become more enclosed. The effect is anticipated to be **Major Adverse** (significant) during construction and would continue to be **Major Adverse** (significant) in the short term after completion. However, this is anticipated to reduce to **Minor Adverse** (not significant) after 10 years.

4.5.46 Works to construct the towers including the modification of the existing tower would be directly opposite in the main view, filtered by existing small trees. New towers would line up in the view creating a denser wirescape although in a part of the view already occupied by towers. Small foreground trees help to reduce visibility to some extent and, as there is limited opportunity for new mitigation for the towers from this property due to the wayleave requirements, it is important that these trees are retained. The effect is anticipated to be **Major Adverse** (significant) during construction, reducing to **Moderate Adverse** (significant) after completion, and continuing to be **Moderate Adverse** and significant after 10 years, though this may reduce over time as mitigation planting continues to grow and mature.

4.5.47 The combined effect of the Proposed Development for this receptor location is anticipated to be **Major Adverse** (significant) during construction, **Major Adverse** (significant) after completion (in the short term) and **Moderate Adverse** (significant) after 10 years.

Receptor Location 5 (Haughend Farm)

4.5.48 Haughend Farm comprises a 1.5 storey farmhouse with farm buildings located on the flat valley floor with westerly side views across a garden and open fields. A temporary significant effect during construction is anticipated to the view from this property in relation to the towers only.

4.5.49 Works to construct new towers and dismantle the tower to be removed would be oblique to north and south in westerly, side views from this property with other activities relating to OHL construction taking place between and more in the direct focus of the view. The new towers would be prominent but in peripheral parts of the view which are already occupied by existing towers. The effect is anticipated to be **Moderate Adverse** (significant) during construction, but would reduce to **Minor Adverse** (not significant) after completion.

4.5.50 The substation would be peripheral in views from this property and partly hidden by adjacent farm buildings. The effect on the view is anticipated to be **Minor – Moderate Adverse** (not significant) during construction and **Minor Adverse** (not significant) following completion.

4.5.51 The combined effect of the Proposed Development for this receptor location is anticipated to be **Moderate Adverse** (significant) during construction, reducing to **Minor Adverse** (not significant) following completion and after 10 years.

Receptor Location 12 (Ruthven House)

4.5.52 Ruthven House comprises a large 2.5 storey house in landscaped grounds overlooking the River Isla. Main views from the house are south-west across the landscaped grounds with an open vista beyond, across open fields. A temporary significant effect during construction is anticipated to the view from this property in relation to the substation only.

4.5.53 Works to construct the proposed substation would be located within the middle distance of the main vista, more visible from upper floors. Although relatively distant, this effect is considered to be significant due to the proposed works occupying a designed vista. After completion the reduction in activities would reduce the effect and by 10 years, mitigation planting is likely to hide the majority of the substation. Though taller structures may remain visible this visibility would decrease over time. However, the mitigation planting may reduce the extent of the existing vista. The effect is anticipated to be **Moderate Adverse** (significant) during construction, reducing to **Minor – Moderate Adverse** (not significant) after completion and **Minor Adverse** (not significant) after 10 years.

4.5.54 From this receptor location, the proposed new towers would be seen behind the existing tower. Although this may give an appearance of a denser wirescape, towers would not occupy much more of the view and are considered unlikely to appear substantially different from the existing tower. The effect is therefore anticipated to be **Minor Adverse** (not significant) during construction and **Negligible** following completion.

4.5.55 The combined effect for the Proposed Development for this receptor location is anticipated to be **Moderate Adverse** (significant) during construction, **Minor – Moderate Adverse** (not significant) following completion and **Minor Adverse** (not significant) after 10 years.

Other Visual Effects considered to be Not Significant

4.5.56 The visual effect on views from all remaining building receptors within the Study Area is considered unlikely to be significant, either during or after construction for both towers and substation.

4.5.57 For the substation, during construction, a potential temporary **Minor – Moderate Adverse** (not significant) effect is anticipated for Receptor Locations 2 (Balendoch) and 5 (Haughend Farm (as described in paragraph 4.5.50 above)). For these properties, construction activities would be at relatively close vantage (less than 500 m) but either peripheral or partially screened / filtered in the view. A potential **Minor Adverse** (not significant) effect is anticipated during construction for Receptor Locations 6 (Hallyards), 7 (West Jordanstone and Cotton of Balhary), 9 (Easter Jordanstone and Selvie), 11 (Brigtown and Balbirnie), 14 (Cottages at Cardean and Simprim) and 16 (Bridge of Crathies and Glenluie) due to more distant potential views or limited potential glimpsed views through or over the tops of trees which would result in only a small distraction in the view.

4.5.58 After completion of construction, effects would be reduced in most of these views with a **Minor Adverse** (not significant) effect for Receptor Locations 2 (Balendoch), 5 (Haughend Farm), 9 (Easter Jordanstone and Selvie) and 14 (Cottages at Cardean and Simprim) and a **Negligible** effect for all other Receptor Locations. After 10 years, this would reduce to **Negligible** for all Receptor Locations with the exception of Receptor Location 5 (Haughend Farm) and Receptor Location 14 (Cottages at Cardean and Simprim) where the effect is anticipated to continue to be **Minor Adverse** as the view is through the OHL wayleave, preventing opportunity to mitigate the view with tree planting.

4.5.59 For the towers, during construction, a potential temporary **Minor Adverse** (not significant) effect is anticipated for Receptor Locations 2 (Balendoch), 6 (Hallyards), 7 (West Jordanstone and Cotton of Balhary), 9 (Easter Jordanstone and Selvie), 11 (Brigton and Balbirnie) 12 (Ruthven House (as discussed in paragraph 4.5.54)), 14 (Cottages at Cardean and Simprim) and 16 (Bridge of Crathies and Glenluie) due to partial appearance of the tower works over the tops of or through trees or where the view would be distant or peripheral within the view.

4.5.60 After completion of construction, effects would be reduced to Negligible for some Receptor Locations due to the reduced level of activity in the view. However, a **Minor Adverse** (not significant) effect is anticipated to continue for Receptor Locations 2 (Balendoch), 6 (Hallyeards), 9 (Easter Jordanstone and Selvie), 14 (Cottages at Cardean and Simprim) and 16 (Bridge of Crathies and Glenluie) as the height of the towers would continue to result in these structures being perceptible features within the view. Given the height of the towers, mitigation planting is considered unlikely to lead to much change in the level of effect, other than for properties close to the Proposed Development. The effect would therefore continue to be **Minor Adverse** after 10 years for the above mentioned Receptor Locations and would be **Negligible** for the remaining Receptor Locations which have not been previously discussed.

4.5.61 The combined effect of the Proposed Development is not anticipated to lead to any increase in level of effect beyond that which is predicted for the substation or towers alone (whichever is anticipated to have the higher level of effect). Therefore, with the exception of Receptor Locations 1, 3, 4, 5 and 12 (as previously discussed), no significant combined visual effects resulting from the substation and towers together are anticipated for remaining Building Receptor Locations.

Views from Routes

4.5.62 Users of one of the nine routes assessed within the Study Area, have been identified as likely to experience potential significant visual effects:

Route Receptor Location R4 (Balendoch Road)

4.5.63 Balendoch Road comprises a winding, single track route through fields and woodland between the B954 near Hallyards and the A926 at Bridge of Ruthven. Views from this route are varying, comprising open and panoramic views through east, south and west from the section of road to the west of the Proposed Development and more enclosed views for the section to the east of the Proposed Development, with filtered views through roadside trees and hedges to the east and south. A significant effect is anticipated to the visual amenity of this route for both the substation and towers during construction and within the short term for the substation after completion.

4.5.64 Works to construct the proposed substation would be immediate and adjacent whilst passing the Proposed Development site within open, southerly views. Temporary mounding would slightly reduce the extent of works which may be seen but this would also create a more enclosed view than the existing open panorama. From the western part of the route views are likely to be filtered by some intervening trees whilst there would be likely to be only very limited views from the more enclosed eastern part of the route. Following completion of construction works, mounding would help to reduce views whilst passing close to the substation to some degree although structures would still be very prominent. After 10 years the growth of planting would minimise views to higher substation structures, more likely to be seen from western sections of the route. It is likely that after 10 years, passing views would be obscured by the new planting, other than when passing the new access. However, the existing open view across the fields would no longer be obtained from this section. The effect on the visual amenity of those travelling this route is anticipated to be **Moderate to Major Adverse** (significant) during construction, **Moderate Adverse** (significant) initially, following completion, and **Minor Adverse** (not significant) after 10 years.

4.5.65 Works to construct the towers would be close and likely to be distracting in main and side views whilst passing the Proposed Development site. Towers would also be prominent above tree tops within main views from the western part of the route though only occasional filtered views of tower tops would be obtained from the eastern part of route. Although the new towers would be seen in the context of other existing towers, they would result in a noticeable increase in this type of structure in the view and may be perceptibly taller if at the upper end of the LoD. After 10 years the growth of mitigation planting for the substation would minimise views to higher parts of the towers when passing the Proposed Development site, though views would remain similar from the western stretch of road. The effect on the visual amenity of travellers along this route is anticipated to be **Moderate – Major Adverse** (significant) during construction, but would reduce to **Minor – Moderate Adverse** (not significant) following completion and **Minor Adverse** (not significant) after 10 years.

4.5.66 The combined effect of the Proposed Development for this Route Receptor Location is anticipated to be **Moderate – Major Adverse** (significant) during construction, reducing to **Moderate Adverse** (significant) after completion and **Minor Adverse** (not significant) after 10 years.

Other Visual Effects Considered to be Not Significant

4.5.67 The visual effect for users of all other routes within the Study Area, comprising five public roads and three Core Path networks is not predicted to be significant for either the substation or towers.

4.5.68 For the substation, during construction, a **Minor Adverse** (not significant) effect is anticipated for Route Receptor Locations R6 (Minor Road past Ruthven House), R7 (Core paths around Easter Jordanstone and Damend) and R8 (Core Paths around Ruthven and Ruthven House) due to possible views of taller structures through or over the tops of trees. This is anticipated to continue as **Minor Adverse** (not significant) after completion for Route Receptor R6, but would reduce to **Negligible** for Route Receptors R7 and R8. After 10 years, the effect would reduce to **Negligible** for all the Route Receptor Locations except R4 (Balendoch Road), as discussed above.

4.5.69 For the tower works, during construction a temporary **Minor Adverse** (not significant) effect is anticipated for Route Receptor Locations R5 (Meigle / Carndean Road), R7 (Core Paths around Easter Jordanstone and Damend) and R8 (Core Paths around Ruthven and Ruthven House). This **Minor Adverse** (not significant) effect is anticipated to continue both after completion and after 10 years for Route Receptor Location R7 but would reduce to **Negligible** for all other Route Receptor Locations other than R4 (Balendoch Road) as discussed above.

4.5.70 The combined effect of the Proposed Development is not anticipated to lead to any increase in level of effect for these Route Receptor Locations beyond that which is predicted for the substation or towers alone (whichever is anticipated to have the higher level of effect). Therefore, with the exception of Route Receptor Location R4 (as previously discussed), no significant combined visual effects resulting from the substation and towers together are anticipated for remaining Route Receptor Locations.

Summary of Effects on Visual Amenity

4.5.71 Anticipated effects to visual receptors are summarised in **Table 4.9 to Table 4.11**. For the purposes of this assessment, effects with a Moderate rating or greater are considered to be significant.

Summary of Effects - Substation

Table 4.9: Summary of Effects on Visual Receptors - Substation

Receptor Type	Effect During Construction						Effect During Operation											
							Operation Yr 1						Operation Yr 10					
	Not significant			Significant			Not significant			Significant			Not significant			Significant		
	Negligible	Minor	Minor - Moderate	**Moderate**	**Moderate- Major**	**Major**	Negligible	Minor	Minor - Moderate	**Moderate**	**Moderate- Major**	**Major**	Negligible	Minor	Minor - Moderate	**Moderate**	**Moderate- Major**	**Major**
Building Receptor Locations	6	6	2	**2**	-	**2**	10	4	2	**1**	-	**1**	12	6	-	-	-	-
Route Receptor Locations	5	3	-	-	**1**	-	7	1		**1**			8	1	-	-	-	-
Totals	11	9	2	**2**	**1**	**2**	17	5	2	**2**	-	**1**	20	7	-	-	-	-

4.5.72 **Table 4.9** shows that significant effects are anticipated to result from the substation during construction to views from four building receptor locations and one route receptor location. Major Adverse effects are predicted to two locations which would be close to the substation works (within 200 m) which would be very prominent within the view: Building Receptor Location 3 (Gamekeeper's Cottage) and 4 (Haughend Farm Cottage). Moderate Adverse Effects are anticipated to two locations at greater distance where the works would be present within a valued view: Building Receptor Locations 1 (Mucketlands) and 12 (Ruthven House). A Moderate – Major Adverse effect is also predicted for Route Receptor Location R4 (Balendoch Road) which passes immediately adjacent to the Proposed Development. Those effects

predicted to be Moderate Adverse during construction are expected to reduce to a non-significant level following completion. However, significant effects are anticipated to continue into the short term operational phase for the remaining two building receptor locations and the route receptor location comprising a Moderate Adverse effect for Building Receptor Location 3 (Gamekeeper's Cottage) and Route Receptor Location R4 (Balendoch Road), and a Major Adverse effect for Building Receptor Location 4 (Haughend Farm Cottage). However, after 10 years, once mitigation has been allowed to establish and mature, these effects are predicted to reduce to Minor Adverse and no significant long term effects are therefore anticipated for the substation development alone.

Summary of Effects - Towers

Table 4.10: Summary of Effects on Visual Receptors - Towers

Receptor Type	Effect During Construction						Effect During Operation											
							Operation Yr 1						Operation Yr 10					
	Not significant			Significant			Not significant			Significant			Not significant			Significant		
	Negligible	Minor	Minor - Moderate	**Moderate**	**Moderate- Major**	**Major**	Negligible	Minor	Minor - Moderate	**Moderate**	**Moderate- Major**	**Major**	Negligible	Minor	Minor - Moderate	**Moderate**	**Moderate- Major**	**Major**
Building Receptor Locations	6	8	-	**2**	-	**2**	9	7	-	**2**	-	**-**	9	8	-	**1**	-	-
Route Receptor Locations	5	3	-	-	**1**	-	7	1	1	**-**	-	-	7	2	-	-	-	-
Totals	11	11	-	**2**	**1**	**2**	16	8	1	**2**	-	**-**	16	10	-	**1**	-	-

4.5.73 **Table 4.10** shows that significant effects are anticipated to result from the towers during construction to views from four building receptor locations and one route receptor location. As for the substation, Major Adverse effects are predicted to two locations which lie close to the proposed tower works (within 300 m) which would be very prominent within the view: Building Receptor Location 3 (Gamekeeper's Cottage) and 4 (Haughend Farm Cottage), whilst Moderate Adverse effects are anticipated to two locations where the works would be present within a valued view or peripheral within a close view: Building Receptor Location 1 (Mucketlands) and 5 (Haughend Farm). A Moderate – Major Adverse effect is also predicted for Route Receptor Location R4 (Balendoch Road) which passes close to the proposed works. Effects to Building Receptor Locations 1 and 5, and Route Receptor Location R4 are expected to reduce to a non-significant level following completion. However, significant Moderate Adverse effects are anticipated to continue into the operational phase for the remaining two building receptor locations: Building Receptor Locations 3 (Gamekeeper's Cottage) and 4 (Haughend Farm Cottage). After 10 years, once mitigation has been allowed to establish and mature, this is anticipated to reduce to Minor Adverse for Building Receptor Location 3 (Gamekeeper's Cottage). However, a long term Moderate Adverse significant effect is predicted to continue after 10 years for Building Receptor Location 4 (Haughend Farm Cottage), though this may reduce with time as mitigation planting continues to grow and mature.

Summary of Effects – Combined Effect (substation and towers)

Table 4.11: Summary of Effects on Visual Receptors – Combined Effects

Receptor Type	Effect During Construction						Effect During Operation											
							Operation Yr 1						Operation Yr 10					
	Not significant			Significant			Not significant			Significant			Not significant			Significant		
	Negligible	Minor	Minor - Moderate	**Moderate**	**Moderate- Major**	**Major**	Negligible	Minor	Minor - Moderate	**Moderate**	**Moderate- Major**	**Major**	Negligible	Minor	Minor - Moderate	**Moderate**	**Moderate- Major**	**Major**
Building Receptor Locations	6	6	1	**3**	-	**2**	8	6	2	**1**	-	**1**	8	9	-	**1**	-	-
Route Receptor Locations	5	3	-	-	**1**	-	7	1	-	**1**	-	-	7	2	-	-	-	-
Totals	11	9	1	**3**	**1**	**2**	15	7	2	**2**	-	**1**	15	11	-	**1**	-	-

4.5.74 **Table 4.11** shows the combined effects for both the substation and towers together. It is not anticipated that for any receptor locations the combined effect would be greater than the level of effect for either the substation or towers alone. Therefore the level of effect is anticipated to be equivalent of either that of the substation or towers (whichever is greater). This results in a slightly greater number of potential significant effects than for the substation or towers alone with construction based significant effects for five building receptor locations and one route receptor location: Major Adverse effects for Building Receptor Locations 3 (Gamekeeper's Cottage) and 4 (Haughend Farm Cottage); Moderate – Major Adverse effects for Route Receptor Location R4 (Balendoch Road); and Moderate Adverse effects for Building Receptor Locations 1 (Mucketlands), 5 (Haughend Farm) and 12 (Ruthven House). After completion, this would reduce to significant effects to two building receptor locations and one route receptor location: a Major Adverse effect for Building Receptor Location 4 (Haughend Farm Cottage); and Moderate Adverse effects for Building Receptor 3 (Gamekeeper's Cottage) and Route Receptor Location R4 (Balendoch Road). After 10 years a significant effect would be anticipated to remain for Building Receptor Location R4 (Haughend Farm Cottage) due to the appearance of the new towers in combination with existing towers although it is expected that this may continue to reduce with time.

4.6 Mitigation Proposals

4.6.1 Mitigation measures are proposed for the Proposed Development in order to offset significant visual effects relating primarily to the proposed substation. These comprise the following measures to reduce the visual appearance of the substation in the short and longer term:

- proposed landform;
- retention and protection of existing trees; and
- proposed planting.

4.6.2 The mitigation proposals are shown on **Figure 4.6** and are described below.

Proposed Landform

4.6.3 It is proposed that soils excavated for the establishment of the proposed substation platform would be used to form new mounding around the periphery of the substation to reduce the visual appearance of the platform and lower features such as fencing. Mounding is proposed around the northern, eastern and western sides of the substation where the

majority of views are likely to be obtained. As the character of the surrounding landscape is low and flat or rolling, high steep mounding is considered out of character and may draw greater attention to the proposed substation. Mounding is therefore proposed to be of a smooth, sweeping gradient on the outer sides of the substation to give as natural an appearance as possible and up to 3 m in height. This would be established with maximum gradients of 1:3 on the outer side (away from the substation) and 1:2 on the inner (substation) side of the mound in order to allow vegetation to establish and maintenance to take place safely. The creation of landform also has the added benefit of using up excavated materials to avoid the need to transport these off-site.

Temporary Landform

4.6.4 During construction, it is proposed that excavated soils would be formed into temporary mounding around the periphery of the site which would help to reduce the visibility of some of the lower construction activities from nearby properties. This landform would comprise, non-compacted, graded mounds, located no closer than 15 m from the property frontages which would reduce potential for visual enclosure from properties whilst protecting the integrity of stored topsoils. To improve the appearance of mounds from properties, seeding with a native, low maintenance seed mix is proposed.

4.6.5 As temporary landform would double up as soil stockpiles, care would be taken to ensure that topsoils are appropriately maintained to ensure the best opportunities for future mitigation planting. Subsoils and topsoils would be stored separately and protected from contamination and compaction by plant.

Retention and Protection of Existing Trees

4.6.6 Existing tree belts exist to the north and west of the Proposed Development and help to filter and screen existing views. The construction of the Proposed Development would require the removal of a number of trees in order to enable a new access to be established. However, it is proposed that the majority of trees would remain in place. These would need to be protected throughout the works to prevent physical damage and damage to the root zone, in accordance with BS 5837: 2012.

4.6.7 In addition, a small number of tree and scrub specimens are present close to Building Receptor Location 4 (Haughend Farm Cottage). It is important that these trees are retained and protected throughout the works as they provide important filtering of views towards the proposed towers where there are restrictions on new planting due to the required wayleave.

Proposed Planting

4.6.8 Planting is proposed around the north, east and west of the substation to further reduce potential views of the proposed substation over time. Planting has not been proposed to the south of the substation due to the restrictions of existing and proposed OHLs and towers and the presence of a Scheduled Monument.

4.6.9 Planting would comprise a mix of native species to encourage biodiversity enhancement of the site and would include a mix of native woodland planting on top of landform mounding and native scrub positioned closer to the substation and wayleaves where a lower canopy height is required. Along parts of the northern and western boundaries of the proposed development, existing narrow woodland shelterbelt and roadside trees are already present. In these locations it is intended that woodland or scrub would be used to thicken up and bolster these shelterbelts, reducing the range of views that are obtained through the lower canopy, particularly during the winter. Planting would also compensate for trees which would need to be removed to enable access to the site and tree removal to accommodate a temporary OHL diversion over the River Isla during construction of the new towers.

4.6.10 Planting would be primarily composed of small stock (transplants) which establishes and thrives more successfully. However, on mounding to the east of the Proposed Development some standard specimen trees are proposed to help give initial screening whilst smaller stock establishes and grows.

4.6.11 Species for planting are likely to include (but not be limited to): Oak (*Quercus petraea*), Scots pine (*PInus sylvestris*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*), Alder (*Alnus glutinosa*) Hawthorn (*Crateagus monogyna*) and Willows (*Salix spp.*). This would be supplemented by species rich seeding in unplanted areas to further enhance biodiversity across the site.

4.7 Statement of Significance

4.7.1 A detailed Landscape and Visual Impact Assessment has been undertaken for the Proposed Development. This has concluded that some significant effects would occur to the landscape and visual resource within 2 km of the Proposed Development during the construction phase for both the proposed substation and steel lattice tower elements of the Proposed Development. Following completion of the Proposed Development, the majority of these effects would reduce to levels which are considered to be not significant. However, significant effects are anticipated to continue into the short-term operational phase for a small number of visual receptors within around 500 m of the Proposed Development. As mitigation planting associated with the Proposed Development establishes and grows, the number of significant effects would further reduce, with visual receptors at only one property anticipated to experience a significant visual effect after 10 years. With increased on-going growth of planting, this effect would be expected to further reduce over time.

CONTENTS

5. TERRESTRIAL ECOLOGY

5.1 Executive Summary

5.1.1 This Chapter describes the ecological (terrestrial) sensitivities present within the anticipated zone of effect for the development of the proposed Alyth 275 / 400 kV Substation and Associated Works (the 'Proposed Development'). The Proposed Development is situated at Haughend near Alyth in Perth and Kinross.

5.1.2 Desk and field surveys were undertaken for identified receptors including sites designated for nature conservation interest, habitat and vegetation, and protected species, according to best practice methodologies.

5.1.3 No sites designated for nature conservation (terrestrial ecology) will be affected by the Proposed Development.

5.1.4 Habitats potentially affected by the Proposed Development do not include those considered to be of high ecological value. Signs of, or features supporting, badger, otter, red squirrel and bats were identified within the survey area.

5.1.5 Proposals for mitigation relevant to identified receptors include adherence to best practice construction methods as detailed in a project Construction Environmental Management Plan (CEMP), pre-construction / pre-felling checks for protected species, pollution prevention measures, prompt reinstatement of any excavations and the employment of an Environmental Clerk of Works (ECoW) to provide environmental guidance and monitoring throughout the course of the construction period.

5.2 Introduction

5.2.1 This Chapter evaluates the importance of the nature conservation interest (terrestrial) and the potential impacts predicted as a result of the proposed Alyth 275 / 400 kV Substation development and Associated Works (the Proposed Development). It outlines the methodologies used to assess potential effects on internationally and nationally protected habitats, flora and fauna (non-avian) both within the footprint of the Proposed Development and the surrounding area. It presents an assessment of the potential impacts on sensitive ecological receptors, along with suggested mitigation measures to avoid or reduce the impacts.

