

NSN LINK

Environmental Statement

**Environmental Statement
Figures and Appendices**

nationalgrid

July 2014



NSN LINK
UK ONSHORE DEVELOPMENTS

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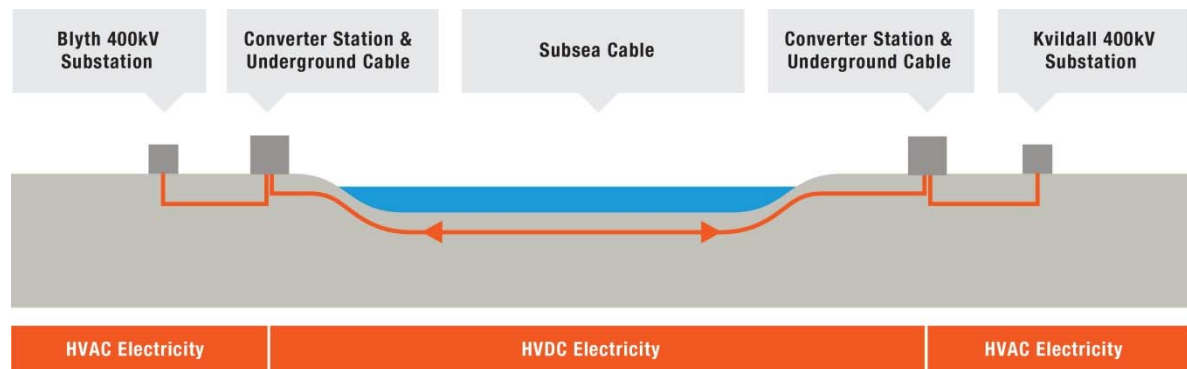
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1 INTRODUCTION

- 1.1 This Environmental Statement (ES) accompanies National Grid NSN Link Ltd.'s planning application for the UK onshore elements of the UK-Norway Electricity Interconnector ("NSN Link"), which was submitted to Northumberland County Council on 15th November 2013 (application reference number 13/03524/OUT).
- 1.2 NSN Link is a proposed high voltage direct current (HVDC) electricity interconnector with an approximate capacity of 1400 megawatts (MW). It will allow the transfer of electrical power between the UK and Norway, via subsea cables. The interconnector will be bi-directional allowing the import and export of electricity between the UK and Norway.

Inset 1.1: Schematic illustration of the NSN Link



- 1.3 The proposed connection point for NSN Link into the national electricity transmission system in the UK is at Blyth 400kV substation. The location of the existing Blyth substation is shown on Figure 1.1.
- 1.4 The project will bring both long and short term local economic benefit; wider benefit to electricity customers in the UK, Norway and continental Europe; and enhance opportunities for the integration of renewable energy to meet climate change targets.
- 1.5 The project is a joint development between National Grid NSN Link Ltd and Statnett. National Grid NSN Link Ltd. is part of the National Grid group of companies but is separate from National Grid Electricity Transmission (NGET) which operates the high voltage transmission system in Great Britain and owns the network in England and Wales. Statnett is the Norwegian transmission system owner and operator.

Project Overview

- 1.6 NSN Link comprises three elements: the UK onshore development; the subsea cables (in UK and Norwegian Waters) and the Norwegian development. These components are, for the main part, covered by different consent regimes.

UK Onshore

- 1.7 The UK onshore components of NSN Link are subject to an application for outline planning consent which includes all elements of the proposed development from the Low Water Mark. The red line planning application boundary is shown on Figure 1.2.
- 1.8 All components are described and assessed in this ES and in brief comprise:
- High voltage direct current (HVDC) subsea and onshore underground cables;
 - A converter station; and
 - High voltage alternating current (HVAC) underground cables from the converter station to a new 400kV Gas Insulated Switchgear (GIS) substation.
- 1.9 A new 400kV GIS substation is proposed adjacent to the existing Blyth 275kV electricity substation. This substation will be owned and operated by NGET and will be subject to a separate planning application. It is assessed in this ES as part of the cumulative assessment

UK Marine

- 1.10 The application for a Marine Licence and its accompanying ES was prepared by Intertek and submitted to the Marine Management Organisation. It addresses the HVDC subsea cables from the mean high water mark to the median line between the UK and Norway. The area between the high water mark and the low water mark, the intertidal area, is an area of 'overlap' between the onshore and offshore consenting regimes. A Marine Licence is needed under the Marine and Coastal Access Act 2009 for installation of the subsea cables from the median line to the high water high mark whilst planning permission is also needed under the Town and Country Planning Act 1990 (as amended) for the subsea cables from onshore to the low water mark. This area of overlap between the high water mark and the low water mark is therefore considered in both this ES and the ES for the Marine Licence application ("UK Marine ES").

Norway Onshore

- 1.11 The elements of NSN Link in Norway (subsea cable between Norwegian landfall and UK/Norway median line and converter station at Kvilldal) were subject to environmental assessment and granted consents in 2001 (then called "North Sea Interconnector"). These consents are regularly reviewed to ensure that they remain current and the information in them valid. Further details on the project in Norway are included in this ES in Chapter 4 with information on the UK consent application presented in Chapter 6.

TEN-E Regulations

- 1.12 On 14 October 2013 under the trans-European energy infrastructure (TEN-E) legislation the European Commission adopted a list of key energy infrastructure projects as 'Projects of Common Interest.' NSN Link is identified as part of this list and under the terms of the TEN-

E Regulations there is an emerging programme which requires “*the coherent application of environmental assessment procedures required under Union law for projects of common interest*”. The application of these procedures is complex not only because there are different consenting regimes for the onshore and marine elements but also because the Norwegian element of NSN Link was consented prior to the adoption of the TEN E Regulations. There is also a significant degree of physical separation between the component parts of the development in the UK and in respect of the Norwegian part of the project. These factors significantly limit the benefits of producing a single composite assessment of NSN Link. In these circumstances each of component part of NSN Link has been assessed separately and the in-combination environmental information for each of the components has been drawn together in a ‘Bridging Document’ which will be submitted with each ES.

NSN Link Bridging Document

- 1.13 The combined environmental impacts of the project are considered and assessed in a separate standalone document. This document provides an overview of the consented Norwegian onshore and intertidal area components of the project and an assessment of the combined effects of the Proposed Development for the subsea cables and the UK onshore (and associated connection) elements of NSN Link.

Need Case

- 1.14 It is recognised that in order to have a competitive, sustainable and secure supply of energy, there is a need to invest in new infrastructure and diversify the way in which the UK energy market operates.
- 1.15 The need for investment in energy infrastructure is reflected in European Policy, and was the main impetus for the formal adoption of the Trans-European Energy (TEN-E) Infrastructure Guidelines on 14th October 2013. They provide a strategic framework for the long-term energy infrastructure provision within the EU and introduce a list of 248 key energy infrastructure projects, known as Projects of Common Interest (PCI) (of which the NSN Link is one), which form an integral part of achieving both the EU’s energy policy goals and economic strategy.
- 1.16 In order to be included as a PCI, NSN Link and other projects were required to meet set criteria. This included:
- Providing significant benefits for at least two member states;
 - Contributing to market integration and further competition;
 - Enhancing security of supply; and
 - Reducing CO² emissions.
- 1.17 NSN Link will create a substantial interconnection capacity between Norway and the UK, this in turn will:
- Improve the security of supply for both the UK and Norwegian energy markets, with the potential to benefit wider European markets;
 - Expand the environmental profile of the UK’s energy consumption mix, through the introduction of alternative renewable energy sectors; and

- Removes the volatility in UK energy production, through the stabilisation abilities of hydropower. This in turn enables further UK renewables investments that are required to reach climate change targets.
- 1.18 In terms of UK renewable energy volatility, the UK is one of the world's largest producers of wind energy. However by its nature, wind generation is intermittent. It is necessary to have plant and equipment that can respond to rapid changes in generating output. Interconnectors, such as NSN Link, provide an effective way to manage these fluctuations in supply and demand, by enabling power to flow between different countries' transmission networks.
- 1.19 Total UK interconnection capacity currently amounts to 3.5GW. This represents just over 4% of the 85GW of installed generation capacity. This falls substantially short of the minimum 10% target set by the EU Council in 2002.
- 1.20 Interconnectors are important to:
- Respond to intermittency of wind generation, which varies according to the strength of the wind;
 - Respond to periods of excess power, specifically when wind generation is greater than electricity demand;
 - Help meet the challenge of retiring fossil fuel and nuclear plants in the UK; and
 - Support neighbouring wholesale and supply markets and, in the case of DC interconnectors, the provision of balancing and ancillary services.
- 1.21 Currently the UK has four interconnectors, providing a total of up to 3,500MW of power transfer capability:
- UK – France: Known as IFA (Interconnexion France Angleterre). This HVDC connection was commissioned in 1986. It is jointly owned and operated by National Grid Interconnectors Limited and Reseau de Transport d'Electricite. The UK landing point is at Baker's Gap near Folkestone and it connects to the high voltage transmission system at Sellindge.
 - UK – Netherlands: Known as BritNed. This HVDC connection was commissioned in 2011. It is owned and operated by BritNed Development Limited which is a joint venture between NLink International BV, a subsidiary of Tennet Holding B.V and National Grid International Ltd. The UK landing point is at the Isle of Grain, Kent and it connects to the high voltage transmission system at the Grain substation.
 - Scotland – Northern Ireland: Known as the Moyle interconnector. This is a connection between Auchencrosh, South Ayrshire, Scotland and Ballycronan More, Northern Ireland. It was commissioned in 2001 and is operated by SONI (System Operator Northern Ireland) on behalf of Northern Ireland Energy Holdings.
 - Republic of Ireland – UK, known as the East – West Interconnector, links the Republic of Ireland (RoI) with Deeside, North Wales. This project has been constructed by EirGrid, the Transmission System Operator for the RoI and was commissioned in 2013. The UK landing point is at Barkby Beach, Prestatyn, North Wales and it connects to the high voltage transmission system at Deeside.

- 1.22 The proposed link between the UK and Norway is one of a number of interconnector projects currently being developed these include:
- Nemo Link - Approximately 100MW interconnector linking the south east of England with Belgium. This project is jointly being developed by National Grid Nemo Link Limited (a subsidiary company of the UK's National Grid Plc) and the Belgian Elia group.
 - IFA2 – A second interconnector between England and France being investigated by National Grid International Limited.
 - Icelink – An interconnector between Iceland and the UK being investigated by National Grid International Ltd;
 - Viking - An interconnector between Denmark and the UK being investigated by National Grid International Holdings Ltd.
- 1.23 Norway is particularly suitable for a new interconnector. It has substantial renewable energy generation from its hydro power stations. It also provides further opportunities to diversify the UK's interconnector portfolio, as there are existing interconnectors between Norway and Central Europe, providing additional opportunities to trade power between the UK and wider continental European power markets.

Structure of the ES

- 1.24 This ES covers the UK onshore elements of the proposed NSN Link and presents the results of surveys and assessments of the potential environmental effects of the proposed development.
- 1.25 The ES is split into 19 Chapters. Chapters 1 to 6 provide an introduction of the proposed development; summarise the process to date; set out the environmental impact assessment method and approach; provide a detailed description of the proposed development; undertake a review of relevant planning policy and set out the alternatives which were considered in the development of the project.
- 1.26 Chapters 7-18 present the assessment of effects for each of the EIA topics and chapter 19 provides a summary of the assessment. A list of EIA topics is given in Table 1.1.

Table 1.1 Environmental Statement and Supporting Documents Structure

ES Chapter	Name
Project Description	
ES Chapter 1	Introduction
ES Chapter 2	Scoping and Consultation
ES Chapter 3	Approach to EIA
ES Chapter 4	Project Description
ES Chapter 5	Planning Policy Review
ES Chapter 6	Alternatives
Assessment Chapters	
ES Chapter 7	Ecology
ES Chapter 8	Landscape Assessment
ES Chapter 9	Visual Assessment
ES Chapter 10	Historic Environment
ES Chapter 11	Land Use

ES Chapter	Name
ES Chapter 12	Geology and Ground Conditions
ES Chapter 13	Hydrology and Flood Risk
ES Chapter 14	Traffic and Transport
ES Chapter 15	Noise and Vibration
ES Chapter 16	Air Quality
ES Chapter 17	Electric and Magnetic Fields
ES Chapter 18	Socio-Economics
ES Chapter 19	Conclusions

2 SCREENING, SCOPING AND CONSULTATION

- 2.1 Environmental Impact Assessment (EIA) is a process by which information about the potential environmental effects of a proposed development is collected, evaluated and presented to facilitate consultation and to enable decision makers to take account of these effects (both beneficial and adverse) when determining whether or not a project should proceed. EIA seeks to identify the potential sources of environmental effects during the design of a project and to avoid or minimise adverse effects through appropriate mitigation. It also seeks to compensate unavoidable effects, for example by providing replacement for environmental features which are lost or changed due to development.
- 2.2 European Community Directive 85/337/EEC sets out formal requirements for member states to implement EIA for projects. Subsequent Directives (1997/11/EC and 2003/35/EC) have been issued with subsequent amendments. The United Kingdom Government has implemented these Directives through a series of regulations. The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 apply to projects regulated through the planning system in England.
- 2.3 In response to the implementation of the TEN E Regulations an application for the UK onshore elements of the UK-Norway Electricity Interconnector (“NSN Link”) was submitted to Northumberland County Council (NCC). A summary of key document issue is provided in Table 2.1 below.

Table 2.1 Chronology of Document Issue

Document	Issued by	Issued to	Date of issue
Outline application for the onshore infrastructure required in the UK for UK-Norway Electricity Interconnector (“NSN Link,.) planning application reference 13/03524/OUT	TEP on behalf of NSN Link Ltd.	NCC	15 November 2013
Screening Opinion	NCC	TEP on behalf of NSN Link Ltd.	6 December 2013
Scoping Report	TEP on behalf of NSN Link Ltd.	NCC	20 January 2014
Scoping Response (ref JGD/13/03524/OUT)	NCC	TEP on behalf of NSN Link Ltd.	28 April 2014

Screening Opinion

- 2.4 The screening process is described in the 2011 Regulations and is the process by which it is determined whether a development proposal is likely to have significant effects on the environment. In the event that such effects are deemed likely to arise, the development proposal would constitute EIA development and an ES would be required.

- 2.5 The 2011 Regulations include two schedules of development which are derived from the Directives. Applications for projects described in Schedule 1 must be accompanied by an EIA. Applications for projects described in Schedule 2 may require EIA, depending on the scale of the development, its characteristics and the sensitivity of the environment in which the development will take place (all of which is set out in Schedule 3).
- 2.6 NCC issued a Screening Opinion on 6th December 2013, setting out the Local Authority's view that it considered the proposed NSN Link would fall under Part 10 (Infrastructure Projects) of Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2011, which requires that applicants proposing development on sites exceeding 0.5ha to be screened. This Screening Opinion is included as Appendix 2.1.
- 2.7 The Screening Opinion makes reference to Annex A of Circular 02/99, guidance which has since been archived and replaced by Environmental Impact Assessment Planning Practice Guidance¹. The Planning Practice Guidance advises that the likelihood of significant effects generally depend on the size of the application site stating that for infrastructure projects, the guidance indicates it is more likely to require an EIA if the site area of the new development is more than 20 hectares. Whilst this development is not an industrial estate development, it is acknowledged that it is similar in nature to this type of development and related to development on potential industrial land.
- 2.8 Additionally Planning Practice Guidance states that in judging whether the effects of a development are likely to be significant, local planning authorities should always have regard to the possible cumulative effects with any existing or approved development.
- 2.9 NCC makes reference to Schedule 3 Paragraph 2 of the EIA Regulations in their Screening Opinion which states that the sensitivity of geographical areas likely to be affected must be considered. The opinion states the proposed NSN Link has the potential to give rise to significant impacts on the Northumberland Shores Site of Special Scientific interest (SSSI) and the Blyth Estuary Site of Nature Conservation Importance (SNCI). It also stated that due to the scale of the development and proximity to residential properties it has potential to give rise to effects on the landscape and visual appearance of the area.
- 2.10 NCC has therefore concluded that the proposed development would be so significant so as to require an Environmental Impact Assessment.

Scoping Request

- 2.11 The Guidance on EIA Scoping (European Commission 2001) states that scoping is *'the process of determining the content and extent of the matters which should be covered in the environmental information to be submitted to a competent authority for projects which are subject to EIA'*.
- 2.12 Regulation 8(1) of the 2011 EIA Regulations (as amended) states that *'a person who proposes to make an application for an order granting planning consent may ask the Commission to state in writing its opinion as to the information to be provided in the environmental statement'*.

¹ National Planning Policy Framework, Environmental Impact Assessment Planning Practice Guidance (March 2014), Reference ID 4-034-20140306, Available online <http://planningguidance.planningportal.gov.uk>.

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- 2.13 A Scoping Report² was prepared in accordance with the guidelines set out in Regulation 8 and Schedule 4 of the 2011 Regulations and seeks the opinion of the Local Planning Authority regarding the proposed approach for the environmental assessment of the Proposed Development.
- 2.14 The Scoping Report for NSN Link was submitted to NCC on 20th January 2014 and ensured that technical information necessary for a comprehensive EIA was obtained and provided an opportunity for statutory bodies and other consultees to make formal representations on the content of the EIA.
- 2.15 In managing the consultation process, attention was paid to ensuring that stakeholders were provided with the opportunity to respond and, where appropriate, incorporated into the EIA process. This was important to ensure a comprehensive EIA which fulfils the requirements of the EIA Regulations (1999).
- 2.16 The Scoping Report submitted to NCC included the following information:
- A description of the Proposed Development;
 - The methodology to be adopted in the EIA; and
 - The potential effects of the development, including those that are potentially significant. It also identifies the environmental aspects proposed to be scoped out of the EIA.

Scoping Opinion and Response

- 2.17 On 28th April 2014 NCC provided comments on the Scoping Report and these are included as Appendix 2.2. NCC's response included a commentary on the relevance and method of assessment for each EIA topic.
- 2.18 Provided in Appendix 2.3 is a summary of the way in which NCC's comments have been addressed within the ES. If no further action has been considered necessary, the Scoping Opinion provides a justification for this.

Proposed Scope of ES

- 2.19 Following a review of the Scoping Opinion representations and consideration of the issues raised at meetings with stakeholders, the scope of the EIA was defined.
- 2.20 Schedule 4, Part 1 of the 2011 Regulations sets out the aspects of the environment likely to be significantly affected by the development which should be included in any ES. These are set out in Table 2.2 together with details as to where they are addressed in this ES.

² TEP (2014) *Scoping Report for NSN Link Ltd*, Doc ref TEP2336.071r02

Table 2.2 Aspects of the Environment

Aspect of the Environment	Environmental Statement Coverage
Population	Chapter 8 - Landscape Chapter 9 - Views Chapter 11 - Land Use Chapter 14 - Traffic and Transport Chapter 15 - Noise and Vibration Chapter 16 - Air Quality Chapter 17 - Electric and Magnetic Fields Chapter 18 - Socio-economics
Fauna	Chapter 7 - Ecology
Flora	Chapter 7 - Ecology
Soil	Chapter 12 - Geology and Land Quality
Water	Chapter 13 - Hydrology and Flood Risk
Air	Chapter 16 - Air Quality
Climatic Factors	Climatic factors are considered as part of the assessment where relevant in the ES technical chapters.
Material assets (including the architectural and archaeological heritage)	Chapter 10 – Historic Environment
Landscape	Chapter 8 – Landscape Chapter 9 - Views
Inter-relationship between the above factors	Inter-relationship of effects is considered as an inherent part of the assessment where relevant in the ES technical chapters

2.21 Table 2.3 sets out the environmental topics that have been scoped out of the EIA process.

Table 2.3 EIA Topics Scoped Out

EIA Environmental Topics Scoped Out	Reason
Ecological effects during operation	Once constructed the proposed development would not give rise to any effects on ecology.
Land use effects during the operation of underground cables	Once operating, there will be no operational effects on land use from the underground cables.
Geological and land quality effects during operation of the underground cables	The underground cables will not give rise to any operational effects on geology and land quality during operation.
Noise impacts associated with the underground cables during operation	Underground cables are practically quiet in operation and would not give rise to significant effects.
Vibration effects during operation of the underground cables	The proposed development would be unlikely to give rise to vibration effects during its operation phase.
Air quality effects during operation	The proposed development would not give rise to emissions such as nitrogen oxides or ammonia.
Effects of electric and magnetic fields (EMF's) during construction	The proposed development will not produce any significant EMF's during construction and prior to energisation

Appropriate Assessment

- 2.22 Development within or adjacent to an existing or candidate Special Protection Area (SPA) or Special Area of Conservation (SAC) is subject to the provisions of the Conservation of Habitats and Species Regulations 2010. Under Regulation 21 of these Regulations, the competent authority is required to undertake an 'appropriate assessment' of any proposed development which is likely to have a significant effect on a designated site to determine the impact of the proposal on the designated site's conservation objectives and determine whether the site's integrity would be adversely affected.
- 2.23 The proposed landfall site lies within 1km from the boundary of the Northumbria Coast SPA/Ramsar site. In determining the application for planning permission, and under the above Regulations NCC, as the competent authority, is required to consider whether an 'Appropriate Assessment' is required. To allow the Council to do this, information to inform the Appropriate Assessment which includes an Assessment of Likely Significant Effects (ALSE) has been produced and included in Chapter 7 of this ES. The document details the development activities that could potentially directly and indirectly affect the internationally designated areas of the site and the methods that will be used to avoid impacts, or mitigate and compensate for those that cannot be avoided.

Consultation and Community Engagement

- 2.24 As part of the development of the project a programme of consultation has been undertaken. In addition to the formal consultation process informal discussion with key stakeholders including NCC has been carried out to discuss technical issues including the method of assessment and extent of survey. Table 2.4 summarises the consultation undertaken to date.

Table 2.4 Consultation

Meeting/Correspondence	Date	Purpose of Consultation
Meeting with Marine Management Organisation (MMO), Natural England (NE), Environment Agency(EA) and NCC	05.03.13	Project overview
Meeting with NE	05.09.13	Site meeting to discuss landfall options
Telephone and email correspondence with NCC (Planning, Nature Conservation, Archaeology, Highways, Flood, Environmental Health); EA, NE and the Port Authority	2012-2014	Specific to topic areas to discuss the scope of the assessments.
Public Information Events	03.12.13-	Information events for elected members, land owners, local

	04.12.13	residents and other interested parties.
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Public Information Events

- 2.25 In November 2013, NSN Link Ltd. wrote to 804 residents and businesses living and operating in East Sleekburn. In the communication, NSN Link Ltd. set out their proposals inviting attendance to public information events planned for 3 and 4 December 2013.
- 2.26 Announcement and details of the public information events were provided to the local newspaper and published in The News Post Leader (28 November 2013 edition).
- 2.27 Prior to the public information events private stakeholder preview sessions were held with invitations made to locally elected representatives including:
- The constituency MP;
 - Neighbouring MPs;
 - MEPs;
 - Northumberland County Councillors;
 - Chief Executive and East Bedlington Parish Councillors; and
 - Representatives from residents' associations.
- 2.28 The NSN Link Project team were present at the events which were attended by 43 people comprising local residents, elected members and interested parties. Two feedback forms were completed by residents during the consultation events with a further 10 leaving contact details requesting to be kept informed of the project's progress.
- 2.29 Attendees were given contact details (Freephone number, email and Freepost address) for further queries. They were also invited to submit their comments via feedback forms.
- 2.30 Following the consultation event a request for further information via the project's Freephone number. The request was made by a resident who was unable to attend due to mobility restrictions. The project team provided an overview of the proposals over the phone and provided a printed copy of the information boards by post.
- 2.31 Further information about the consultation events is provided within a Statement of Community Involvement from February 2014 however in summary:
- Attendees' feedback to members of the project team at the information events were very positive, with the project being seen as a welcome addition to the local area. A number of attendees were pleased to hear that the project would restore and improve the slipway access onto Cambois beach.
 - One attendee completed a feedback form to express their concerns, which were to ensure that any impact on marine life and disruption to Cambois beach users during the cable installation would be minimised.
 - Attendees were also keen to understand the impact of the project on the community, in particular minimising disruption to local traffic and ensuring the local community is kept updated on the project.
- 2.32 In February 2013 NSN Link Ltd wrote to East Bedlington Parish Council offering members an update on NSN Link. The response received from councillors of East Bedlington Parish Council indicated that a briefing would be helpful when the project had progressed further.

- 2.33 Information received from all consultees and members of the public has been taken into consideration when assessing the potential environmental impacts of the proposed development and when formulating avoidance and mitigation measures to be implemented to help reduce the impacts of likely significance.

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3 APPROACH TO ENVIRONMENTAL IMPACT ASSESSMENT

- 3.1 This Chapter of the Environmental Statement (ES) outlines the Environmental Impact Assessment (EIA) process and the methods used in the identification and assessment of significant environmental effects of the past, present or reasonably foreseeable development activities.
- 3.2 This ES presents the findings of the environmental impact assessment carried out for the proposed development and has been prepared in accordance with the appropriate legislation and regulatory framework set out in Chapter 2.

IEMA Best Practice

- 3.3 The Institute of Environmental Management and Assessment's (IEMA) Special Report entitled 'The State of Environmental Impact Assessment Practice in the UK' states that the primary method of describing environmental effects (to aid the decision-making process) is to describe and evaluate the significance of individual effects on different aspects of the environment.
- 3.4 The IEMA report includes a reference to its 'Guidelines for Environmental Impact Assessment (2004)' which states:
- 'There is often not a single, definitive, correct answer as to whether an impact is significant or not. Significance is influenced by the values of the individual, how the changes to the environment affect them and whether they have a stake in the project or not.'*
- 3.5 This ES has been undertaken in accordance with IEMA's Special Report which states that the evaluation of significance is often subjective, and findings are regularly set out as different levels of significance (e.g. major, moderate, minor, etc.). The evaluation of significance is commonly undertaken by comparing the magnitude of the predicted effect with the sensitivity of the receiving environment.

Assessment of Effects

- 3.6 Best practice guidance has been used for individual chapters where available and appropriate. A full method of approach is set out in each Chapter, however a general principle for the presentation of environmental impacts has been adopted to ensure consistency in the evaluation of significance across all specialist topic areas.
- 3.7 Significance considers the sensitivity of a receptor and the magnitude of effect, giving rise to a significance of impact scale ranging from minor, through moderate to major. Impacts can be beneficial (positive) or adverse (negative) as well as neutral (where there is either no impact, or where positive and negative impacts balance) or indeterminate.
- 3.8 A quantitative or qualitative assessment of the impact is given depending on the specialist discipline the type of information that can be collected from the site and the professional's own judgement. Notwithstanding this, impact significance always takes into account the

impact's deviation from the established or projected baseline conditions (impact magnitude) and the sensitivity of the receptor.

- 3.9 Specialist methods of assessment are presented in the relevant assessment chapters. The general method for the presentation of environmental impacts across all specialist topic areas is outlined below.

Sensitivity of Receptor

- 3.10 The sensitivity of the receptor in the base case varies according to the relative importance of existing environmental features on or near to the proposed development (e.g. whether it is of national, regional or local importance) or with regard to guidance, legislation, statutory or other designations, professional judgement or a combination of these..
- 3.11 Sensitivity generally is expressed on a scale (very high, high, medium, or low) or with regard to importance or value (international, national, regional or local).
- 3.12 The following criteria provide a general definition for determining the sensitivity of receptors. Sensitivity criteria are explained in each specialist topic chapter.
- Very high sensitivity - the receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance e.g. special qualities of a Special Protection Area or National Park;
 - High sensitivity - the receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance e.g. special qualities of a Site of Special Scientific Interest or AONBs;
 - Moderate sensitivity - the receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional importance e.g. special qualities of a regionally important geological site;
 - Low sensitivity - the receptor is tolerant of change without detriment to its character, is of low environmental value, or local importance e.g. qualities of a hedgerow or industrial areas; and
 - Negligible sensitivity - the receptor is resistant to change or is of little environmental value.

Magnitude of Effect

- 3.13 The magnitude of potential effects (both beneficial and adverse) on the relevant receptor in the environmental base case has been identified through the detailed consideration of the proposed development taking into account the following:
- The degree to which the environment is potentially affected e.g. whether the quality is enhanced or impaired;
 - The scale or degree of change from baseline conditions as a result of the proposed development;
 - The duration of the effect e.g. whether it is temporary or permanent; and
 - The reversibility of the effect.
- 3.14 The following criteria provide a general definition for determining the magnitude of a particular effect:

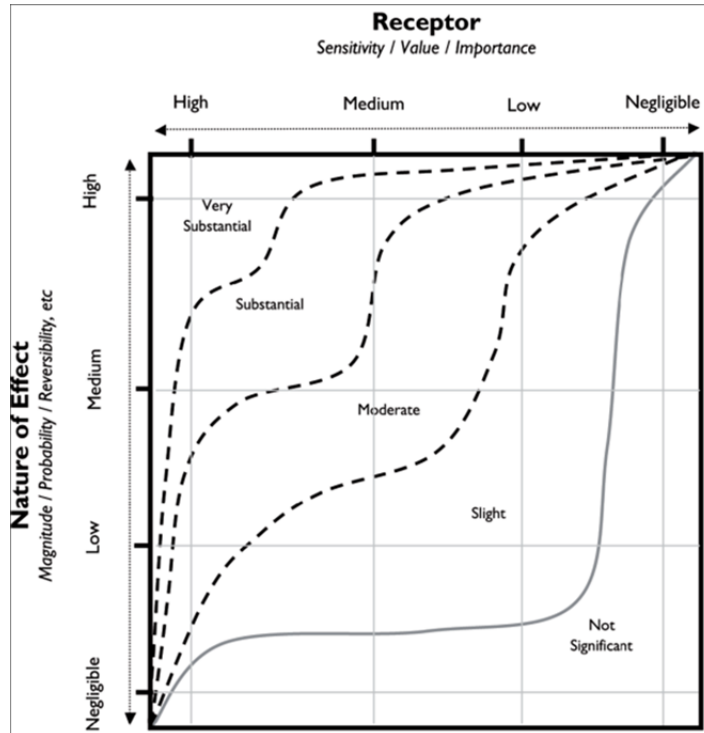
-
- High magnitude - total loss or major alteration to key elements or features of the baseline conditions to the extent that post-development character or composition of baseline conditions will be fundamentally changed;
 - Moderate magnitude - loss or alteration to one or more key elements or features of the baseline conditions to the extent that post-development character or composition of the baseline conditions will be materially changed;
 - Low magnitude - minor shift away from baseline conditions. Changes arising will be detectable but not material; the underlying character or composition of the baseline conditions will be similar to the pre-development situation; and
 - Negligible magnitude - very little change from baseline conditions. Change is barely distinguishable, approximating to a 'no change' situation.

Significance of Effect

3.15 The significance of effect is a judgement made on the consideration of the sensitivity of the receiving environment or receptor and the magnitude of the likely effect. The significance of the likely effects arising from the proposed development is categorised throughout the ES as follows (unless stated otherwise) and is illustrated further at Inset 3.1.

- Major adverse.
- Moderate adverse.
- Minor adverse.
- None.
- Minor beneficial.
- Moderate beneficial.
- Major beneficial.

Inset 3.1: Matrix for Assessing Significance of Effects (from (IEMA) Special Report entitled 'The State of Environmental Impact Assessment Practice in the UK')



Type of Effect

3.16 The prediction of possible environmental effects in each environmental topic considers:

- Direct effects;
- Indirect (or secondary) effects;
- Temporary effects;
 - Short term (less than 12 months);
 - Medium term (between one year and five years); and
 - Long term (more than five years)
- Permanent effects;
- Adverse effects;
- Beneficial effects;
- Construction effects;
- Operation effects;
- Decommissioning effects;
- Intra-project effects;
- Inter-relationship of effects;
- Residual effects; and
- Cumulative effects.

-
- 3.17 Construction, operation, decommissioning, intra-project, inter-relationship, residual and cumulative effects are described in more detail below.

Construction Effects

- 3.18 Construction effects are those that would occur during the construction phase of the proposed development. This includes effects resulting from the activities associated with installation of the underground cables and the construction of the converter station. These activities include the creation of temporary access tracks and construction compound areas and work activities. Construction effects are temporary during the construction phase of the proposed development. Likely temporary effects during the construction phase of the proposed development are described in the ES.

Operation Effects

- 3.19 Operation effects would occur as a result of the presence, operation and maintenance of the proposed development. Infrequent maintenance will be required throughout the lifespan of the infrastructure, which at times will involve the refurbishment and replacement of equipment. Some operation effects may be temporary, for instance, during the maintenance period of the proposed development, whereas other operation effects may occur throughout the lifespan of the proposed development. Likely permanent and temporary effects during the operation phase of the proposed development are described in the ES.

Decommissioning Effects

- 3.20 Decommissioning effects are those that would occur only during the decommissioning phase of the proposed development. This would include effects resulting from the activities associated with the removal of the proposed development once the development is no longer required. The effects are likely to be similar to those during the construction phase but could be temporary or permanent. Likely permanent and temporary effects during decommissioning phase of the proposed development are described in the ES.

Combined Effects of Proposed Development Components

- 3.21 Individual proposed development components have the potential to result in combined effects on individual receptors. For example, in areas where there are several proposed development components such as underground cables being installed close to the converter station. Individual receptors may experience effects from more than one of these components.
- 3.22 Where combined effects are considered likely, such effects are described in each environmental topic chapter. Depending upon the nature and geographical location of a given receptor, this assessment is presented either in isolation and in combination, or in combination only.

Inter-relationship of Effects

- 3.23 The inter-relationship between environmental topics is inherently considered in each environmental topic chapter. For example, topic areas such as hydrology and ecology are related because changes in hydrology may result in changes in ecology. The ES identifies potential interactions between environmental topic areas where relevant.
- 3.24 An exception is the inter-relationship of effects on human receptors where, for example, a receptor may experience visual effects, construction noise and construction traffic effects.

Mitigation Required to Prevent, Reduce and Offset Significant Adverse Effects

- 3.25 Mitigation is typically used to reduce effects of higher significance and can be 'embedded' i.e. designed into the project or considered to reduce significant adverse effects. Embedded mitigation is a very effective way to avoid and minimise effects as proposals develop. From the earliest stages of the project, and throughout the design evolution, NSN Link Ltd has been committed to a process of review and assessment (including consideration of environmental information) which has meant that embedded mitigation has been included and forms an important part of the proposed development.
- 3.26 The ES includes judgements about the overall significance of effects in relation to topics. These have informed decisions made to date about the appropriateness of mitigation measures.
- 3.27 Where appropriate, mitigation has been proposed to enable potentially adverse effects to be avoided, minimised or the environment enhanced, in accordance with Schedule 4, Part 1, paragraph 21 of the 2009 Regulations (as amended).
- 3.28 Where specific mitigation measures are proposed such as landscape works around the proposed converter station, these are described in each technical chapter where relevant. The time taken for mitigation to be effective is also described in each technical chapter.

Residual Effects

- 3.29 The overall significance of potential effects takes into account the identified mitigation measures and considers the residual effects of the proposed development after mitigation measures have been implemented and established.

Cumulative Effects

- 3.30 Cumulative effects are those that may result from the combined or incremental effects of the past, present or future development activities. A single development or activity may result in an effect which in itself is not significant but when combined with other effects (significant or not) in the same geographical area and occurring at the same time, result in a cumulative impact which is significant.
- 3.31 The cumulative impact assessment has been designed to address the following:
- Wider cumulative impacts which are the combined impacts that may occur between the UK onshore components of NSN Link with other non-related developments;
 - Project-wide cumulative impacts which arise from the combined impacts of the UK onshore elements of NSN Link with other elements of NSN Link Project i.e. UK and Norwegian subsea cables and Norwegian onshore infrastructure have also been considered and are presented in NSN Link Bridging Document which presents an overview of the whole project; and
 - Project related cumulative impacts which are the combined impacts that may occur between the UK onshore elements of the project. Within this ES, this relates specifically to the National Grid Electricity Plc (NGET) Substation which will be required to connect NSN Link to the National Electricity Transmission System.
- 3.32 Cumulative effects are addressed in this ES where appropriate in the individual environmental topic Chapters.

- 3.33 Non-related projects that potentially needed to be considered within the cumulative impact assessment were identified through a planning search. The search which was undertaken in consultation with Northumberland County Council (NCC) considered all submitted planning applications for developments that have been consented within a 1km radius of the onshore infrastructure within the last two years and also any that are still pending determination.
- 3.34 Projects have been scoped out from further assessment where they are of insufficient scale and nature for them to contribute to significant cumulative effects, for example household applications.
- 3.35 Major development proposals considered as part of the assessment of potential cumulative effects are summarised in Table 3.1.

Table 3.1: Developments to be considered in cumulative assessment

Development	Status	Approximate Distance from NSN Link	Areas of Potential Cumulative Impact
National Grid 400kV GIS Substation	Future application by National Grid Electricity Transmission plc. (NGET)	Immediately adjacent	All to be considered given close proximity
Port of Blyth Biomass Power Station*	Consented	1.5km to the east at Blyth Harbour	Landscape/Visual, Noise and Ecology, Traffic/Transport (if Construction timescales overlap)
*RES announced its intention to withdraw from the development of Blyth Biomass Power Station in March 2014. The Development Consent Order remains valid until 15/08/18 and is considered in the cumulative assessment.			
Ferguson Business Park Single Turbine (53.3m to tip)	Consented (12/00375/RENE)	1km north of the converter station site	Landscape/Visual
Earth Balance Single Turbine, (43.5m to tip)	Application under consideration	Approximately 2km west of the Proposed Development (Ferguson/Sleekburn Business Park)	Landscape/Visual
Narec Project Fujin (offshore wind drive train test facility 15MW)	Constructed	Located at Blyth Harbour approximately 2km east	Considered in baseline
Narec Offshore Wind Demonstration Site	Consented	Located 8-17km off the Blyth coast	Landscape/Visual
Residential development – 48 dwellings	Decision pending (13/03937/FUL)	500m west of the converter station, south of Brock Lane	Landscape/Visual, Noise and Traffic 7 Transport

- 3.36 In 2008 an application for the development of “467 homes, retail and health care, combined heat and power facility, roads, car parking and landscaping” was submitted to NCC (ref 08/00403/OUTES). Consultation with NCC has confirmed that the application is not considered to be committed development and raised concerns about deliverability of the application including the need to resolve matters relating to a Section 106 agreement under the Town and Country Planning Act. NCC has indicated that subject to the resolution of

these issues the application would need to be referred to the Secretary of State as it is contrary to the provisions of the development plan for the area. On these grounds the proposals set out in 08/00403/OUTES have been excluded from the assessment of cumulative impact.