5.2.2 The Proposed Development is proposed to be built at the point where an existing 275 kV overhead line (OHL) network converges on an existing OHL T-Junction. The current OHL arrangement leads to an unequal sharing of power flows on OHL's between the Fetteresso, Tealing and Kincardine substation which limits the capacity of the OHLs and the ability of the network to accept new generation connections. Establishing a new substation at the T-Junction and connecting the OHLs into the substation will address this issue.

5.2.3 This assessment has been completed by suitably qualified ecologists with relevant accreditations (MCIEEM) of Blairbeg Consulting.

5.3 Scope of Assessment

Survey Area

5.3.1 The survey area for this assessment incorporates land within 250 m of all infrastructure associated with the Proposed Development. The area of land surveyed covers approximately 111 hectares (Ha), located approximately 3.5 km south-east of Alyth, Perthshire, see **Chapter 3**: The Proposed Development for more detail.

5.3.2 The most dominant habitats that the survey area encompasses include: open arable and pasture fields used for rearing livestock and growing arable crop, and grazed pastureland. The landscape within the survey area is dominated by an extensive area of flat lying land within a valley that holds the River Isla. There is a small stand of woodland to the west and north of the Proposed Development, but otherwise the site is quite open in character. Two 275 kV OHLs meet in the centre of the survey area. Two large farmsteads are located at Haughend and Wester Cardean.

5.3.3 The River Isla transects the southern section of the survey area. It is a major river, approximately 20 m wide, and is a tributary of the River Tay. There are no other notable watercourses or waterbodies within the survey area beyond small narrow ditches and modified drains present at some field boundaries.

5.4 Consultation

5.4.1 A Screening Opinion was issued by the Scottish Ministers on 23rd August 2019 in relation to the new OHL and tower elements of the Proposed Development. Responses relevant to terrestrial ecology were received from Marine Scotland (MSS), Scottish Environment Protection Agency (SEPA) and Scottish Natural Heritage (SNH). The Screening Opinion is included in **Appendix 1.2** with responses relevant to terrestrial ecology summarised below.

- Marine Scotland highlight the proximity of the River Tay SAC to the Proposed Development and advise that the Applicant contacts that Tay District Salmon Fisheries Board (TDSFB) for information regarding local fish populations. TDSFB were contacted for relevant information on local fish stocks to inform the Environmental Appraisal (EA) but no response was received.
- SEPA advised in their response that there wouldn't be a significant environmental impact provided mitigation measures are carried out.
- The response from SNH noted that they consider the separation distance between the construction works and the River Tay Special Area of Conservation (SAC) is great enough not to pose a significant pollution risk. They welcome the commitment to update all protected species surveys.

5.4.1 A Screening Opinion was issued by Perth and Kinross Council on 30th August 2019 in relation to the substation elements of the Proposed Development. The Screening Opinion is included in **Appendix 1.1** with responses relevant to terrestrial ecology summarised below.

- The response noted that the development is close to the River Tay SAC and potential significant effects should be avoided by appropriate mitigation being identified and undertaken. In addition, the response recognised that a number of species were identified through ecology surveys for the extant permission and noted that any significant effects should be appropriately managed and mitigated.

5.5 Methodology

Desk Study

5.5.1 Baseline data on the nature conservation interest of the survey area and its surroundings, including information on sites designated for nature conservation and protected species records, were sought from the following sources:

- EA submitted as part of original application in 2012 (Application Reference: 12/00948/FLM)[1];
- Joint Nature Conservation Committee (JNCC) website (http://www.jncc.gov.uk/) – accessed July 2019;
- SNH Site Link website (http://gateway.snh.gov.uk) – accessed July 2019;
- The National Biodiversity Network website (http://data.nbn.org.uk/) (NBN Gateway) – accessed July 2019; and
- Large-scale 1:10,000 Ordnance Survey (OS) maps in conjunction with colour 1:25,000 OS map (to determine the presence of ponds and other features of nature conservation interest).

5.5.2 Further information on the nature conservation features that have potential to be affected by the Proposed Development was obtained through searches of internet sources (e.g. UK Biodiversity Action Plans (UKBAP), Scottish Biodiversity List (SBL), Local Biodiversity Action Plans (LBAP)) and the relevant published literature (i.e. relevant guidance documents and scientific papers).

Field Survey

5.5.3 Fieldwork was carried out in July 2019. Field survey methodology is detailed within **Appendix 5.1**.

Assessment of Effects

5.5.4 The assessment has been undertaken according to the current guidance detailed by the Chartered Institute of Ecology and Environmental Management (CIEEM 2018)[2].

5.5.5 The assessment of the significance of predicted impacts on ecological receptors is based on both the 'sensitivity' of a receptor and the nature and magnitude of the effect that the Proposed Development will have on it. Effects in biodiversity may be direct (e.g. the loss of species or habitats), or indirect (e.g. effects due to noise, dust or disturbance on receptors located within or outside the survey area).

<u>Sensitivity / Importance</u>

5.5.6 The evaluation methodology has been adapted from the CIEEM Guidelines. A key consideration in assessing the effects of any development on flora and fauna is to define the areas of habitat and the species that need to be considered. This requires the identification of a potential zone of influence, which is defined as those areas and resources that may be affected by biophysical changes caused by project activities, however remote from a site.

[1] Scottish Hydro Electric Transmission PLC (2012) Alyth Substation 275 / 400 kV Environmental Appraisal. April 2012.

[2] Chartered Institute of Ecology and Environmental Management (2018). Guidelines for ecological impact assessment in the United Kingdom. Winchester. Chartered Institute of Ecology and Environmental Assessment.

5.5.7 In identifying these receptors, it is important to recognise that a development can affect flora and fauna directly (e.g. the land-take required) and indirectly, by affecting land beyond the development site (e.g. through noise generation or hydrological impacts). The approach that has been undertaken for this assessment is to identify 'sensitive ecological receptors' (species and habitats that are both valued in some way and could be affected by the Proposed Development) and separately, to consider legally protected species.

5.5.8 It is impractical for an assessment of the ecological effects of a development to consider every species and habitat that may be affected; instead it should focus on valued ecological receptors. These are species and habitats that are both valued in some way and could be affected by the Proposed Development. Where there is no potential for valued ecological receptors to be affected significantly, it is not necessary for them to be considered.

5.5.9 The sensitivity of species populations and habitats is assessed with reference to:

- their importance in terms of 'biodiversity conservation' value (which relates to the need to conserve representative areas of different habitats and the genetic diversity of species populations);
- any social benefits that species and habitats deliver (e.g. relating to enjoyment of flora and fauna by the public); and
- any economic benefits that they provide.

5.5.10 Both species' populations and habitats have been valued using the following scale: Very High, High, Medium, Low, Very Low and Negligible.

5.5.11 The approach taken in this assessment is that a species population that is considered to be of medium or greater importance in biodiversity conservation terms is considered to be a sensitive ecological receptor. Therefore, if a species population is considered to be of low value, the Proposed Development will not have a significant effect on the receptor in question. Exceptions are if the species population has been identified as having a high social or economic value or if the species is legally protected.

5.5.12 A similar approach is adopted for habitats i.e. if a habitat is considered to be of very low value, the Proposed Development will not have a significant effect on the receptor in question. The exception would be if the habitat has economic or social value (e.g. an open space that is used extensively for informal recreation by local people, where the area's wildlife is an important contribution to this value).

5.5.13 Ecological features have been valued using the scale set out in **Table 5-1** below, with examples provided of criteria used when defining the level of value.

Table 5-1: Scale of Value

Sensitivity of Receptor	Examples (Guidance to Evaluation)
Very High (International)	An internationally important site e.g. Special Protection Area (SPA), Special Area of Conservation (SAC), Ramsar (or a site proposed for, or considered worthy of such a designation); A regularly occurring substantial population of an internationally important species (listed on Annex IV of the Habitats Directive).
High (National)	A nationally designated site e.g. Site of Special Scientific Interest (SSSI), or a site proposed for, or considered worthy of, such designation; A viable area of a habitat type listed in Annex 1 of the Habitats Directive or smaller areas of such habitat which are essential to maintain the viability of a larger whole; A regularly occurring substantial population of a nationally important species, e.g. listed on Schedules 5 & 8 of the 1981 Wildlife and Countryside Act; A feature identified as a priority species / habitat in the UK BAP.

Medium **(Regional)**	Regional areas of internationally or nationally important habitats which are degraded but are considered readily restored; A regularly occurring, locally significant population of a species listed as being nationally scarce.
Low	Viable areas of priority habitat identified in the LBAP or smaller areas of such habitat which are essential to maintain the viability of a larger habitat as a whole; A site designated as a non-statutory designated site e.g. Site of Importance for Nature Conservation (SINC), or a site listed on the Ancient Woodland Inventory (AWI) or Semi-natural Ancient Woodland Inventory (SNAWI); A regularly occurring, substantial population of a nationally scarce species, including species listed on the UK and Local BAPs e.g. common frog (a UK BAP species); Areas of nationally important habitats which are degraded and have little or no potential for restoration; A good example of a common or widespread habitat in the local area, e.g. those listed as broad habitats on the LBAP; Species of national or local importance, but which are only present very infrequently or in very low numbers within the subject area.
Very Low	Areas of habitat which have value to the local environment, or populations of regularly occurring common species of local conservation interest; Local areas of heavily modified or managed vegetation of low species diversity or low value as habitat to species of nature conservation interest; Common and widespread species.
Negligible	Areas of limited ecological value, which are not representative of semi-natural habitat and do not support wildlife of conservation interest.

Magnitude of Effect

5.5.14 Effects can be permanent or temporary; direct or indirect; adverse or beneficial and can be cumulative. Effects can vary according to scales of size, extent, duration, timing and frequency of impacts. These factors are brought together to assess the magnitude of the effect on the 'conservation status' of the particular valued ecological receptors, and on the 'integrity' of the habitats that support them:

- integrity is the coherence of the ecological structure and functions of a site or habitat that enables it to sustain its plant and animal communities and populations; and
- conservation status is the ability of a habitat, a plant or animal community or population to maintain its distribution and / or extent / size.

5.5.15 Conservation status is therefore largely determined by the extent to which integrity is maintained. It follows that habitats may or may not be valued ecological receptors in their own right.

5.5.16 Wherever possible, the magnitude of the effect is quantified. Professional judgement is then used to assign the effects on the receptors to one of four classes of magnitude, as defined in **Table 5-2**.

Table 5-2: Magnitude of Effect

Magnitude	Definition
High	A permanent or long-term effect on the integrity of a site or conservation status of a habitat, species assemblage / community, population or group. If adverse, this is likely to threaten its sustainability; if beneficial, this is likely to enhance its conservation status.
Medium	A permanent or long-term effect on the integrity of a site or conservation status of a habitat, species assemblage / community, population or group. If adverse, this is unlikely to threaten its sustainability; if beneficial; this is likely to be sustainable but is unlikely to enhance its

	conservation status.
Low	A short-term but reversible effect on the integrity of a site or conservation status of a habitat, species assemblage / community, population or group that is within the range of variation normally experienced between years.
Negligible	A short-term but reversible effect on the integrity of a site or conservation status of a habitat, species assemblage / community population or group that is within the normal range of annual variation.

Significance of Effect

5.5.17 The significance of an effect results from the value of the ecological receptor and the magnitude of effect on it. **Table 5-3** below illustrates a matrix, which is used in this assessment as guidance for impact assessment.

5.5.18 Where effects are considered Major or Moderate, further detailed assessment should be carried out.

Table 5-3: Magnitude of Effect

Value of Receptor	Magnitude of Impact			
	High	**Medium**	**Low**	**Negligible**
Very High	Major	Moderate or Major	Minor or Moderate	Negligible or Minor
High	Moderate or Major	Moderate or Major	Minor or Moderate	Negligible
Medium	Moderate or Major	Moderate	Minor	Negligible or Minor
Low	Minor or Moderate	Minor	Negligible or Minor	Negligible
Very Low	Negligible	Negligible or Minor	Negligible	Negligible

Limitations to the Assessment

5.5.19 Phase One habitat surveys were conducted in July, within the optimal time of year (i.e. between the months of April to September); however, it is recognised that some early flowering species may not have been apparent at the time of survey.

5.5.20 Due to the presence of sensitive ornithological receptors within the survey area, not all areas were walked within 100 m to undertake a full protected species and habitat survey in order to avoid disturbance, however, the area could be viewed at a distance with the use of binoculars to ascertain broad habitat types and suitability of habitats for protected species without causing disturbance to sensitive ornithological receptors. This lack of access is considered unlikely to affect the conclusions of this assessment.

5.5.21 Bat habitat assessment was carried out, but the species, usage and population status of any bat using potential roost features (PRFs) is not known. Where tree felling is required within 30 m of a location identified as having PRFs, a thorough search of PRFs should be undertaken by a licensed bat worker.

Issues Scoped Out

5.5.22 The following surveys have been scoped out of the assessment:

- freshwater habitat survey: it is anticipated that construction will be undertaken in accordance with best practice measures and pollution prevention guidelines, therefore significant impacts to fish and their habitats are not anticipated, see Chapter 7 further details on watercourse protection; and

- specific surveys for reptiles and amphibians will not be required. With implementation of best practice construction methodology and adoption of the Applicant's Species Protection Plans (SPPs) (see Appendix 3.5), significant effects on these ecological receptors are not anticipated.

5.6 Baseline Conditions

Designations

5.6.1 **Figure 5.1**: Sites Designated for Nature Conservation shows the location of Special Areas of Conservation (SAC) within a 10 km radius, and Sites of Species Scientific Interest (SSSI) designated for biological features within a 5 km radius of the Proposed Development.

5.6.2 One Special Area of Conservation (SAC) was identified within 10 km of the Proposed Development. In addition, two Sites of Special Scientific Interest (SSSI) designated for biological features were identified within 5 km of the Proposed Development. A summary of their citations and distance to the Proposed Development is provided in **Table 5-4**.

5.6.3 Within a 5 km radius of the Proposed Development, there are three areas of woodland included on the Ancient Woodland Inventory (AWI). Two of which form part of the two SSSIs noted above (Den of Airlie and Den of Alyth). The third area of woodland included on the AWI is 1.5 km north of the Proposed Development. No areas of ancient woodland are located within the survey area.

5.6.4 There are no local nature reserves or other non-statutory designated areas within 5 km of the Proposed Development.

Table 5-4: Summary of Internationally and Nationally Designated Sites

Site Name	Distance from Application Site and Direction	Reason for Designation
River Tay SAC	540 m south	Designated in 2005, this is Scotland's longest river, flowing east from its origins on the slopes of Ben Lui to the mouth of the Firth of Tay, south of Dundee. It is designated for river lamprey (*Lampetra fluviatilis*), brook lamprey (*Lampetra planeri*), sea lamprey (*Petromyzon marinus*), otter (*Lutra lutra*), Atlantic salmon (*Salmo salar*) and oligotrophic to mesotrophic standing waters with aquatic vegetation and poor to moderate nutrient levels. Although not a designated feature, areas of the River Tay are known to support populations of Freshwater Pearl Mussel (*Margaritifera margaritifera*) and Eurasian beaver (*Castor fiber*).
Den of Airlie SSSI	3.4 km north-east	This wooded gorge is the largest area listed on the Ancient Woodland Inventory (AWI) in Angus, designated for its upland mixed ash woodland, bryophytes (mosses and liverworts), invertebrates, the river jelly lichen (*Collema dichotomum*) and the rare whorled solomon's-seal (*Polygonatum verticillatum*).
Den of Alyth SSSI	4.9 km north-west	A wooded gorge, designated for its upland mixed ash woodland. Also listed on the Ancient Woodland Inventory (AWI).

Habitats and Vegetation

5.6.5 **Figure 5.2**: Phase One Habitat Survey, shows the vegetation according to Phase One Habitat types. A full description of habitats, vegetation communities and associated notes on location and condition are included below. Target notes are displayed on **Figure 5.2**, with locations and photographs detailed in **Appendix 5.2**.

5.6.6 A total of 111.16 hectares (Ha) comprising fourteen habitat types were mapped within the survey area. Arable fields dominated, with smaller areas of woodland and grassland. No Annex 1 habitats are present within the survey area and no notable plant species were identified. Habitat types recorded are summarised in **Table 5-5** and described below.

Table 5-5: Phase One Habitats recorded within the Survey Area.

Phase One Habitat	Area (Ha)
Broadleaved woodland – plantation	1.15
Broadleaved woodland – semi-natural	1.15
Buildings and Gardens	1.72
Coniferous woodland - plantation	1.77
Cultivated/disturbed land - arable	76.56
Hedgerows	0.11
Improved grassland	16.63
Mixed woodland - plantation	1.48
Neutral grassland - semi-improved	3.36
Other tall herb and fern – tall ruderal	2.39
Public Road	2.82
Running water	1.20
Scrub	0.26
Track	0.57
TOTAL	**111.16**

Habitat Descriptions

Broadleaved Woodland

5.6.7 Semi-natural broadleaved woodland is present along the disused railway embankment in the western section of the Survey Area and along the banks of the River Isla. The trees along the railway embankment include mature ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and birch (*Betula pubescens*) with a shrub layer of hawthorn (*Crataegus monogyna*). The groundlayer vegetation is typically rather poorly developed, mostly comprising stands of false oat-grass (*Arrhenatherum elatius*), but more open areas of woodland have increased species diversity with field scabious (*Knautia arvensis*), kidney vetch (*Anthyllis vulneraria*), wild strawberry (*Fragaria vesca*), common dog-violet (*Viola riviniana*) and oxeye daisy (*Leucanthemum vulgare*). The riparian habitat present along the banks of the River Isla includes mature and immature alder (*Alnus glutinosa*), goat willow (*Salix caprea*) and grey willow (*Salix cinerea*).

5.6.8 The broadleaved plantation woodland south of the River Isla is more species diverse and includes mature beech, oak, Scots pine, sycamore (*Acer pseudoplatanus*), rowan (*Sorbus aucuparia*) and wych elm (*Ulmus glabra*) trees. The groundlayer was composed of wood avens (*Geum urbanum*), dog's mercury (Mercurialis perennis), male-fern (*Dryopteris filix-mas*), red campion (*Silene dioica*) and hedge woundwort (*Stachys sylvatica*), with numerous oak saplings indicating a good level of regeneration within the woodland. Himalayan balsam is also scattered throughout the northern section of this woodland where the plant is encroaching from where it is growing vigorously along the banks of the River Isla.

Buildings and Gardens

5.6.9 Buildings and gardens included farm steadings at Haughend and Wester Cardean and four residential properties.

Coniferous Woodland – Plantation

5.6.10 A strip of coniferous plantation, dominated by Scots pine (*Pinus sylvestris*), with some Sitka spruce (*Picea sitchensis*), is present northern section of the survey area. Little light penetrates through the canopy, with the vegetation under the canopy dominated by needle litter.

Cultivated / Disturbed Land – Arable

5.6.11 Arable crops are the most frequent land use and habitat type across the survey area (69 %). At the time of survey, the fields were planted with cereal crops (including barley and maize), soft fruit shrubs (blackcurrants) and vegetables (including carrots, peas and potatoes). Generally, the arable fields have negligible field margins, being planted to field boundaries.

Hedgerows

5.6.12 Hedgerows are rare within the survey area, with fields typically planted to the field boundaries. Species poor, road-side hedgerows run alongside the public road to the north of the proposed entrance for the substation access road and the public road in the southern section of the survey area. The hedgerows are predominantly pollarded beech, with occasional sycamore (*Acer pseudoplantanus*) trees.

Improved Grassland

5.6.13 Fields of improved grassland, cultivated as pasture for livestock, comprised the second most dominant land use and habitat type within the survey area (15 %). The fields were grazed by cattle and pigs at the time of survey and are dominated by common agricultural grass species such as Perennial rye-grass (*Lolium perenne*), Timothy grass (*Phleum pratense*) and White clover (*Trifolium repens*), and are typically species-poor with little species diversity within the sward.

Mixed Woodland – Plantation

5.6.14 Mixed woodland plantations are present in the northern section of the survey area to the west and the north of the proposed substation location. The woodlands are comprised of mature beech (*Fagus sylvatica*), oak (*Quercus robur)*, Scots pine (*Pinus sylvestris*), Sitka spruce (*Picea sitchensis*) and Norway spruce (*Picea abies*) trees. The ground layer of the woodland is dominated by grasses, with bramble (*Rubus fruiticosus agg.*), nettle (*Urtica dioica*), occasional harebell (*Campanula rotundifolia*) and Lesser burdock (*Arctium minus*).

Neutral Grassland – Semi-improved

5.6.15 Semi-improved grassland was uncommon within the survey area and was restricted to one field on the south side of the River Isla and the field margins of the fields planted with fruit shrubs. The field margin was approximately 4 m wide. These grasslands were species poor, with Yorkshire fog (*Holcus lanatus*), Creeping soft-grass (*Holcus mollis*) and Cock's-foot (*Dactylis glomerata*) the main species present, with occasional broad-leaved dock (*Rumex obtusifolius*) and cleavers (*Galium aparine*). Elsewhere within the survey area, fields were typically planted to the boundaries.

Other Tall Herb and Fern – Tall Ruderal

5.6.16 An extensive area of this habitat was found around the River Isla, dominated by Himalayan balsam (*Impatiens glandulifera*) and the large leaves of butterbur (*Petastites hybridus*), five-foot tall in places, with smaller amounts of meadowsweet (*Filipendula ulmaria*).

Public Road and Tracks

5.6.17 The Balendoch single track road runs through the northern section of the survey area, and another unnamed road transects the southern extent of the survey area, south of the River Isla. A small number of access tracks to properties, farmsteads and the River Isla are also present.

Running Water

5.6.18 The River Isla runs in a north-east to south-west direction in the southern section of the survey area. It is a major river, approximately 20 m wide, although the surrounding vegetation indicates that the river levels regularly rise and the channel is wider than the extent of the river at the time of survey. The banks of the river are dominated by large swathes of the non-native invasive Himalayan balsam along with the large rhubarb-like leaves of butterbur (Petasites hybridus). There are no other notable watercourses or waterbodies within the survey area beyond small narrow modified drains present at some field boundaries.

Invasive Species

Himalayan balsam (*Impatiens glandulifera*) is an invasive weed listed under Schedule 9 of the Wildlife and Countryside Act. It is present in large swathes along the banks of the River Isla and within the edge of the broadleaved woodland plantation nearby.

Protected Species

5.6.19 Protected species surveys recorded signs of badger, otter, red squirrel and shelters that may provide roosting opportunities for bats within the survey area.

5.6.20 Details on badger activity within the survey area are contained within Confidential **Appendix 5.4**.

5.6.21 Two red squirrel dreys and signs of foraging on cones were located in woodland north of the proposed substation location, as displayed in **Figure 5.3**: Protected Species Surveys. Desk based studies identified both red and grey squirrels as being present within the area of the Proposed Development. An incidental sighting of a red squirrel was recorded in this woodland area during breeding bird surveys in May 2019. Due to the sighting of a red squirrel close to the areas where the dreys were identified, dreys and feeding signs within the survey area are considered to be those of red squirrels for the purposes of this assessment. Further details are contained within **Appendix 5.3**.

5.6.22 Two otter spraints were identified along the banks of the River Isla, indicating that otters may pass through the area or forage along the River Isla. No breeding or resting sites were located within 250 m of the Proposed Development.

5.6.23 Six trees were identified that contained potential roost features PRFs for bats, located in a strip of woodland west of the Proposed Development, as displayed in **Figure 5.3**: Protected Species Surveys. Four of the trees were standing deadwood (conifers and broadleaves), with the two other alive trees being mature beech (*Fagus sylvatica*). One of the trees (ID 1), a standing deadwood with several potential roost features is located where the access to the substation is proposed. Further details are contained within **Appendix 5.3**.

5.6.24 During surveys carried out by SHE Transmission in the area in 2013 and 2014 for the public road improvements works associated with the substation, signs of beaver activity were identified approximately 800 m west of the survey area, adjacent to the Balendoch public road. In addition, a SNH Commissioned Report[3] identified beaver activity in the local area around the River Isla. No signs of beaver were identified within the survey area during surveys carried out for this assessment.

5.6.25 No evidence of any other protected species was identified during the course of surveys.

5.7 Potential Effects

5.7.1 The potential effects which may arise from the Proposed Development relate principally to the construction phase. There are no anticipated effects from the operational phase of the Proposed Development.