4 PROJECT DESCRIPTION

Project-Wide Development Proposals

- 4.1 NSN Link comprises three elements: the UK onshore development, the offshore subsea cables (in UK and Norwegian waters) and the Norwegian onshore development. An environmental assessment of the offshore cables has been undertaken with an Environmental Statement having been submitted to the Marine Management Organisation. An environmental assessment of the Norwegian onshore development has been undertaken, submitted and consented by the Norwegian authorities.
- 4.2 The Proposed Development for which planning permission is being sought is part of wider development proposals to form NSN Link. The elements of the Project that fall outside the jurisdiction of the Local Planning Authority (Northumberland County Council) comprise high voltage direct current (HVDC) subsea cables passing through UK (English and Scottish) and Norwegian waters, and onshore infrastructure in Kvilldal, Norway comprising onshore underground cables, a converter station and connection into an existing substation.
- 4.3 A bridging document accompanies this ES providing an overall summary of the entire project. The bridging document ties together the environmental assessments for each element of the project and will include a description of each project element outlined above, and a summary of residual and cumulative and in-combination effects of the project as a whole. The proposed project mitigation measures will also be outlined.
- 4.4 For completeness, an overview of the subsea cable and Norwegian onshore elements are below, followed by a more detailed project description of the UK elements from mean low water, to which this ES relates

Subsea Cables in UK and Norwegian Waters

- 4.5 The subsea cables in UK waters are subject to a consenting regime under the Marine and Coastal Access Act 2009. That regime extends to the high water mark and planning permission extends to the low water mark. The subsea cables between the low water mark and the high water mark (the intertidal area) falls under the provisions of both the Town and Country Planning Act (1990) and the Marine and Coastal Access Act 2009.
- 4.6 NSN Link includes two HVDC subsea cables between the landfall points at Cambois Beach and Hylen, Norway. The HVDC cables proposed are Mass Impregnated (MI) cables and will be the same as those described for the intertidal area. The cables will be installed in separate installation campaigns and will be separated by 20m to 50m depending on local conditions, at a depth of between 1m and 2m below seabed levels, although this may vary depending on the nature of the substrate and may increase where there is anchoring activity or in areas of mobile seabed.
- 4.7 Prior to the installation of the subsea cables there will be a need to undertake enabling works.

- 4.8 The detailed method of subsea cables installation will be determined by the contractor that will be responsible for the activity.
- 4.9 The programme for the commencement of installation has not yet been determined but it is likely that installation of the subsea cables will take place between 2016 and 2019. In general, subsea cables installations in European waters are undertaken in the summer season, broadly between April and October. This period is determined primarily by the high probability of adverse weather occurring outside of this period.
- 4.10 The installation programme for the subsea cables will be influenced by factors including requirements for any ecological mitigation, cables delivery and the availability of installation vessels.
- 4.11 Onshore infrastructure in Norway will mirror that described below in the UK. Components in Norway will include:
- Two HVDC subsea cables to make landfall at Djupevika situated at the head of the Hylsfjorden on the Suldal coast in Hylen, which is to the south west of Kvilldal, Norway.
 - From the landfall the subsea cables will be routed via a micro tunnel to the west shore of the Suldalsvatnet Lake. The cables will then be laid on the bed of the lake to a landing at Kvilldalsvika on the eastern shore.
 - At the Kvilldalsvika landfall there will be a transition to onshore underground cables in a transition joint pit (TJP). The onshore underground cables will be routed from the TJP to the converter station.
 - Construction of a HVDC converter station and connection to an existing 400kV electricity substation at Kvilldal on the north side of Hylen.

Proposed Connection of NSN Link to the National Electricity Transmission System (NETS) in the UK

- 4.12 The proposed converter station will connect to the National Electricity Transmission System (NETS) via six 400kV high voltage alternating current (HVAC) underground electricity cables which will run from the converter station to a new 400kV GIS substation adjacent the existing Blyth 275kV substation.
- 4.13 The new 400kV GIS substation will be owned and operated by National Grid Electricity Transmission Plc (NGET). NGET is part of the same National Grid Plc as National Grid NSN Link Ltd, but NGET and National Grid NSN Link Ltd referred to hereafter as NSN Link Ltd are separate legal entities. Their statutory roles are clearly segregated under the Electricity Act 1989. The development of the grid connection is the responsibility of NGET and is part of its statutory functions as the holder of a licence to transmit electricity under Section 6(1) (b) of the Electricity Act 1989. The operation of an electricity interconnector is a separately licensable activity under Section 6(1) (e) of the Electricity Act. The Act expressly provides that the same person or company may not hold an interconnector licence and a transmission licence. Under its Licence Conditions, NGET is obliged to offer terms for connection to the NETS with National Grid NSN Link Ltd as it is for any other customers seeking a NETS connection.

- 4.14 NGET intend to design and construct a new 400kV substation to the west of the existing Blyth 275kV substation. The scheme is at an early stage of development with initial environmental surveys in progress. Whilst the size, location and technology to be used is yet to be determined, it is currently expected that the substation will be situated within the area indicated on Figure 1.1. It is anticipated that the footprint will not exceed 200m x 240m with a height of 15m. In association with the construction of the substation it is possible that there may need to be minor modifications to the location of the tower(s) of the existing 400kV overhead line and these parameters have been considered in the assessment carried out as part of this ES. As part of the design process there will be engagement with Northumberland County Council (NCC) and statutory and non-statutory consultees.

UK Onshore Elements of the NSN Link

- 4.15 The sections which follow provide a description of the UK onshore elements of NSN Link (the "Proposed Development"). This information has been used to inform the identification and assessment of significant environmental impacts for the construction, operational and decommissioning phases of the Proposed Development.
- 4.16 The proposals have been considered in the context of typical engineering construction techniques and are considered to represent reasonable worst case conditions.

Converter Station

- 4.17 The converter station will be constructed on land immediately to the east of the A189 spine road, to the north of East Sleekburn as shown on Figure 1.1. The site is approximately 1.5km north east of Blyth, on the north side of the Blyth estuary and 1km inland from the Northumberland coastline.
- 4.18 The site forms part of a wider area of land allocated as the Cambois Zone of Economic Opportunity, which provides a simplified planning process for two sites (including the converter station site) through a Local Development Order (LDO), which grants planning permission for certain types of development specified in the Order.
- 4.19 Access to the converter station is proposed via a new access off Brock Lane. Permanent roads around the perimeter of the converter station and internal roads will be constructed to provide access to the different building units for regular and ad hoc maintenance activities and for the delivery of materials to site.
- 4.20 Landscaping will be implemented around the perimeter of the converter station to help integrate the proposed development site into the landscape setting. The existing native planting to the road frontage and around the site will be largely retained and supplemented with additional native planting around the converter station site.

Converter Station Design

- 4.21 The converter station will be contained within a secure fenced compound. The majority of electrical equipment will be indoors to prevent exposure to saline air. Salt deposition can lead to damage and the need to prematurely replace equipment.
- 4.22 The converter station will comprise a series of interconnected buildings including the following:

- *Valve Halls:* These will comprise four 'wings' each containing the high voltage power electronics which convert electricity from AC to DC and vice-versa. Each hall is nominally 45x30m in plan with a height of up to 25m.
- *Equipment Halls:* Located between two of the valve hall wings, containing high voltage equipment for smoothing the electrical waveforms. Each hall is nominally 50x35m with a height of up to 20m.
- *Filter Halls:* Connected to the Equipment Halls, containing high voltage filtering equipment and interconnections from the transformers. Each hall is nominally 60x35m with a height of up to 20m.
- *Control and Protection Equipment Annexe:* Containing the control panels and associated operator stations, offices, welfare facilities etc. Each hall is nominally 40x20m with a height of up to 15m.
- *DC Switch Hall:* An area that contains the termination of the HVDC onshore underground cables together with HVDC switchgear to connect these to the power electronics. Each hall is nominally 70x50m with a height of up to 25m.
- *Transformer Pens:* These are external to the main building and contain the single phase power transformers which are located in bunds to contain any oil leaks. The bunds will be connected to an oil containment/separation drainage system. These transformers convert the power from the Grid voltage of 400kV to the appropriate voltage to connect to the power electronic equipment. The transformers will be separated into pens by concrete fire protection walls. Noise enclosures will be fitted around the transformers if required. Each of the six pens is approximately 20x20m in size.

4.23 In addition further buildings are required as follows:

- *400kV Switch houses:* Two buildings to contain the 400kV switchgear together with filtering equipment. These are installed indoors to prevent failures from saline pollution due to the proximity to the sea. Each switch house is approximately 30x40m with a height of up to 15m.
- *Services building:* A building to house electricity supplies to the converter site. The service building is approximately 26x20m.
- *Diesel Generator:* A housing for an emergency standby diesel generator.
- *Spare Parts Building:* A building to house spare parts and components, this will be supplemented by hardstanding areas that will be provided for storage of a spare transformer and spare cable drums. The spare parts building is about 40x20m.

4.24 Figures 4.1-4.4 show indicative proposals for the proposed converter station. The converter station building will be constructed from a steel frame and clad with insulated metal panels. Panels will be grey in colour and graduate from dark grey to light grey to the roofline. This information presented in Figures 4.1-4.4 has been used as the basis for the assessments and include::

- Figure 4.1 Site Block Plan
- Figure 4.2 Existing and Proposed Floor Plans
- Figure 4.3 Finished Floor and Site Levels

Figure 4.4 Proposed Elevations

- 4.25 The converter station will be designed for a 40 year lifespan, with only control equipment expected to require inspection and replacement during that time.
- 4.26 Lighting (when required) will be controlled to avoid the unnecessary illumination of areas beyond the development. Glare and the spread of upward light will be kept to a minimum to reduce sky glow and minimise visual intrusion within the open landscape. It is not necessary to illuminate the whole perimeter. The entrance and walkways for access and egress and emergency exits will need illuminating for safety reasons.
- 4.27 The Aerodrome Safeguarding Map for Newcastle International Airport confirms that consultation with the aerodrome safeguarding authority is only required at the proposed location where the proposed development exceeds 90m in height. The converter station and associated buildings are not expected to exceed 25m in height.
- 4.28 The perimeter and internal roads will be used to provide access for regular and ad hoc maintenance activities and for the delivery of materials to site. The access into the converter station site off Brock Lane will be constructed so that it can accommodate the delivery of transformers by large vehicles which comprise Abnormal Indivisible Loads (AILs). The access road will feature deceleration and acceleration tapers on Brock Lane designed in accordance with the traffic regulations for the 60mph speed and classification of the road.
- 4.29 Transformers for the converter station will be delivered during construction under a Transport Order. The route to each part of the site will retain the ability to accommodate these loads. In the event of transformer failure at the converter station, a spare transformer held on site would be installed and the failed transformer removed to a 'spare' storage area. Transportation of the failed transformer to a contractor's factory for repair would then be arranged including the appropriate Transport Order from the Highways Agency for the abnormal movement. Reliability data on transformers of this nature indicates that failures would not be anticipated at intervals of less than 10 years.
- 4.30 Car parking spaces (including disabled spaces) will be provided at the converter station in accordance with NCC Car Parking Standards. These will be to the south of the converter station building, and will be for operations staff that will monitor and maintain electrical equipment and plant at the converter station.

Site Drainage

- 4.31 A Drainage Strategy has been prepared for the converter station site. Initial ground investigations indicate that the scope for infiltration is minimal and due to proposed ground levels, discharge into the Sleek Burn is preferred, either directly through an open channel or buried pipeline or via the existing surface water drainage network. As the Sleek Burn is tidal at this location, unrestricted discharge from the site is proposed. This approach has been confirmed in principle with the Environment Agency.
- 4.32 Perimeter swales (or equivalent) are proposed for high return period of rainfall events which would convey water to a culverted crossing beneath Brock Lane from which a connection may be made to the Sleek Burn via the field south of Brock Lane.
- 4.33 Other Sustainable urban Drainage System (SuDS) components would also be implemented to effectively manage the potential impact with respect to surface water discharges as well

as provide the required attenuation volume, which may include pervious pavement, mini-swales, bio-retention or planters, as well as small ponds or basins.

- 4.34 The nature of the final outfall will be designed in consultation with the Environment Agency to avoid degradation of the Sleek Burn.

Construction of the Converter Station

- 4.35 The construction of the Converter Station is planned to be undertaken over a period of approximately 3-4 years. Work is expected to commence on the preparatory site works in 2016/17, followed by the converter site development, which includes the erection, installation, connection and testing of equipment between 2018 and 2020 which is when the Converter Station is expected to be commissioned.

- 4.36 Construction will include the activities summarised below:

- *Preliminary Works:* Further site investigation and pre-construction surveys in advance of construction;
- *Site Preparation and Establishment:* This will include the construction of the access road to the site from Brock Lane, vegetation clearance, development of internal site access and establishment of temporary facilities including site offices, storage areas, welfare facilities, development of electricity and water supplies and the erection of security fencing or hoarding. It is proposed that a laydown area will be established adjacent to the converter station site on its western edge;
- *Earthworks:* The current site levels fall gently from west to east and vary from 10.4m to 8.6m AOD. Cut and fill works will be required to create a level site for the converter station. A cut and fill balance will be targeted to minimise material movement external to the site. A cut and fill volume of approximately 15,000m³ is envisaged. Construction platforms and areas of hardstanding will be founded on compacted fill over natural ground following a topsoil strip. Piled foundations may be required to support major structures, very heavy equipment and equipment sensitive to settlement. Piles will be designed on the basis of the ground conditions identified by intrusive investigations. A concrete mixing plant may be installed on site to mix concrete for the foundations and footings. Final ground levels will result in a finished floor level of 9.3mAOD;
- *Civil Engineering Works:* Construction of building platforms on the piled foundations, development of the site's permanent drainage system and construction of permanent access, internal roads and car parking arrangements;
- *Buildings Construction:* Construction of all buildings including erection of steel frames and cladding;
- *Cable Installation:* Installation of underground HVDC cables from the landfall to the converter station. Installation of underground HVAC cables to connect to the proposed new 400kV NGET GIS substation. Installation of underground 11kV cables within the converter station for auxiliary supplies;
- *Mechanical and Electrical Works:* Installation of high voltage AC and DC electrical equipment in the converter station and the delivery of transformers;
- *Commissioning:* Following completion of all construction works there will be a period of commissioning and testing; and

- *Site Reinstatement and Landscape Works:* Removal of the site construction offices and temporary facilities, land reinstatement and landscape works.

Construction Access Arrangements

- 4.37 Prior to commencement of construction, a Traffic Management Plan (TMP) will be prepared in consultation with NCC Highways Department. This will set out all construction access arrangements including agreed access points, delivery routes and times.
- 4.38 The construction access road into the converter station site will be constructed prior to the commencement of the converter station construction works to enable site access. It is likely that this will remain as a stoned surface during construction, with final surfacing following substantial completion of works on the site.
- 4.39 During the construction period a range of vehicles will be accessing the site. Flatbed trucks will deliver equipment and plant including excavators, bulldozers and cranes. There will also be cars and vans used by construction staff.
- 4.40 Equipment will be delivered to the site, erected and connected using mobile cranes and hydraulic access platforms. The switchgear and busbars will be delivered to site in modules, using normal road transport. The modules would be stored on site in designated secure storage areas until required for erection.
- 4.41 Transformers will be delivered to site on a self-powered modular trailer (SPMT) and would be classed as abnormal indivisible loads (AIL). The final method of installation will be subject to detailed design and is likely to be one of two methods described below, both of which have been assessed. One method would involve the transformers being manufactured with wheels, and lowered from the SPMT using hydraulic jacks direct onto a permanent rail system built into the transformer footings. From here the transformer would be winched into position on the rail system to allow a rapid transformer change. Alternatively the transformers would be slid into position by use of a hydraulic system.

Construction Site Layout

- 4.42 The construction site for the converter station will be securely fenced during the construction period and there will be a number of temporary facilities on site including:
- Sites offices including offices and meeting rooms;
 - Staff welfare facilities including portable chemical toilets, kitchen and mess room;
 - A laydown area for storage areas for construction vehicles, plant, equipment and other construction materials;
 - Appropriately bunded areas to be used for the storage of oils and other fuels;
 - Wheel washing facilities to be used by construction vehicles and plant; and
 - Segregated waste and management storage areas.

HVDC Underground Cables

Cables in the Intertidal Area

- 4.43 NSN Link will include two subsea HVDC cables between the landfall points at Cambois Beach and Hylen, Norway. The cables are known as “mass impregnated” and wrapped in

paper insulation impregnated with mineral oil. The cables are designed to minimise release of mineral oil in the event of rupture.

- 4.44 The cable make-up comprises multiple layers including: copper core with a screen; mass impregnated paper layers; and outer dielectric screen made of semi-conducting paper.
- 4.45 The cables are contained within a water tight sheath made up of extruded seamless lead overlain with polyethylene to provide protection against corrosion. Subsea cables will have an additional layer of galvanised steel wire armour to increase the cable's tensile strength to help it withstand the stresses of subsea installation, the configuration of which will be subject to detailed design.

Cables Installation

- 4.46 The subsea cables will be laid with a separation of approximately 50m so as to offer a degree of protection from damage. In the approach to the landfall the last 200m of subsea cable will be separated by approximately 20m. The subsea cables will be joined to the HVDC onshore underground cables in the transition joint pit (TJP). The approximate distance between the low water mark and the TJP will be 500m.
- 4.47 The TJP will be an excavated pit (approximately 12m long x 5m wide x 3m deep) with a reinforced concrete plinth laid in its base. The cables will be jointed on the plinth and once this is undertaken, the excavation will be backfilled to original ground levels. On completion of the works, there will not be any visible sign of the TJP on the surface. The excavation and preparation of the area to construct the joint bay will take approximately 1-2 weeks.
- 4.48 From the low water mark the subsea cables will be routed below surface to the TJP, via the beach, most likely using trenching techniques, involving a cable way constructed through the existing slipway and trenching across the Cambois Links. Alternatively; conduits may be installed beneath the car park, slipway and possibly the beach.
- 4.49 For the most likely installation method – an “open cut” installation method, cables would be landed from a vessel which will approach as far inshore as is possible and involve using mechanical diggers to construct a trench across the beach from low to high water and floating the cable to the trench.
- 4.50 The TJP will be above high water in the agricultural land west of the road known as The Bucca. Access to the site of the TJP will be required off The Bucca road for a mechanical excavator and concrete deliveries during the construction work. TJP construction will be completed in advance of cables landing operations to avoid any possibility of delay to the landing operation.
- 4.51 Access to the beach and slipway will be required from North Cambois Beach public car park for a mechanical excavator, concrete deliveries etc. during the preparation work to the slipway. The slipway will be modified to incorporate a covered trough to house the cables and a head wall to secure the end of the cable armour. These works will be completed in advance of the cable laying operations to avoid any possibility of delay to the landing operations.
- 4.52 Between the head of the slipway and the TJP the cables will be buried in one trench routed via the beach car park and Cambois Links, passing under The Bucca. This trench will be excavated immediately prior to cable installation to minimise disruption.

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- 4.53 In preparation for the subsea cables being brought ashore, the beach works area, comprising approximately 2000sqm will be marked off with a tape or a buoy line to warn the public not to enter the works area. On rising tide a shallow water cable laying vessel will move into position as close to the top of the beach as the tidal conditions allow. A pulling device, either a winch or a tracked vehicle, and rollers and quadrants necessary to guide the hauling rope and subsequently each cable will be put in place. The cables will be laid from the vessel to the shore individually and a hauling rope will be installed between the beach pulling device and a cable end on the vessel running through the slipway cable duct. Construction access to this works area will be via the public car park and existing slipway.
- 4.54 Depending on the tide, the intervening distance between vessel and the slipway may be entirely dry (with the installation vessel resting on the seabed) or more probably a combination of dry beach and beach below water. Each cable will be supported at the sea surface by floats attached as the cables leave the vessel and supported on rollers placed on the beach above the water line.
- 4.55 Each cable will be hauled towards the slipway with floats being removed as necessary. When sufficient length of each cable has been passed to the shore to allow it to be installed in the slipway cable trench and for jointing to an onshore underground cable, it will be secured at the head of the slipway and in the TJP.
- 4.56 Once the cables have been secured at the head of the slipway and in the TJP and tested to confirm that no damage has occurred during the installation process, each cable will be manoeuvred into its correct alignment in relation to the pre-determined route between the slipway and Mean Low Water (MLW). For cable sections still afloat, the manoeuvring will be accomplished using workboats. Once in the correct position, the remaining floats will be removed and the cables allowed to sink to the seabed. Any cables on dry land leading up to the TJP will be manoeuvred using excavators or similar prior to burial.
- 4.57 In dry areas of the beach, a single trench will be excavated alongside the cables using conventional mechanical excavators adopted for working on soft soils. The excavated material will be placed to one side for back filling. Rollers will be used in the base of the trench to pull the cables along it. The cables installation trench will be approximately 1-2m wide and the cables will be buried to a target depth of circa 2-3m. The temporary works footprint will be approximately 10m. A cofferdam may be required to keep water from entering the trench during excavation.
- 4.58 The cables will be manoeuvred into the bottom of the trench by mechanical excavators and buried with the material excavated from the trench.
- 4.59 The landing operation including landfall preparation and subsea cables installation is expected to take approximately 4 weeks.

HVDC Onshore Underground Cables

- 4.60 HVDC onshore underground cables will connect the subsea cables to the converter station (a distance of approximately 2km) and will be of mass impregnated design similar to the HVDC subsea cables. This will minimise the complexity of the joint at the TJP. The layer of galvanised steel wire armour required for the subsea cables is not required for the onshore

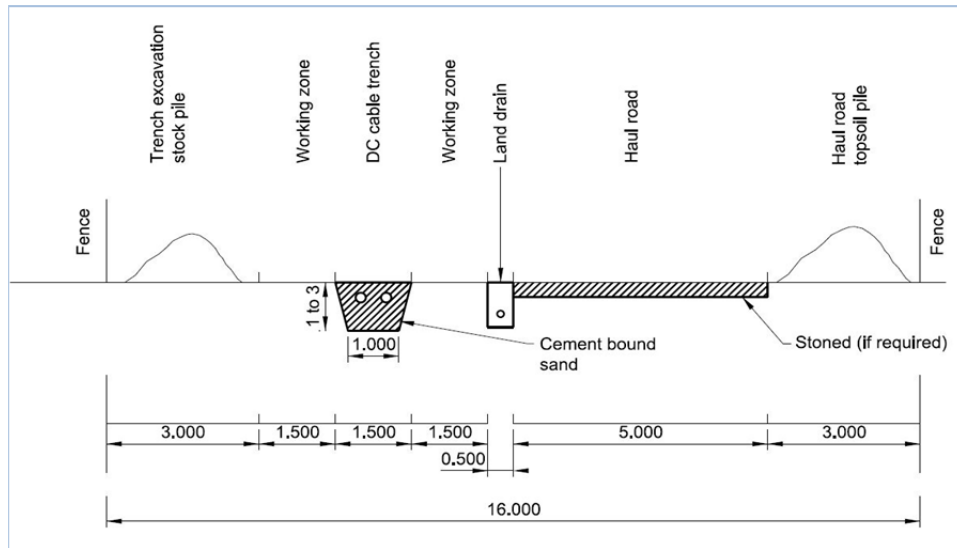
cables. The diameter of each of the onshore underground cables will be approximately 15cm.

- 4.61 The HVDC onshore underground cables will be delivered to a temporary contractor's compound. Temporary works compounds are anticipated to be established close to or on the existing car parking area at North Cambois Beach, adjacent to the waste water treatment works, and immediately south of the Ferguson Business Centre. It is anticipated that each drum would hold approximately 500-1000m of onshore underground cable. The compounds will form the bases for the onshore underground cable installation works from which the main items of plant and workers will travel, minimising the need for transport.
- 4.62 Cable installation will include excavation, laying the cables, jointing and terminating and testing the cables and will be undertaken in parallel as the construction of the converter station between 2019 and 2020.
- 4.63 Prior to the commencement of works along the onshore underground cables route, a photographic inventory will be taken and in particular records of the presence and condition of items such as fences and gates will be made and, where possible, agreed with the landowner prior to commencement.
- 4.64 Secure temporary fencing will be erected around the working area (which will vary as the onshore underground cables installation progresses). The fencing will define the working area, protect any sensitive areas and prevent third party access. Access gates will be installed that are suitable for both personnel and for movement of plant and equipment.
- 4.65 The onshore underground cables will be installed primarily in excavated trenches; either direct placed or in pre placed ducts. Standard trenching techniques will be used for excavation. Where the onshore underground cables will cross obstructions, such as the railway a "trenchless technology", such as HDD, thrust boring or pipe jacking will be considered.
- 4.66 The description of installation techniques below refers to the different parts of the cable route from the TJP to the Converter Station.

Open Trench Installation

- 4.67 Where possible open trench installation techniques will be used. Prior to excavation, the surface will be cleared of vegetation. Trenches will be excavated by hydraulic excavators, except where any risk to existing services is identified where digging by hand will verify the position of existing services. Trenches will be excavated to industry standards and the dimensions will vary subject to topography and local ground conditions. As shown in Inset 4.1 the trench section will be 1m - 3m deep and approximately 1.5m at the surface tapering to 1m at the bottom of the trench. The depth of the trench will typically be excavated to between 1m and 2m below ground level (bgl) however in localised areas excavations may be extended to 3m bgl. Excavated topsoil and subsoil will be stored separately for reinstatement.
- 4.68 The construction area will consist of a working swathe of about 16m as shown in Inset 4.1. This will allow provision of a haul route along the length of the cable, sufficient operating space around the works, areas for stockpiling top soil and excavated material, and space for security fencing.

Inset 4.1: Typical HVDC onshore underground cables working swathe



Note unit of measurement is metres (m).

- 4.69 The trench integrity will be assessed in different soil types, and where required the sides will be battered, benched, or shuttered with timber or metal sheets secured by cross braces. This will prevent collapse and will protect personnel during the works.
- 4.70 Prior to the onshore underground cables being laid, a layer of cement bound sand (CBS) approximately 60cm deep will be placed in the bottom of the trench and surrounding the cables. The CBS will help dissipate heat generated when the cables are in operation and will ensure the onshore underground cables are installed on a surface which is smooth and consistent.
- 4.71 Concrete slabs will be installed 60cm above the top of each cable and plastic warning tape will be laid directly over the slabs. The material excavated from the trench will be used to complete backfilling of the trench. The topsoil will be used to ensure that the upper profile of the backfilled trench is restored to the previous condition. Any excess subsoil will be removed from site to an appropriately licensed facility.
- 4.72 A permanent easement of approximately 7m will be required above the HVDC onshore underground cables.
- 4.73 Temporary measures such as damming and pumping may be required to facilitate open trench installation to cross watercourses.

Ducted Installation

- 4.74 Some cable route sections could be installed in ducts. Ducts increase the cables' protection and increase installation flexibility.
- 4.75 Ducts can be installed prior to the installation of the cables with cables then pulled through the ducts between jointing bays. This can reduce the length of time required for installing each section of cables although the time taken for installing ducts is similar to the time needed for open trenching of cables.

- 4.76 Ducting will however increase the thermal resistivity and reduce the cables' ratings. A stabilised material may be required in the ducting to improve the heat dissipation.

Trenchless Technology

- 4.77 Sections of the onshore underground cables will need to be installed by a trenchless technique to avoid surface disturbance, for example to cross the railway line, the main roads and potentially larger watercourses.
- 4.78 These techniques require a 'launch pit' working area from which the main driving of the rig will be undertaken and a 'receptor pit' working area which will receive the end of the crossing.
- 4.79 The launch and receptor pit working areas will require some temporary roadways to be constructed to provide suitable access for drilling plant and associated equipment.
- 4.80 Two ducts would need to be installed at each trenchless crossing. The depth of the crossings will depend on surface features. Crossings would be completed in advance of cables delivery to avoid any possibility of delay to the installation.
- 4.81 The void between the cable and the duct will be filled with a bentonite material to seal the void and aid heat dissipation.

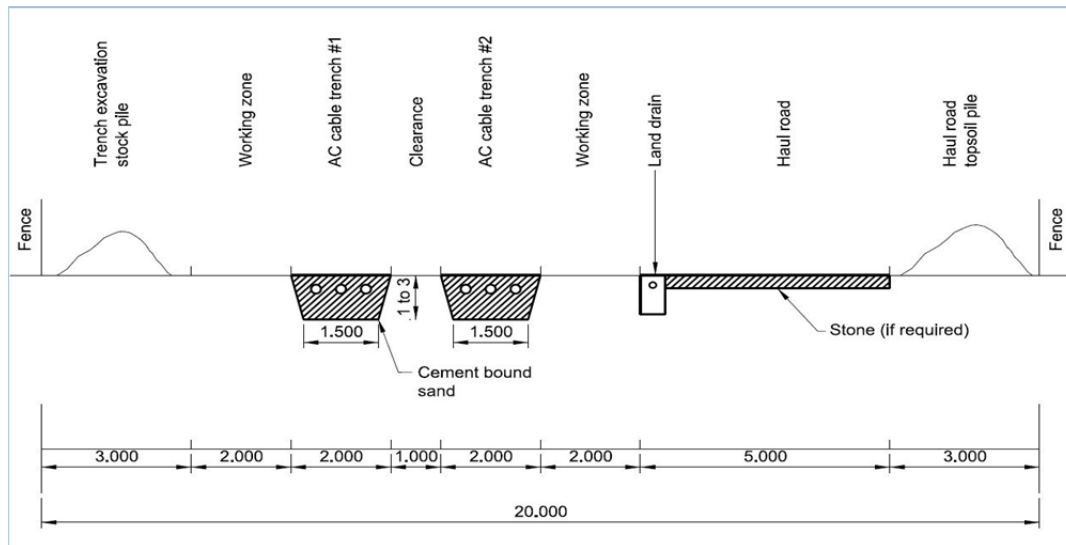
Joint Pits

- 4.82 Joint bays will be required at approximately 500m centres. This will be the point where separate cable lengths are jointed and their location is partly determined by the length of cable that can be transported on a cable drum and partly determined by identifying an appropriate with access.
- 4.83 The excavation, preparation and construction of a joint bay is approximately 1-2 weeks. An area of hard standing (approximately 20mx20m) is required for delivery of the cable drum with sufficient space for a crane to offload the cable drum from a low loader.
- 4.84 The construction of each jointing enclosure takes approximately 2-3 days and the jointing and testing will take approximately 7-10 days which will require 24 hour working. This activity will require local power supply, air-conditioning and internal lighting. On completion the removal of jointing equipment will take days 2-3 days and burial of the jointing pit and the reinstatement of the ground will take approximately 1 week.
- 4.85 Approximately three joint pits will be required in addition to the transition joint pit at the coast. The approximate locations are close to the railway crossing adjacent the Northumbria Water treatment works; to the south of Ferguson's Business Park and close to Cow Gut.

HVAC Land Cables

- 4.86 Six 400kV HVAC cables will connect the converter station to the proposed new 400kV GIS substation. The HVAC cables will be the same type as the HVDC cables (mass impregnated – MI) and will be approximately 150mm in diameter. The total length of the HVAC cables route is less than 1km. They will be laid in two banks of three, with a separation gap between them. A construction corridor of about 20m will be required as shown in Inset 4.2. This will accommodate a haul route along the length of the cable, sufficient operating space around the works, areas for stockpiling top soil and excavated material, and space for drainage and temporary security fencing.

Inset 4 2: Typical HVAC underground cables working swathe



Note unit of measurement is metres (m).

Cable Route Description

4.87 The cable routing studies sought to define a cable route which avoided or minimised environmental effects and took account of existing and proposed development proposals. The following factors particularly influenced the cable routing studies:

- Designated sites of nature conservation;
- Presence of protected species;
- Proximity to residential areas;
- Archaeology;
- Highways;
- Planning proposals;
- Water courses;
- Risk of encountering contamination;
- Utilities and services; and
- Land use.

4.88 Several options were considered in the identification of the indicative HVDC underground cable route and these options are outlined in Chapter 6 Alternatives. The cable route is described below. It has been split into sections for ease of reference across the assessment Chapters and these sections are shown on Figure 4.5 Cable Route Sections.

Section 1: Landfall

4.89 From mean low water the subsea cables will be trenched in the beach with the original beach sediment used to backfill following installation. The cables would then either be trenched through the slipway or pulled through pre-installed ducts within the slipway. The slipway will be reinstated to full working condition on completion. The cables will then run

north through open grassland, known locally as Cambois Links, parallel and to the east of the road known as The Bucca (or Cambois Farm Road) before heading west across The Bucca to a TJP close to the north of properties at Cambois Farm on Heightly Court.

Section 2: Agricultural Land to North of Wembley Gardens

- 4.90 From the TJP the cables run west through agricultural land to the north of Wembley Gardens. Standard open trench installation techniques will be used to lay the cables within this section with the agricultural land reinstated on completion. The standard working width including access, trenching and working areas is up to 16m as shown in Inset 4.1. Where the cable route crosses existing hedgerows a section of 10-16m of hedgerow will be removed at each crossing during cable installation. Hedgerows will be replanted on completion and existing field drainage in agricultural land will be reinstated where disturbed.
- 4.91 The screen planting to the north of Wembley Gardens will be retained as part of the Proposed Development. The cable route continues in a south westerly direction running parallel to Wembley Gardens towards Northumbria Water treatment works.
- 4.92 A Joint Pit (JP) is required in this area with the exact location to be confirmed by the cable contractor. The JP (as with the TJP) is the point at which cables are jointed and will involve working activities as outlined above. This will include appropriate provision for the delivery and offloading of the cable drum and the construction of a temporary access/laydown area.

Section 3: Railway Line

- 4.93 The cables will cross the railway line and road using a trenchless technique to enable the cables to be installed without surface disturbance. The trenchless technique will require the construction of a launch pit and receptor pit and temporary roadways to provide suitable access for drilling plant and associated equipment.

Section 4: Ferguson Business Park

- 4.94 The cables will run due south along the access track/Public Right of Way (PRoW) which runs between Ferguson's Business Park (to the west) and Sleekburn Business Centre (to the east). A temporary closure of the PRoW will be required during the installation of cables and a temporary diversion route will be put in place and appropriately sign posted.
- 4.95 The cables will be installed in Section 4 using standard open trenching techniques. Existing underground services will be negotiated in the detailed cable routeing, and the realignment of existing fence lines may be required in agreement with landowners. The surface of the track will be reinstated on completion.

Section 5: Scramble Track/Agricultural Land

- 4.96 A JP will likely be required to the south of the industrial development. From here the cable route will run south towards the water course called Cow Gut. From the industrial area the cable route could be laid through agricultural land or along the edge of an area of bare ground presently used for a scramble track. The exact cable route will be determined by the crossing point of Cow Gut.
- 4.97 The crossing of Cow Gut will be via one of the following three options:
- Using the existing culvert

- A new open trench crossing
- Cable bridge

4.98 The assessments consider each of these options. A third JP will likely be required close to the north or south of Cow Gut.

Section 6: Converter Station Site

4.99 From Cow Gut the cable route runs south through an area of plantation towards the proposed converter station site. The cables will be installed using standard open trench installation and will require the removal of a swathe of up to 16m of juvenile planting. On completion the ground will be reinstated with a grass seed mix and low growing native shrubs as tree species will affect the rating of the cables.

Section 7: HVAC Underground Cables from Converter Station Site to National Grid Substation

4.100 From the converter station site two swathes of HVAC cables will run south across Brock Lane to the proposed new NGET 400kV substation. Each swathe will require the removal of approximately 15-20m of juvenile planting along the road frontage and the roadside hedgerow.

4.101 Open cut techniques will be used to install ducts within Brock Lane to enable the cable installation. Traffic management will be put in place to retain access during the works. The road surface will be reinstated to appropriate highway standards on completion.

4.102 The HVAC cables run in a south east direction through agricultural land with a connection at the proposed new NGET 400kV substation (subject to a separate planning application). Agricultural land will be reinstated on completion and hedgerows will be replanted.

General Construction Information

Environmental Management

4.103 During construction, the appointed Contractors will be required to develop and implement a detailed site-specific Construction Environmental Management Plan (CEMP). The CEMP will as a minimum, set out the requirements to implement the mitigation measures identified within this ES. It will also set out a variety of control measures for managing the potential environmental effects of construction works including control and management of noise, dust, surface water runoff, waste and pollution control. In addition, the site environmental management will be audited by the developer and appropriate specialist environmental consultants.

Contractor Responsibilities and Communication

4.104 Contractors and their subcontractors will be required to conform to all relevant legislative and statutory requirements and comply with British Standards and relevant codes of good practice during construction works.

4.105 Communication will be undertaken with local residents and communities who may be affected by or interested in the works. Typical communications shall include the delivery of leaflets to local residents and businesses, newspaper advertisements and the establishment

of a ‘freephone’ telephone number for interested persons to call with questions or observations on the works.

- 4.106 The approach to communication during the works is intended to ensure that potential causes for complaints or disturbance are avoided where possible and that if any issues of concern arise, there is a mechanism for communicating with the developer.

Staffing and Employment

- 4.107 The number of staff on site will vary according to the construction phase and activities being undertaken.
- 4.108 Staff levels will be at their highest during the converter station earthworks and civil engineering works phases. Staffing levels will generally decrease as construction is progressed through to the commissioning phase.
- 4.109 The appointed contractor will employ a Site Environmental Manager (SEM) or Environment Clerk of Works (ECoW) who will be responsible for the preparation and implementation of the CEMP ensuring that mitigation measures identified in this ES are appropriately implemented. The SEM or ECoW will be supported by environmental specialists such as ecologists and archaeologists as required.

Hours of Working

- 4.110 The assessments in this ES have assumed that construction activities generally will take place on weekdays between 07.00 and 19.00 and at weekends between 07.00 and 14.00. There will be some periods, such as cable jointing, where 24 hours working will be required and exact arrangements will be agreed with NCC.

Construction Waste and Spoil

- 4.111 Subject to geotechnical testing, all excavated materials will be re-used on site wherever possible. Where waste materials are to be disposed of off-site, this will be at licensed waste disposal facilities in accordance with a Site Waste Management Plan (SWMP). The SWMP will be prepared by the Contractor in consultation with the Environment Agency (EA).
- 4.112 Estimated timescales for the construction of the UK onshore elements of NSN Link are set out in Table 4.1.

Table 4.1: Estimated Construction Timescales

UK Onshore element of the NSN Link	Timescales							
	2016/17		2017/18		2018/19		2019/20	
Converter site works								
Construct converter station and lay cables								
Converter site development (e.g. install equipment, connect, test and commission)								
Cable installation (excavate, lay joint and terminate and test)								

General Operation and Maintenance

- 4.113 The converter station will have a small workforce on site (approximately 6 personnel per day divided between 3 shifts over a 24 hour period) and the site will be subject to infrequent inspections and maintenance visits whilst in operation. The frequency and duration of maintenance visits will be dependent on the manufacturer's recommendations for the equipment installed.
- 4.114 NSN Link Ltd will be responsible for on-going maintenance and upkeep of the converter station. This will include regular inspection of the site and equipment as well as safety checks. In addition to the permanent staff there will be a requirement for a small number of additional visiting staff. The frequency of visiting staff will be ad hoc and subject to the activities to be undertaken. Should a programme of refurbishment/replacement be required there may be a requirement for greater numbers of personnel on site albeit on an ad hoc basis.
- 4.115 An assessment of the predicted effects associated with the permanent and temporary workforce is provided in Chapter 18.

Decommissioning

- 4.116 The anticipated operational life of the converter station and cables is approximately 40 years. This life expectancy could be extended dependent on the operation of the component parts which will be subject to ongoing inspection. Decommissioning of the converter station and cable infrastructure will be subject to a separate consent however for the purposes of this assessment decommissioning would involve similar activities to those described for construction.
- 4.117 Decommissioning of the converter station would involve the main components being dismantled and removed for recycling or disposal in accordance with the relevant waste disposal regulations.
- 4.118 Decommissioning of underground cables would involve disconnection from operational cable with options for leaving redundant cable in-situ or removal. Removal would involve similar activities to installation.

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5 PLANNING CONTEXT

Introduction

5.1 This chapter presents a summary of national and local planning policy relevant to the proposed development. Specific planning policies relevant to the environmental topics covered in this environmental statement (ES) are summarised in the specialist topic chapters.

National Policy

5.2 The National Planning Policy Framework (NPPF) published in March 2012 sets out the Government's planning policies for England. Some Planning Policy Statements that predated the NPPF remain in place such as PPS 10 (Planning for Sustainable Waste Management).

5.3 The NPPF is a material consideration in planning decisions and guides the development of Local Plans. Policies from the NPPF relating to the Proposed Development are outlined below.