5.7.2 The project construction method indicates that construction procedures would accommodate a number of measures designed to minimise impacts on terrestrial ecology receptors, including the development of a Construction Environmental Management Plan (CEMP) detailing measures to protect habitats and species and prevent pollution (see **Section 3.9 of Chapter 3: The Proposed Development**).

Statutory Designated Sites

5.7.3 As part of the proposed works, a temporary OHL will be constructed which will oversail the River Isla which is part of the River Tay SAC designated for river lamprey, brook lamprey, sea lamprey, Atlantic salmon and otter, and is also known to have viable populations of freshwater pearl mussel (FWPM). Potential risks to the SAC from the Proposed Development would be through degradation of water quality, disturbance of habitats and disturbance and / or mortality or injury to protected species. As part of the works, a temporary mast will be installed for the duration of the works approximately 210 m north of the banks of the River Isla. The line will be strung across the river to the existing tower to be retained on the south side of the river, 170 m from the river bank. No works are proposed alongside the river banks and there will be no disturbance of habitats immediately surrounding the river. Due to the low impact of the proposed works for the OHL modifications and the distance from the SAC, coupled with the Applicant's GEMPs which include good practice procedures to follow when working in proximity to watercourses, it is unlikely that any pollution of the watercourse would occur.

5.7.4 The procedures and mitigation measures included in the Applicant's GEMPs which reference the relevant Pollution Prevention Guidelines (PPGs), are considered to reduce any potential risks of watercourse sedimentation or pollution, therefore it is unlikely that the freshwater habitats that the lamprey, otter, Atlantic salmon and FWPM rely on will be affected.

5.7.5 No otter breeding or resting sites were located within 250 m of the Proposed Development, although spraints indicate that otters may pass through the area or forage along the River Isla. Any disturbance to otter foraging along the River Isla within proximity to the Proposed Development would be short-term, affecting the species indirectly by construction noise or lighting. Given the distance between proposed construction works and the SAC, the short-term nature of the works and the low otter activity recorded in the area, the potential effects on otter during the construction phase are likely to be of low magnitude and not significant.

Habitats

5.7.6 Potential impacts include the following:

- permanent and temporary direct habitat loss and fragmentation of habitats as a result of the construction of the Proposed Development;

[3] Campbell-Palmer, R., Puttock, A., Graham, H., Wilson, K., Schwab, G., Gaywood, M.J. & Brazier, R.E. 2018. Survey of the Tayside area beaver population 2017-2018. Scottish Natural Heritage Commissioned Report No. 1013

- change in habitat type resulting from disturbance to soils and alterations to the hydrology of the site; and
- pollution / chemical damage to vegetation relating to the use of hazardous materials or exposure of sediment during the construction phase.

5.7.7 The Proposed Development is located in an area of predominantly arable pasture and species poor grassland. No Groundwater Terrestrial Ecosystems (GWDTE) habitats were found within the survey area. The proposed substation is located within a species-poor arable field. The OHL and tower modifications will result in the removal of one tower and the addition of three new towers. All three new towers are located in areas of agricultural crop fields or improved grassland, which are habitats of very low sensitivity. In addition, there will be three new temporary towers installed to divert power during modifications to OHLs and towers. As with the new permanent towers, these temporary towers will be located in areas of agricultural crop fields or improved grassland, which are habitats of very low sensitivity. The area of direct habitat loss in these habitats will be minimal: the footprint of the substation is approximately 6.8 Ha and the working areas for each of the three new tower foundations are anticipated to be 2,500 m^2. Given the small area of direct habitat loss and the low sensitivity of habitats that would be effected, it is not likely that the Proposed Development would have a significant effect on habitats.

Protected Species

5.7.8 Potential impacts include the following:

- disturbance to individual animals foraging or resting in proximity to construction activity (noise, lighting, vehicle movements); and
- mortality or injury to individual animals.

5.7.9 Tree felling will be required for the creation of an access track from the Balendoch public road to the proposed substation location and the pruning or limited felling of trees within the vicinity of the existing wayleave may be required to accommodate the southern temporary OHL diversion where it crosses the River Isla. Tree felling has the potential to disturb roosting bats within woodland to the north-west of the proposed substation location. Mitigation to reduce these potential impacts are included in section 5.8 below.

5.7.10 There is potential for the Proposed Development to cause disturbance to badgers during the construction phase. Measures to avoid impacts to badgers are contained in Confidential **Appendix 5.4**.

5.7.11 No otter breeding or resting sites were located within 250 m of the Proposed Development, although spraints indicate that otters may pass through the area or forage along the River Isla. Any disturbance to otter foraging along the River Isla within proximity to the Proposed Development would be short-term, affecting the species indirectly by construction noise or lighting. Given the distance between proposed construction works and the SAC, the short-term nature of the works and the low otter activity recorded in the area, the potential effects on otter during the construction phase are likely to be of low magnitude and not significant.

5.8 Mitigation

5.8.1 The following good practice management measures are proposed in order to minimise potential impacts on ecological features across the site and ensure legal compliance during the construction phase:

5.8.2 General mitigation measures:

- a CEMP would be developed, detailing measures to manage, control and monitor the potential effects of noise, dust litter and personnel/vehicular movements;

- an Environmental Clerk of Works (ECoW) would be appointed, specifically to provide monitoring of construction activities relating to the installation of infrastructure. The ECoW will also identify and monitor sensitive receptors immediately prior to, during and immediately after the construction phase. This will include identifying possible constraints on construction presented by the presence of protected mammals and adopting specific mitigation measures where necessary;
- SHE Transmission has developed GEMPs and SPPs for construction works that may negatively impact upon habitats and protected species (see **Appendix 3.5**). The SPPs outline the procedures that must be followed where there is a potential for protected species to be present. Each SPP outlines the responsibilities of SHE Transmission and its contractors, legislative protection for the protected species, best practice measures to follow and an approved methodology for carrying out certain mitigation activities. This suite of SPPs has been approved by SNH and would be adopted where relevant to the project;
- best practice pollution control measures, with reference to SEPA and Control of Substances Hazardous to Health (COSHH) guidelines, would be included in the CEMP. Particular reference would be made to managing handling, storage and use of hazardous chemicals and fuels used during the construction process. A detailed spill response plan will be developed and fully-briefed to all site operatives and forms part of the CEMP; and
- pollution control measures would also consider the deployment of silt traps to prevent flow of silt across vegetation.

5.8.3 Measures specific to all habitats:

- the new substation and associated infrastructure have been located so as to avoid sensitive habitats where possible;
- where excavation is required to create the temporary construction compounds, excavated materials will be stored according to best practice taking care to separate, as far as is reasonable, vegetation turves, topsoils, soil and boulders to ensure successful reinstatement; and
- during construction activities, surface water flows will be captured through a series of cut off drains to prevent water entering excavations or eroding exposed surfaces. If dewatering is required, pumped discharges would be passed through silt / sediment control measures.

5.8.4 Measures specific to all protected species:

- prior to construction commencing, a professional ecologist or ECoW would undertake a pre-construction survey to ascertain the presence and level of activity of all protected mammal species in the area;
- ramps or gently sloping faces would be employed within excavations to allow safe access/egress for any mammal species that may become trapped;
- the workforce would be briefed by the ECoW on the protected species present in the general area, the legislative context and potential signs of activity; and
- in the event of any significant signs of mammal activity being found, works would cease immediately in that area and advice sought from the appointed ECoW, and if necessary, the local SNH office.

5.8.5 Measures specific to bats:

- Works required within 30 m of an active roost may constitute disturbance and therefore may require a licence from SNH. A bat species protection plan (SPP) is included in **Appendix 3.5** and will be adhered to during works. Trees identified as having features that could potentially hold roosting bats must be checked thoroughly prior to any works commencing that may disturb or destroy a roost. The following is recommended:

- a series of emergence and re-entry surveys be undertaken by bat consultants in line with current guidance[4]. Signs of bat activity should also be searched for in and around the tree, this would be carried out using specialist tree climbers under the supervision of a licensed bat worker. During the checks, all crack, crevices and holes will be checked for bats and/ or signs of roosting bats. As bats tend to use a network of summer roosts, holes may be occupied one night and empty the next, therefore signs other than the actual presence / absence of bats must be searched for (e.g. staining around any feature, droppings below or within a hole in the tree, strong smell of ammonia, social calls coming from a hole);
- If no evidence of bats are found during the surveys described above, felling of trees identified as having potential bat roost features should be undertaken out with the breeding season (i.e. November to March);
- If evidence of bats are found during the surveys described above, any felling of trees with potential bat roost features will require a license from SNH and will be supervised by a licensed bat worker who will supervise the sectional or soft-felling of the trees and inspect timber on the ground for bats.

5.8.6 Measures specific to badgers:

- Mitigation measures specific to badgers are contained within confidential **Appendix 5.4**.

5.9 Residual Effects

5.9.1 Good practice management measures have been identified, as detailed in Section 5.8 above, to further avoid and reduce effects. Mitigation measures included in the confidential **Appendix 5.4** have reduced the potential effects on badger to non-significant. The residual effects on ecological receptors after consideration of mitigation measures are non-significant.

5.10 Summary

Habitats

5.10.1 The construction of the Proposed Development is not considered to have an effect on any habitats of significance or conservation importance. Where habitats are affected by installation of permanent infrastructure (i.e. substation and new towers), there will be a residual impact in that habitat extent will be reduced. The total area of lost habitats of value is likely to be very small and highly localised. Any temporary disturbance to habitats and soils resulting from the construction of the Proposed Development will be mitigated by employing best practice methods to reinstate and restore the habitats present. There are likely to be only localised changes in the vegetation community composition and structure, with residual impacts moderated by the high potential for affected habitats to readily re-establish.

Protected Species

5.10.2 Signs of, or features supporting, badger, red squirrel, otter and bats were identified within the survey area. The construction of the Proposed Development has the potential to have an effect on trees with the potential to support bat roosts where the substation access track is proposed and on badgers where OHL modifications are proposed. Best practice mitigation measures to avoid the injury or disturbance of any protected species which may be present within the vicinity of the construction works will reduce the risk of disturbance and risk of injury / mortality to these species.

[4] Collins, J. (ed.) 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.

CONTENTS

Figures

6. ORNITHOLOGY

6.1 Executive Summary

6.1.1 This Chapter describes the ornithological sensitivities present within the anticipated zone of effect for the development of the proposed Alyth 275 / 400 kV Substation and Associated Works (the 'Proposed Development'). The Proposed Development is situated at Haughend near Alyth in Perth and Kinross.

6.1.2 Desk and field surveys were undertaken for identified receptors including sites designated for nature conservation interest in order to establish the ornithological baseline, according to best practice methodologies.

6.1.3 No sites designated for nature conservation (ornithological) will be affected by the Proposed Development.

6.1.4 One Schedule 1 species, osprey, was identified as breeding within proximity to the Proposed Development.

6.1.5 Proposals for mitigation relevant to identified receptors include adherence to best practice construction methods as detailed in a project Construction Environmental Management Plan (CEMP), adoption of a species protection plan (SPP) for osprey, pre-construction checks to update the ornithological baseline and the employment of an Environmental Clerk of Works (ECoW) to provide environmental guidance and monitoring throughout the course of the construction period.

6.2 Introduction

6.2.1 This Chapter evaluates the importance of the nature conservation interest (ornithological) and the potential impacts predicted as a result of the proposed Alyth 275 / 400 kV substation development (the 'Proposed Development'). It outlines the methodologies used to assess potential effects on sensitive ornithological receptors, both within the footprint of the Proposed Development and the surrounding area. It presents an assessment of the potential impacts, along with suggested mitigation measures to avoid or reduce the impacts.

6.2.2 The Proposed Development is proposed to be built at the point where an existing 275 kV overhead line (OHL) network converges on an existing OHL T-Junction. The current OHL arrangement leads to an unequal sharing of power flows on OHL's between the Fetteresso, Tealing and Kincardine substation which limits the capacity of the OHLs and the ability of the network to accept new generation connections. Establishing a new substation at the T-Junction and connecting the OHLs into the substation will address this issue. This assessment has been completed by suitably qualified ecologists with relevant accreditations (MCIEEM) of Blairbeg Consulting.

6.3 Scope of Assessment

Survey Area

6.3.1 The survey area for this assessment incorporates land within 250 m of all infrastructure associated with the Proposed Development. The area of land surveyed covers approximately 111 hectares (Ha), located approximately 3.5 km south-east of Alyth, Perthshire, see **Chapter 3**: The Proposed Development for more detail.

6.3.2 The most dominant habitats that the survey area encompasses include: open arable and pasture fields used for rearing livestock and growing arable crop, and grazed pastureland. The landscape within the survey area is dominated by an extensive area of flat lying land within a valley that holds the River Isla. There is a small stand of woodland to the west and north of the Proposed Development, but otherwise the site is quite open in character. Two 275 kV OHLs meet in the centre of the survey area. Two large farmsteads are located at Haughend and Wester Cardean.

6.3.3 The River Isla transects the southern section of the survey area. It is a major river, approximately 20 m wide, and is a tributary of the River Tay. There are no other notable watercourses or waterbodies within the survey area beyond small narrow ditches and modified drains present at some field boundaries.

6.4 Consultation

OHL and Towers

6.4.1 A Screening Opinion was issued by the Scottish Ministers on 23rd August 2019 in relation to the OHL and new tower elements of the Proposed Development. The Screening Opinion is included in **Appendix 1.2** with responses relevant to ornithology summarised below.

6.4.2 The response from Scottish Natural Heritage (SNH) welcomed the commitment to update all protected species surveys in order to inform relevant species protection plans and advised in that it will be important to establish the existence of the osprey nest site(s) at the development site and to ensure that appropriate mitigation is implemented.

6.4.3 The Royal Society for the Protection of Birds (RSPB) declined to comment.

Substation

6.4.4 A Screening Opinion was issued by Perth and Kinross Council on 30th August 2019 in relation to the substation elements of the Proposed Development. The Screening Opinion is included in **Appendix 1.1** with responses relevant to ornithology summarised below.

6.4.5 The response noted that a number of protected species were identified through previous survey work for the extant consent at the site and effects were considered significant if not appropriately managed and mitigated. The response highlighted that some mitigation had been undertaken in relation to raptor displacement.

6.5 Methodology

Desk Study

6.5.1 Baseline data on the ornithological interest of the survey area and its surroundings, including information on sites designated for nature conservation and protected species records, were sought from the following sources:

- Environmental Appraisal submitted as part of original application in 2012 (Application Reference: 12/00948/FLM)[1];
- Joint Nature Conservation Committee (JNCC) website (http://www.jncc.gov.uk/) – accessed July 2019;
- SNH Site Link website (http://gateway.snh.gov.uk) – accessed July 2019;
- The National Biodiversity Network website (http://data.nbn.org.uk/) (NBN Gateway) – accessed July 2019; and
- Large-scale 1:10,000 Ordnance Survey (OS) maps in conjunction with colour 1:25,000 OS map (to determine the presence of ponds and other features of nature conservation interest).

6.5.2 Further information on the potential nature conservation features that have potential to be affected by the Proposed Development was obtained through searches of internet sources (e.g. UK Biodiversity Action Plans (UKBAP), Scottish Biodiversity List (SBL), Local Biodiversity Action Plans (LBAP)) and the relevant published literature (i.e. relevant guidance documents and scientific papers).

Breeding Bird Survey

6.5.3 Three breeding bird survey (BBS) visits were carried out on 17th May, 20th June and 23rd July 2019. The breeding bird survey area is displayed in **Figure 6.2**.

6.5.4 The methodology for breeding bird surveys followed that detailed in SNH 2014[2] and in Gilbert et al. 1998[3] and consisted of walking over the site to a distance of 100 m (i.e. all parts of the site were viewed from no further than 100 m) and recording all birds observed or heard within the survey area. The following information recorded for all birds heard or seen: location; species; number; behaviour and age / sex where possible. All registrations were mapped on 1:10,000 scale maps using BTO species codes. Visits were made in daylight hours and acceptable weather conditions.

Breeding Osprey Survey

6.5.5 Information gathered for the original EA application in 2012 identified osprey as breeding within proximity to the proposed substation location. Two breeding osprey nest checks were carried out on 16th May and 24th July 2019 to check if ospreys were utilising the artificial nesting platform. Surveys were carried out by suitably experienced surveyors under a Schedule 1 Licence in suitable weather conditions. Whilst surveys were designed to target osprey in particular, all raptors encountered were recorded.

Assessment of Effects

6.5.6 The assessment has been undertaken according to the current guidance detailed by the Chartered Institute of Ecology and Environmental Management (CIEEM) (2018)[4].

[1] Scottish Hydro Electric Transmission PLC (2012) Alyth Substation 275 / 400 kV Environmental Appraisal. April 2012.

[2] Scottish Natural Heritage (2014, revised 2017) Recommended Bird Survey methods to Inform Assessment of Onshore Wind Farms. SNH, Battleby.

[3] Gilbert, G, Gibbons, D.W & Evans, J. (1998) Bird Monitoring Methods, RSPB, Sandy

[4] Chartered Institute of Ecology and Environmental Management (2018). Guidelines for ecological impact assessment in the United Kingdom. Winchester. Chartered Institute of Ecology and Environmental Assessment.

6.5.7 The assessment of the significance of predicted impacts on ecological receptors is based on both the 'sensitivity' of a receptor and the nature and magnitude of the effect that the Proposed Development will have on it. Effects in biodiversity may be direct (e.g. the loss of species or habitats), or indirect (e.g. effects due to noise, dust or disturbance on receptors located within or outside the survey area).

Sensitivity / Importance

6.5.8 The evaluation methodology has been adapted from the CIEEM Guidelines. A key consideration in assessing the effects of any development on ornithological features is to define the species that need to be considered. This requires the identification of a potential zone of influence, which is defined as those areas and resources that may be affected by biophysical changes caused by project activities, however remote from a site.

6.5.9 In identifying these receptors, it is important to recognise that a development can affect ornithological features directly (e.g. destruction of nests of breeding birds) and indirectly, by affecting land beyond the development site (e.g. if birds are displaced through noise generation during the construction phase). The approach that has been undertaken for this assessment is to identify 'sensitive ornithological receptors' (species that are both valued in some way and could be affected by the Proposed Development) and, separately, to consider legally protected species. Where there is no potential for valued ornithological receptors to be affected significantly, it is not necessary for them to be considered.

6.5.10 The sensitivity of species populations is assessed with reference to:

- their importance in terms of 'biodiversity conservation' value (which relates to the need to conserve the genetic diversity of species populations);
- any social benefits that species deliver (e.g. relating to enjoyment of the ornithological fauna by the public); and
- any economic benefits that they provide.

6.5.11 The importance of an ornithological receptor is assessed according to the criteria summarised in **Table 6-1** below. The criteria are based on the conservation status of individual bird species and include three main attributes:

- Schedule 1 species listed in the Wildlife and Countryside Act and Annex 1 species of the Birds Directive. Under this Directive the UK is committed to take 'the requisite measures to preserve, maintain or re-establish a sufficient diversity and area of habitat for all species of naturally occurring birds in the wild state';
- following a review of the status of all bird species in the UK, the country's leading non-governmental organisations agreed priorities for bird conservation. Species listed on the Red list are species of high conservation concern, species whose population or range is in rapid decline, recently or historically and those of global conservation concern. Amber list species are those whose population is in a moderate decline, rare breeders, internationally importance and localised species, and those of an unfavourable conservation status in Europe; and
- UK Priority BAP species which have been identified as part of the UK biodiversity initiative.

6.5.12 Species' populations have been valued using the following scale: Very High, High, Medium, Low, Very Low and Negligible.

6.5.13 The approach taken in this assessment is that a species population that is considered to be of medium or greater importance in biodiversity conservation terms is considered to be a sensitive ornithological receptor. Therefore, if a species population is considered to be of low value, the Proposed Development will not have a significant effect on the receptor in question. Exceptions are if the species population has been identified as having a high social or economic value or if the species is legally protected.

6.5.14 Ornithological features have been valued using the scale set out in **Table 6-1** below, with examples provided of criteria used when defining the level of value.

Table 6-1: Scale of Value

Sensitivity of Receptor	Examples (Guidance to Evaluation)
Very High (International)	An internationally important site e.g. Special Protection Area (SPA), or a site proposed for, or considered worthy of such a designation. A qualifying feature of an internationally designated site. A regularly occurring substantial population of an internationally important species (listed on Annex I of the Birds Directive).
High (National)	Species present in nationally important numbers (>1% UK population). Ecologically sensitive species such as rare birds (<300 breeding pairs in the UK). A species listed under Schedule 1 of the Wildlife and Countryside Act or Annex I of the Birds directive.
Medium (Regional)	Species present in regionally important numbers (>1% of the regional population). Species occurring within SPAs but not crucial to the integrity of the site.
Low	A regularly occurring, substantial population of a nationally scarce species, including species listed on the UK and Local BAPs e.g. skylark. Sites containing viable breeding populations of species known to be county rarities (e.g. included in the county BAP).
Very Low	Undesignated sites, features or species considered to appreciably enrich the habitat resource within the immediate environs of the site.
Negligible	All other species that are widespread and common and which are not present in locally important numbers and which are considered to be of low conservation concern (e.g. UK BoCC Green List species).

Magnitude of Effect

6.5.15 Effects can be permanent or temporary; direct or indirect; adverse or beneficial and can be cumulative. Effects can vary according to scales of size, extent, duration, timing and frequency of impacts. These factors are brought together to assess the magnitude of the effect on the 'conservation status' of the particular valued ornithological receptors, and on the 'integrity' of the habitats that support them:

- integrity is the coherence of the ecological structure and functions of a site or habitat that enables it to sustain its plant and animal communities and populations;
- conservation status is the ability of a habitat, a plant or animal community or population to maintain its distribution and / or extent / size.

6.5.16 Wherever possible, the magnitude of the effect is quantified. Professional judgement is then used to assign the effects on the receptors to one of four classes of magnitude, as defined in **Table 6-2**.

Table 6-2: Magnitude of Effect

Magnitude	Definition
High	A permanent or long-term effect on the integrity of a site or conservation status of a species assemblage / community, population or group. If adverse, this is likely to threaten its sustainability; if beneficial, this is likely to enhance its conservation status.
Medium	A permanent or long-term effect on the integrity of a site or conservation status of a species assemblage / community, population or group. If adverse, this is unlikely to threaten its sustainability; if beneficial; this is likely to be sustainable but is unlikely to enhance its conservation status.

Low	A short-term but reversible effect on the integrity of a site or conservation status of a species assemblage / community, population or group that is within the range of variation normally experienced between years.
Negligible	A short-term but reversible effect on the integrity of a site or conservation status of a species assemblage / community population or group that is within the normal range of annual variation.

Significance of Effect

6.5.17 The significance of an effect results from the value of the ornithological receptor and the magnitude of effect on it. **Table 6-3** below illustrates a matrix, which is used in this assessment as guidance for impact assessment.

6.5.18 Where effects are considered Major or Moderate, further detailed assessment should be carried.

Table 6-3: Magnitude of Effect

Value of Receptor	Magnitude of Impact			
	High	**Medium**	**Low**	**Negligible**
Very High	Major	Moderate or Major	Minor or Moderate	Negligible or Minor
High	Moderate or Major	Moderate or Major	Minor or Moderate	Negligible
Medium	Moderate or Major	Moderate	Minor	Negligible or Minor
Low	Minor or Moderate	Minor	Negligible or Minor	Negligible
Very Low	Negligible	Negligible or Minor	Negligible	Negligible

Collision Risk Assessment

6.5.19 In line with current guidance from SNH[5], a generic collision risk modelling approach, typically carried out for wind farm developments, has not been undertaken as part of this assessment as this is considered to be less appropriate for assessing collision risk with power lines. Instead, current guidance recommends that emphasis is put on mitigation where the assessment has indicated potential risks. Results of baseline surveys will be analysed to identify any 'hot-spots' where mitigation may be required.

6.6 Baseline Conditions

Designations

6.6.1 There are no designated nature conservation areas, with ornithological qualifying interests, within or immediately adjacent to the Proposed Development.