5.4 The NPPF highlights the importance of delivering and planning for sustainable development and states a presumption in favour of sustainable development which is based around 12 principles that should under-pin plan making and decision taking. The following four principles are particularly relevant to the Proposed Development:

- *'Drive and support sustainable economic development to deliver the homes, business and industrial units, infrastructure and thriving local places that the country needs';*
- *'Seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings';*
- *Support the transition to a low carbon future in changing climate...and encourage the reuse of existing resources including conversions of existing buildings...'; and*
- *'Contribute to conserving and enhancing the natural environment ...prefer[ing] land of lesser environmental value where consistent with other policies in this framework.'*

5.5 The NPPF sets out 13 sub-topics beneath the goal of Delivering Sustainable Development. The most relevant to this ES are set out below.

- Section 4: Promoting Sustainable Transport;
- Section 7: Requiring Good Design;
- Section 10: Meeting the Challenge of Climate Change, Flooding and Coastal Change;
- Section 11: Conserving and Enhancing the Natural Environment; and
- Section 12: Conserving and Enhancing the Historic Environment.

5.6 This ES includes assessments which demonstrate the effects of the Proposed Development on these topics. Transport is addressed in Chapter 14 - Traffic and Transport. The design of the Proposed Development described in Chapter 4 - Project Description, is appropriate to its specialised function and incorporates measures to avoid or reduce environmental effects. The aspect of climate change which is likely to pose greatest risk to the project is risk of

flooding which is addressed in Chapter 13 - Hydrology and Flood Risk. The natural environment is considered in Chapters 7, 8 and 9 – Ecology, Landscape and Views respectively, while the historic environment is considered in Chapter 9 - Historic Environment.

Regional Planning Policy

- 5.7 The Localism Act contains provisions to alter the planning system and allow the Secretary of State to make orders revoking Regional Spatial Strategies (RSS). An order was laid before Parliament to formally revoke the North East RSS on 22nd March 2013. The Northumberland County and National Park Joint Structure Plan Alteration (February 2005) was also revoked as part of the Order, with the exception of Policy S5, concerning the Green Belt extension around Morpeth. The Council also resolved to have regard to the housing requirement figures contained in the revoked Regional Spatial Strategy on an interim basis until the adoption of the Northumberland Core Strategy. These two issues are not relevant to the Proposed Development.

Local Planning Policy

- 5.8 Current planning policies for Northumberland are contained in a number of documents that were produced and approved by the following former Local Planning Authorities in Northumberland.
- Alnwick District Council
 - Berwick-Upon-Tweed Borough Council
 - Blyth Valley Borough Council
 - Castle Morpeth Borough Council
 - Tynedale District Council
 - Wansbeck District Council
 - Northumberland County Council
- 5.9 In April 2009, these seven Local Planning Authorities merged to form one single Local Planning Authority – Northumberland County Council. The plans and policies produced individually by each of the seven Local Planning Authorities have been brought together to form the ‘Northumberland Consolidated Planning Policy Framework’.
- 5.10 The consolidated Planning Policy Framework forms the statutory Development Plan for Northumberland, and comprises ‘saved’ policies from the seven former Local Planning Authorities and Policy S5 from the former Northumberland Structure Plan. The Development Plan is amended by Local Development Framework documents as they are adopted.
- 5.11 The Proposed Development falls within the former District of Wansbeck. The Wansbeck District Local Plan was adopted in July 2007 and currently forms part of the Consolidated Planning Policy Framework for Northumberland County Council.
- 5.12 Preparation of the Northumberland Local Development Plan (the Local Plan) has commenced. Stage 1 of the Core Strategy Preferred Options document was consulted on during February and March 2013. Consultation on Stage 2 of the Preferred Options which sets out NCC’s preferred approach to housing, employment and Green Belt ended on 2nd

January 2014. While neither of the Preferred Options Consultation Documents have been adopted, they are still a material consideration in determining planning applications.

- 5.13 The area is currently identified in the Wansbeck District Local Plan as part of the Cambois Zone of Economic Opportunity. Policy EMP3 maintains Cambois as an area suitable for development by large employers, requiring large sites in non-estate locations and includes development proposals in use classes B1, B2 and B8. The area has since become established as an energy production location, particularly following the development of the UK's first pilot offshore wind farm in 2000 and the development of the National Renewable Energy Centre (NaREC) and the subsequent blade testing facilities on the Blyth Estuary.
- 5.14 Emerging planning policy recognises the growth in the low carbon, renewable energy economy in Blyth and includes the creation of a strategic employment area within the Blyth Estuary Renewable Energy Zone (BEREZ). BEREZ was established in 2010 and is a public/private sector partnership, including Northumberland County Council, to support investment in the low carbon sector at six sites north and south of the River Blyth. All of which have been given Enterprise Zone (EZ) status.
- 5.15 The proposed converter station site and part of the HVDC cable route corridor, south of Ferguson's Business Park are located on land which forms one of the BEREZ strategic sites; the East Sleekburn Strategic Site, which is identified for use as a blade or nacelle manufacturing plant or other major manufacturing operations associated with the Port and offshore renewables. It is also subject to a Local Development Order (LDO), which offers a potential fast-track planning approval for developments specified within the order.

The East Sleekburn LDO

- 5.16 The East Sleekburn LDO was adopted in February 2013 as a means of streamlining the planning process and to enable the development of two sites in East Sleekburn as part of the wider strategic initiatives outlined above, to create and support the conditions for economic growth.
- 5.17 The LDO grants planning permission exclusively for the erection of buildings and/or the use of the land and associated development for Use Classes B1(a), B1(b), B1(c); B2; and B8 (and ancillary Use Classes A1, A3)¹ subject to prescribed criteria and development conditions. It should be noted that although the Proposed Development does not fall within the provisions of the LDO, it can still be acceptable in planning terms; it just requires formal planning approval.
- 5.18 In developing the LDO, Northumberland County Council and its partners assembled comprehensive site information to provide developers with a detailed understanding of the sites to help assist them in devising their proposals. The following highlights a number of development considerations and conditions set out in the LDO, but are also of relevance to the Proposed Development, particularly in relation to the converter station site.

Access and Site Layout

- 5.19 The main access road to the LDO sites from the A189 (Spine Road) is Brock Lane, which is the proposed access route for the converter station. The LDO confirms that the existing highway is potentially suitable for the transportation of very large components (subject to

¹ As defined in the Town and Country Planning (Use Classes) Order 1987 (as amended)

minimal adjustments) and therefore capable of accommodating abnormal loads, which would be required for the delivery of transformers as part of the converter station development.

- 5.20 In terms of site layout, the LDO sets out a condition stating that development should be positioned so as not to prejudice future development in the wider LDO area and should take account of development restrictions associated with the overhead lines which cross the site. The converter station has been positioned as close to the edge of the site as possible, to achieve a large developable area for future development on the remaining part of the site, whilst limiting the loss of screen planting and limiting the impact on residential amenity. In addition, no buildings or areas of assembly, unloading, stacking or moving material or tall structures such as lighting columns are proposed underneath the overhead lines.

Development Scale

- 5.21 The LDO sets a maximum height of 35m AOD for all buildings. The tallest buildings proposed as part of the Proposed Development, relate to the converter station valve halls and DC switch hall which are anticipated to be up to 25m in height – well below the LDO maximum height limit

Landscaping

- 5.22 The LDO sets a requirement for a high quality landscaping scheme to be submitted for a site or development area which for the converter station site, should include the retention of at least a 50m wide strip of existing planting on the site's western boundary, and where possible a minimum 10m wide strip along the southern boundary.
- 5.23 As much of the existing planting is to be retained as possible as part of the Proposed Development. Additional planting will be created where the need is identified as part of the Landscape and Visual assessments.

Transport, Parking and Access

- 5.24 In order to comply with the provisions of the LDO, development exceeding set floorspace thresholds is required to submit a Transport Assessment. A Transport Assessment has been undertaken for the Proposed Development (Chapter 14) and considers the impacts of the Proposed Development on transport during construction, operation and decommissioning.
- 5.25 The LDO also seeks to ensure accessibility of the site through the consideration of servicing requirements, manoeuvring, loading/unloading, highway safety and must provide adequate parking for commercial vehicles, employees and visitors and cycle parking facilities. Servicing and parking facilities are proposed within the converter station site and includes circulation space to enable manoeuvring. These have been assessed as part of the Traffic and Transport assessment to ensure adequate parking and access provision to minimise danger, obstruction and inconvenience to users of the adjoining highway.

Sustainable and Surface Water Drainage

- 5.26 Details of drainage works are required to be submitted and approved by the LPA in order to comply with the condition set out in the LDO. This should include an assessment of potential Sustainable Drainage System (SuDS).
- 5.27 A conceptual Drainage Strategy has been prepared for the converter station site. This includes the provision of SUDS which would be implemented to effectively manage the

pollution risk arising from the proposed converter station and paved areas as well as provide the required attenuation volume, which may include pervious pavement, mini-swales, bio-retention or planters, as well as small ponds or basins.

Land Contamination and Ground Conditions

- 5.28 The LDO includes a condition which requires developments to determine the level of ground contamination present and remediation detailed and approved by the LPA. In addition, where development falls within the Coal Mining Referral Area, a Coal Mining Risk Assessment Report must also be submitted and approved by the LPA in consultation with the Coal Authority.
- 5.29 Chapter 12, Geology and Ground Conditions describes a range of surveys and desk-based assessments which have been used including Environment Agency mapping, British Geological Survey Maps and Coal Mining Authority reports and surveys and have been included as part of the Geology and Land Quality assessment.

Archaeology

- 5.30 A programme of archaeological work is required to be undertaken as part of the requirements set out in the LDO. These include submitting a written scheme of investigation, the completion of the archaeological recording scheme and where required, a programme of analysis, reporting, publication and archiving.
- 5.31 As part of the Historic Environment assessment (Chapter 10) receptors have been identified as part of the initial desk-based studies, which identified conservation areas, scheduled and non-scheduled monuments as well as areas of know and potential archaeological remains. The information collated as part of these studies has been used to establish the baseline for the historic environmental assessment and appropriate mitigation has been identified.

Lighting

- 5.32 In accordance with the LDO new lighting should be designed in accordance with Institute of Lighting Engineers Guidance Notes For The Reduction Of Obtrusive Light and should be positioned so as to protect the interests of amenity, prevent nuisance and distraction and protecting species and habitats
- 5.33 As described in Chapter 4 – Project Description, lighting (when required) as part of the converter station site will be controlled to avoid the unnecessary illumination of areas beyond the development. Glare and the spread of upward light will be kept to a minimum to reduce sky glow and minimise visual intrusion within the open landscape. It is not necessary to illuminate the whole perimeter. The entrance and walkways for access and egress and emergency exits will however need illuminating for safety reasons.

Noise

- 5.34 Noise from construction, piling and operations on site should be assessed using BS5228 and BS4142 respectively prior to the commencement of development under the provisions of the Order and a scheme for the effective control of noise and vibration from premises shall be submitted and approved in writing by the LPA. In addition, the Order limits noise associated with construction, operation and decommissioning to 55db(LAmax) at designated sites during the over wintering period October – March.

5.35 A full Noise and Vibration assessment has been undertaken as part of the ES. All relevant legislation, guidance and industry best practice has been used to inform the assessment including BS5228 and BS4142.

Dust, Particulates, Odour and Ventilation

5.36 The LDO requires that where a proposed development would result in emissions of dust, particulates, fumes or odours from the construction or operation of the site, a scheme be submitted for the effective control of such emissions.

5.37 A desk-based air quality assessment has been undertaken, provided in Chapter 16, to determine the potential air quality effects on receptors arising from the construction and operation of the Proposed Development, and a Construction Environmental Management Plan (CEMP) has been produced which identifies mitigation measures to be implemented where required during the construction stage to reduce or remove impacts such as dust, particulates, fumes and odours on receptors.

Ecological Assessment and Mitigation

5.38 A number of ecological matters are raised which need to be addressed as part of the conditions for the LDO. These include:

- Making provision for suitable undisturbed feeding and roosting habitat for wading birds and provision for suitable habitats for Grayling butterfly and reptiles;
- Bat accesses shall be created prior to any filling, sealing or other works to tunnels, or other voids;
- Construction pits/trenches/foundations should include escape ramps for otters;
- Where the site has developed a short perennial/ephemeral vegetation type of floristic interest the seed-bank should be trans-located to landscaping within or off-site or a seed collection method should be carried out; and
- No vegetation/site clearance shall be undertaken on the site or area of the development phase between the 1st March and 31st August unless it has been confirmed that no birds nests are being built or in use, eggs or dependent young will be damaged or destroyed

5.39 A full ecological assessment has been undertaken as part of the ES for the Proposed Development and appropriate mitigation has been identified in the interests of the conservation of biodiversity and the protection of species and their habitats.

5.40 Local planning policies relevant to each environmental topic in this ES are considered in Table 5.1 below.

Table 5.1 Summary of Relevant Planning Policy

Planning Policy	Policy Summary	Response to Policy
ES Chapter 7 – Ecology		
Wansbeck District Local Plan (2007) Policy GP8 – The Coastal Zone	The Coastal Zone, as defined on the Proposals Map, will be protected and, where possible, improved. Development in or affecting the Coastal Zone will only be permitted if: a) a coastal location is essential and no suitable alternative site exists; and b) development would not cause harm to coastal systems and habitats.	Designated and other locally important sites have been identified as part of the initial desk-top studies for the Ecology assessment (Chapter 7). These have been supplemented by extensive field studies to inform different elements of the proposals, including the location of the landfall, cable route and the location of the converter station. Information gathered also identified receptors to form part of the baseline data to be used in the Ecology assessment.
Wansbeck District Local Plan (2007) Policy GP10 – Sites of National Importance for Nature Conservation	This policy ensures that protected species and their habitats are not harmed by development. Where development is permitted, which affects a site providing habitat for a protected species, planning conditions and/or agreements will be used to ensure the protection and enhancement of the site's nature conservation interest or to provide compensatory measures for any harm.	Protected species and their habitats and non-designated sites of biodiversity importance have been included in the assessment.
Wansbeck District Local Plan (2007) Policy GP12 – Protection of Species	This policy ensures that protected species and their habitats are not harmed by development. Where development is permitted, which affects a site providing habitat for a protected species, planning conditions and/or agreements will be used to ensure the species are protected. In addition, Policy GP12 strongly advises development to undertake pre-application consultations with Natural England to avoid delays.	
Wansbeck District Local Plan (2007) Policy GP13 – Biodiversity and Wildlife Networks	The value to biodiversity of all sites proposed for development will be considered when planning applications are determined whether or not they are designated sites. Particular importance will be attached to the protection of priority habitats and species in Wansbeck. Where proposals affect a habitat which contributes, or could potentially contribute, to a network of natural habitats the developer will be required to protect and enhance the network.	
Northumberland Local Plan Preferred Options	Development proposals should seek to conserve and	

Planning Policy	Policy Summary	Response to Policy
Policy 51 – Natural Environment	enhance Northumberland's natural environment. Proposals that would result in significant harm to Northumberland's natural environment will only be permitted where the harm cannot be avoided, adequately mitigated or, as a last resort, compensated.	
ES Chapters 8 and 9 – Landscape and Views		
Wansbeck District Local Plan (2007) Policy GP5 – Landscape Character	The policy recognises that landscape and topographical features make an important contribution to the character and attractiveness of the District. It seeks to ensure that development that would have an adverse effect on the character or appearance of those areas which contribute most to the quality and distinctiveness of the local landscape, will not be permitted.	<p>Important themes running through these policies relate to the protection and enhancement of the natural environment and landscape features.</p> <p>Features within the landscape that help to define the landscape character and sensitive receptors have been identified in the Landscape and Visual Assessments. Effects of the Proposed Development on these features and receptors have been assessed.</p> <p>The landscape treatment of the development is described and assessed.</p>
Wansbeck District Local Plan (2007) GP6 – Trees and Hedgerows	Policy GP6 seeks to protect trees, woodlands and hedgerows and encourages new planting (particularly of native species), and development which would result in the loss of healthy trees which make an important contribution to the quality of the environment, will not be permitted unless there are overriding social or economic benefits of doing so.	
Wansbeck District Local Plan (2007) Policy GP30 – Visual Impact	All proposed development will be assessed in terms of its visual impact. Developments which in visual terms would cause significant harm to the character or quality of the surrounding environment will be refused.	
Wansbeck District Local Plan (2007) Policy GP32 – Landscaping and Public Realm	This policy requires developers to incorporate a high standard of landscape treatment in their developments. This should include: <ul style="list-style-type: none"> a) The retention of valuable landscape features; b) The inclusion of new landscape features which are appropriate to the development and its location; c) The inclusion of landscape features which enhance the visual quality of the development, reduce its impact and provide habitat for the district's wildlife; and d) Arrangements put in place for the future management and maintenance of all landscaped areas. 	
Northumberland Local Plan Preferred Options Policy 51 – Natural Environment	Development proposals should seek to conserve and enhance Northumberland's natural environment. Proposals	

Planning Policy	Policy Summary	Response to Policy
	that would result in significant harm to Northumberland's natural environment will only be permitted where the harm cannot be avoided, adequately mitigated or, as a last resort, compensated.	
Northumberland Local Plan Preferred Options Policy 52 – Landscape	Development proposals should seek to conserve and enhance the distinctive character and quality of Northumberland's landscape having regard to the Northumberland Landscape Character Assessment.	
ES Chapter 10 – Historic Environment		
Wansbeck District Local Plan (2007) Policy GP21 - Archaeology	Where evidence suggests that a proposed development could disturb archaeological remains, the developers will be required, before their planning application is determined, to provide information on the character and extent of the remains and any measures they propose to mitigate the impact of development. A field evaluation will be required if judged necessary.	Policies relevant to the Historic Environment Chapter address archaeological sites and remains, conservation areas and the historic environment. As part of the Historic Environment assessment (Chapter 10) receptors were identified as part of the initial desk-based studies, which identified conservation areas, scheduled and non-scheduled monuments as well as areas of know and potential archaeological remains. The information collated as part of these studies has been used to establish the baseline for the historic environmental assessment.
Northumberland Local Plan Preferred Options Policy 50 – Natural and Historic Environment	Development proposals should seek to conserve, protect and enhance Northumberland's distinctive and valued natural and historic environment by: <ul style="list-style-type: none"> • Giving great weight to the protection of international and national designated nature and historic conservation sites; • Applying an ecosystem approach to minimise impacts on biodiversity and providing net gains in biodiversity where possible; • Understanding the significance of heritage assets and their settings and the potential effect of proposals; • Protecting and enhancing the character, quality and distinctiveness of the landscape; • Preventing harm to geological conservation interests; • Preventing harm from unacceptable levels of soil, air and water pollution as well as adverse impacts on land stability; • Soil should be protected through sustainable use and re-use ; 	

Planning Policy	Policy Summary	Response to Policy
	<ul style="list-style-type: none"> • Limiting the impact of urbanising effects in those areas identified as tranquil; and • Identifying opportunities to enhance understanding and enjoyment of the natural, historic and built environment. 	
Northumberland Local Plan Preferred Options Policy 53 – Heritage Environment & Heritage Assets	Development proposals should seek to conserve, enhance and promote the quality and integrity of Northumberland's distinctive and valued historic environment and heritage assets. Proposals that would result in significant harm will only be permitted where the harm cannot be avoided, adequately mitigated against or, as a last resort, compensated.	
ES Chapter 11 – Land Use		
Wansbeck District Local Plan (2007) Policy GP7 – Best and Most Versatile Agricultural Land (BMV)	Development which would have an adverse and irreversible effect on the best and most versatile agricultural land will only be permitted if it can be demonstrated that the development cannot be accommodated on poorer quality land that is not subject to sustainability constraints.	<p>The local planning policies highlight that new development should aim to protect BMV agricultural land from development, preserve the coastal zone for development which requires a coastal location and which does not cause harm to coastal systems and habitats, and development of allocated sites for large industry to help encourage economic prosperity and the development of skills within the local area.</p> <p>The effects of the Proposed Development on these groups of land use receptors have been assessed in the Land Use Chapter of the ES. Where adverse effects are predicted mitigation measures are proposed to remove or reduce these effects.</p>
Wansbeck District Local Plan (2007) Policy GP8 – The Coastal Zone	<p>The Coastal Zone, as defined on the Proposals Map, will be protected and, where possible, improved. Development in or affecting the Coastal Zone will only be permitted if:</p> <ul style="list-style-type: none"> a) a coastal location is essential and no suitable alternative site exists; and b) development would not cause harm to coastal systems and habitats. 	
Wansbeck District Local Plan (2007) Policy GP36 – Comprehensive Development	Policy GP36 is concerned with making full use of land which is suitable for development, and does not permit development which would prejudice the future comprehensive development of other land which is either allocated for development in the plan or which has reasonable prospects in terms of plan policies of coming forward for development.	
Wansbeck District Local Plan (2007) Policy EMP3 – Cambois Zone of Economic Activity	<p>Defined on the Proposals Map, the Cambois Zone of Economic Activity provides an opportunity for developments requiring large sites in non-estate locations.</p> <p>Development for Use Classes B1, B2 and B8 are</p>	