6.6.2 Within the wider area, two internationally designated sites, with ornithological qualifying interests, were identified within the 10 km Study Area for the Proposed Development. A summary of the citations for these Special Protection Areas (SPA) is provided in **Table 6-4** and their locations are displayed in **Figure 6.1**: Sites Designated for Nature Conservation.

[5] SNH (2016) Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds. (Version 1). SNH

Table 6-4: Summary of Internationally and Nationally Designated Sites

Site Name	Distance from Application Site and Direction	Reason for Designation
Loch of Lintrathen SPA and RAMSAR site	7 km north	Designated in 1992 for supporting a wintering greylag goose population of European importance. The qualifying species for the RAMSAR site is also greylag goose which occurs in internationally important numbers.
Loch of Kinnordy SPA and RAMSAR site	9.1 km north-east	Designated in 1994 for supporting wintering greylag goose and pink-footed goose populations of European importance. The qualifying species for the RAMSAR site is also greylag goose which occurs in internationally important numbers.

6.7 Field Surveys

6.7.1 One Schedule 1 species, osprey, was recorded breeding within the survey area. The location is shown on confidential **Figure 6.3**. No other Annex I species or Schedule 1 species were recorded breeding within the survey area.

6.7.2 A total of 26 species were recorded within the survey area. Breeding bird territories are shown in **Table 6-5** and displayed in **Figure 6.2**: Breeding Bird Survey.

6.7.3 The breeding bird survey recorded a total of eight species of conservation concern (BAP species and / or listed as Amber or Red in Birds of Conservation Concern) considered to be breeding within the survey area:

- Red listed: skylark, song thrush, house sparrow and yellowhammer;
- Amber listed: dunnock, house martin, oystercatcher and willow warbler.

6.7.4 The majority of species were found within woodland areas north of the proposed substation location.

Table 6-5: Results of Breeding Bird Survey

Common name	Number of Breeding Territories	Conservation Status
Pheasant	3	
Osprey	1	Schedule 1
Oystercatcher	1	Amber listed
Woodpigeon	4	
Great spotted woodpecker	2	
Jay	1	
Jackdaw	2	
Blue tit	6	
Great tit	4	
Skylark	1	Red listed / UKBAP
Swallow	2	
House martin	3	Amber listed
Willow warbler	8	Amber listed
Chiffchaff	4	
Wren	10	
Treecreeper	1	
Blackbird	5	
Song thrush	2	Red listed / UKBAP

Robin	4	
House sparrow	3	Red listed / UKBAP
Dunnock	4	Amber listed
Pied wagtail	1	
Chaffinch	12	
Goldcrest	1	
Siskin	1	
Yellowhammer	2	Red listed / UKBAP

6.8 Potential Effects

6.8.1 The enabling and construction works, any tree felling, the installation of temporary and permanent tower structures, the modifications to the OHLs and the operation of the Proposed Development all have the potential to impact upon ornithological features.

6.8.2 Based on (the consultation responses and) known environmental sensitivities, this assessment considers the following potential effects:

- the direct loss and fragmentation of bird habitats due to 'land take' by the Proposed Development, which may reduce the quantity and quality of available breeding, roosting and foraging habitat for bird species including raptors, waders and wildfowl. This effect may also include the pruning or limited felling of trees / scrub within the vicinity of the existing wayleave to accommodate the southern temporary OHL diversion where it crosses the River Isla;
- the modification of bird habitat due to hydrological change should construction activities disrupt hydrological pathways and processes. This may have a potential effect on quality of breeding and foraging habitat for waders and wildfowl;
- impacts on the qualifying features of the nearby SPAs and Ramsar through connectivity between the SPA and the Proposed Development;
- the permanent or temporary displacement of birds during construction and operations phase which may result from noise, lighting and vehicular movements. This effect may include affecting breeding, roosting and foraging behaviour of raptors, waders and wildfowl; and
- the accidental mortality of individual birds due to collision risk resulting from contact with the tower structures, temporary masts and OHL.

Electrocution

6.8.3 Birds can be at risk of electrocution from contact with unprotected wires and associated metal infrastructure. Large birds are generally more vulnerable to electrocution by OHLs because of the greater risk of spanning between two phase conductors or energised and earthed structures with outreached wings or other body parts6. Many bird species (particularly raptors) are attracted to OHLs and their supports, especially in open un-forested areas, as they provide lookout posts, as well as being used generally for perching, nesting and roosting. Ground nesting species (such as hen harrier) rarely use OHL supports for perching / hunting and are therefore at less risk from electrocution[7].

6.8.4 Studies carried out to investigate avian electrocution in Europe, associated with wooden poles, concluded that wingspan was the key biometric associated with the possibility of being electrocuted8. If the distance between conductor phases is small, if only short upright insulators are used or if protective gaps (e.g. arcing horns for lightning strikes) are installed on a wood pole, even small birds can be electrocuted.

6 Lehman, R., Kennedy, P. and Savidge, J. (2007) The state of the art in raptor electrocution research: A global review. Biological Conservation 136 159-174

7 Haas, D., Nipkow, M., Fielder, G., Schneider, R., Haas, W. and Schurenberg, B. (2005) Protecting birds from powerlines. Nature and Environment, 140. Council of Europe Publishing, Strassbourg

8 Janss , G. and Ferrer, M. (1999) Avian electrocution on power poles: European experiences. Birds and Power Lines: Collision, Electrocution and Breeding. Quercus, Madrid, Spain, pp. 145 – 164.

6.8.5 The configuration of the conductors and towers of the Proposed Development means that it is not possible for a bird to be able to touch a conductor while it is perched on an earthed tower, touch a conductor and the earth wire simultaneously or touch two conductor wires simultaneously due to the gaps between the conductors and perch points being greater than any bird wing span found within the Study Area (2.5 m). The electrical infrastructure located within the substation platform is not considered to pose a risk of electrocution to birds.

6.8.6 There should therefore be no risk of electrocution to birds from the Proposed Development.

Statutory Designated Sites

6.8.7 The two SPAs within 10 km of the Proposed Development are designated for wintering geese. The survey area is not considered to be within a key foraging site for wintering geese and there are no waterbodies within 5 km of the Proposed Development noted for roosting geese. Given the nature of the Proposed Development and distance to designated sites within the surrounding area, potential effects are likely to be negligible.

Species

6.8.8 Potential impacts on ornithological interests within the vicinity of the Proposed Development could include:

- damage to nests on or in the vicinity of the works; and
- disturbance to the nests or young of species listed on Schedule 1 of the Wildlife and Countryside Act in the vicinity of works.

6.8.9 Construction of the new substation, installation of temporary masts and permanent towers, the removal of an existing tower and associated felling works for the access may result in damage to nests if construction occurs in spring. However, only two territories of green-listed species (pheasant and blue tit) were identified within the footprint of the proposed new substation and associated access track and one oystercatcher territory (amber-listed species) was identified within proximity to the proposed new towers and temporary masts. It is possible that the construction of the Proposed Development may result in the displacement of a small number of breeding birds within the footprint of the substation and towers, however there is alternative breeding habitat available within the surrounding area and any effects would be temporary. Therefore, the effect of displacement due to disturbance for these species is predicted to be of **low magnitude** and **not significant**.

6.8.10 The presence of an established osprey nest in the vicinity of the Proposed Development is assessed as a nature conservation of National, although the osprey population is expanding in Scotland, the absolute number of pairs is still low throughout the UK. Disturbance distance for breeding osprey is considered to be between 500 and 750 m. Disturbance of a Schedule 1 bird whilst nesting is considered an illegal offence under the Wildlife and Countryside Act 1981 (as amended). Osprey could be disturbed visually by the presence of workers and machinery or by increased noise levels from construction activities. The pair have used the artificial nesting platform annually since 2014, successfully raising chicks in 2017 and at least one chick observed to have hatched during the visit undertaken in July 2019. It is likely that the pair will continue to return to the nesting platform each year. In the absence of mitigation, it is likely that the Proposed Development could result in the displacement of one pair of osprey, representing 6.25 % of the Eastern Lowlands Natural Heritage Zone (NHZ) population of 16 pairs. Due to the potential for effecting more than 1 % of the regional population, the risk of unmitigated displacement due to disturbance during the construction phase is predicted to be of **moderate** magnitude and **significant** for this species.

6.8.11 Due to the presence of a breeding osprey pair within proximity to the Proposed Development, there is a risk that the birds could collide with the OHLs. Birds are typically most susceptible when landing and taking off from perches / nesting sites. Given the number of existing OHLs in the area, it is assumed that the pair are successfully able to avoid collision with the existing OHLs. The Proposed Development will involve a minor decrease in length of OHL and realignment of the existing configuration. There is potential that the height of the proposed new towers will differ as a 10 % vertical Limit of Deviation is proposed. There will be an addition of the temporary OHLs and masts during the construction phase. The new temporary lines and the minor realignment of existing lines and towers could increase the risk of collision to osprey

due to unfamiliarity with the new layout. In the absence of mitigation, the Proposed Development could result in the mortality of osprey during the breeding season. As described above, the pair represent more than 1 % of the regional population, therefore the collision risk to is predicted to be of **moderate magnitude** and **significant** for this species.

6.9 Mitigation

6.9.1 Consent was previously granted by Perth and Kinross Council for a proposed substation at the site (Application Reference: 12/00948/FLM). Condition 7 of the consent stated:

"Before development commences on site, the mitigation measures that are approved under application 12/01393/FLL[9], which seek to protect the breeding Ospreys and specifically dissuade them from using areas of the site to be worked during the breeding season shall be implemented in accordance with a timescale to be approved in writing by the Planning Authority in Consultation with SNH and such other parties as considered appropriate".

6.9.2 To satisfy the requirement of the condition, the Applicant installed an artificial nesting platform with perches for osprey in March 2014. The nesting platform has been successful, with the pair choosing it over their old nest site. Following successful relocation of the pair to the platform, the old nest was removed. Moving the pair to the new location increases the distance between the Proposed Development and the breeding pair, reducing the impact of disturbance.

6.9.3 The following good practice management measures are proposed in order to minimise potential impacts on ornithological features across the Proposed Development site and ensure legal compliance during the construction phase:

6.9.4 The project construction method indicates that construction procedures would accommodate a number of measures designed to minimise impacts on ornithology receptors, including the development of a Construction Environmental Management Plan (CEMP) detailing measures to protect birds and the habitats they rely on (see Section 3.9 of Chapter 3).

6.9.5 General mitigation measures:

- a CEMP would be developed, detailing measures to manage, control and monitor the potential effects of noise, dust litter and personnel / vehicular movements;
- an Environmental Clerk of Works (ECoW) would be appointed, specifically to provide monitoring of construction activities relating to the installation of infrastructure. The ECoW will also identify and monitor sensitive receptors immediately prior to, during and immediately after the construction phase. This will include identifying possible constraints on construction presented by the presence of birds and adopting specific mitigation measures where necessary;
- SHE Transmission has developed GEMPs and SPPs for construction works that may negatively impact upon habitats and protected species, including birds (see **Appendix 3.5**). The SPPs outline the procedures that must be followed where there is a potential for protected species to be present. Each SPP outlines the responsibilities of SHE Transmission and its contractors, legislative protection for the protected species, best practice measures to follow and an approved methodology for carrying out certain mitigation activities. This suite of SPPs has been approved by SNH and would be adopted where relevant to the project;
- best practice pollution control measures, with reference to SEPA and Control of Substances Hazardous to Health (COSHH) guidelines, would be included in the CEMP. Particular reference would be made to managing handling, storage and use of hazardous chemicals and fuels used during the construction process. A detailed spill response plan will be developed and fully-briefed to all site operatives and forms part of the CEMP; and
- pollution control measures would also consider the deployment of silt traps to prevent flow of silt across vegetation, with particular focus on wetland and riparian areas.

[9] Planning Application to PKC for the erection of tower and timber structures on land 450 m north-west of Haughend Farm

6.9.6 Measures specific to ornithological interests:

- construction works would take place over a 24 - 30 month period and therefore it is not possible for all works to be undertaken out with the breeding bird season (late March to end of July inclusive). To reduce the risk of disturbance to breeding birds within proximity to the Proposed Development, vegetation and tree removal and ground clearance within the footprint of the Proposed Development should be conducted during the autumn and winter periods outside of the breeding season, pre-construction checks should be undertaken by a qualified ecologist / ornithologist to identify, and mitigate for, the presence of protected bird species and nests;
- the installation and removal of the temporary OHL diversion works would be undertaken out with the breeding season (late March to end of July) to eliminate any potential impacts on the breeding osprey;
- to avoid accidental destruction of bird nests, all nests within proximity to works will be identified, marked and made known to contractors prior to works commencing;
- should a nest of any bird species be located during the course of construction activities, works will be stopped within 30 m of the nest and advice sought from a qualified ecologist / ornithologist, and if necessary local SNH staff;
- an osprey SPP will developed in consultation with SNH and will form part of the CEMP which will be adopted by the Principle Contractor. It is proposed that the osprey SPP will include the following:
- ospreys are most sensitive to disturbance at the start of the breeding season (i.e. when they are re-establishing their pair bond, egg laying and incubating), in discussion with the ECoW, the construction programme will aim to schedule the majority of works out with the most sensitive period for the species (i.e. from when the birds return in March to the end of May)
- an experienced ECoW will be employed for the duration of the breeding season to undertake watching briefs to monitor the behaviour of the osprey. If signs of disturbance are observed, works will cease until later in the breeding season;
- to limit the impact of noise disturbance to osprey, the use of vibration causing stationary equipment (e.g. generators, pumps, compressors) will be limited during the breeding season; and
- to limit the collision risk of the re-aligned new permanent OHL, appropriate line marking is recommended on the earthwire of the OHLs. Collision risk can be decreased by the use of line marking by improving the visibility of conductors. In line with SNH guidance[10], the line marking would involve placing spiral bird diverters at a spacing of approximately 10 m.

6.10 Residual Effects

6.10.1 The implementation of mitigation measures described in section 6.10 above will ensure that the impacts of the Proposed Development are reduced as far as possible The mitigation specific to osprey to protect the breeding birds from disturbance during the construction of the Proposed Development would reduce the potential effects on osprey from moderate to **minor** and therefore **not significant**.

6.11 Summary

6.11.1 The construction of the Proposed Development is not considered to have a significant effect on any ornithological features of significance or conservation importance. Any temporary disturbance to species resulting from the construction of the Proposed Development will be mitigated by employing SPPs, GEMPs and best practice methods to minimise potential effects.

[10] SNH (2016) Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds. (Version 1). SNH

CONTENTS

Appendices

Figures

7. WATER AND SOILS

7.1 Executive Summary

7.1.1 An assessment has been undertaken of the potential impacts the proposed Alyth 275 / 400 kV substation and associated works, (hereafter referred to as the 'Proposed Development') may have on soils, geology and the water environment.

7.1.2 Information on the study area was compiled using baseline information from a desk study that was verified by field work prior to completion of the assessment. The assessment was undertaken considering mitigation measures incorporated as part of the development design.

7.1.3 The assessment has considered both the construction and operational phases of the Proposed Development.

7.1.4 A detailed assessment of flood risk and management of runoff from the Proposed Development has also been completed (**Appendix 7.1 and Appendix 7.2**). It has been shown that the Proposed Development is not considered at flood risk and attenuation measures can be provided on site to control both the rate and quality of discharge from site, so that flood risk to site users and downstream property is not increased.

7.1.5 It has been shown that there are no private water supplies (PWS) or licensed water abstractions within 500 m of the Proposed Development. There are mobile water abstractions, for irrigation purposes, from the River Isla and it has been shown that with the use of industry standard best practice construction techniques the yield and quality of water in the River Isla can be safeguarded.

7.1.6 The River Isla is part of the River Tay Special Area of Conservation (SAC). It has been shown that the qualifying interest of the SAC will not be impaired by the Proposed Development, subject to appropriate detailed design and best practice construction techniques.

7.1.7 Again, subject to best practice construction techniques, it has been shown that the Proposed Development would have no adverse effects on soils, geology, groundwater levels, groundwater quality, surface water quality and surface water flows.

7.2 Introduction

7.2.1 This Chapter assesses the potential for effects of the Proposed Development on soils, geology and the water environment.

7.2.1 The assessment has been undertaken by SLR Consulting Limited.

7.3 Scope of Assessment

Study Area

7.3.1 The study area and identified features are indicated on **Figures 7.1 – 7.6**. The study area includes a 500 m buffer of the substation site boundary and associated works, including the proposed overhead line (OHL) works.

Consultation

7.3.2 Data requests were issued to Scottish Environmental Protection Agency (SEPA), Perth and Kinross Council (PKC) and Angus Council (AC) to obtain information relating to water quality data, groundwater level and flow data, PWS, licenced water abstraction and discharges, and landfill sites.

7.3.3 A screening opinion has been prepared by PKC which confirmed that the Proposed Development is non-EIA. In their response (dated 30th August 2019) PKC confirmed that the following issues of relevance to soils, geology and the water environment would need to be addressed in any planning application:

- changes that might effect drainage and runoff;
- loss of Category 2 agricultural land and management measures to ensure the quality of soil is not adversely compromised or sterilised; and
- potential effects on the Tay Special Area of Conservation (SAC).

7.3.4 It is confirmed that potential effects on drainage and runoff and on the Tay SAC as well as potential effects on soils are addressed in this Chapter.

7.4 Methodology

7.4.1 This section outlines the methodology used for the assessment of potential effects on soils, geology and the water environment.

Desk Study

7.4.2 An initial desk study has been undertaken to determine and confirm the baseline characteristics by reviewing available information on soils, geology, hydrology and hydrogeology. The following sources of information have been consulted in order to characterise the baseline conditions of the study area:

- Alyth 275 / 400 kV Substation Environmental Appraisal. Scottish Hydro Electric Transmission Limited (SHETL) April 2012 (Application Reference: 12/00948/FLM);
- New Overhead Line and Tower into Alyth Substation Environmental Appraisal. Scottish Hydro Electric Transmission Limited (SHETL) 2012 (Application Ref: 12/01393/FLL);
- Road widening, formation of stairs and demolition of railway bridge for Alyth Substation Environmental Report. SHETL (October 2014) (Application Reference: 14/01915/FLL);
- Renewal of permission (12/00948/FLM) erection of new 400/275 kV electricity substation and associated works Environmental Appraisal SHETL November 2014 (Application Reference: 14/01949/FLM);

- Section 42 of the Town & Country Planning (Scotland) Act 1997 to modify condition 3 of planning permission 12/00948/FLM Environmental Appraisal. SHETL (February 2018) (Application Reference: 18/00200/FLN);
- Soil map of Scotland and Soil Capability map (partial cover) 1:25,000[1];
- British Geological Survey (BGS) Onshore Geoindex[2];
- SEPA open report[3];
- SEPA water quality data;
- British Geological Survey (BGS) Baseline Scotland report series;
- BGS Groundwater Vulnerability mapping;
- Scottish Natural Heritage (SNH) Sitelink[4];
- Magic Map webpage[5];
- Water Framework Directive River Basin Management Plan[6]; and
- SEPA flood mapping[7].

Field Survey

7.4.3 A site walkover survey was carried out by an experienced hydrologist on 19th July 2019 to verify the information that was collected during the desk study and allow an appreciation of the study area and sensitive soils, geological and hydrological, and hydrogeological receptors.

7.4.4 Intrusive site investigations at the Proposed Development site were undertaken in March 2011 and January 2014. The results of the site investigation have informed the design of the substation and are reported in this assessment.

Legislation and Guidance

7.4.5 The assessment was undertaken with respect to environmental legislation and general guidance, including the following.

Legislation

- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (Controlled Activities Regulations (CAR));
- European Union (EU) Water Framework Directive (2000/60/European Commission (EC));
- EU Drinking Water Directive (98/83/EC);
- Scottish Planning Policy (2014);
- The Water Supply (Water Quality) (Scotland) Regulations, 2001;
- The Flood Risk Management (Scotland) Act 2009;
- Water Environment and Water Services (WEWS) (Scotland) Act 2003 (WEWS Act); and
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017.

[1] Scotland's Soils, (2018). *The James Hutton Institute Soil map of Scotland (partial cover) 1:25,000* [online] Available at: http://map.environment.gov.scot/Soil_maps/?layer=2 [Accessed 8th June 2019].
[2] British Geological Survey, (2018) *Onshore GeoIndex* [online] Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html [Accessed 8th June 2019].
[3] Dochartaigh, B, MacDonald, A, Fitzsimons, V, and Ward, R. (2015) Groundwater Science Programme Open Report OR/15/028. *British Geological Survey*, [online]. Available at: http://nora.nerc.ac.uk/511413/1/OR15028.pdf [Accessed 8th June 2019].
[4] Scottish Natural Heritage (2018). Sitelink [online] Available at: https://gateway.snh.gov.uk/sitelink/searchmap.jsp [Accessed 8th June 2019].
[5] Natural England (2018) Magic [online} Available at: http://magic.defra.gov.uk/ [Accessed 8th June 2019].
[6] Scottish Environmental Protection Agency (2018) Water Classification Hub [online] Available at: https://www.sepa.org.uk/data-visualisation/water-classification-hub/ [Accessed 8th June 2019].
[7] Scottish Environmental Protection Agency (2018) Flood Maps and Reservoirs Maps [online] Available at: http://map.sepa.org.uk/floodmap/map.htm and http://map.sepa.org.uk/reservoirsfloodmap/Map.htm [Accessed 8th June 2019].

Guidance

Planning Advice Notes (PAN)

- PAN 61 Planning and Sustainable Urban Drainage Systems; and
- PAN 69 Planning and Building Standards Advice on Flooding.

SEPA Pollution Prevention Guidance Note (PPG) and Guidance for Pollution Prevention (GPP)

- PPG01 General Guide to the Prevention of Pollution;
- GPP02 Above Ground Oil Storage Tanks;
- PPG03 Use and Design of Oil Separators in Surface Water Drainage Systems;
- GPP05 Works and Maintenance in or near Water;
- PPG06 Working at Construction and Demolition Sites;
- PPG07 Safe Storage – The Safe Operation of Refuelling Facilities;
- GPP08 Safe Storage and Disposal of Used Oils;
- GPP13 Vehicle Washing and Cleaning;
- GPP21 Pollution Incident Response Planning; and
- GGP22 Dealing with Spills.

Construction Industry Research and Information Association (CIRIA) Publications

- C532 Control of Water Pollution From Construction Sites (2001);
- C741 Environmental Good Practice on Site (2015); and
- C753 The Sustainable Urban Drainage Systems (SUDS) Manual (2015).

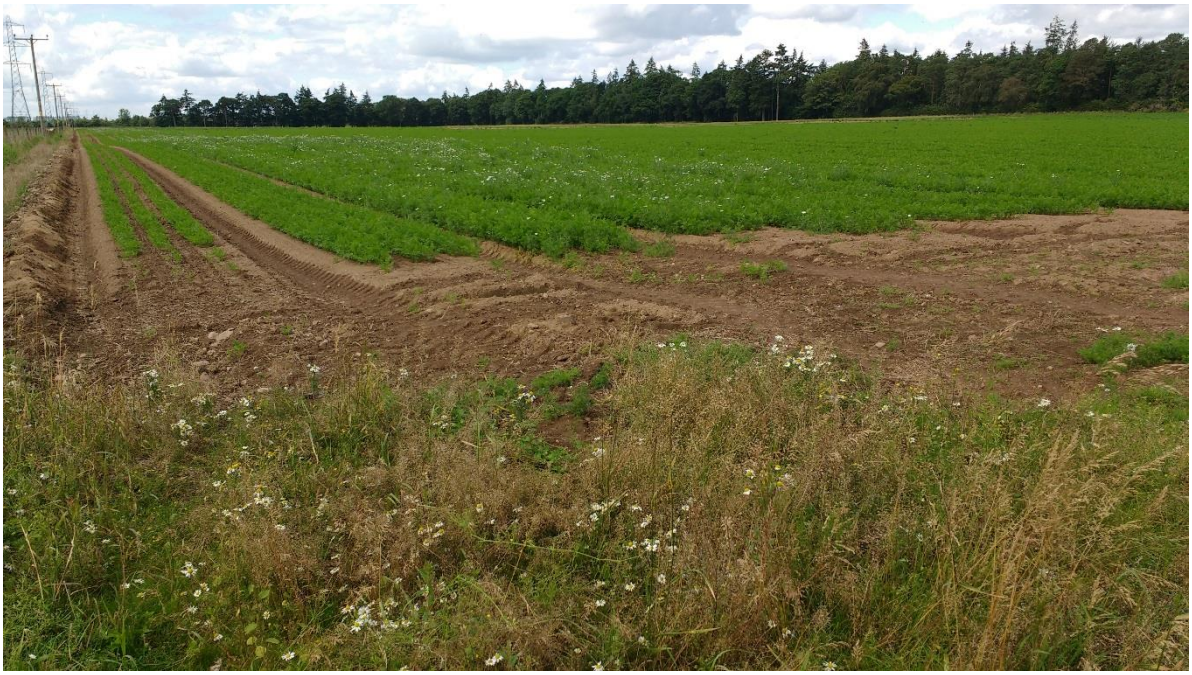
SEPA Publications

- Engineering in the Water Environment: Good Practice Guide – Sediment Management (2010); and
- Groundwater Protection Policy for Scotland, Version 3 (2009).