Planning Policy	Policy Summary	Response to Policy
	<p>permitted provided;</p> <ul style="list-style-type: none"> • Development cannot be accommodated in a designated employment area • If development is proposed on greenfield land, there are not suitable brownfield sites • Proposals must include large amounts of tree planting and other forms of landscaping 	
Northumberland Local Plan Preferred Options Policy 2 – Spatial Distribution	The Core Strategy will focus the majority of new development in Northumberland's main towns and service centres. Additional large-scale development and growth will be focused on key locations in: Blyth, Cramlington, Ashington and Morpeth.	
Northumberland Local Plan Preferred Options Policy 6 – South East Northumberland Delivery Area.	<p>The County has been divided up into separate delivery areas. The South East Delivery Area includes the main settlements of Ashington, Bedlington, Blyth, Cramlington and Amble.</p> <p>Policy 6 aims to tailor the delivery approach to meet the specific development needs of the area. These include:</p> <ul style="list-style-type: none"> • Focusing large-scale development and growth on key locations in Blyth, Cramlington, and Ashington; and • Prioritising the Blyth Estuary Renewable Energy Zone strategic employment area for economic development within the low carbon and environmental goods and services sector and for renewable and low carbon energy generation; 	
Northumberland Local Plan Preferred Options Policy 13 – BEREZ Strategic Employment Area	The BEREZ strategic employment area is prioritised for economic development within the low carbon and environmental goods and services sector, and for renewable and low carbon energy generation.	
ES Chapter 12 – Geology and Ground Conditions		
Wansbeck District Local Plan (2007) Policy GP23 – Pollution and nuisance	When determining planning applications, the authority will consider whether a proposed development has the potential to cause pollution or nuisance. Planning permission will not be granted for development liable to cause significant harm to	Chapter 12, Geology and Ground Conditions describes a range of surveys and desk-based assessments which have been used including Environment Agency mapping, British Geological Survey Maps and Coal Mining Authority reports and surveys and have been

Planning Policy	Policy Summary	Response to Policy
	either: <ul style="list-style-type: none"> a) human health and safety b) the amenity of local residents and other land users c) the quality and enjoyment of all aspects of the environment 	included as part of the Geology and Land Quality assessment.
Northumberland Local Plan Preferred Options Policy 57 – Coastal Erosion and Coastal Change Management	Development proposals should avoid areas vulnerable to coastal change or add to the impacts of physical changes to the coast. Such development proposals must be proven appropriate and sustainable when assessed against the relevant management approach for the area as set out in the Shoreline Management Plan. Development proposals in areas vulnerable to coastal change will be required to: <ul style="list-style-type: none"> • Demonstrate the need for a coastal location that overrides the risk of coastal change and provides wider sustainability benefits; • Provide a Coastal Change Vulnerability Assessment which demonstrates that the development is safe over its planned lifetime; • Demonstrate that the coastal environment is not significantly adversely affected; • Provide an assessment of the impact of the development on existing coastal defence infrastructure. 	
ES Chapter 13 – Hydrology and Flood Risk		
Wansbeck District Local Plan (2007) Policy GP22 – Flood Risk and Erosion	Policy GP22 provides that developers should consider both the impacts of flood risk and erosion on the proposed development as well as the impact of the development on flood risk and erosion elsewhere. Where development is proposed in areas of flood risk a flood risk assessment is required. In coastal situations, work should not prejudice the ability of coastal features and processes to form natural sea defences.	Policy GP22 deals with flood risk, and more specifically minimising the risk and impact of flooding and erosion. A Flood Risk Assessment for the Proposed Development is provided in a report prepared by Ramboll UK, dated November 2013. Information on flood risk within the Proposed Development study area has been collected from a range of sources, including Flood Risk Assessments (FRA), Flood Management Plans and information and mapping from the Environment Agency (EA) website. The information
Wansbeck District Local Plan (2007)	When determining planning applications, the authority will	

Planning Policy	Policy Summary	Response to Policy
Policy GP23 – Pollution and nuisance	<p>consider whether a proposed development has the potential to cause pollution or nuisance. Planning permission will not be granted for development liable to cause significant harm to either:</p> <ul style="list-style-type: none"> a) human health and safety b) the amenity of local residents and other land users c) the quality and enjoyment of all aspects of the environment 	<p>collated as part of the desk-based studies forms part of the baseline for the hydrology and flood risk assessment in Chapter 13.</p> <p>There are also policies relating to water quality. The hydrology assessment considers the protection of groundwater and ground water sources. As part of the initial desk-based assessment and studies, a number of Environment Agency (EA) maps were utilised including groundwater vulnerability maps and the online aquifer designation and groundwater source protection zone (SPZ) maps, which formed part of the baseline assessment, along with information collated from other sources, including site assessment surveys.</p>
Northumberland Local Plan Preferred Options Policy 56 – Water Environment	<p><i>Flood Risk</i> Development proposals will be required to consider the effects of the proposed development on flood risk, both on-site and off-site, having regard to the policy approaches contained within the relevant Catchment Flood Management Plan.</p> <p><i>Water Quality</i> The strategy for water quality is to maintain and improve the water quality of Northumberland, having regard to local river basin management plans and the findings of the Northumberland Water Cycle Study.</p>	
Northumberland Local Plan Preferred Options Policy 57 – Coastal Erosion and Coastal Change Management	<p>Development proposals should avoid areas vulnerable to coastal change or add to the impacts of physical changes to the coast. Such development proposals must be proven appropriate and sustainable when assessed against the relevant management approach for the area as set out in the Shoreline Management Plan.</p> <p>Development proposals in areas vulnerable to coastal change will be required to:</p> <ul style="list-style-type: none"> • Demonstrate the need for a coastal location that overrides the risk of coastal change and provides wider sustainability benefits; • Provide a Coastal Change Vulnerability Assessment which demonstrates that the development is safe over its planned lifetime; • Demonstrate that the coastal environment is not significantly adversely affected; <p>Provide an assessment of the impact of the</p>	

Planning Policy	Policy Summary	Response to Policy
	development on existing coastal defence infrastructure.	
ES Chapter 14 – Traffic and Transport		
Wansbeck District Local Plan (2007) Policy GP4 - Accessibility	The policy provides that new development should be located to reduce the need to travel and to minimise journey length. It should be accessible by a range of transport modes including buses, walking and cycling, making clear that developments which are only accessible by car will not be permitted.	A number of the local planning policies relate to pedestrian access and the preservation of the amenity and safety of Public Rights of Way (ProW) and other forms of access. PRow and other public accesses have been identified as part of the baseline environment and included as part of the traffic and transport assessment, provided in Chapter 14. Where the Proposed Development is considered to have an adverse effect on access (including PRow), mitigation is proposed such as diversion routes during construction. Policy T6 considers the traffic impacts of new development. The Local Transport Plan provides a range of strategic objectives for transport. As part of the Transport Assessment the impacts of construction traffic on local roads and public amenity have been assessed and proposals to reduce the effects of construction have been considered.
Wansbeck District Local Plan (2007) Policy T3 – Provision for Cyclists	Developers will be required as a condition of planning permission to provide cycle parking as part of their developments.	
Wansbeck District Local Plan (2007) Policy T4 – Provision for Walking	Developers will be required to provide safe, convenient and pleasant routes for pedestrians. Proposals to extinguish or divert public rights of way, or close other footpaths, will not normally be supported	
Wansbeck District Local Plan (2007) Policy T5 – Access for People with Reduced Mobility	Developers are required to make appropriate provision for those with reduced mobility as part of their developments.	
Wansbeck District Local Plan (2007) Policy T6 – Traffic Implications of New Development	New developments vary greatly in terms of scale, character and location but all should provide satisfactory arrangements for access, internal circulation and servicing. Policy T6 seeks to ensure that proper consideration is given to such matters as part of the development control process.	
Wansbeck District Local Plan (2007) Policy T7 - Parking Provision in New Development	Policy T7 establishes that car parking will be an important consideration when proposals are being considered, taking account of: <ul style="list-style-type: none"> • The scale and type of development; • Accessibility by a range of transport modes; • The level of area wide parking standards and restrictions; and • The potential for environmental problems and safety issues. 	
Northumberland Local Plan Preferred Options Policy 40 – Principles for Accessibility	New developments should make adequate provision of pedestrian and cycle access and links to existing networks will be sought where appropriate. All development proposals should where appropriate and viable promote accessibility by:	

Planning Policy	Policy Summary	Response to Policy
	<ul style="list-style-type: none"> • Reducing the need to travel; • Supporting investment in infrastructure for sustainable modes of travel; • Prioritising access for pedestrians and cyclists; and • Considering the transport and accessibility needs of the whole community when planning and assessing development. 	
<p>Northumberland Local Plan Preferred Options Policy 41 – Parking Standards for Residential and Non-residential Development</p>	<p>This policy retains the Council’s current car parking standards with the need to consider:</p> <ul style="list-style-type: none"> • The scale and type of development; • Accessibility by a range of transport modes; • The level of area wide parking standards and restrictions; and • The potential for environmental problems and safety issues. 	
<p>Northumberland Local Plan Preferred Options Policy 43 – The Effects of Development on the Road Network</p>	<p>Development which will impact on the road network will be required to:</p> <ul style="list-style-type: none"> • Include appropriate measures to mitigate the adverse effects; • Minimise conflict between different types of road user; • Facilitate the safe use of the public highway; • Provide appropriate access and egress to/from the development; • Minimise any adverse impact on communities, including noise and air quality; • Where necessary, contribute to the improvement of access to key services and facilities; and • Provide access to sustainable transport provisions, where appropriate. 	
<p>ES Chapter 15 – Noise and Vibration</p>		
<p>Wansbeck District Local Plan (2007) Policy GP23 – Pollution and Nuisance</p>	<p>When determining planning applications, the authority will consider whether a proposed development has the potential to cause pollution or nuisance. Planning permission will not be granted</p>	<p>The local plan policies seek to control the impact of noise. The noise and vibration assessment, provided in Chapter 15 identified receptors as part of the baseline assessment and ambient noise assessments were</p>

Planning Policy	Policy Summary	Response to Policy
	<p>for development liable to cause significant harm to either:</p> <ul style="list-style-type: none"> a) human health and safety b) the amenity of local residents and other land users c) the quality and enjoyment of all aspects of the environment 	<p>undertaken. The predicted noise levels have been assessed for the construction and operational phases of the development and mitigation is proposed where appropriate.</p>
<p>Wansbeck District Local Plan (2007) Policy GP25 - Noise</p>	<p>Policy GP25 relates specifically to noise, and states that any likely impact of development in relation to noise, will be assessed in terms of the following:</p> <ul style="list-style-type: none"> a) any disturbance to people living in the area; b) any disturbance to other noise-sensitive uses such as hospitals, schools, colleges, offices and community buildings; c) any effect on people's enjoyment of the outdoor environment including gardens, parks, the coast and the countryside; d) any disturbance to wildlife or livestock; and e) whether any potential conflict can be resolved by the use of planning conditions or obligations. <p>Proposals which would cause significant harm in terms of the above criteria will be refused.</p>	
ES Chapter 16 – Air Quality		
<p>Wansbeck District Local Plan (2007) Policy GP23 – Pollution and Nuisance</p>	<p>When determining planning applications, the authority will consider whether a proposed development has the potential to cause pollution or nuisance. Planning permission will not be granted for development liable to cause significant harm to either:</p> <ul style="list-style-type: none"> a) human health and safety b) the amenity of local residents and other land users c) the quality and enjoyment of all aspects of the environment 	<p>Policy GP23 does not specifically relate to air quality. However it does seek to prevent development that has the potential to cause pollution or nuisance.</p> <p>A desk-based air quality assessment has been undertaken, provided in Chapter 16, to determine the potential air quality effects on receptors arising from the construction and operation of the Proposed Development</p>
ES Chapter 18 – Socio Economics		
<p>Wansbeck District Local Plan (2007) Policy GP35 – Crime Prevention</p>	<p>Proposals should include measures which discourage criminal activity. This could include:</p>	<p>The local planning policies highlight that new development should aim to achieve a high level of</p>

Planning Policy	Policy Summary	Response to Policy
	<ul style="list-style-type: none"> • Promotion of mixed use development and other schemes that increase the range of activities that maximize the opportunities for surveillance; • Maximizing the amount of defensible space which is controlled, or perceived to be controlled, by occupiers; and • A high standard of street lighting. 	<p>design which incorporates crime prevention measures, includes the principles of sustainable development and meets the overall regeneration objectives of the area.</p> <p>The effects of the Proposed Development on socio-economic receptors have been assessed in the socio-economic chapter of the ES (Chapter 18). Where adverse effects are predicted mitigation measures are proposed to remove or reduce these effects.</p>
<p>Northumberland Local Plan Preferred Options Policy 1 – Sustainable Development</p>	<p>This provides an overarching policy which reflects the presumption in favour of Sustainable Development, which includes:</p> <ol style="list-style-type: none"> a. Building a strong economy; b. Providing access to housing; c. Supports and improves access, health, infrastructure, social and cultural wellbeing; d. Conserves and enhances the natural, historic and built environment; e. Makes the most efficient and effective use of available resources (e.g. land, water, minerals, buildings); f. Demonstrates high quality design which respects and enhances local distinctiveness; g. Is resilient to economic, social and climatic change; h. Is aligned with the objectives of the Core Strategy. 	
<p>Northumberland Local Plan Preferred Options Policy 36 – Large-scale Renewable and Low Carbon Energy Development</p>	<p>Large-scale renewable and low carbon energy development proposals will be supported in order to contribute to energy generation and a reduction in CO2 emissions, unless the benefits are clearly outweighed by significant adverse effects on the environmental, social and economic wellbeing.</p>	

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6 OPTIONS AND ALTERNATIVES CONSIDERED

Introduction

- 6.1 This chapter outlines the alternatives which have been considered in the development of NSN Link project and the rationale for the selection of the preferred development option.
- 6.2 The main considerations for an interconnector are:
- The need for the connection;
 - The identification of appropriate technology to make the connection;
 - A marine cable route which is technically and environmentally achievable preferably following the shortest route;
 - An appropriate connection point to the grid system in each country;
 - The identification of an appropriate landfall and converter station site (up to 5 hectares);
 - A feasible HVDC connection between the landfall and converter station site;
 - A feasible HVAC connection and cable corridor to accommodate two pairs of cable infrastructure between the converter station site and HVAC connection; and
 - A connection point with the grid system.
- 6.3 The need case for NSN link is set out in Chapter 1. Having established the need for the link the factors listed above have been considered in the identification of the feasible alternatives. The alternatives considered in the development of NSN Link are outlined below.

Technology Options

- 6.4 There are a number of technology options for the principal components of NSN Link project and these are outlined in brief below with reasons for the selection of the terminology chosen.

HVAC or HVDC

- 6.5 In order to connect the national high voltage grid systems of Norway and the UK, a subsea cables connection is required. The only method of efficiently transferring electricity over the distance between the two countries is HVDC technology (as opposed to HVAC technology). For HVAC cable lengths in excess of a few tens of kilometres, the charging current creates a reactive power component that reduces the capability of the system to transmit power. In the onshore environment intermediate shunt compensation reactors (SCRs) can be installed in HVAC cable systems to compensate for the reactive power and restore the power transfer efficiency. SCRs contain assemblies of electrical components of considerable physical size which would be impractical to install in the marine environment.
- 6.6 HVDC does not suffer from reactive power losses and, by optimising the operating voltage and copper conductor cross-sectional area, system losses can be minimised and the link made highly efficient. The lower cost of HVDC transmission also makes it the most appropriate option to economically exchange power flows between the UK and Norway.

- 6.7 The use of HVDC technology for the link means that a converter station is required at each end of the link to convert between HVDC power and HVAC power, as used in the national grid transmission system.

HVAC-HVDC Connection Technologies

- 6.8 There are two HVAC-HVDC conversion technologies available that could meet the indicative power rating required for NSN Link. These are self-commutated voltage source conversion (VSC) and line-commutated current source conversion (CSC). NSN Link will use VSC technology. The main benefit of VSC technology is that less reinforcement work is necessary on the UK and Norwegian transmission networks in order to provide assurance of a connection date in 2020. In addition, VSC technology has the ability to control reactive power and active power independently to keep the voltage and frequency stable as well as providing the opportunity for multi-terminal configurations, which are particularly attractive in this case for the integration of large scale renewable energy sources such as offshore wind farms.

Monopole or Bipole Configuration

- 6.9 HVDC interconnectors can be configured either as monopole or bipole systems. The configuration dictates the number of HVDC/HVAC converter valves in the converter station and also the type of return path used to complete the electric circuit.
- 6.10 Bipole systems transmit power via a closed circuit of two high-voltage conductors of opposite polarity connected to four HVAC/HVDC converter valves.
- 6.11 Monopole systems have a single high-voltage conductor, at either negative or positive polarity connected to a single converter at each end. The return path maybe through the earth (and sea) or via a second cable. Using an earth return requires large copper electrodes to be placed near each end of the link to feed the return current into the earth and sea. Although monopole interconnectors with earth returns operate successfully in a number of locations without adverse effects on local environments, concern has sometimes been expressed in respect of recent possible similar installations. These concerns generally relate to the effects on the marine environment of electrolysis products from the electrodes and the possible effects on metallic structures (such as pipelines) of stray currents.
- 6.12 If a return conductor, known as a metallic return cable is used this is usually a cable with a lower voltage rating, although it carries the same current as the pole cable. Monopole systems may also use a metallic sheath around the main conductor as the return path (known as an integrated return conductor or IRC). Monopole systems with an IRC metallic return cable are often confused with bipolar systems. Monopole systems with metallic return presently available do not have the necessary power rating required for NSN Link. It is for these reasons that the proposed converter station will be constructed as a bipolar configuration.

HVDC Overhead or Underground

- 6.13 The HVDC transmission between the subsea cables landfall and the converter station could be achieved by overhead transmission (overhead lines suspended from lattice steel towers (pylons) or other supports) or by underground cables. The key factors in considering

whether underground or overhead transmission is used are cost, both capital and operational, and environmental effects.

- 6.14 Experience of operating outdoor above-ground HVDC electrical equipment in coastal locations indicates a relatively high level of faults due to the combinations of salt-laden air and pollution causing insulation problems. Underground transmission would be technically advantageous, reducing the need for maintenance and the risks of faults, for routes up to 3km inland from the landfall.
- 6.15 As the converter station site is less than 3 km from the coast, the connection from the landfall to converter station site will be by underground cables.