7.5 Baseline Conditions

7.5.1 This section outlines the baseline conditions of the water environment and soils at and within the vicinity of the Proposed Development.

7.5.2 The Proposed Development is located in a rural setting, approximately 500 m north of the River Isla. The proposed substation is centred at National Grid Reference (NGR) NO 28868 46954, approximately 3.5 km to the south-east of the town of Alyth, Perth and Kinross. **Photograph 7-1** shows the location of the proposed substation.



Photograph 7-1 – Location of the Proposed Substation (from NGR NO 29105 47114)

7.5.3 The proposed works relate to earthworks, construction of hardstanding, substation infrastructure and connection to the transmission network. In addition to the substation works there would be a requirement to alter an existing tower; install three new steel lattice towers and 362 m of new OHL conductors; and the removal of one steel lattice tower and 555 m of OHL conductors immediately adjacent to the proposed substation, as described in Chapter 3.

7.5.4 The extents of the planning application boundary and study area are shown on **Figure 7.1.**

7.5.5 Land uses in the surrounding area generally comprise farmland with several isolated farmhouses. Some relatively small wooded areas to the north and south-west are also present, along with a disused railway approximately 300 m to the west of the Proposed Development. Historic mapping shows the substation site and surrounding area has remained undeveloped throughout its recorded history, being utilised for agricultural purposes.

Designations

7.5.6 Review of the Scottish Natural Heritage (SNH) Sitelink and Magic Map webpage indicates that the Proposed Development is located approximately 500 m north of the River Isla that is part of the River Tay SAC, a 9,462 ha site. The SAC is designated for its oligotrophic to mesotrophic standing waters as well as populations of Atlantic salmon (*Salmo salar*), brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis)*, sea lamprey (*Petromyzon marinus*) and breeding otter (*Lutra lutra*). The populations of Atlantic salmon are considered to be high-quality and the River Tay catchment supports the full range of salmon life-history types found in Scotland, with adult salmon entering the River Tay throughout the year to spawn in different parts of the catchment.

7.5.7 Given the national importance and high quality of the River Tay SAC it considered a highly sensitive receptor.

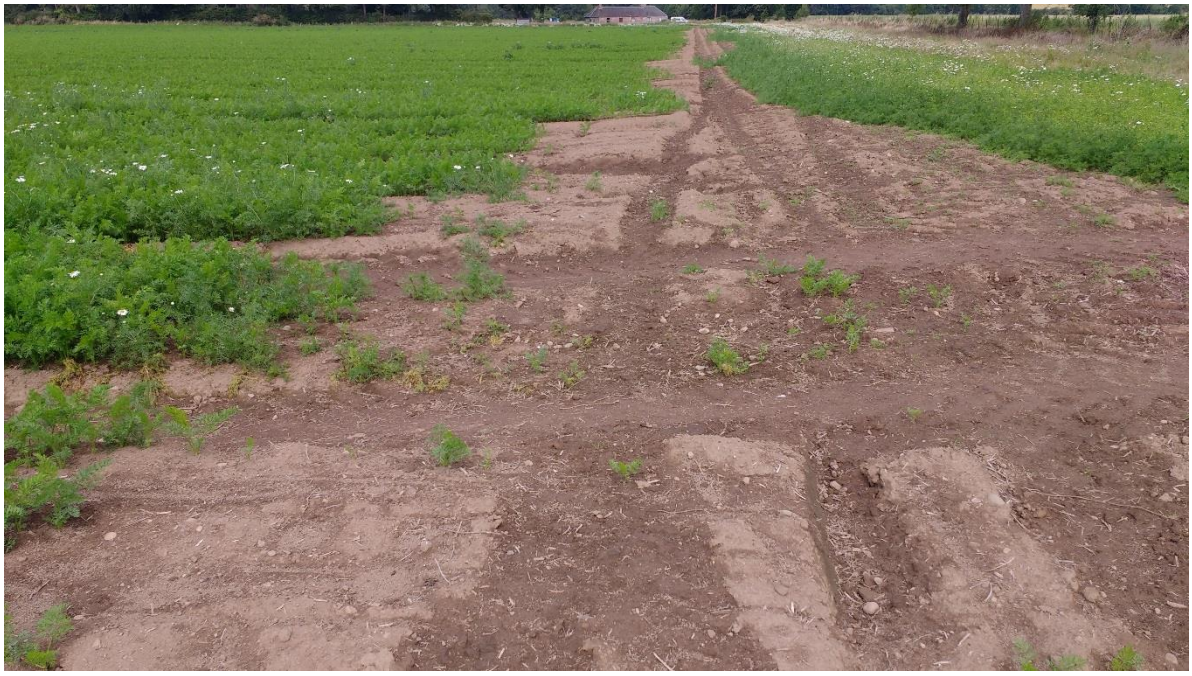
7.5.8 No other designated sites are recorded within 500 m of the Proposed Development.

Soils and Geology

Soils

7.5.9 Review of the Soil map of Scotland (partial cover) 1:25,000 scale (**Figure 7.2**) indicates that the north western corner of the proposed substation site is underlain by brown soils, described as freely drained glacio-fluvial deposits of sands and gravels derived from acid schists, sediments and lavas from Lower Old Red Sandstone age. Alluvial soils are recorded south of the brown soils and are described as imperfectly drained soils derived from recent riverine and lacustrine loamy alluvial deposits.

7.5.10 The published Soil Capability for Agriculture map confirms that the whole site is underlain by soils that are classified as Class 2 soils. Class 2 soils are capable of supporting arable agriculture and a wide range of crops. Typically to support Class 2 soils the climate is favourable and, slopes are shallow and soils are at least 45 cm deep which means the land use is flexible. The area of the Proposed Development is very small compared to the extent of Class 2 mapped. A photograph of soils noted on site is presented in **Photograph 7-2**.



Photograph 7-2 – Typical Soils Noted at Substation Site

Superficial Geology

7.5.11 Review of the BGS Onshore Geoindex of superficial deposits (**Figure 7.3**) confirms River Terrace deposits underlie the Proposed Development, which comprise gravels, sands, silt and clays. These form beds and lenses of deposits reflecting the channels, floodplains and levees of a river.

7.5.12 The 2011 and 2014 intrusive ground investigation confirmed the published geology. Sandy, gravelly clay topsoil was encountered across the site to depths typically between 0.20 m and 0.40 m, underlain by fine to coarse sand and gravel with many cobbles or soft to firm sandy clay. No made ground was noted.

7.5.13 Alluvium comprised of clay, silt, sand and gravels is recorded along the River Isla corridor.

7.5.14 **Figure 7.3** shows that Glacial Till is likely to lie below River Terrace and Alluvial deposits and above the solid or bedrock geology.

Solid Geology

7.5.15 Review of the BGS Onshore Geoindex for bedrock and linear features (**Figure 7.4**) indicates that the Proposed Development is underlain by the Cromlix Mudstone Formation (mudstone), described by the BGS as poorly sorted, fine grained silty sandstones, siltstones and mudstones, which may be locally interbedded with thin lenses of medium-coarse pebbly sandstones. The bedrock was not encountered in any of the trial pits or boreholes excavated at the substation site, which extended to depths of up to 12.5 m below ground level.

7.5.16 The Coal Authority online Gazetteer indicates that the site is not in an area that is likely to be affected by coal mining activity. Additionally, the BGS Mining Plans Portal indicates that no mine plans (coal or other minerals) are available for the site, suggesting that risk of underground mining in the area of the site from coal and other minerals is unlikely.

Hydrogeology

7.5.17 An extract of the BGS 1:625,000 scale Hydrogeological Map of Scotland (1988) and the 1:100,000 scale Aquifer Productivity and Groundwater Vulnerability datasets are presented in **Figure 7.5** and **Figure 7.6** respectively.

7.5.18 The superficial deposits underlying the Proposed Development are classified as a locally important aquifer of moderate productivity in which intergranular groundwater flow occurs. Groundwater was encountered within a number of the trial pits and in the boreholes advanced in 2011 in 2014 at depths between 2 m and 3 m. Infiltration tests completed in a trial pit recorded infiltration rates in the superficial deposits of $1x10^{-5}$ – $1x10^{-6}$ m/sec.

7.5.19 The bedrock deposits are classified as moderately productive and groundwater flow is recorded to occur through via primary (intergranular) and secondary (fractures and other discontinuities) permeability. The bedrock aquifer is also considered locally important.

7.5.20 The presence of Glacial Till below the River Terrance and Alluvial deposits may result in groundwater in the superficial deposits being locally perched above the regional groundwater table in the bedrock deposits.

Groundwater Levels and Flow

7.5.21 SEPA has confirmed no groundwater monitoring occurs within 1 km of the Proposed Development.

7.5.22 Groundwater flow in the superficial and bedrock deposits is likely to follow regional topography.

Groundwater Quality

7.5.23 The Proposed Development is within the Isla and Lower Tay Sand and Gravel groundwater body (ID: 150740), which is classified as having Poor overall groundwater quality (in 2017, the last reporting cycle). The Poor classification was attributed to surface water interactions of nitrate within the Drinking Water Protection Zone (DWPA) with all other parameters recorded as Good.

7.5.24 Through consultation with SEPA, water quality data (2016-2018) was provided for their nearest groundwater monitoring location (NGR NO 33958 47979), 5 km east of the substation site, for the Isla and Lower Tay groundwater body, summarised in **Table 7-1**.

Table 7-1: SEPA Groundwater Quality Data 2016-2018 (NGR NO 33958 47979)

Determinand (units)	Min	Max	Mean
Nitrate as N (mg/L)	5.54	10.4	7.2
Nitrite as N (mg/L)	<0.005		

For the purposes of the Designation of Nitrate Vulnerable Zones (Scotland) Regulations 2015 The Scottish Government have designated the region as the Strathmmore, Fife and Angus Nitrate Vulnerable Zone, which the Proposed Development lies within.

7.5.25 A summary of the regional groundwater chemistry for bedrock deposits is presented within the BGS Baseline Scotland report series, as summary of which is given in **Table 7-2**.

Table 7-2: Regional Groundwater Quality within Strathmore Aquifer

Determinand	Units	Drinking Water Standard	Count	Min	Mean	Max
Calcium	mg/l	-	48	24.7	52.4	140
Chloride	mg/l	250	48	6.83	29.3	354
Dissolved Oxygen	mg/l	-	35	<0.1	7.21	10.4
Iron	ug/l	200	40	<6	<6	547
Bicarbonate (HCO3)	mg/l	-	48	84.2	158	293
Potassium	mg/l	-	48	<0.5	2.13	201
Magnesium	mg/l	-	48	3.89	11.7	32.4
Sodium	mg/l	200	48	8.17	20.9	284
Nitrate (NO3)	mg/l	50	48	0.2	6.7	81
pH	pH units	6.5 – 9.5	48	6.54	7.48	8.62
Electro-conductivity	uS/cm	2,500	38	273	508	1,528
Cadmium	ug/l	5.0	35	<0.05	<0.05	0.12
Chromium	ug/l	50	35	<0.5	0.6	2.1
Copper	ug/l	2,000	35	0.5	1.2	40.7
Manganese	ug/l	50	42	0.1	1.43	528
Nickel	ug/l	20	35	<0.2	<0.2	0.9
Lead	ug/l	10	35	<0.1	0.1	1.3
Zinc	mg/l	5.0	35	0.0007	0.0092	0.836

7.5.26 Review of **Table 7-2** shows that the groundwater is characterised by high calcium and bicarbonate and is typically near-neutral to slightly alkaline with pH ranging between 6.54 to 8.62 pH units.

7.5.27 Metals are typically recorded below respective Drinking Water Standards (DWS), however slightly elevated concentrations of manganese and iron are recorded at concentrations of up to 528 ug/l and 547 ug/l respectively.

7.5.28 Concentrations of nitrate range between 0.2 mg/l to 81 mg/l. The high concentration of 81 mg/l was observed in one sample and appears to be a direct result from contamination by nitrogen fertiliser as stated within the BGS report.

Groundwater Vulnerability

7.5.29 Groundwater vulnerability is divided into five classes (1 to 5) with 1 being least vulnerable and 5 being most vulnerable.

7.5.30 An extract of BGS 1:100,000 scale Groundwater Vulnerability data is included as **Figure 7.6** and indicates the following:

- the River Terrace is classified as a 'Moderate to High Productivity (Intergranular Flow)' aquifer;
- the bedrock is classified as a 'Moderate Productivity (Intergranular and Fracture Flow)' aquifer; and
- groundwater beneath the Proposed Development in the uppermost aquifer (the superficial aquifer) is classified with a groundwater vulnerability 4a – described by the BGS as vulnerable to those pollutants not readily adsorbed or transformed.

7.5.31 The vulnerability of groundwater in the superficial aquifer is likely to reflect the relatively shallow depth to groundwater, the absence of overlying low permeability deposits above the groundwater and the potential for relatively rapid groundwater movement.

Licenced Sites / Abstractions / Discharges

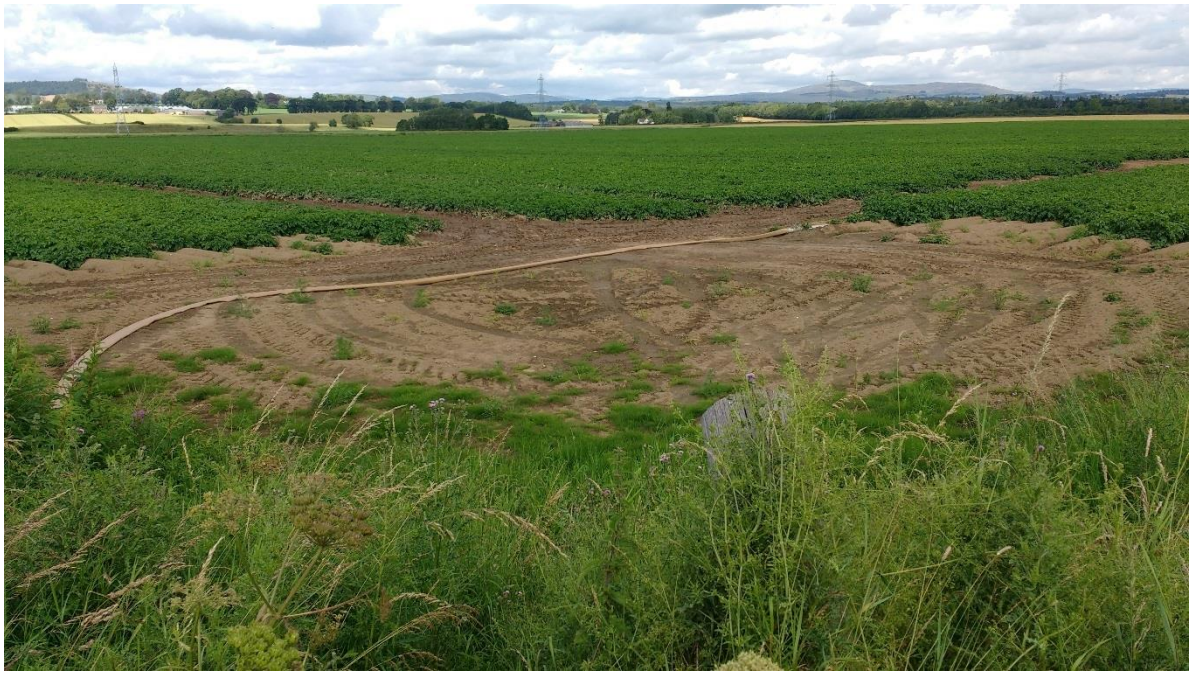
7.5.32 Consultation with PKC, AC and SEPA has been conducted regarding registered and licenced water abstraction / discharges within 500 m of the Proposed Development.

7.5.33 SEPA has supplied information regarding the activities of CAR registrations and licences, illustrated in **Figure 7.1** and detailed in **Table 7-3**. Within 500 m of the Proposed Development almost all CAR authorisations are registrations for private sewage disposal, with one surface water abstraction licence recorded on Haughend Farm, downstream of the Site (CAR/L/1004442).

Table 7-3: CAR Registrations and Licences within 500 m of the Proposed Development

CAR Licence Number	Registered Property (NGR)	Activity
CAR/L/1004442	Haughend Farm (NO 29204 46916)	Agriculture (irrigation – mobile plant) from a watercourse
CAR/R/1051569	Hill of Hallyards (NO 28012 47228)	Sewage (private) primary to groundwater
CAR/R/1064202	Hallyards Cottage (NO 27913 46593)	Sewage (private) primary to a watercourse
CAR/R/1065132	Hallyards House (NO 27825 46739)	Sewage (private) untreated to a watercourse

7.5.34 During the site visit (19th July 2019) the land manager at Haughend provided details regarding the surface water abstraction. The abstraction is direct from the River Isla and is used for irrigation of crops and temporary in nature. Abstraction is taken from NGR NO 29405 46604, directly south of Haughend. During the site visit, a similar abstraction was also noted at the Bridge of Crathies for land managed by adjacent farms (CAR licence number CAR/L/1010122, however this licence is registered to a property outside of the study area). The abstraction is shown as **Photograph 7-3**.



Photograph 7-3 – Portable Temporary Abstraction Apparatus for Irrigation – Bridge of Crathies

7.5.35 PKC and AC have confirmed that they hold no records of properties served by PWS within 500 m of the Proposed Development. This was confirmed following discussion with residents adjacent to the Proposed Development during the site visit whom confirmed they are connected to Scottish Water mains supplies.

Landfill Sites

7.5.36 SEPA provided no records of currently active or historic landfills located within the study area.

7.5.37 Through consultation with PKC and AC, one historical landfill has been identified within 500 m of the Proposed Development, see **Figure 7.1**.

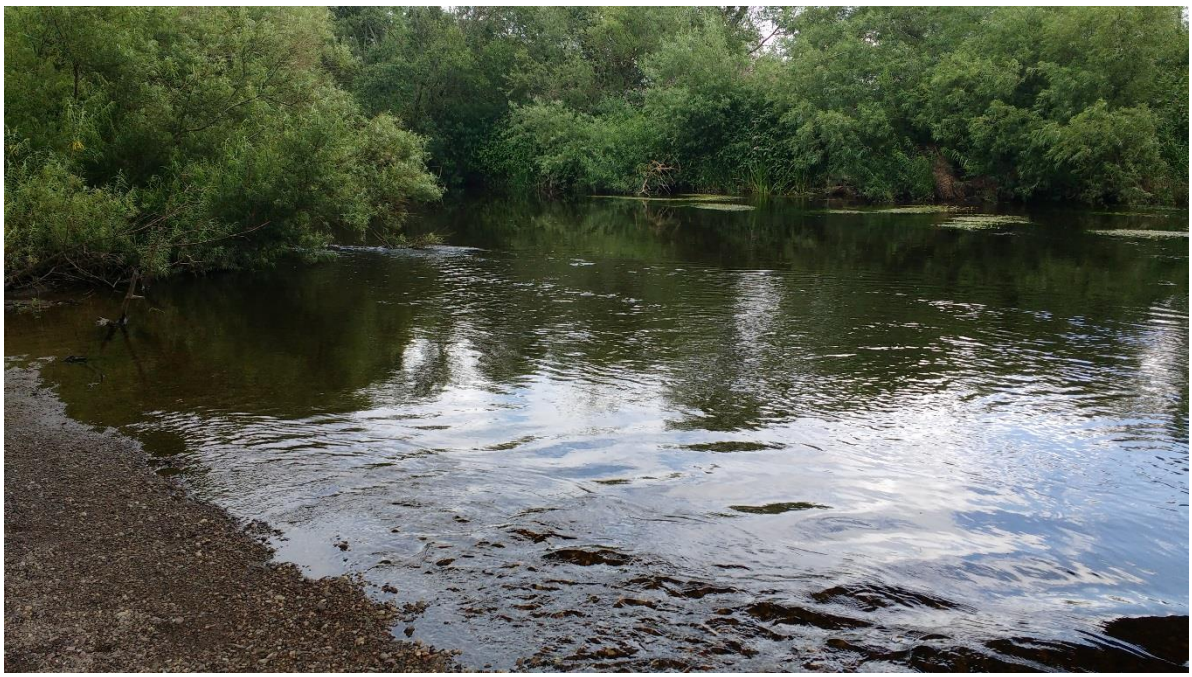
7.5.38 One historical landfill site is shown c. 200m west of the Proposed Development near the disused railway bridge. Discussion with local residents suggests that this historical landfill record represents an area of reworked inert soils and sand to improve embankment stability along the dismantled railway track. The area associated with this historical landfill was visited during the site visit however no evidence of landfill was noted (**Photograph 7-4**).

Photograph 7-4 – Area of Dismantled Railway Embankment Highlighted as Historical Landfill

Hydrological Setting

7.5.39 The local hydrology is shown on **Figure 7.1**.

7.5.40 The Proposed Development is located within the surface water catchment of the River Isla, which is part of the larger River Tay catchment. The River Isla within the study area generally flows south westward. The River Isla at the Bridge of Crathies is illustrated in **Photograph 7-5** and highlights the deposits of alluvium along the watercourse banks.

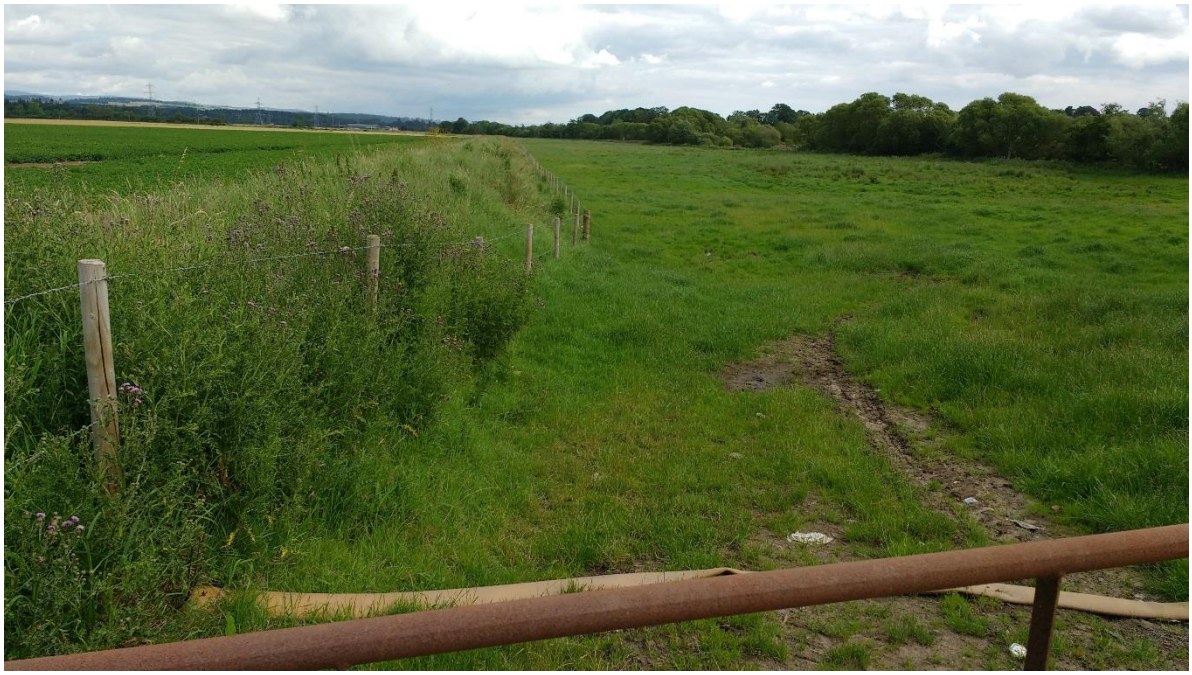


Photograph 7-5 – River Isla at Bridge of Crathies

7.5.41 It is understood that the substation site drains in a southerly direction via a series of field drains into the River Isla, which has a channel width of approximately 15 – 20 m near to the Proposed Development.

7.5.42 The Wester Cardean gauging station (NGR 329427, 746591) is located on the southern bank of the River Isla, adjacent to the site. It has a recorded standard annual average rainfall of 1085 mm and a mean gauged flow of 7.81 cubic meters per second (m^3/s). Low flows (Q95) are recorded as 1.566 m^3/s, whilst high flows (Q10) are recorded as 16.58 m^3/s. The catchment area is 366.5 square kilometres (km^2).

7.5.43 To the north of the River Isla a linear embankment approximately 2 m high was noted during the site visit, separating the agricultural land and the immediate floodplain of the River Isla (**Photograph 7-6**). The feature appears to continue past the Haughend property to the south of the Proposed Development. It is considered that the feature is an informal flood defence, constructed historically to prevent flooding of agricultural land.



Photograph 7-6 – Linear Embankment Along River Isla Floodplain

7.5.44 A large tributary of the River Isla, Dean Water, is located to the south of the River Isla, discharging into the River Isla approximately 200 m upstream of the Bridge of Crathies.

7.5.45 Several unnamed minor watercourses and drains also exist within the vicinity of the Proposed Development which flow to the River Isla and Dean Water.

Surface Water Quality

7.5.46 A Drinking Water Protection Area (DWPA) for surface water exists approximately 1 km west of the Proposed Development (see Figure 10.1). The DWPA is located within the Netherton Burn catchment and extends to the confluence with the River Isla. The DWPA is upstream of the Proposed Development and is therefore not hydraulically connected to the Proposed Development and is not discussed further.

7.5.47 The River Isla, before the confluence with the Dean Water, is recognised by SEPA as the River Isla - Glencally Burn to Dean Water catchment (ID: 6523). As part of the Water Framework Directive River Basin Management Plan the watercourse is currently (2017) classified as having a Good overall status.

7.5.48 The River Isla, downstream of the Dean Water confluence, is recognised by SEPA as the River Isla - Dean Water to River Ericht Confluence (ID: 6522) and is classified as having a Moderate overall status and is impaired by water abstraction pressures for agricultural irrigation.

7.5.49 The nearest surface water monitoring location to the Proposed Development for the River Isla is at NGR NO 29426 46595. The nearest surface water monitoring location along the Dean Water is at NGR NO 29373 45755 (see **Figure 7.1**). Soluble reactive phosphorus water quality data collected monthly (2016 - 2018) for these monitoring locations are summarised in **Table 7-4**.

Table 7-4: SEPA Surface Water Quality Data 2016-2018 (NGR NO 29426 46595 and NO 29373 45755)

Waterbody	Determinand (units)	Minimum	Maximum	Mean
River Isla	Soluble reactive phosphorus (mg/L)	<0.009	<0.009	<0.009
Dean Water		0.026	0.314	0.109

Flood Risk

7.5.50 A review of the SEPA flood mapping indicates that the Proposed Development lies in an area that is not at risk from river (fluvial) or significant surface water (pluvial) flooding. The Flood Risk Assessment (FRA) presented as **Appendix 7.1** illustrates modelled flood risk for the 1 in 200 year (including 20% allowance for climate change) and 1 in 1000 year flood flow rates for various points along the River Isla. The results show that the substation site is not at risk of flooding from the River Isla for any of these scenarios. However, it does show that the River Isla 200 year floodplain extent includes an area surrounding temporary mast T3.

7.5.51 It is noted that the linear embankment feature along the north bank of the River Isla is not recorded by SEPA as a flood defence. The Flood Maps natural flood management data highlights that the River Isla immediately to the east of the Proposed Development includes an area of high erosion while the rest of the River Isla channel is described as areas of moderate-high deposition.

7.5.52 Minor areas of surface water ponding have been modelled by SEPA within the site, however these are isolated and never form significant flow paths.

7.5.53 A summary of the potential sources of flooding and a review of the potential risk posed by each source is presented in **Table 7-5**. A detailed consideration of flood risk, including proposals for the management and control of storm water runoff shed from the site, is given in **Appendix 7.1** and **Appendix 7.2**.

Table 7-5: Potential Sources of Flood Risk

Potential Source	Potential Flood Risk to Application Site	Discussion
Coastal flooding	No	At over 40m AOD and review of SEPA flood mapping it is confirmed that the substation site is not at risk from tidal or coastal flooding.
River Flooding	Yes	SEPA river flood mapping highlights that no flooding of the proposed substation area is modelled. This has been confirmed by site specific hydraulic modelling (see **Appendix 7.1**). However, there is potential for high risk of fluvial flooding from the River Isla surrounding temporary mast T3. There are no recorded historic fluvial flooding instances within the Site boundary. There are instances of historic flooding where the B954 crosses the River Isla but these are shown (see **Figure 7.1**) to be remote from the Proposed Development. There are also instances of recorded flooding at Hallyards close to the proposed access route to the Site; approximately 1 km to the west of the Proposed Development. Flood risk and management of runoff on the proposed access route is considered in a separate planning application for the Public Road Improvement works.
Surface Water Flooding	Yes (minor)	SEPA flood mapping indicates that there are small discrete areas of the substation area identified as at potential risk of surface water flooding. Surface water flooding is not considered to present a development constraint and potential effects can be mitigated by good site design.
Groundwater Flooding	No	The geology beneath the site has been shown to be permeable and thus will readily allow groundwater movement. Significant variation in groundwater level is not therefore expected. Review of the SEPA mapping confirms no risk of groundwater flooding.
Flood Defence Breach (Failure)	No	During site survey an informal 2 m high linear feature was noted on the north bank of the River Isla, downstream of the Site. However, this is not noted on SEPA flood management maps and is not

		included in their flood model extents for the River Isla locally.
Flooding from artificial drainage systems	No	The site is currently agricultural land and not served by any formal drainage systems.
Flooding due to infrastructure failure	Yes (minor)	Three breach scenarios designated as high risk are highlighted on SEPA's Reservoirs Map across the Proposed Development. These include one breach scenario of the Blackwater reservoir (RES/R/1127813) and two for the Lintrathen reservoir (RES/R/1127816). The SEPA reservoir inundation maps highlight that the flood extents include the Proposed Development site however, the reservoirs are subject to routine inspection by a Panel Engineer as required by the Reservoirs Act and are located more than 5 km upstream of the Proposed Development. Thus the risk of failure of the reservoirs is very low and should any flooding occur it is expected it will be shallow. Flooding due to infrastructure failure is therefore not considered a constraint for the Proposed Development.

Scottish Water Assets

7.5.54 Scottish Water Asset Maps for the Proposed Development (reported in the 2012 EA) indicate that there are two mains supply lines within the vicinity of the site; one of which feeds the houses accessed off Haughend Road; the second feeds houses to the north of the site and appears to terminate approximately 190 m north of the Proposed Development.

7.6 Potential Effects

7.6.1 The Proposed Development would include:

- Substation: development of a temporary construction compound and laydown areas, earthworks excavation to suitable load bearing substrate, construction of hardstanding, access roads, and substation infrastructure (including a new 275 / 400 kV substation platform, one GIS control building and one STATCOM building); and
- OHL: diverting the existing 275 kV OHL to connect into the proposed substation. This will consist of installing three temporary OHL masts (T1, T2 and T3), removal of one existing steel lattice tower (641), installation of three new steel lattice towers (239A, 239B and 641R), construction of three sets of downleads to connect the OHL conductors to the new substation, and modifications to one existing steel lattice tower (240), comprising approximately 362 m of new OHL conductor, and removal of approximately 555 m of OHL conductor.

7.6.2 As discussed earlier in this Chapter, the Proposed Development will be constructed on deposits that may contain groundwater. Therefore, dewatering may be required during the construction phase to establish foundations and towers.

7.6.3 Without appropriate design and controls, construction of the substation has the potential to impair soils, geology, local hydrology (surface water) and hydrogeology (groundwater), such as:

- the use of machinery and the movement of soils has the potential to generate suspended solids in site runoff and / or introduce oils or hydrocarbons to the water environment;
- existing groundwater or surface water drainage paths could be disturbed or altered; and
- inadequate hardstanding drainage could increase or exacerbate local surface water ponding and flooding.

7.6.4 There are standard construction techniques and best practices which are used to avoid or reduce these potential impacts. Details are given in the following section.

7.7 Mitigation

7.7.1 The Applicant has established best practice construction techniques and procedures that have been agreed with statutory consultees, including SEPA and SNH. These are set out within the Applicant's General Environmental Management Plans (GEMP) (see **Appendix 3.5**). It is confirmed that the Proposed Development would be constructed in accordance with this guidance.

7.7.2 The construction phase of the works will also be undertaken in accordance with good practice guidance, including UK and Scottish guidance within the following documents:

- Control of Water Pollution from Construction Sites - Guide to Good Practice, CIRIA 2002;
- Environmental Good Practice on Site C650, CIRIA 2005;
- Engineering in the Water Environment: Good Practice Guide – Sediment Management, SEPA, June 2010; and
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) – A Practical Guide (Version 8.3), SEPA, February 2019.

7.7.3 The Pollution Prevention Guidelines (PPGs) (and replacement Guidance for Pollution Prevention (GPPs)) identified below are the principal guidance documents for preventing water pollution and erosion from construction activities and are jointly produced by the Environment Agency, SEPA and the Environment and Heritage Service in Northern Ireland. The guidelines are available via NetReg's website[8]:

- PPG1 General Guide to the Prevention of Pollution (PPG1, July 2013);
- GPP2 Above Ground Oil Storage Tanks (GPP2, January 2017);
- PPG3 Use and Design of Oil Separators in Surface Water Drainage Systems (PPG3, April 2006);
- GPP5 Works and maintenance in or near water (GPP5, January 2017);
- PPG6 Working at Construction and Demolition Sites (PPG6, May 2012);
- GPP8 Safe Storage and Disposal of used oils (GPP8, July 2017);
- PPG10 Highway Depots (PPG10, March 1999);
- GPP13 Vehicle Washing and Cleansing (GPP13, April 2017);
- PPG18 Managing fire water and major spillages (PPG18, June 2000);
- GPP21 Pollution Incident Response Planning (GPP21, July 2017); and
- GPP22 Dealing with Spills (GPP2, October 2018).

7.7.4 Guidelines for surface water management and flood risk assessment are as follows:

- The SuDS Manual (Report C753). CIRIA, 2015; and
- Scottish Planning Policy, Scottish Government, June 2010.

Soils and Geology

7.7.5 The soil (topsoil and sub-soil) will be excavated during the construction phase, kept on site and used for landscaping around the substation and to reinstate ground around the towers and poles.

7.7.6 The existing soils at site would be managed and handled in accordance with the Applicants GEMP4 (see **Appendix 3.5**). The GEMP recognises that soil is a precious resource and presents the measures that would be used to safeguard its value, which includes stripping storing and handling top soils and sub soils separately.

[8] NetRegs, (2018). *Environmental Topics*. [online] Available at: http://www.netregs.org.uk/environmental-topics/ [Accessed 2nd July 2019].

7.7.7 It has been shown that the soils at site are productive but are common locally. Subject to best practice with regard to stripping, handling and placement of soils they can be safeguarded and used for the proposed landscaping. Their value, quality and structure, therefore, can be retained.

7.7.8 The bedrock deposits are common regionally and have no specific rarity value. The superficial deposits at site are also common regionally. The Proposed Development would not degrade the value of the bedrock or superficial deposits.

7.7.9 The Proposed Development will be subject to detailed design prior to construction which will be informed by further site investigation that will include geotechnical analysis to ensure the stability of the Proposed Development.

Substation Water Supply and Disposal

7.7.10 It is proposed that water required for the site welfare facilities during the construction phase is provided by either connection to the mains or imported by water bowser or tanker. Water from site welfare facilities would be discharged to a sealed tank which would be routinely emptied and disposed of at an appropriately licensed off-site facility (i.e. no discharge to the water environment).

7.7.11 Following construction, either a rainwater collection system would be used for any grey water requirements or a connection to Scottish Water mains would be obtained. It is likely that waste water would be discharged to soakaway or septic tank, details of which would be agreed with SEPA and authorised in accordance with Controlled Activity Regulations (CAR), as part of the detailed site design.

Private Water Supplies and Consented Abstractions

7.7.12 It has been shown that there are no licensed water abstractions or PWS within 500 m of the Proposed Development. The Proposed Development will not affect any licensed abstractions or PWS and therefore monitoring of water abstractions is not required.

7.7.13 It has been confirmed that mobile surface water abstractions take water from the River Isla near to the Proposed Development for irrigation purposes. Potential impacts on the water flow and quality in the River Isla, which could affect these abstractions, is discussed below.

Surface Water and Groundwater Quality

Construction Phase

7.7.14 The construction of the Proposed Development will be undertaken in accordance with the Applicant's GEMPs (see Appendix 3.5), relevant technical guidance, PPG / GPPs and other codes of best practice, to limit the potential for contamination of both ground and surface waters.

7.7.15 A Site Construction Licence would be required and obtained in accordance with the CAR from SEPA prior to any construction works commencing on site. The Licence would specify the controls and measures that would be used at site to safeguard the water environment.

7.7.16 In addition, a Construction Environmental Management Plan (CEMP) will be developed prior to commencement of any construction work, which will outline measures to ensure that the construction phase of the works minimise the risk to both groundwater and surface water. It is expected that the following will be included within the CEMP:

- during construction there would be heavy plant and machinery required on site and as a result it is appropriate to adopt best working practices and measures to protect the water environment, including those set out in Pollution Prevention Guidance (PPG1);
- in accordance with GPP2 any above ground on-site fuel and chemical storage would be bunded;
- an emergency spill response kit would be maintained during the construction works (GPP21);

- a vehicle management system / road markings would be put in place wherever possible to reduce the potential conflicts between vehicles and thereby reduce the risk of collision (GPP21);
- a speed limit would be used to reduce the likelihood and significance of any collisions;
- drip trays will be placed under vehicles which could potentially leak fuel/oils;
- stockpiling of soils will only occur in demarked areas which have drainage to intercept, control and manage runoff shed from stockpiles;
- the use and deployment of cut-off ditches and silt fences;
- road cleaning;
- any water contaminated with silt or chemicals will not be discharged directly or indirectly to a watercourse without prior treatment; and
- the use and placement of concrete will be carefully controlled so as not to cause a direct or indirect impact on the water environment.

7.7.17 The above measures would significantly reduce the likelihood of pollutants, including suspended solids, being discharged to nearby watercourses or groundwater and would safeguard water quality in the River Isla and its tributaries.

Operational Phase

7.7.18 The risk of contamination from the substation itself is considered to be very low, as there will be no requirement for the storage of any potentially hazardous substances and runoff from the site will typically comprise of clean run-off from roofs and areas of hardstanding. The risk of contamination from the OHL is considered to be negligible as runoff will comprise clean run-off from reinstated ground at the base of the proposed towers.

7.7.19 The transformers on site will require the use of insulating oils. Transformers will be installed within bunded areas so that in the unlikely event of a leak or damage there would be no release to the site surface water drainage system (see below). As an additional safeguard, surface water runoff will also be routed through an oil interceptor before being discharged to the surface water drainage system.

7.7.20 The transformers will be subject to regular inspections and would have an automated warning system to alert if oil levels within the transformers suddenly drop. The construction and maintenance of the transformers will be undertaken in accordance with best practice guidance, particularly “GPP2: Above Ground Storage Tanks” and PPG8: Safe Storage and Disposal of used Oils in Relation to the Maintenance of Transformers”.

7.7.21 Runoff from any vehicle movement areas will be routed through an oil interceptor prior to out falling to the site surface water management system, to ensure that there is no risk of the release of any oils to the wider environment.

7.7.22 As above, these measures would significantly reduce the likelihood of pollutants, including oils and suspended solids, being discharged to nearby watercourses or groundwater and would safeguard water quality in the River Isla and its tributaries.

Groundwater Levels and Flows

7.7.23 It is anticipated that groundwater beneath the Proposed Development will be in hydraulic continuity with the River Isla.

7.7.24 It is noted that the area of the Proposed Development, and in particular the extent of any foundations, is very small compared to the extent of the superficial and bedrock aquifers and therefore, subject to appropriate design, no effects on groundwater levels or flows in the River Isla (and its tributaries) are expected.

7.7.25 The detailed design of the Proposed Development will be informed by further site investigation which would be used to ensure appropriate safeguards are included in the construction works and CEMP.

Surface Water Flow and Flood Risk

7.7.26 It has been shown earlier in the Chapter that the substation site and area covering the permanent new towers is not at flood risk.

7.7.27 Temporary mast T3 is potentially located within the floodplain and, to minimise flood risk during construction, the site specific CEMP would consider flood risk at this location and include a flood evacuation plan so that construction personnel and equipment can be safeguarded in the event of a flood event occurring. No storage of materials will occur in the floodplain.

7.7.28 The proposed permanent and temporary towers have a very small footprint and will not materially alter surface water flow paths or increase the rate or volume of surface water runoff.

7.7.29 The construction of temporary stone tracks or trackway panels would be used to access existing and proposed towers to avoid compaction of soils and thus prevent an increase in the rate and volume of runoff.

7.7.30 The proposed substation will include impermeable surfacing and could, therefore, without appropriate control and mitigation, increase both the rate and volume of surface water shed from the site. A surface water drainage design has been developed for the Proposed Development (see **Appendix 7.2**) which adopts SuDS and will limit the rate of runoff to pre-development or 'greenfield' rates. The required surface water attenuation would be provided by an attenuation pond. This will ensure that the Proposed Development will not increase flood risk at or downstream of the site.

7.8 Summary and Conclusion

7.8.1 Existing soil, geological, hydrogeological and hydrological conditions have been identified and used to assess the potential impacts the Proposed Development might have on the soils, geology and the water environment.

7.8.2 Best practice construction techniques that would safeguard soils, geology and the water environment and would be incorporated in the detailed design of the works and during the construction works have been identified. Subject to the adoption of the best practice no effects on soils, geology or the water environment have been identified.

7.8.3 A site specific flood risk assessment and drainage assessment has been prepared. It has been shown that the proposed substation site and area covering the permanent new towers is not at risk of flooding and that surface water runoff can be managed in accordance with best practice so that flood risk to or downstream of the site is not increased as a consequence of the Proposed Development.

7.8.4 No licensed water abstractions or PWS sources have been identified near to the Proposed Development. Several abstraction licences for agricultural irrigation exist on the River Isla, the closest to the Proposed Development located at Haughend Farm. Safeguards have been proposed to ensure that the quality and quantity of water shed to the River Isla (and its tributaries) will not be impaired and thus no effect on the surface water abstractions is expected.

7.8.5 Groundwater is present in the underlying superficial deposits and it has been shown that the groundwater is vulnerable to pollution. Best practice measures have been proposed to safeguard groundwater quality and flow, so that groundwater quality is not impaired nor is any surface water in hydraulic continuity with groundwater impaired as a consequence of construction and operation of the Proposed Development.

7.8.6 The River Isla is part of the River Tay SAC which is designated for its oligotrophic to mesotrophic standing waters as well as populations of Atlantic salmon (*Salmo salar*), brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis)*, sea lamprey (*Petromyzon marinus*) and breeding otter (*Lutra lutra*). It is also a highly regarded salmon fishery. The safeguards proposed for groundwater and surface water will ensure that the qualifying interests of the SAC are not impaired by the construction and operation of the Proposed Development.

CONTENTS

Appendices

Figures

8. CULTURAL HERITAGE

8.1 Executive Summary

8.1.1 The likely effects on cultural heritage resulting from the construction and operation of the proposed Alyth 275 / 400 kV substation and associated works (hereafter referred to as the 'Proposed Development') have been appraised, based upon the advice provided in a series of consultations undertaken in 2010-11; a baseline survey, desk-based study, field survey and archaeological investigations carried out in 2011 and in 2014; an updated desk-based assessment, carried out in August 2019; and an impact appraisal.

8.1.2 The desk-based study carried out in 2011, augmented by the results of field surveys undertaken at that time, identified one site of cultural heritage interest within the Proposed Development site: cropmark site of possible prehistoric features. Subsequently, trial trench investigation was carried out in 2011 at the site to investigate these cropmarks. None of the recorded cropmark features investigated was found to be of archaeological origin or interest. However, in the course of trial trenching, a range of other archaeological features were detected, none of which were visible as cropmarks on aerial photographs. Further archaeological investigations were carried out in 2014 of the area of the Proposed Development site not investigated in 2011. Several pits and linear features, all of unknown date, were identified, along with a possible old ground surface. The results of this work have been reviewed and, where relevant, updated by additional desk-based study for this assessment.

8.1.3 Twenty six heritage assets have been identified within 1 km of the centre of the Proposed Substation site (Inner Study Area), by this current appraisal. Four of these are Scheduled Monuments, three are Listed Buildings and 19 are non-designated heritage assets. Most of the records are for cropmark sites of prehistoric or Roman date, along with medieval or later settlement and agrarian remains. Three heritage assets, cropmark sites of potential prehistoric sites (one of which is a Scheduled Monument) are recorded within the current Proposed Development site boundary. Trial trench investigations carried out in 2011and 2014 detected potential prehistoric archaeological remains scattered across the site, indicating that the Proposed Development site is an area of high archaeological potential.

8.1.4 Ground disturbing works associated with the Proposed Development (including landscape mitigation areas) have the potential to disturb or remove a range of archaeological features including those identified during the archaeological trial trench investigations. A direct impact on these remains would result in an effect of high magnitude. Mitigation measures have been set out to reduce the predicted effects.

8.1.5 Nine Scheduled Monuments, nine Category B Listed Buildings, nine Category C Listed Buildings and one Inventory Garden and Designed Landscape have been identified within 3 km of the Proposed Development (Outer Study Area), from which there is predicted 'bare-earth' theoretical visibility of the Proposed Development. It is assessed that there would be a high magnitude effect on the setting of one Scheduled Monument, Haughend Enclosure (SM7263), from the construction and operation of the Proposed Development. All other effects on the setting of heritage assets in the Outer Study Area are assessed as being of no more than low magnitude.

8.2 Introduction

8.2.1 This Chapter identifies the likely impacts of the Proposed Development on cultural heritage and archaeology (hereafter 'heritage assets'). It details the results of a desk-based assessment covering the proposed Alyth 275 / 400 kV substation and associated infrastructure (new overhead line (OHL) connection into the substation) (**Appendix 8.1**; **Figure 8.1**) and provides an assessment of the potential impacts on the settings of heritage assets in the surrounding landscape (**Appendix 8.2**; **Figure 8.2**).

8.2.2 The assessment was undertaken by CFA Archaeology Ltd and conducted in accordance with the Chartered Institute for Archaeologists 'Code of Conduct' (2014[1]) and 'Standard and Guidance for Historic Environment Desk-based Assessment

[1] Chartered Institute for Archaeologists (CIfA) (2014) 'Code of Conduct'.

(2017[2]), using information provided by Historic Environment Scotland (HES), Perth and Kinross Heritage Trust (PKHT), Aberdeenshire Council Archaeology Service (ACAS), archaeology advisors to Angus Council, and the results of previous archaeological work for the Haughend Farm substation site (CFA2011[3]; Mitchell 2011[4], Amey 2014[5]) (hereafter referred to as 'previous application site'. A description of the project proposals that form the basis of this appraisal is provided in Chapter 3 (The Proposed Development).

8.2.3 The objectives of the appraisal were to:

- Describe the cultural heritage baseline, including identifying archaeological potential, of the Proposed Development site;
- Identify the potential construction (direct impacts), operation (impacts on setting) and cumulative effects of the Proposed Development on heritage assets; and
- Identify any mitigation measures proposed to address likely impacts.

8.2.4 The type of impacts on heritage assets which might result from the Proposed Development have been assessed in the following categories:

- Direct (construction) impacts: where there may be a physical impact on an asset caused by construction of the Proposed Development. Direct impacts tend to have permanent and irreversible effects upon cultural heritage assets.
- Operation Impacts: where elements of the Proposed Development would affect the setting of heritage assets.