Marine Cable Route

- 6.16 The subsea cables in UK Waters are subject to a consenting regime under the Marine and Coastal Access Act 2009. The marine cable route has been subject to a feasibility study and detailed environmental assessment. An Environmental Statement (ES) for the UK marine elements of the project has been undertaken by Intertek on behalf of National Grid NSN Link Ltd. The ES presents the environmental assessment for the marine cable route within UK waters from the UK Norway median line to mean high water mark at Cambois, a distance of approximately 340km.
- 6.17 Consent has been granted by the Norwegian Authorities for cable installation between the Norwegian landfall (Hysten) and the UK Norway median line.
- 6.18 The UK landfall area is particularly relevant to the onshore application. The marine consenting regime extends to the mean high water mark and planning permission extends to the low water mark. The subsea cables between the low water mark and the high water mark in the intertidal area require planning permission and a license under the Marine and Coastal Access Act 2009 in an area of overlap between consenting regimes. The landfall and HVDC cable route in the intertidal area is considered in the following sections.

Connection Point in Norway

- 6.19 The Norwegian elements of NSN Link were subject to environmental assessment in 2002 during the development of a former UK-Norway interconnector project called North Sea Interconnector (NSI). This project was not progressed due to changes in Norwegian policy, but the consents granted at the time remain valid for the development of a converter station at Kvilldal.
- 6.20 The UK connection point for NSI was at Hawthorn Pit with a landfall at Ryhope. The UK consents granted for NSI are no longer valid however the opportunity for renewing these consents was considered in the feasibility study for NSN Link as outlined in the section below.

Connection Point in the UK

- 6.21 Initial studies were undertaken by Intertek and TEP on behalf of NSN Link in 2010 covering a wide area of study along the east coast of England extending from Norfolk to the Humber Estuary and including The Wash. These high level studies identified a range of environmental, technical and economic challenges in both the marine and terrestrial environments.
- 6.22 System studies undertaken by National Grid in 2011/2012 concluded that a connection in the north east of England offered the greatest opportunity for a connection to the transmission network as it would not require significant reinforcement works to the existing system. This also offered the shortest marine connection between the UK and England, albeit marginal.
- 6.23 Three connections points were put forward for further study at:
- Hawthorne Pit Substation, County Durham;
 - Saltholme Substation at Seal Sands, Cleveland; and
 - Blyth Substation, Northumberland.
- 6.24 Marine and terrestrial feasibility studies were commenced by Intertek and TEP in 2011 to consider these potential connection options from an environmental perspective.
- 6.25 A landfall closest to a proposed converter station site generally offers greatest potential if there is little differentiation in environmental constraints as it will require a shorter DC connection. Similarly a converter station site closest to the connection to the National Electricity Transmission System offers benefit as it minimises the length of the AC connection.
- 6.26 The marine feasibility studies are presented in the Marine ES with reference to the landfalls and an overview of the terrestrial studies included below.

Hawthorn Pit

- 6.27 Hawthorn Pit Substation was the connection point for the previously consented NSI project. The NSI project acquired consent in 2003 for a converter station to the south of Hawthorne Pit substation on land formerly part of a coking works and subject to an extensive reclamation scheme at the time. The project also achieved consent for a landfall in Ryhope and a 9km DC cable route running through the administrative boundaries of Easington District Council (now part of Northumberland County Council) and Sunderland City Council.
- 6.28 The previous planning consent was achieved through Public Inquiry in 2002. The local planning authority refused permission twice as a result of local residents and councillors objecting to the proposal due to concerns relating to noise, health and general effect on amenity from a large development on the site.
- 6.29 This consent has now lapsed and the local environmental conditions have been subject to change in recent years, including the full reclamation and restoration of the coking works site to open land and employment use (Hawthorn Prestige Business Park). A new housing development has also been built to the north of South Hetton, bringing properties closer than previously to the existing substation and formerly consented converter station site. This suggests that concerns previously expressed regarding effects on amenity, particularly in terms of noise and views would be of greater concern.

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- 6.30 There is some opportunity to site a converter station remote to the existing substation further east in Hawthorn Prestige Business Park however the relatively high ground levels in comparison to the surrounding land would result in a converter station being more visible in this location from the surrounding area.
 - 6.31 Cable routes and landfalls are considered to be achievable, although the DC cable route would be approximately over 9km in length and coastal erosion is an issue in this area.
 - 6.32 The planning history associated with the previous NSI project and the subsequent changes to the local environment were factored into concluding that there was less merit in pursuing this option further whilst a better alternative remained.

Saltholme

- 6.33 The feasibility of siting a converter station site on land approximately 2km to the east of the existing Saltholme substation on or close to the proposed Thor Cogeneration (combined heat and power and combined cycle gas turbine) 1,020MW power station was considered. Three potential sites were considered to offer opportunity subject to a review of technical constraints and availability of land.
- 6.34 All the sites identified were allocated for industrial use and the development of a converter station would be consistent with the scale of surrounding industry. Views in the area are limited with few residential properties in close proximity. Where views are possible they already include views of existing industrial units. The availability of land was however uncertain with some held for future expansion by existing industries in the area.
- 6.35 The area is covered by a number of ecological designations with much of the surrounding area is designated for its nature conservation interest including Ramsar, SPA and SSSI designations.
- 6.36 A landfall for these potential converter station sites was identified at Seaton Carew. A car park provides beach access although this area is allocated for commercial development. The coastline is designated for its ecological interest and there is also a known heritage asset in the intertidal area.
- 6.37 A 7km DC cable route from Seaton Carew to a potential converter station site close to Saltholme substation would be required. Cable routeing through this area was considered to be heavily constrained and would need to negotiate built development and industrial areas with numerous services both above and below the ground. The AC connection was considered to be possible through the use of an existing 400kV overhead line for which the Thor development had obtained consent to connect into but had not utilised.
- 6.38 Saltholme was found to offer good potential for gaining planning consent for a converter station, although land availability was a potential issue. The existing above and below ground services were considered to pose a serious technical constraint to identifying both DC and AC connections and it was concluded that there was less merit in pursuing this option further whilst a better alternative remained.

Blyth

- 6.39 Initial desk and field studies identified several sites with potential to accommodate a converter station for a connection into Blyth Substation. Feasible landfall and cable route options were also identified.
- 6.40 Potential landfall sites were identified in the marine feasibility study by Intertek. These are described below and the marine aspects are set out in further detail in the Marine ES.
- 6.41 Three geographically distinct landfalls were identified in relation to marine constraints and where potentially feasible converter station sites were present. These were at Lyne Sands, Sandy Bay and Cambois.
- 6.42 Several converter station sites were considered for a connection to Blyth substation. A summary of these potential sites is outlined below with reference to the landfall and DC and AC cable connections which would be required.

Adjacent Sandy Bay Holiday Park

- 6.43 This site was put forward for consideration as it was understood that the land would be made available by the landowner for development.
- 6.44 The site is to the north of the Wansbeck on agricultural land which is not allocated for development. Unlike much of the land to the south of the Wansbeck it has not been subject to former development and the area is more rural in character. There are relatively few views into the site, although it is very close to Sandy Bay Holiday Park and a converter station development would be visible from some parts of the Sandy Bay Holiday Park. .
- 6.45 The landfall option at Sandy Bay Holiday Park was identified as the preferred landfall for this site. It lies within the Northumberland Shores and the Cresswell and Newbiggin Shores SSSIs (geological and ecological sensitivities), and a DC cable route would need to negotiate Sandy Bay Holiday Park.
- 6.46 The AC connection to Blyth Substation would be around 3.5km and would need to cross the River Wansbeck.

Ashwood Business Park

- 6.47 This site was identified within an existing Business Park with the land allocated for employment uses, although the allocation favours development in the Information and Communications Technology sector in a high quality business park setting.
- 6.48 Views from North Seaton are limited by an established landscape scheme, although there would be views from the south and particularly from a small area of terraced housing which could raise amenity issues in terms of views and noise.
- 6.49 The landfall adjacent to Sandy Bay Holiday Park was considered to be the preferred landfall option and therefore had similar DC and AC cable route issues as described in the section entitled “Adjacent Sandy Bay Bay Holiday Park” above.
- 6.50 The baseline case for the Ashwood Business Park site has changed since the feasibility study with a large paint factory now occupying the majority of this site.

West Sleekburn

- 6.51 Two potential sites were identified to the west of the A189 to south of the River Wansbeck, one adjacent the Four Rivers biofuel plant (which has since been decommissioned and dismantled) and the second site adjacent an aggregate block works. Both identified sites are within the Cambois Zone of Economic Opportunity allocated for development by businesses requiring a large non-estate site for Use Classes B1 Business, B2 General Industry and B3 Storage or Distribution and a converter station was considered to be consistent with the scale of existing development and views into the sites would be limited. The baseline case for the Four Rivers site has since changed with its demolition and new large scale development in this location adjacent the river would now be more prominent.
- 6.52 A landfall at north Cambois would enable a DC cable route of 2-3km connection to these sites and a 2-3km AC connection to the substation at Blyth. The AC cable routes would need to negotiate A189.

Adjacent Lynemouth Power Station/Alcan

- 6.53 Several sites were identified in the vicinity of the Lynemouth Power Station and the former RTZ aluminium smelter however land availability and ground conditions were identified as factors which would require further consideration.
- 6.54 A landfall option at Lyne Sands was identified which avoided the Ramsar, SPA and SSSI designations although within an area of historic coastal landfill.
- 6.55 A DC cable route would be short although technically challenging due to existing land uses including coal storage, a sewage works and settlement. An AC connection to Blyth Substation would be approximately 8km in length and would need to negotiate the settlement of Woodhorn and a railway line and cross the River Wansbeck.

Blyth Substation

- 6.56 The majority of land close to the substation is brownfield land and is within the Cambois Zone of Economic Opportunity for development by businesses requiring a large non-estate location for Use Classes B1 Business, B2 General Industry and B3 Storage or Distribution. Large scale development is already present in this area and the converter station development would be consistent with this.
- 6.57 A site in the vicinity of Blyth substation offered opportunity as it would minimise the length of the DC and AC connections. Feasible landfall sites were identified close to Blyth Substation on Cambois beach.

Summary

- 6.58 It was concluded that sites close to Blyth Substation offered greater opportunity to minimise environmental effects and should be considered further in the first instance. Existing large scale development is already present and planning policy promotes similar development in the area. Feasible landfall sites and short feasible DC and AC cable routes are also present.
- 6.59 NSN Link Ltd has entered into an agreement to connect at Blyth substation.
- 6.60 A summary of the detailed development of the project components for a connection at Blyth Substation are outlined below.

Identification of Preferred Project Components at Blyth

Converter Station Site

- 6.61 Early discussions with the Local Planning Authority and Arch Group provided an understanding of the aspirations for the area and talks with Natural England established the feasibility of landing the cables within a designated SSSI.
- 6.62 Discussions with landowners established that much of the land close to Blyth Substation was not readily available for sale or long term lease to NSN Link Ltd. The East Sleekburn site was considered to offer good opportunity to site the converter station and is within an area covered by a Local Development Order to promote development in the area as outlined in the Chapter 5 Planning Policy.
- 6.63 The siting, design and access of the converter station has been considered in the development of the project to produce an outline scheme which is technically achievable and minimises effects on the local environment. This outline design forms the 'Rochdale Envelope' basis for this assessment. The detail will be confirmed by the preferred contractor on the award of the contract and the detailed design will be secured through reserved matters applications.

Landfall Site

- 6.64 Two landfall options were identified to connect to a converter station close to Blyth Substation. These are Cambois south and Cambois north and are described below.

Cambois South

- 6.65 This landfall is due east from Blyth Substation. It is close to an existing access road beneath the railway and a roundabout on Brock Lane. This landfall is technically achievable from a marine perspective with access to the beach via the existing access track.
- 6.66 This is however also the preferred landfall for the Narec Offshore Wind Demonstration Site project and the narrow access way beneath the railway compromises the feasibility of the site for multiple projects. Brock Lane would provide the HVDC cable route from this landfall to the converter station site and this is constrained by existing underground services and is also the proposed cable route for the proposed Narec development and the North Blyth Biomass Power Station development.
- 6.67 The use of the former Blyth Power Station outfall pipe was considered as an option to avoid conflict with other projects in this constrained area. However this pipe was installed for a different use, is over fifty years old and runs beneath several properties. This option was therefore considered to bring greater technical uncertainty and risk to the project and was not considered further whilst a more feasible option to the north remained.

Cambois North

- 6.68 Cambois North is to the south of the River Wansbeck in the vicinity of an existing slipway. This landfall is technically achievable from a marine perspective with access to the beach via the existing slipway.
- 6.69 Several options and techniques were considered for a landfall in this area including Horizontal Directions Drilling (HDD) and open trenching at several locations to the north and south of the access road. Technical studies (including coastal erosion and ground

investigation studies) combined with ecological studies and a site meeting with Natural England on 23rd August 2013 has informed the decision making process.

- 6.70 The direct burial of the cables in the beach and in the existing slipway has been identified as the preferred method of cable landfall on technical, economic and environmental grounds.

DC Cable Route

- 6.71 Technical and environmental factors have been considered in the identification of an underground cable route from the landfall to the proposed converter station site.
- 6.72 A direct connection between a landfall at Cambois slipway and a converter station site at East Sleeburn is constrained by existing housing at Wembley Gardens and the former Blyth Power Station coal stocking area and landfill site.
- 6.73 A cable route along the existing road system along Wembley Gardens Road was considered as an option however it is constrained by existing services and would increase disturbance to local residents during the installation works.
- 6.74 A route west through agricultural land to the north of Wembley Gardens was considered to offer a feasible route. There are limited environmental and technical constraints. The cable route installation would result in short term disturbance with agricultural practice able to continue following reinstatement. There are proposals by NCC to improve this land for nature conservation interest; however discussions have confirmed that a cable route through this area would not compromise this proposal subject to sensitive routeing and reinstatement.
- 6.75 The route south through Ferguson Business Park to a converter station site at East Sleekburn was considered be feasible although required technical consideration of issues such as the crossing of the railway and Cow Gut.
- 6.76 It was concluded that a landfall at North Cambois and a HVDC cable route through agricultural land and Ferguson Business Park was environmentally and technically preferred.

AC Cable Route

- 6.77 An AC connection is required between the converter station and a new 400kV Substation. This new substation would be sited next to the existing 275kV substation at Blyth and is being developed as a separate planning application by NGET. Due to the short length of this connection (of less than 500m) underground cables are being proposed beneath Brock Lane.

Conclusions

- 6.78 Several alternative options for a grid connection point, converter station sites, underground cable routes, landfalls and subsea cable routes have been considered in the development of NSN Link project since 2011.
- 6.79 This feasibility study has confirmed the preferred onshore elements of NSN Link project which comprise a converter station site at East Sleekburn; a landfall at the existing slipway in north Cambois; a DC cable route through agricultural land and Ferguson Business Park; and

a short AC connection between the converter station site and a proposed new NGET substation adjacent the existing Blyth Substation.

- 6.80 The project scheme assessed in this Environmental Statement is the preferred option in relation to technical feasibility, economic viability and deliverability and is expected to cause the least disturbance to the environment and people relative to other options that have been considered.
- 6.81 The following chapters provide a detailed assessment of the effects of the preferred project design on the environment and the identification of mitigation measures which will minimise effects during installation, operation and decommissioning of the project components.

7 ECOLOGY

Introduction

- 7.1 This chapter examines the effects associated with the proposed onshore components of NSN Link (“the Proposed Development”) on ecology. In particular, it considers the potential effects of any loss, disturbance, damage or deterioration of valued ecological receptors that may result from the Proposed Development.
- 7.2 For details of the project description, reference should be made to Chapter 4 of the Environmental Statement (ES). The application boundary of the Proposed Development has been split into seven sections as presented in Figure 4.5 of this ES.
- 7.3 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance. The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (“NSN Link Ltd”) and their contractors, in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the scheme design to reduce identified impacts
- 7.4 In consultation with Northumberland County Council the desktop assessment has been informed by a programme of Ecological Assessment. Those surveys carried out include: :
- Desktop Study;
 - Extended Phase 1 Habitat Survey;
 - Great Crested Newt Survey;
 - Water Vole/Otter Survey;
 - Wintering Bird Survey;
 - Breeding Bird Survey;
 - Badger Survey;
 - Bat Roost Potential of Buildings and Trees; and
 - Bat Activity Surveys.
- 7.5 All ecological surveys were undertaken in 2012 to 2014 with surveys carried out by TEP and their sub consultant. The extent of the survey area is illustrated in Figure 7.1 and the respective technical reports included as Ecological Assessment of the Cambois and East Sleekburn Area and Winter and Breeding Bird Survey 2012 to 2014, available under a separate cover.

Legislative and Policy Context

- 7.6 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on ecology associated with the Proposed Development. This section should be read in conjunction with Chapter 5 which provides a more detailed overview of the policy context however the key policies relevant to this chapter are discussed below.
- 7.7 The Proposed Development and the species recorded within the Proposed Development have been considered within the context of the relevant legislation including:

- The Conservation of Habitats and Species Regulations 2010 (as amended) (The Habitat Regulations);
- Wildlife and Countryside Act 1981 (as amended) (WCA);
- The Countryside and Rights of Way Act 2000 (as amended) (CRoW Act);
- Natural Environment and Rural Communities Act 2006 (NERC);
- The Protection of Badgers Act 1992; and
- Hedgerow Regulations 1997.

The Conservation of Habitats and Species Regulations 2010

- 7.8 These Regulations¹ are the principal means by which the provisions of the Habitats Directive (Council Directive 92/43/EEC)² and the Birds Directive (Council Directive 2009/147/EC)³ are transposed into national legislation in England and Wales.
- 7.9 The Regulations provide for the designation of European protected sites (Special Areas for Conservation (SACs) as required by the Habitats Directive and Special Protection Areas (SPAs) as required by the Birds Directive). The Regulations require an appropriate assessment be made where any plan or project is likely to adversely affect the integrity of a European protected site.
- 7.10 The Regulations also provide for the identification of habitats and species for which European sites may be designated (as listed on Annex I and Annex II of the Habitats Directive) and assigns a European level of protection for certain native animals and plants (European Protected Species (EPS)).

The Wildlife and Countryside Act 1981 (as amended) and the Countryside and Rights of Way Act 2000 (as amended)

- 7.11 The WCA (as amended)⁴ provides a national level of protection to specific native animals and plants and controls the release of non-native species
- 7.12 The Act also provides for the designation and protection of Sites of Special Scientific Interest (SSSIs), identified for their flora, fauna, geological or physiographical interest.
- 7.13 The CRoW Act⁵ amends the WCA, expanding the terms of offences to include reckless activity. The Act also places a duty on Government and Ministers to have regard to biodiversity and lists a number of habitats and species of principal importance in conserving biodiversity.

¹ Statutory Instrument No. 490 (2010) The Conservation of Habitats and Species Regulations 2010, Office of the Deputy Prime Minister, London.

² Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended)

³ Council Directive 2009/147/EC of 30 November 2009 on the Conservation of Wild Birds

⁴ Office of Public Sector Information: Wildlife and Countryside Act 1981 Chapter 69, as amended including by Statutory Instrument No. 431 (2008) Wildlife and Countryside Act 1981 (Variation of Schedule 5) (England) Order 2008, ODPM, London.

⁵ Office of Public Sector Information: Countryside and Rights of Way Act 2000 as amended

The Natural Environment and Rural Communities Act 2006

- 7.14 The Act⁶ imposes a duty on all public bodies to have regard for biodiversity conservation when carrying out their functions. This extends the duty imposed upon Government and Ministers by the CRoW Act⁵.
- 7.15 The Act also amends the list of habitats and species of principal conservation importance for which biodiversity conservation should be prioritised.

Badger Protection Act 1992

- 7.16 The Badger Protection Act sets out the protection given to badgers and their setts and the penalties for disturbing badgers without consent.

Hedgerow Regulations 1997

- 7.17 Various criteria specified in the Regulations are used to identify “important” hedgerows for wildlife, landscape or historical reasons. “Important” hedgerows (as defined in the Regulations) are protected from removal (up-rooting or otherwise destroying) without written consent from the local planning authority.
- 7.18 All ecological mitigation proposals within this assessment have been drawn up in full consideration of the above legislation. For example, timing of works and habitat mitigation measures are proposed to avoid and reduce impacts upon nesting birds protected under the WCA. Mitigation measures have been drawn up to maintain or enhance the favourable conservation status (FCS) of the relevant species or habitat.