8.2.5 There are no proposed developments in the study area that would give rise to a cumulative effect on heritage assets in combination with the Proposed Development, therefore the assessment of cumulative effects has been scoped out.

8.2.6 The assessment draws on the results of work previously undertaken by CFA in 2011 and by Amey in 2014.

8.2.7 The chapter is supported by:

- **Appendix 8.1**: Cultural Heritage Assets within the Inner Study Area;
- **Appendix 8.2**: Cultural Heritage Assets within the Outer Study Area;
- **Figure 8.1**: Cultural Heritage: Assets within the Inner Study Area; and
- **Figure 8.2**: Cultural Heritage: Assets within the Outer Study Area.

8.3 Scope of Assessment

Study Area

8.3.1 Two zones have been employed for the cultural heritage appraisal:

- the Inner Study Area (**Figure 8.1**): an area extending to 1 km from the centre of the Proposed Substation site has been used to identify the potential for direct impacts upon heritage assets (including buried archaeology) arising from construction of the Proposed Development (**Figure 8.1**: Cultural Heritage: Assets within the Inner Study Area). A gazetteer of these heritage assets is provided as **Appendix 8.1**; and
- the Outer Study Area (**Figure 8.2**): an area extending to 3 km from the centre of the Proposed Substation site has been used to identify the potential for effects upon the settings of heritage assets with statutory and non-statutory designations arising from construction of the Proposed Development (**Figure 8.2**: Cultural Heritage: Assets within the

[2] Chartered Institute for Archaeologists (CIfA) (2017) 'Standard and Guidance for Historic Environment Desk-based Assessment'.

[3] CFA (2011) 'Cultural Heritage Effects' East Coast 400 kV Reinforcement Project Haughend 275 / 400 kV Substation – Environmental Appraisal

[4] Mitchell, S (2011) East Coast 400kV Reinforcement Project. Haughend Farm, by Alyth, Perth and Kinross, Archaeological Evaluation of Proposed Substation Site (Option A3-2). Unpublished, CFA Report No 1879.

[5] Amey (2014) East Coast 400kV Reinforcement Project: Alyth substation, Perth & Kinross: Data Structure Report on Archaeological Assessment, Report No CO25000197/E/A05

Outer Study Area). A gazetteer of these heritage assets is provided as **Appendix 8.2**, which also provides tabulated summary assessments of the predicted impacts on their settings on a case-by-case basis.

Consultation

8.3.2 A Scoping exercise for the East Coast 400 kV Overhead Line Upgrade, which included a proposed substation at Haughend, was carried out in 2010 for an earlier application. At that time, and subsequently, as the project developed between 2010 and 2013, consultations with Historic Scotland[6] (HS), ACAS and PKHT were also undertaken separately by CFA. A summary of the various responses relevant to the current Proposed Development and the actions required are summarised below in **Table 8.1**.

8.3.3 Reponses relevant to the current application were provided in August 2019 by the Scottish Government, HES and PKC in response to the request from Scottish & Southern Electricity Networks (SSEN) for a screening opinion. A summary of the main points as this applies to cultural heritage is provided in **Table 8.1**.

Table 8.1: Consultation responses

Consultee	Response comments	Action
Scottish Government Scoping Opinion (response dated 16/06/2010)	Expressed concerns that there was potential for a direct impact on Haughend Enclosure (SM7263). Identified five Scheduled Monuments, Cardean, Roman Fort (SM2306), Cardean Roman Camp (SM4337), Cardean Prehistoric Barrow (SM6330[7]), Hallyards Cottages, Moated Site (SM7262) and Haughend Enclosure (SM7263), which might experience an impact and requested that impacts upon them and other cultural heritage assets in the wider area be considered.	Noted. The layout of the Proposed Development has been designed to avoid Haughend Enclosure (SM7263). The potential impacts of the Proposed Development on the setting of designated heritage assets are assessed in Section 8.6 and in **Appendix 8.2**.
Scottish Government Screening Opinion (dated 23/08/2019)	Advised that HES consider that significant adverse impacts on Scheduled Monument Haughend Enclosure (SM7262) were unlikely given the setting baseline.	Noted The layout of the Proposed Development has been designed to avoid Haughend Enclosure (SM7263). The potential impacts of the Proposed Development on the setting of designated heritage assets are assessed in Section 8.6 and in **Appendix 8.2**.
Historic Scotland Preferred Site Option Consultation (response dated 01/03/2011 & 02/03/2011)	Confirmed that they were broadly content with the proposals, welcoming the proposed avoidance of Haughend Enclosure (SM7263)	Noted Mitigation to avoid the Scheduled Monument is provided below in Section 8.7.

[6] Now Historic Environment Scotland

[7] Since the original Environmental Assessment Scheduled Monuments Cardean Roman Camp (SM4337) and Cardean Prehistoric Barrow (SM6330) were rescheduled in 2015 and the two sites are now designated together under one record - SM4337.

	and the proposed woodland screening around the substation. Requested that the Scheduled Monument be fenced off or otherwise protected during construction works to prevent accidental damage occuring to it.	
Historic Scotland **CFA Consultation** **(response dated 17/01/2012)**	Confirmed that the existing tower proposed for removal appears to stand c.35.m west of Haughend Enclosure (SM7263) and suggested that fencing be placed within 3 m east of the base of the tower during dismantling works to prevent encroaching into the Scheduled Area.	Following revision of the Proposed Development, the existing tower standing immediately west of the Scheduled Monument would not be removed as part of the current proposals. Mitigation to avoid the Scheduled Monument during construction is provided below in Section 8.7.
HES **Screening Opinion** **(dated 24/06/2019)**	Confirmed that they were content that the Screening Report identified the designated historic environemtn assets within their remit in the vicinity of the Proposed Development whose settings may be affected by the proposals. Confirmed that they were content that provided appropriate mitigation is put in place that direct physical impacts on Scheduled Monument, Haughend Enclosure (SM7263) are unlikely. Considered that there is potential for the proposed new towers to have an adverse impact on the setting of Scheduled Monument, Haughend Enclosure (SM7263) as they will bring the already existing infrastructure of the overhead line closer in proximity to the monument. However, the existing overhead line and the consented substation to the north forms part of the baseline setting of this monument and they consider that the erection of the two new towers will not significantly increase the adverse impacts on the setting of the Scheduled Monument.	Noted The layout of the Proposed Development has been designed to avoid Haughend Enclosure (SM7263). Mitigation to avoid the Scheduled Monument is provided below in Section 8.7. The potential impacts of the Proposed Development on the setting of designated heritage assets are assessed in Section 8.6 and in **Appendix 8.2**.
PKHT **CFA consultation** **(response dated 10/06/2010)**	Advised that there was potential to directly impact on two sites: Haughend Enclosure (SM7263) and	Archaeological trial trench investigations of the Proposed Development Site were carried out in

	unenclosed settlement (HER Ref MPK16596 – Asset 7 below) and confirmed that an archaeological site evaluation would be required of the site as there is potential for it to contain archaeological remains.	2011 (Mitchell 2011) and in 2014 (Amey 2014). Mitigation to reduce / offset effects on cultural heritage assets is set out in Section 8.7.
PKHT **Preferred Site Option Consultation** **(response dated 15/02/2011)**	Confirmed that transcription of the cropmarks of unenclosed settlement (MPK12753) from aerial photographs and a 6% by area trial trenching evaluation of the proposed substation site would represent an effective strategy for investigationg what archaeological resources would potentially be impacted by the Proposed Development.	Archaeological trial trench investigations of the Proposed Development Site were carried out in 2011 (Mitchell 2011) and in 2014 (Amey 2014). Mitigation to reduce / offset effects on cultural heritage assets is set out in Section 8.7.
PKC **Screening Opinion** **(dated 30/08/2019)**	Noted that the site is located adjacent to a Scheduled Monument. Advised that there is a likely signifcant effect from the construction of the Proposed Development on the Scheduled Monument, but that this has been addressed and considered through previous submission.	Mitigation to reduce / offset effects on cultural heritage assets is set out in Section 8.7.

8.4 Methodology

Introduction

8.4.1 The principal survey methods comprised desk-based (archival and documentary) research, consultation with interested parties, and walkover reconnaissance field survey, undertaken in the period 2010-11. Archaeological trial trench investigations of the previous application site was also carried out (Mitchell 2011[8], Amey 2014[9]).

8.4.2 The collation of baseline information for this current application, carried out in 2019, was undertaken in accordance with the Chartered Institute for Archaeologists' (CIfA) 'Standard and Guidance for Historic Environment Desk-Based Assessment' (2017[10]). Up-to-date data was obtained from HES, PKHT and ACAS to inform the assessment, as set out below. The assessment also draws on the results of the preceding work (CFA 2011[11]; Mitchell 2011[12]).

Desk Study

8.4.3 The following information sources were consulted for this appraisal:

- PKHT (HER); provided up-to-date data for all assets within 3 km of the Proposed Development site;
- Angus Council Sites and Monuments Record (SMR) (provided by ACAS): provided up-to-date data for all assets within 3 km of the Proposed Development site;

8 ibid
9 ibid
10 ibid
11 ibid
12 ibid

- National Record of Historic Environment (NRHE) Scotland database (Canmore) (HES 2019[13]): for any information additional to that contained in the HER / SMR;
- HES Spatial Data Warehouse (HES 2019[14]): provided up-to-date data on the locations and extents of Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory status Garden and Designed Landscapes and Inventory status Historic Battlefields;
- Previous archaeological trial trench investigations for the Haughend Farm substation (Mitchell 2011[15], Amey 2014[16]);
- Previous Environmental Appraisal for the Haughend Farm substation and 400 kV overhead line upgrade works (CFA 2011[17]); and
- Historic Land-Use Assessment Data for Scotland (HLAmap) (HES 2019c[18]): for information on the historic land use character of the Proposed Development site and the surrounding area.

8.4.4 As the information contained in them has not changed since the earlier work, undertaken in 2010-11, the following sources of information have not been reassessed:

- Map Library of the National Library of Scotland: for Ordnance Survey maps and other historical map resources; and

Scottish Palaeoecological Archive Database (SPAD) (Coles et al. 1998[19]): records the distribution of known sites across Scotland, was consulted for information on sites with palaeoenvironmental and palaeoecological potential.***Field survey***

8.4.5 A walk-over field survey was carried out in 2011 within the 'Inner Study Area' (as defined in Section 8.3.1 above) in order to:

- Locate all visible cultural heritage sites, monuments and landscape features, both identified during the desk-based assessment and previously unrecognised, and record their character, extent and current condition;
- Identify areas with the potential to contain unrecorded, buried archaeological remains, taking into account factors such as topography, geomorphology and ground conditions; and
- Inform the appraisal of the likely effects of the Proposed Development on those features.

8.4.6 The field survey achieved these aims but did not lead to the discovery of any features of cultural heritage interest additional to those collated during the preceding desk study.

8.4.7 Site visits were made to receptors within the 'Outer Study Area' (as defined in Section 8.3.1 above), in as far as access was possible, to appraise whether the proposals would affect their settings (see Sections 8.4).

8.4.8 Identified sites were recorded on pro-forma monument recording forms and by digital photography and were located where necessary using GPS equipment.

8.4.9 There have been no changes to the land use since the field survey carried out in 2011 and it continues to be use as arable farmland. There have been no changes to the cultural heritage assets within in the Inner Study Area since the original study in 2011. Therefore, no further survey work has been necessary to inform the current appraisal.

[13] Historic Environment Scotland database (HES 2019) Canmore, available at: http://pastmap.org.uk/ [accessed July 2019]

[14] Historic Environment Scotland (HES 2019) (online GIS downloader), available at: http://portal.historic-scotland.gov.uk/spatialdownloads: [accessed July 2019]

[15] ibid

[16] ibid

[17] ibid

[18] Historic Land-Use Assessment Data for Scotland (HES 2019c) (HLAmap), available at: http://hlamap.org.uk/ [accessed July 2019]

[19] Coles, G.M., Gittings, B.M., Milburn, P. and Newton, A.J. (1998) Scottish Palaeoecological Archive Database (SPAD), available from http://www.geo.ed.ac.uk/spad/ [accessed June 2010]

Archaeological Evaluation

8.4.10 A 6% by area trial trench investigation of the core area of the previous application site (5.5 ha), as understood at that time, was undertaken in March 2011 (Mitchell 2011[20]), with the trench locations informed using a rectified plot of cropmarks of the putative unenclosed settlement (MPK12753; Asset 7) transcribed from RCAHMS[21] oblique aerial photographs. The objectives of the evaluation were to establish the presence, absence, location, extent, date and character, condition, significance and quality, of any archaeological remains surviving within the proposed substation site (as it was constituted at that time); and to establish the vulnerability of any such remains to the Proposed Development.

8.4.11 Trial trenches were distributed across the proposed substation site both to target cropmark features and to provide good overall coverage. Topsoil and modern deposits were removed by back-acting mechanical excavator using a smooth-bladed ditching bucket operating under constant archaeological supervision, to reveal either the natural subsoil surface or the surface of archaeological deposits. A sample of identified archaeological features was excavated by hand in order to establish their likely date, nature, extent and condition. Details of the archaeological site methodology can be found in the report on that work (Mitchell 2011).

8.4.12 None of the cropmark features examined by the trial trench investigation were found to be of archaeological origin or interest. However, in the course of trial trenching a range of archaeological features were detected (Asset 8), which were not visible on aerial photographs. These consisted of two clusters of pits and a series of shallow and narrow ditches of potential prehistoric date (details provided in **Appendix 8.1** and discussed below).

8.4.13 Further trial trench investigation of the remainder of the previous application site, as understood at that time, was undertaken in 2014 (Amey 2014[22]). A total of 46 trenches (6% sample) were opened across that part of the previous application site that was not investigated in 2011. Details of the archaeological site methodology can be found in the report on that work (Amey 2014).

8.4.14 The buried remains of two pits, two linear features and remains of a possible old ground survey (Asset 8) were uncovered, scattered across the investigated area. Only one sherd of coarse pottery was recovered from one of the pits, and the date and function of the features are of uncertain date and function.

Assessment of Effects

Sensitivity / Importance

8.4.15 Cultural heritage assets are given weight through the designation process. Designation ensures that sites and places are recognised by law through the planning system and other regulatory processes. The level of protection and how a site or place is managed varies depending on the type of designation and its law and policies (HES, 2019[23]).

8.4.16 Table 8.2 summarises the relative sensitivity of key cultural heritage assets (and their settings) relevant to the Proposed Development (excluding, in this instance, World Heritage Sites and Marine Resources).

[20] ibid
[21] Royal Commission on the Ancient and Historical Monuments of Scotland; now part of HES
[22] ibid
[23] Historic Environment Scotland (2019) Historic Environment Policy for Statement (HEPS), Edinburgh

Table 8.2: Sensitivity of Heritage Assets

Sensitivity of Asset	Definition / Criteria
High	Assets valued at an international or national level, including: Scheduled Monuments Category A Listed Buildings Inventory Gardens and Designed Landscapes Inventory Historic Battlefields Non-designated assets that meet the relevant criteria for designation
Medium	Assets valued at a regional level, including: Archaeological sites and areas that have regional value (contributing to the aims of regional research frameworks) Category B Listed Buildings Conservation Areas
Low	Assets valued as a local level, including: Archaeological sites that have local heritage value Category C Listed Buildings Unlisted historic buildings and townscapes with local (vernacular) characteristics
Negligible	Assets or little or no intrinsic heritage value, including: Artefact find-spots (where the artefacts are no longer in situ where their provence is uncertain) Poorly preserved examples of particular types of features (e.g. quarries and gravel pits, dilapiitated sheepfolds, etc)

Criteria for Assessing the Significance of Effects

8.4.17 The magnitude of impact (adverse or beneficial) is assessed in the categories, high, medium, low and negligible and described in **Table 8.3**.

Table 8.3: Magnitude of Impact

Contribution	Criteria	
	Adverse	Beneficial
High	Changes to the fabric or setting of a heritage asset resulting in the complete or near complete loss of the asset's cultural significance. Changes that substantially detract from how a heirtage asset is understood, appreciated and experienced.	Preservation of a heritage asset in situ where it would otherwise be completely or almost completely lost. Changes that appreciably enhance the cultural significance of a heritage asset and how it is understood, appreciated and experienced.
Medium	Changes to those elements of the fabric or setting of a heritage asset that contribute to its cultural significance such that this quality is appreciably altered. Changes that appreciably detract from how a heritage asset is understood, appreciated and experienced.	Changes to important elements of a heritage asset's fabric or setting, resulting in its cultural significance being preserved (where this would otherwise be lost) or restored. Changes that improve the way in which the heritage asset is understood, appreciated and experienced.
Low	Changes to those elements of the fabric or setting of a heritage asset that contribute	Changes that result in elements of a heritage asset's fabric or setting detracting from its cultural

	to its cultural significance such that this quality is slightly altered. Changes that slightly detract from how a heritage asset is understood, appreciated and experienced.	significance being removed. Changes that result in a slight improvement in the way a heritage asset is understood, appreciated and experienced.
Negligible	Changes to fabric or setting of a heritage asset that leave its cultural significance unchanged and do not affect how it is understood, appreciated and experienced.	

Assessment of Setting Effects

8.4.18 HES guidance document, 'Managing Change in the Historic Environment: Setting' (HES 2016[24]), notes that:

"Setting can be important to the way in which historic structures or places are understood, appreciated and experienced. It can often be integral to a historic asset's cultural significance."

"Setting often extends beyond the property boundary or 'curtilage' of an individual historic asset into a broader landscape context".

8.4.19 The guidance also advises that:

"If proposed development is likely to affect the setting of a key historic asset, an objective written assessment should be prepared by the applicant to inform the decision-making process. The conclusions should take into account the significance of the asset and its setting and attempt to quantify the extent of any impact. The methodology and level of information should be tailored to the circumstances of each case".

8.4.20 The guidance recommends that there are three stages in assessing the impact of a development on the setting of a historic asset or place:

- Stage 1: identify the historic assets that might be affected by the Proposed Development;
- Stage 2: define and analyse the setting by establishing how the surroundings contribute to the ways in which the historic asset or place is understood, appreciated and experienced; and
- Stage 3: evaluate the potential impact of the proposed changes on the setting, and the extent to which any negative impacts can be mitigated.

8.4.21 Following this approach, the 'bare-earth' ZTV for the Proposed Development was used to identify those heritage assets from which there would be theoretical visibility of the Proposed Development.

Limitations to the Assessment

8.4.22 This assessment has been completed using data derived from HES Spatial Warehouse and from the PKHT HER and ACAS SMR obtained in 2019. It is assumed that, at the time of the acquisition of the data from HES and the HER / SMR, the information provided was accurate and up-to-date.

8.4.23 The presence of growing crops, and in some places livestock, restricted the areas that could be covered by the field survey within the 'Inner Study Area' in 2011. However, as the land that was not visited consisted of improved arable fields, it was considered probable that there would be no visible cultural heritage features within those areas that were not inspected, and that remains the case for the current appraisal.

8.4.24 In 2011 and 2014, the then proposed substation site was subject to archaeological evaluation by trial trenching (Mitchell 2011[25]; CFA 2011[26], Amey 2014[27]) that amounted to 6% of the then proposed substation site. Archaeological remains

[24] Historic Environment Scotland (2016) 'Managing Change in the Historic Environment – Setting', Edinburgh
[25] ibid
[26] ibid

were detected scattered across the proposed substation site. The Proposed Development boundary has been expanded since the trial trench investigations took place (**Figure 8.1**), therefore parts of the Proposed Development have not been subject to archaeological field evaluation; it is considered however that the results obtained from the area investigated in 2011 and 2014 are likely to be representative of those present across the whole of the Proposed Development site.

8.5 Baseline Conditions

Inner Study Area

8.5.1 Twenty-six features of cultural heritage interest have been identified within 1 km from the Proposed Development (**Figure 8.1**).

8.5.2 Numbers in brackets in the following text refer to heritage asset numbers depicted on **Figure 8.1** and listed in **Appendix 8.1**.

8.5.3 Four of the assets are Scheduled Monuments: Haughend, enclosure (9; SM7263); Hallyards Cottage, Moated Settlement (18; SM7262); Cardean Roman Fort (23; SM2306), and Cardean Roman Camp and prehistoric barrow (27; SM4337).

8.5.4 Three of the assets are Listed Buildings: Category B Listed Balendoch House (1; LB52) and Hallyards House (16; LB4389), and Category C Listed Balendoch House dovecot (2; LB4391).

Prehistoric

8.5.5 Eight of the identified heritage assets are of prehistoric date. These include the remains of two souterrains (17 & 26), of likely Iron Age date; a Bronze Age barrow (forming part of 27; SM4337); two enclosures (9; SM7263 & 22), possibly of Iron Age date; and a series of ditches and pits (4, 10 & 20). All of the prehistoric remains survive as cropmarks visible on aerial photographs and none of the sites have visible above ground remains.

8.5.6 The prehistoric settlement and funerary remains are all part of a wider prehistoric settlement landscape along the River Isla and show that this area was a focus for prehistoric activity. Two sites, the barrow site (27; SM4337) and an enclosure (9; SM7263), are Scheduled Monuments and are accordingly of high sensitivity. The other prehistoric features (4, 10, 17, 20, 22 & 26) are potentially of medium sensitivity.

8.5.7 In 1998, RCAHMS collected oblique aerial photographic images (Refs D32750-1, taken 16/07/1998), which show cropmarks that were interpreted as indicating that the archaeological remains of an unenclosed settlement (7) were present, buried beneath the ploughsoil within the Proposed Development site. Trial trenches excavated across several of the cropmarks (Mitchell 2011[28]) demonstrated that these were in fact natural in origin and not of archaeological interest. However, in the course of the trial trenching archaeological features were detected (8), none of which are visible on aerial photographs. These consisted of:

- A group of shallow pits (8a) of uncertain purpose and date detected in the north-west corner of the evaluated area;
- An area containing several pits located on a slightly elevated and level part of the Proposed Development site (8b). This may have been an area of prehistoric activity; the dating evidence is limited to a single basal sherd of later prehistoric pottery recovered from a pit with some structural characteristics that suggest that it might be a grave (although no human remains were encountered during excavation); and
- Sections of a series of shallow and narrow ditches discovered in the centre and west of the evaluated area. Their purpose and date are unclear, although it is possible that they are the remains of relict field boundaries.

[27] ibid
[28] ibid

8.5.8 Additional buried remains were uncovered during further trial trench excavation carried out in 2014 (Amey 2014[29]) across the remainder of the previous application site that was not covered by the 2011 investigations. Two pits, two linear features and a possible old ground surface, all of unknown date, were uncovered towards the western and eastern edges of the proposed development site.

8.5.9 The results of the trial trenching do not suggest that a dense concentration of archaeological remains survive in the area and, on the basis of the evaluated sample, the archaeological remains that have been identified are assessed as being assets valued at the local level and of low sensitivity (CFA 2011[30]).

Roman

8.5.10 Three of the identified heritage assets are of Roman date. These include the remains of Cardean Roman Fort (23; SM2306) and Cardean Roman Camp (27: SM4337). There is also one recorded artefact find-spot: an iron sword (24), discovered at West Cardean in 1863.

8.5.11 The Roman fort (23; SM2306) and camp (27; SM4337) are both Scheduled Monuments of high sensitivity; they formed part of the Gask Ridge frontier, a chain of Roman watchtowers, forts and fortlets, built to monitor movement between the Highland massif and Fife in the mid-AD 80s. There are no remains associated with the artefact find-spot (24) and it is assessed as being of negligible sensitivity.

Medieval or Later Settlement

8.5.12 The remains of a moated settlement (18; SM7262) of medieval and later date are visible as a series of cropmarks on oblique aerial photographs just south-east of Hallyards House (16); no visible above ground remains of the site survive. Moated settlements were high-status dwellings of the medieval period and documentary sources (HES Designations Portal) record the continued occupation of this site from the early-16th to the mid-18th century; although its origins are likely to be earlier. The site is a Scheduled Monument and it is accordingly of high sensitivity.

8.5.13 Additional residues of medieval or later settlement and land use, which relate to a landscape that was removed during widespread land improvements of the 18th and 19th centuries, have been recorded at various locations within the Inner Study Area. These include: the relict earthwork remains of rig and furrow cultivation, preserved on Balendoch Law (5) and the unlocated site of a former village known as 'Bandoch' (3). These assets have some heritage value at a local level, as relicts of the past farming landscape and are assessed as being of low sensitivity.

8.5.14 Occupied buildings of heritage interest within the Inner Study Area include: Balendoch House (1; LB52) and its associated dovecot (2; LB4391); Hallyards House (16; LB4389) and Haughend Farm (11). Both Balendoch House and Hallyards House are of early 18th century date and are shown on Gen. W. Roy's Military Survey of Scotland map (1747-55). Both Balendoch House (1) and Hallyards House (16) are Category B Listed Buildings and of medium sensitivity, while the dovecot (2), associated with Balendoch House, is Category C Listed and of low sensitivity. Haughend Farm (11) was originally a U-plan steading, although it is now much altered; it is assessed as being a heritage asset valued at the local level and of low sensitivity.

8.5.15 A small rectangular building (19) is depicted on the Ordnance Survey 1st and 2nd Edition maps (1867[31] & 1902[32]) just east of Hallyard Cottages and close to the public road. The building is not visible on modern aerial photographs (GoogleEarth™) and the former site is occupied by a modern garage. The site of the former building is of little or no heritage value and is assessed as being of negligible sensitivity.

29 ibid
30 ibid
31 Ordnance Survey (1867) 'Perthshire, sheet LIII, 6 inches to 1 mile'
32 Ordnance Survey (1902) 'Perth and Clackmannan, sheet LIII.SE, 6 inches to 1 mile.

18-19th Century Features

8.5.16 18th and 19th century features within the Inner Study Area include: the site of a former gravel pit of likely 19th century origin (12); a dismantled railway line (13); a railway bridge (14); a length of levée along the north bank of the River Isla (21); and the remains of the 18th century turnpike road (25) to Forfar, visible as cropmarks on aerial photographs, to the south of the River Isla. These all form elements of the historic landscape.

8.5.17 The former railway line (13) and railway bridge (14), the levee (21) and turnpike road (25) are assets having some residual value at the local level and are assessed as being of low sensitivity.

8.5.18 The former gravel pit (12) has no intrinsic heritage value and is assessed as being of negligible sensitivity.

Miscellaneous

8.5.19 The cropmarks of various rectilinear and curvilinear features, including former field boundaries (15), are visible on aerial photographs at Hallyards. The date and function of these features is presently unknown, and they are accordingly assessed as being of unknown heritage value and of unknown sensitivity.

Outer Study Area

8.5.20 Based on analysis of the 'bare-earth' ZTV there are nine Scheduled Monuments and one Inventory status Garden and Designed Landscape, all being assets valued at the national level and of high sensitivity, within the Outer Study Area from which there is predicted visibility of the Proposed Development (**Appendix 8.2**; **Figure 8.2**).

8.5.21 There are also nine Category B Listed Buildings, of medium sensitivity, and nine Category C Listed Buildings, of low sensitivity, within the Outer Study Area from which there is predicted theoretical visibility of the Proposed Development (**Appendix 8.2**; **Figure 8.2**).

Archaeological Potential of the Proposed Development Site

8.5.22 The archaeological potential of the Proposed Development site has been established by the archaeological site evaluations carried out in 2011 and 2014. Potential prehistoric archaeological remains were detected scattered across the Proposed Development site, including concentrated pockets of features on locally elevated ground. The Proposed Development footprint has been expanded since the trial trench investigations (**Figure 8.1**), and parts of the Proposed Development have not been subject to archaeological field evaluation; although the results of the evaluation work can be considered to be representative of the likely distribution and concentration of archaeological remains in the immediate locale. The identified features from 2011 and 2014 also lie close to the Scheduled Monument: Haughend, enclosure (9; SM7263), a probable prehistoric enclosed settlement. It is likely therefore that buried archaeological remains extend beyond the Proposed Development site and this area is assessed as being of high archaeological potential.

Future Baseline

8.5.23 If the Proposed Development was not to proceed, it is probable that there would be little or no change to the baseline condition of the various heritage assets and features that presently survive within the Inner Study Area. The current agricultural land-use would be likely to continue, and that activity would continue to exert an attritional influence on any buried archaeological remains or deposits that may be present, while natural decay (weathering and erosion) would occur to sites and features surviving as upstanding remains.

8.5.24 The surviving Scheduled Monuments within the Outer Study Area would continue to receive statutory protection as a designated Scheduled Monument and the Listed Buildings would likewise benefit from ongoing statutory protection.

8.6 Potential Effects

Direct Effects

8.6.1 Direct (physical) impacts on cultural heritage assets are most likely to arise from ground-disturbing activities that occur during development construction works, which may damage, and possibly obliterate, cultural heritage remains. Direct impacts can also occur as result of above-ground disturbance: for example, as a result of vehicle movement over cultural heritage features or from the storage of construction materials on top of them. Direct effects on cultural heritage assets are normally adverse, permanent and irreversible.

8.6.2 The Proposed Development construction works have the potential to lead to three heritage assets (8, 9; SM7263 and 10) experiencing adverse, permanent and irreversible direct effects. One further asset within the Proposed Development site (7) has been demonstrated by archaeological investigations to be not of archaeological origin and it is not considered further.

8.6.3 Ground disturbing works associated with construction of the proposed substation (including landscape mitigation areas) have the potential to disturb or remove a range of archaeological features including those (8) identified during the 2011 and 2014 archaeological investigations, assessed to be collectively of low sensitivity, and on other hitherto undetected features or deposits. Construction work for the Proposed Development would be likely to result in a **high** magnitude direct adverse impact on these known archaeological features.

8.6.4 Ground disturbing works associated with the construction of the new OHL towers and temporary masts, close to Scheduled Monument, Haughend Enclosure (9; SM7263) and adjacent to an area of unscheduled cropmarks (10), has the potential to disturb high sensitivity archaeological remains and lead to a **high** magnitude direct adverse impact on the known archaeological remains. Archaeological mitigation measures are presented below to ensure that the Scheduled Monument is avoided.

8.6.5 There is also the possibility that any ground disturbing works in areas required for construction of the new OHL connections could disturb or destroy any buried, hitherto unrecorded archaeological remains present in affected areas. It has been established by trial trench investigations (Mitchell 2011[33], Amey 2014[34]) that scattered prehistoric features may extend across the areas intersected by the proposed OHL connections. However, the likelihood of any such remains being present within the limited areas of ground to be disturbed is considered to be low.

Setting Effects

8.6.6 The assessment of effects on the setting of heritage assets has been carried out with reference to the layout of the Proposed Development and the locations of designated heritage assets shown on **Figure 8.2**. The criteria detailed in **Tables 8.2** and **8.3** have been used to assess the magnitude of the predicted impacts, which are set out in summary form in **Appendix 8.2**.

8.6.7 The assessment of operational effects provided in **Appendix 8.2** has been based upon analysis of the 'bare-earth' ZTV, taking into account the present baseline setting of each asset, the distance of the assessed asset from the Proposed Development, and the degree of predicted visibility of the Proposed Development.

8.6.8 Heritage assets identified through the assessment and through consultation with HES (see **Table 8.1** for details) as being potentially sensitive to development in the surrounding landscape (Cardean Roman Fort (23; SM2306), Cardean Roman

[33] ibid
[34] ibid

Camp and Prehistoric Barrow (27; SM4337[35]), Hallyards Cottages, Moated Site (18; SM7262), Haughend Enclosure (9; SM7263) and Drumkilbo GDL (GDL00142)) are discussed in detail below.

General Observations

8.6.9 The bare-earth ZTV (**Figure 8.2**) for the Proposed Development indicates that there is limited visibility of the proposed substation from heritage assets in the Outer Study Area, with intervening topography and existing woodland / shelterbelts providing screening of the proposed substation. Further screening of the proposed substation would be provided by the proposed landscaping and planting mitigation, which would reduce, or entirely screen, visibility of the proposed substation from heritage assets located to the north, east and west of the Proposed Development.

8.6.10 From heritage assets to the south of the Proposed Development (i.e. Cardean Roman Fort (23; SM2306), Cardean Roman Camp and Prehistoric Barrow (27; SM4337) & Drumkilbo GDL (GDL00142)), both the proposed substation and the proposed new OHL connections would be seen together, with the substation visible beyond the proposed towers. The proposed substation and proposed new OHL connections would be added to a landscape that already contains towers which run east from Hallyards and north from Wester Cardean to the T-junction at the proposed substation location. The proposed new OHL connections would lead to a revised configuration of towers being visible, including the presence of additional masts during the temporary diversion phase. The proposed new towers would be the more visible elements and the proposed substation would contribute little to the overall effect on these heritage assets.

Cardean Roman Fort (23; SM2306)

8.6.11 This Scheduled Monument comprises the remains of a 1st century Roman fort with two probable annexes. No above ground remains of the fort survive and the site is only detectable as cropmarks on oblique aerial photographs. The site survives in arable fields on a promontory between the confluence of the River Isla and the Dean Water. The fort formed part of the Gask Ridge frontier, a chain of Roman watchtowers, forts and fortlets, built to monitor movement between the Highland massif and Fife, and the monument has an important relationship with a later (3rd century) Roman Temporary Camp (27; SM4337) that lies immediately east of the fort (**Figure 8.2**).

8.6.12 The monument's setting within a pattern of modern arable fields adds little to the asset's value as an archaeological resource; although it is still possible to gain an appreciation of the topographic location of the fort and its association with the temporary camp (27; SM4337) to the east that contribute to its cultural significance. It is also possible to gain an understanding of and to appreciate the wider landscape views that would have been afforded from the fort, including along the River Isla valley and the interrelationship with Cardean Roman Temporary Camp (27; SM4337) to the east; key aspects of its setting.

8.6.13 The Proposed Development would be visible to the north of the monument, around 700 m away across the River Isla. The bare-earth ZTV (**Figure 8.2**) indicates that visibility of the proposed substation would be limited to the eastern side of the monument, while further screening of the substation would be provided by woodland that edges surrounding roads and is present along the banks of the River Isla.

8.6.14 An existing electricity OHL runs past to the east of the Scheduled Monument to the existing T-junction adjacent to the proposed substation site. The proposed new OHL connections would lead to a revised configuration of electricity towers being present to the north of the monument, including the presence of two additional towers and the replacement and relocation of another tower. However, taking account of the screening provided by woodland that surrounds the Scheduled Monument, visibility of the proposed new OHL connections would likely be restricted, with only glimpses of towers being visible beyond the trees.

[35] Since the original Environmental Assessment Scheduled Monuments Cardean Roman Camp (SM4337) and Cardean Prehistoric Barrow (SM6330) were rescheduled in 2015 and the two sites are now designated together under one record - SM4337.

8.6.15 The Proposed Development would not be seen in the views from the fort to the Roman Temporary Camp (27; SM4337) and the interrelationship between these two associated monuments would not be adversely affected by the introduction of the Proposed Development into the wider landscape.

8.6.16 The presence of the Proposed Development in the wider landscape around the Scheduled Monument would not appreciably affect the way in which the monument is understood, appreciated or experienced and its cultural significance would not be appreciably diminished by the introduction of the Proposed Development into its setting. It is therefore assessed that the impact of the Proposed Development on the setting of the fort as a cropmark site would be of **negligible** magnitude.

Cardean Roman Camp and Prehistoric Barrow (27; SM4337)

8.6.17 This Scheduled Monument comprises the remains of a Roman temporary camp, dating possibly to the Severan campaign (AD 208-211), together with the ring-ditch of a probable prehistoric barrow (funerary site). The archaeological features survive mainly as buried remains, visible as cropmarks on oblique aerial photographs in arable fields just north of Dean Water and south of the River Isla on relatively level terrain; although the south-east side of the camp survives as an upstanding earthwork in Crow Wood and the barrow is visible on the ground as a low mound. The camp formed part of the Gask Ridge frontier built to monitor movement between the Highland massif and Fife, and the monument has an important relationship with the earlier (1st century) Cardean Roman Fort (23; SM2306) which lies immediately to the west.

8.6.18 The monument's setting within a pattern of modern arable fields adds little to the asset's value as an archaeological resource; although it is still possible to gain an appreciation of the topographic location of the camp and its association with the Cardean Roman Fort (23; SM2306) to the west that do contribute to its cultural significance. It is also possible to gain an understanding of and to appreciate the wider landscape views that would have been afforded from the fort, including along the River Isla valley and the interrelationship with Cardean Roman Fort (23; SM2306) to the west; key aspects of its setting.

8.6.19 The Proposed Development would lie to the north of the asset, around 800 m away across the River Isla. The bare-earth ZTV (**Figure 8.2**) indicates that visibility of the proposed substation would be limited to the northernmost edge of the Camp, while further screening of the proposed substation would be provided by woodland that edges surrounding roads and is present along the banks of the River Isla.

8.6.20 An existing OHL runs past the western edge of the Scheduled Monument to the existing T-junction adjacent to the proposed substation site. The proposed new OHL connections would lead to a revised configuration of electricity towers being present to the north of the monument, including the introduction of two additional towers and the replacement and relocation of another tower However, taking account of the screening provided by woodland that surrounds the Scheduled Monument, visibility of the proposed new OHL connections would likely be restricted, with only glimpses of towers being visible beyond the trees.

8.6.21 The Proposed Development would not be seen in views from the Camp towards Cardean Roman Fort (23; SM2306) and the interrelationship between these two associated monuments would not be adversely affected.

8.6.22 The presence of the Proposed Development in the wider landscape around the Scheduled Monument would not appreciably affect the way in which the monument is understood, appreciated or experienced and its cultural significance would not be appreciably diminished by the introduction of the Proposed Development into its setting. It is therefore assessed that the impact of the Proposed Development on the setting of the Camp as a cropmark site would be of **negligible** magnitude.

Hallyards Cottages, Moated Site (18; SM7262)

8.6.23 This Scheduled Monument comprises the remains of moated settlement of medieval and later date, visible as a series of cropmarks on oblique aerial photographs; no above ground remains survive. The monument lies in arable farmland immediately adjacent to the Balendoch public road. It is crossed by the existing Kintore to Kincardine 275 kV OHL.

8.6.24 The monument's setting within a pattern of modern arable fields adds little to the asset's value as an archaeological resource; although it is still possible to gain an appreciation of the topographic location of the moated site. It is also possible to gain an understanding of and to appreciate the wider landscape views that would have been afforded from it, including the open views along the River Isla valley, and which contribute to its cultural significance. The key aspects of the setting of the moated site are its rural location and its relationship to the historical settlement at Hallyards; including in particular its relationship with Hallyards House (16; LB4389), which may have succeeded it as the main residence.

8.6.25 The Proposed Development would be around 700 m to the north-east of the monument. The bare-earth ZTV shows that, from the monument there would be very limited visibility of the proposed substation. The disused railway embankment (13) obstructs views in that direction and an existing shelterbelt, present along the western edge of the Proposed Development site, provides further screening. It is proposed that, as part of the Proposed Development, this shelterbelt would be retained and enhanced (thickened up with native species planting) and once mature this would serve to further reduce visibility of the Proposed Development from the monument.

8.6.26 There would be views from the monument to the proposed new OHL towers, although the disused railway embankment would to some degree restrict views of the towers. The monument is currently crossed by the existing Kintore to Kincardine 275 kV OHL and the proposed new towers would be added to a landscape already containing similar structures in the same general location, as well as others adjacent to the monument itself. On that basis, it is assessed that the overall impact of the Proposed Development on the setting of the moated cropmark site would be of **negligible** magnitude.

Haughend Enclosure (9; SM7263)

8.6.27 This Scheduled Monument comprises the remains of a prehistoric enclosure (probable enclosed settlement site), which survives as cropmarks visible on oblique aerial photographs. The cropmarks show a rectilinear ditched enclosure with several cropmarks within the enclosure that appear to be internal structures or features; no above ground remains survive. The site survives in arable fields to the north of the River Isla on relatively level terrain and is one of several prehistoric settlement sites within the River Isla valley that attest to significant prehistoric settlement and activity along the valley. The monument is crossed by the existing Kintore to Kincardine 275 kV OHL and a tower stands directly to the south-west side of the scheduled area.

8.6.28 The monument's setting within a pattern of modern arable fields adds little to the asset's value as an archaeological resource; although it is still possible to gain an appreciation of the topographic location of the settlement site. It is also possible to gain an understanding of and to appreciate the wider landscape views that would have been afforded from it, including views across and along the River Isla valley. The key aspects of the setting of the site are its rural location and the River Isla valley in which it is located.

8.6.29 The construction of the Proposed Development, including the substation, and new OHL towers to the east, would introduce additional modern elements in close proximity to the Scheduled Area. The Proposed Development would result in the interruption of the presently all-round open aspect of the monument, change the immediate topographical context of the cropmark site and add two additional towers in close proximity to the monument. Taking this into consideration, it is assessed that the overall impact of the Proposed Development would result in a **high** magnitude impact, as a result of the change to the immediate surroundings of the Scheduled Monument.

Drumkilbo Inventory Garden and Designed Landscape (GDL00142)

8.6.30 This small 19th century designed landscape (GDL) lies around 1.5 km to the north-east of Meigle village and forms the setting for Drumkilbo House (LB18335). The designed landscape comprises woodland policies that surround the house and provide a sheltered and secluded setting for the house; a tree-lined drive leads to the house from the road that runs past immediately to the north of the GDL. The woodland policies lie within the broad vale of Strathmore and close to the River Isla. The Inventory (HES Designations Portal) notes that panoramic views north from the landscape towards the Grampian Mountains form an important element of the setting of the GDL; these views can be especially appreciated when leaving the GDL via the main access, at the gates at the north end of the drive.

8.6.31 The 'bare-earth' ZTV (**Figure 8.2**) indicates that there would be no visibility of the proposed substation from within the designated area and screening provided by surrounding woodland would largely restrict views of the proposed new OHL connections from the GDL itself. However, both the proposed substation and the new OHL connections would be visible from just outside the northern boundaries of the GDL and visible in views to the Grampian Mountains, particularly from the northern end of the tree-lined main drive. The proposed changes would be located within an area of the landscape where several towers are already visible; the Proposed Development being seen framed by two blocks of woodland on the opposite side of the River Isla and together with a number of existing steel lattice towers that support the OHL that runs past the western edge of the GDL on a roughly north-south alignment. On that basis, whilst the Proposed Development would be visible from Drumkilbo, it is considered that the overall impact of the Proposed Development on the setting of Drumkilbo House GDL, and associated listed buildings, would be of **low** magnitude.

8.7 Mitigation

8.7.1 Planning Advice Note 1/2013: Environmental Impact Assessment (PAN1/2013) describes mitigation as a hierarchy of measures: prevention, reduction, compensatory (offset) measures. Prevention and reduction measures can be achieved through design, whilst compensatory measures offset impacts that have not been prevented or reduced.

8.7.2 The emphasis in Planning Advice Note (PAN) 2/2011: Planning and Archaeology (PAN2) is for the preservation of important remains in situ where practicable and by record where preservation is not possible. The mitigation measures presented below therefore take into account this planning guidance and provide various options for protection or recording and ensuring that, where practical, surviving assets are preserved intact to retain the present historic elements of the landscape.

8.7.3 All mitigation works presented in the following paragraphs would take place prior to, or, where appropriate, during, the construction of the Proposed Development. All works would be conducted by a professional archaeological organisation, and the scope of works would be detailed in one or more Written Scheme(s) of Investigation (WSI) developed in consultation with (and subject to the agreement of) Perth and Kinross Heritage Trust (PKHT) on behalf of Perth and Kinross Council (PKC).

Construction Phase

8.7.4 Any appropriate strategy for construction phase archaeological mitigation would be set out in a Written Scheme of Investigation (WSI) and agreed with PKC and, where relevant to protecting Haughend Enclosure (9; SM7263), HES in advance of the commencement of the development works. The strategy would include:

- Appropriate investigation and recording of archaeological remains present within the Proposed Development site, focused upon the features identified during the archaeological site evaluations, where they cannot be preserved in situ, following a strategy agreed with PKHT through consultation. This would take the form of targeted area archaeological excavations conducted before construction works commence, to a scope and strategy to be agreed with PKHT / PKC and approved in the WSI.
- Fencing off the Scheduled Area of Haughend Enclosure (9; SM7263) during the period of the Proposed Development construction works, to ensure that no accidental damage occurs to the Scheduled Monument. The fence should be

located at least 10 m outside the boundary of the Scheduled Area; or such distance as required by HES. Where the existing steel lattice tower stands just west of the Scheduled Area, a fence should be placed within 3 m of the base of the tower to prevent accidental encroachment into the Scheduled Area during works in this area. This commitment would be included within the Construction Environmental Management Plan (CEMP).

- Archaeological field evaluation by trial trenching of those parts of the Proposed Development site not covered by the work already undertaken (**Figure 8.1**) where there is risk that the development works, including landscape mitigation, laydown areas and compound areas should these require topsoil removal, could damage buried archaeological remains. Further mitigation responses would be agreed with PKHT / PKC as necessary based upon the results of that evaluation. This work would be conducted before the commencement of construction works.
- Archaeological monitoring of ground-breaking works associated with the construction of the new OHL connections between the proposed substation and existing infrastructure, with provision made for excavation and recording of any archaeological remains.
- Formal arrangements would be put in place for any unforeseen archaeological discoveries made by the construction contractor to be reported to a retained professional archaeological. These arrangements would require any unexpected discoveries to be assessed by a retained, professional archaeological advisor and dealt with appropriately, and would make clear the legal responsibilities placed upon those who make unexpected discoveries of archaeological significance. These arrangements would be included in the CEMP for the construction project, and would be explained in toolbox talks presented by the retained archaeological.
- Production of a written report on the findings of the archaeological mitigation works, with post-excavation analyses, publication and archiving of the results where appropriate.

Operational Phase

8.7.5 No mitigation is required during the operation of the Proposed Development. Proposed landscaping and planting mitigation as shown on Figure 4.6 would serve to reduce, over time, the visibility of the substation when seen from the cultural heritage receptors in the surrounding landscape.

8.8 Residual Effects

Direct Effects

8.8.1 For heritage assets within the Proposed Development site, completion of the programme of archaeological mitigation works set out above (Section 8.7) would avoid Haughend Enclosure (9; SM7263) and minimise or offset the loss of any archaeological remains (8 and 10) that may occur as a result of the construction of the Proposed Development. Taking the proposed mitigation into account, any residual effects arising from construction of the Proposed Development in relation to direct effects on the cultural heritage resource within the Inner Study Area would be of no more than **negligible** significance.

Effects on Setting

8.8.2 Analysis of the 'bare-earth' ZTV has shown that there could be theoretical visibility of the Proposed Development from 28 designated cultural heritage assets within the Outer Study Area.

8.8.3 Visibility of the Proposed Development from the majority of these assets would be limited to a greater or lesser degree by topography and by surrounding woodland and shelterbelts. Additional screening, provided by the proposed landscape planting and woodland enhancement (Figure 4.6), would also serve to further reduce and minimise over time the visual impacts on heritage assets in the Outer Study Area.

8.8.4 During its operational lifetime, the residual effects of the Proposed Development on the settings of the heritage assets in the Outer Study Area would be the same as the predicted impacts. One residual effect of **high** magnitude on the setting

of Haughend Enclosure (9; SM7263); one residual effects of **low** magnitude and twenty six residual effects of **negligible** magnitude are predicted.

8.9 Conclusion

8.9.1 A desk-based study and field survey carried out in 2011, and a review of the desk-based assessment, carried out in August 2019, have been undertaken to inform the assessment of the potential effects of the Proposed Development on cultural heritage interests.

8.9.2 It has been established, by archaeological trial trench evaluation carried out in 2011 and in 2014, that the proposed substation site, and by extrapolation the area around it, has a high archaeological potential.

8.9.3 There is potential for construction works within the Proposed Development site to result, prior to mitigation, in direct effects on buried archaeological features that survive in the area. Mitigation measures are proposed to offset and reduce the potential loss of the archaeological resource that is likely to occur as a result of the construction of the Proposed Development.

8.9.4 Twenty eight designated heritage assets in the Outer Study Area are predicted to have theoretical visibility of the Proposed Development. It is predicted that there would be a **high** magnitude impact on the setting of one Scheduled Monument: Haughend Enclosure, (9; SM7263). All other operational impacts would be no more than of **low** magnitude.