National Planning Policy

- 7.19 The National Planning Policy Framework (NPPF) underlines the Government’s commitment to sustainable development, the conservation, enhancement and restoration of the diversity of our wildlife and geology, and ensures that developments take account of the role and value of biodiversity and green infrastructure.
- 7.20 Circular 06/2005: Biodiversity and Geological Conservation – Statutory Obligations and their Impacts on the Planning System, remains in force as a statutory document accompanying the NPPF. It outlines the legislative provisions relating to biodiversity and geological conservation which affect planning and development. The Circular provides guidance on the protection of designated international and national nature conservation sites, non-designated sites, the conservation of species, and advice on the related issues and statutory powers.

Local Planning Policy

- 7.21 The Northumberland Consolidated Planning Policy Framework forms the statutory Development Plan for Northumberland, and comprises ‘saved’ policies from the seven former Local Planning Authorities, as well as Policy S5 from the former Northumberland Structure Plan and Local Development Framework documents as they are adopted
- 7.22 The UK onshore elements of NSN Link fall within the former District of Wansbeck. The relevant planning policy documents are the Wansbeck District Local Plan (2007), which currently forms part of the Consolidated Planning Policy Framework for Northumberland County Council, and the Core Strategy Preferred Options document which, although not yet adopted, is still a material consideration in determining planning applications.

⁶ Office of the Deputy Prime Minister (2006) Natural Environment and Rural Communities Act 2006 Chapter 16, ODPM, London.

Habitats and Species of Principal Importance and the Northumberland Biodiversity Action Plan (LBAP)

7.23 The UK BAP has now been superseded by the UK Post-2010 Biodiversity Framework. This includes the “list of habitats and species of principal importance for the conservation of biodiversity” in England, as required under Section 41 of the Natural Environment and Rural Communities Act 2006. The conservation of these habitats and species is a material consideration in determining planning applications.

7.24 In relation to this project, the following habitats and species are of particular relevance:

- Hedgerows;
- Common toad;
- Great crested newt;
- Otter;
- Bats (except common pipistrelle);
- Water vole;
- Skylark;
- Curlew; and
- Lapwing.

Northumberland Biodiversity Action Plan

7.25 The local BAP (LBAP) for the area is entitled ‘Northumberland Biodiversity Action Plan’. This focuses on aspects of the local ecology which are in need of protection or conservation. The habitat and species action plans of general relevance to this proposal are:

- Saltmarsh and mudflat;
- Sand dunes;
- Trees and hedgerows;
- Rivers and streams; lowland meadows and pastures;
- Otter
- Bats;
- Great crested newts;
- Water vole; and
- Coastal, farmland and garden birds.

Birds of Conservation Concern

7.26 Birds in the UK are split into three categories of conservation importance – red, amber and green. Red is the highest conservation priority, and includes species that are globally threatened, or have experienced historical UK population decline, a severe decline in UK breeding population, or a severe contraction of UK breeding range. Amber is the next most critical group, followed by green.

Methodology

Study Area

- 7.27 The assessment was undertaken for the Proposed Development and a 2km buffer. Information and species data were sought for the Proposed Development and buffer up to 2km to place the Proposed Development into its ecological context and, to ensure that any potential impacts on surrounding habitats/species were taken into consideration. In relation to birds the assessment was undertaken for the Proposed Development and a 5km buffer.

Assessment Methodology

- 7.28 The methodology outlined below is considered to be applicable for the construction, operational and decommissioning phases.
- 7.29 For the purposes of this chapter and in relation to ecology, the activities associated with decommissioning are considered to be similar in nature to those of construction. The cables might require repair during the operational phase in which case there may be a need to excavate down to them. In terms of decommissioning it is understood that the redundant cables would either be left in situ or removed.
- 7.30 The scope of this assessment comprised the following:
- Desk based review of available information;
 - Site walkover of the cable route and converter station;
 - Consultation with Northumberland County Council (NCC) to inform the scope of the ecological baseline
 - Establish a robust and accurate ecological baseline for the site;
 - Identify and evaluate the nature conservation/biodiversity interest present;
 - Identify any potential impacts arising from the development proposals (construction and operational stages);
 - Establish the magnitude and significance of those identified impacts;
 - Identify mitigation measures to address the significant impacts;
 - Assess any residual impacts and the need for any compensation; and,
 - Assess cumulative impacts from other surrounding developments.

Consultation and Scoping

- 7.31 During the initial stages of the Ecological Impact Assessment, discussions were held with NCC to identify potentially important ecological receptors. The key comments/ecological receptors identified through consultation are detailed below:
- Bird species and inland roosting for birds associated with SPA/SSSI;
 - Otter recorded on Blyth and Wansbeck Estuaries and likely to range along watercourses occasionally;
 - Common lizard recorded on brownfield areas and dunes and slow-worm recorded within 2 miles. NCC confirmed that they would expect to see reptiles properly accounted for if suitable habitats (i.e. railway lines and dune backs) would be impacted by the proposals;

- Dingy skipper are often found on roadsides, rail sidings or similar habitats as well as grayling;
- Nesting birds should be considered as ecological receptors as hedgerows are suitable for nesting, and ground nesting species could also be present;
- Bats may range across the area but roosts are unlikely to be affected;
- Presence of water vole possible, but previous extensive survey in the area has not resulted in records; and
- Great crested newts considered low risk as one record from approximately 10 years ago and extensive survey in the area since has not resulted in any records.

Assessment Methodology

Zone of Ecological Influence

7.32 The Zone of Ecological Influence is defined by the Institute of Ecology and Environmental Management (IEEM)⁷ as ‘the areas and resources that may be affected by the biophysical changes caused by activities completed during the project’. In the case of this project as defined in paragraph 7.27 the zone of influence extends beyond the site boundary, as there is the potential for impacts to watercourses connected to those within the site, as well as to protected sites to the south of the site boundary, and to the coastal habitats which are important for wintering shore birds and lie downstream of the site.

7.33 The scope of this assessment comprised the following:

- A review of digital mapping and aerial photography;
- A review of existing survey information including:
 - A report prepared by Northumberland Wildlife Trust (2006)
 - Reports prepared by White Young Green (2007)⁸
 - A report prepared by SKM Enviros (July 2011)⁹
- A site walkover of cable route and converter station by TEP;
- Consultation with NCC Ecologist
- A programme of Ecological Assessment including: :
 - Desktop Study;
 - Extended Phase 1 Habitat Survey;
 - Great Crested Newt Survey;
 - Water Vole/Otter Survey;
 - Wintering Bird Survey;
 - Breeding Bird Survey;
 - Badger Survey;
 - Bat Roost Potential of Buildings and Trees; and
 - Bat Activity Surveys.

⁷ Institute of Ecology and Environmental Management (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom*. IEEM, Winchester

⁸ White Young Green, various reports of the former Blyth Power Station Site prepared for RWE Power. Reports included: Amphibian Survey (October 2007), Reptile Survey (February 2008), Riparian Mammal Survey (August 2008) and bat Roost Potential and Transect Surveys (August 2008).

⁹ SKM Enviros, Blyth-Cambois Wader Study prepared for Northumberland County Council (July 2011)

- An assessment of the potential impacts and any mitigation measures that might be required.

Desktop Study and Consultation

- 7.34 A desktop study was carried out in February 2013, prior to any fieldwork. The objective of the desktop study was to collate existing background information on the ecology of the site. The study included a search for statutory and non-statutory sites designated for their nature conservation value, records of protected or notable species within the site or surrounding habitats which could be impacted by the scheme and habitats or features of interest.
- 7.35 A review of published information relating to the Proposed Development was undertaken. Information was obtained from the following sources:
- Natural England;
 - Ordnance Survey Maps;
 - MAGIC website¹⁰
 - Aerial mapping
- 7.36 As part of the desk study and development of the baseline existing ecological survey reports prepared by White Young Green in relation to the former Blyth Power Station, and Northumberland Wildlife Trust in 2006, in relation to the development of the existing sub-station were reviewed to provide additional background detail of the likely features of ecological value within the survey area
- 7.37 In addition a programme of consultation was undertaken in February 2013 and the following groups were consulted:
- Natural England;
 - Northumberland Wildlife Trust
 - Northumberland County Council (Ecologist);
 - Environmental Records Information Service (ERIC);
 - Royal Society for the Protection of Birds (RSPB);
 - Northumberland Bat Group; and
 - Northumberland Badger Group.
- 7.38 Ecological surveys were carried out by TEP and sub consultants E3 Ecology Ltd. The sections which follow detail the survey methodology adopted.

Extended Phase 1 Habitat Survey

- 7.39 An Extended Phase 1 Habitat Survey was carried out between 25th and 27th June 2013 by TEP. The area surveyed included the Proposed Development and additional buffer area. The survey was carried out in accordance with the Phase 1 Habitat Survey Methods¹¹ and the Guidelines for Baseline Ecological Appraisal (IEEM 2012).
- 7.40 Each habitat was classified in the field and its extent mapped onto Ordnance Survey maps (1:10,000). The Phase 1 habitat plan is provided at Figures 7.3.1 to 7.3.3 Notes were made in the field relating to dominant plants, their associates, structure of vegetation or

¹⁰ <http://www.magic.gov.uk>

¹¹ Joint Nature Conservation Committee (2010). *Handbook for Phase 1 Habitat Survey - a Technique for Environmental Audit*. Reprinted by JNCC, Peterborough.

points of general conservation/ecological interest, including the presence, or potential presence of notable or protected species on the site. Botanical taxonomic nomenclature follows that of Stage 3rd edition¹².

Great Crested Newt Survey

- 7.41 Aerial photography and a site walkover were used to identify any waterbodies up to 500m from the development area. A Habitat Suitability Index (HSI) was calculated, as detailed in ARG UK Advice Note 5 and based on Oldham *et al* 2001¹³, for 23 waterbodies to assess their suitability to support great crested newts. The location of the ponds is indicated on Figure 7.4. The results from this informed the requirement for detailed great crested newt surveys.
- 7.42 Great crested newt surveys were carried out by E3 Ecology Ltd and followed the standard methodology in the Great Crested Newt Mitigation Guidelines¹⁴. A combination of survey methods was undertaken on each visit, which included a mix of egg searches, torchlight surveys, netting and bottle trapping, and surveys were undertaken in suitable weather conditions (i.e. minimum overnight temperature of >5°C, low wind and little rain) where possible. Surveys were carried out between 13th May and 12th June 2013 but, due to the late start of the season as a result of unusually cold weather, this timing is considered appropriate.

Bats

- 7.43 An initial assessment of the value of the Site for bats was undertaken in conjunction with the Phase 1 Habitat Survey in June 2013. This involved an external assessment of any buildings in terms of their potential to support roosting bats, as well as a ground based assessment of any mature trees. The surveys were undertaken with the aid of close focusing binoculars to identify any features of potential value to bats, such as fissures and cracks in trees or brickwork, or evidence of use by bats such as droppings or staining. The habitats on site were also assessed in terms of their likely value for foraging and/or commuting bats.
- 7.44 Following the initial site assessment, two activity transects were carried out in the south-west section of the site and around the proposed converter station, where sections of hedgerow and/or scrub may require removal for the development. These surveys were undertaken by E3 Ecology Ltd on 5th and 19th September 2013 using standard methodology as described in Bat Conservation Trust Bat (BCT) Surveys: Good Practice Guidelines 2012¹⁵. A pair of surveyors walked a transect along key features for bats, such as hedgerows. Surveys commenced approximately 10-15 minutes before sunset and continued until approximately 1.5 to 2 hours after sunset, with point counts undertaken at a number of selected stations along the transects. All bat activity was recorded at both selected points and along the transect between these points. The time, location, activity, direction of flight, species and number of all bats encountered was recorded. Surveyors used Batbox Duets heterodyne and frequency division bat detectors, together with Anabat SD2 frequency division recorders

¹² Clive Stace (2010). *New Flora of the British Isles*. 3rd edition. Cambridge University Press, Cambridge

¹³ Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal 10(4), 143-155.

¹⁴ English Nature (2001). *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough.

¹⁵ Bat Conservation Trust (2012). *Bat Surveys: Good Practice Guidelines*, 2nd Edition. Bat Conservation Trust, London.

linked to a GPS. Surveys were undertaken in suitable weather conditions (i.e. avoiding heavy rain, high winds and temperatures below 10°C).

- 7.45 The location of the buildings assessed in terms of bat roost potential and the transect routes for the activity surveys are indicated on Figure 7.5.

Water Vole and Otter

- 7.46 Water vole surveys were carried out in conjunction with the Phase 1 Habitat Survey following the accepted methodology described in the Water Vole Conservation Handbook 3rd edition¹⁶. This involves searching for characteristic signs of water vole presence, such as droppings, latrines, feeding stations, burrows, runways in vegetation and footprints. Surveys were undertaken from the banks only, not from within the watercourse itself. Evidence of the presence of otters, such as tracks, spraint, couches and/or potential holts was also searched for in accordance with guidance provided by Macdonald et al (1998).

Reptiles

- 7.47 Full reptile surveys were not carried out in 2013, although low numbers of common lizard have been recorded in the dune habitat and in the grassland to the east of the existing electricity sub-station. It was considered that any additional information resulting from further survey would not alter recommendations for avoiding impacts on reptiles.

Wintering Birds

- 7.48 A wintering bird survey to record all wader and wildfowl activity was carried out by TEP and sub consultants E3 Ecology Ltd between October 2012 and March 2013 in accordance with methodology reported in British Trust for Ornithology (BTO). A total of six transect surveys, covering the period 3 hours either side of high tide, were undertaken from publicly accessible viewpoints which included, in this case, the beach, roads and public rights of way. The survey area extended north as far as Sandy Bay Holiday Park, south as far as South Cambois and parts of the Blyth Estuary and west as far as the A189 road. High tide and low tide wader and wildfowl counts were also undertaken on all inter-tidal areas from Sandy Bay Holiday Park to South Cambois.
- 7.49 Any Birds of Conservation Concern (BoCC) including red and amber-listed species and S.41 species were also recorded to provide further insight into the value of the survey area for birds.
- 7.50 The winter bird survey was repeated in winter 2013 – 2014, but focussing on designated sites located close to the proposed corridor and other works areas. This included the landfall site adjacent to the Northumberland Shore SSSI, the Wansbeck Estuary LWS and the Blyth and Sleekburn Estuary LWS. In addition to these areas, the site of the proposed convertor station was also subject to survey due to the extent of habitat loss which would occur in this location. The 2013 - 2014 winter bird survey included monthly visits between December 2013 and March 2014. Two counts were undertaken on the Blyth and Sleekburn Estuary LWS during each survey visit to gain greater insight into the influence of the tide on the use of this location by birds listed in the SSSI designation.

¹⁶ Strachan R, Moorhouse T, and Meryll Gelling (2011). *Water Vole Conservation Handbook*, 3rd Edition. Wildlife Conservation Research Unit (WildCRU), Oxford University

Breeding Birds

- 7.51 A breeding bird survey, consisting of two site visits, was undertaken on 16th May and 26th June 2013 by TEP and sub consultant E3 Ecology Ltd. The methods used are based on the standard breeding bird survey methodology developed by the British Trust for Ornithology. During each visit, transects were walked through the proposed corridor route; the survey transect passed within 100m of all land within the corridor including the River Wansbeck to the north and the River Blyth and Sleekburn to the south. Surveys were conducted between half an hour after dawn and midday to coincide with peak bird activity. The route was walked at a steady pace with observation stops at regular intervals. All bird activity encountered, including songs, calls, flight lines, feeding, nesting, and territorial behaviour was recorded and mapped.

Badger

- 7.52 A badger survey was undertaken in conjunction with the Phase 1 Habitat Survey in June 2013 and in accordance with recommended guidelines¹⁷. The entire site, where accessible, was searched for any signs of badger activity such as setts, either single isolated holes or a series of holes likely to be interconnected underground; faeces and latrines; scratching posts, usually at the base of trees; footprints, hairs, foraging and diggings signs and well-defined trails.

Survey Limitations

- 7.53 There were two areas where the presence of dense vegetation prohibited the survey of water voles and badgers. These areas were Cow Gut and the western boundary of the survey area adjacent to the main A189 road.

Impact Assessment and Significance Criteria

- 7.54 A description of the development is outlined in Chapter 4 which is used as the basis for assessing impacts. The approach for ecological impact assessment as set out in the Ecological Impact Assessment (2006)⁷ has been adopted. The IEEM methodology for the assessment of significance entails:
- Identification and valuation of ecological receptors;
 - Characterisation of the predicted biophysical changes likely to affect the valued ecological receptors;
 - Assessment of the significance of the biophysical changes predicted;
 - Identification of the scope for refinement of the proposals to include avoidance, mitigation, amelioration, compensation or enhancement measures
 - Assessment of the predicted residual impacts upon the valued ecological receptors;
 - Summary of the residual impacts in the context of planning and legislative frameworks.
- 7.55 IEEM guidelines aim to establish a standard in the evaluation of the effects of potential development on wildlife receptors. IEEM guidelines require ecological receptors to be valued (or to have the potential to be valued) according to a geographical scale as follows:

¹⁷ Harris S, Cresswell P and Jefferies D (1989). *Surveying Badgers*. Mammal Society.

- **International:** Internationally designated sites or candidate sites (e.g. Special Areas for Conservation (SAC), Special Protection Areas (SPA), Ramsar Site);
- **National:** Nationally designated site (e.g. Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR));
- **Regional/County:** County Wildlife Sites; ancient woodlands; habitats or species populations of importance for Northumberland;
- **Local:** Local Nature Reserves (LNR); Local Wildlife Sites (LWS), significant ecological features such as old hedgerows, woodlands, ponds or species for the Blyth/Sleekburn area;
- **Zone of Influence:** Features with ecological value of significance within the site only, or a larger area if impacts extend further for certain receptors; or,
- **Negligible importance.** Areas of built development, active mineral extraction, or intensive agricultural land.

7.56 The value of an ecological receptor is then used to determine the legal, policy and development control consequences of a significant impact. A significant impact, in ecological terms, is defined in the IEEM guidelines⁷ as:

“an impact (adverse or positive) on the integrity of a defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, including cumulative impacts.”

7.57 The Government Circular ODPM 2005/06 defines site integrity as:

“the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of species for which it was classified.”

7.58 The conservation status of a species is defined in Article 1(i) of the Habitats Directive as favourable when:

“population dynamics data on the species concerned indicate that it is maintaining itself on a long term basis as a viable component of its natural habitats; and the natural range of the species is neither being reduced nor is likely to be reduced in the foreseeable future; and there is, and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis.”

7.59 It should be noted that the values assigned to ecological receptors in this Chapter do not take account of the amenity or economic values of the ecological resources. Assigned ecological values are based purely on the innate value of the flora, fauna and habitats in terms of the conservation of genetic resources.

7.60 IEEM guidelines⁷ evaluate the effects of potential development on wildlife receptors. They also highlight the importance of considering the likelihood that a change/activity will occur as predicted, and also the degree of confidence in that impact assessment on ecological structure and function. The following four-point scale is proposed by IEEM to standardise the degree of certainty in a prediction as follows:

- **Certain/Near Certain:** probability estimated at 95% chance or higher;
- **Probable:** probability estimated above 50% but below 95%;

- **Unlikely:** probability estimated above 5% but less than 50%;
- **Extremely Unlikely:** probability estimated at less than 5%

7.61 When describing changes/activities and impacts on ecosystem structure and function, the following parameters are characterised:



- **Positive or Negative:** is the impact positive or negative?
- **Magnitude:** refers to the size or “amount” of the impact.
- **Extent:** the area over which the impact occurs.
- **Duration:** The time for which the impact is expected to last prior to recovery or replacement of the resource or feature.
- **Reversibility:** an irreversible (permanent) impact is one from which recovery is not possible within a reasonable timescale: a reversible (temporary) impact is one from which spontaneous recovery is possible or for which effective mitigation is possible.
- **Timing/Frequency:** some changes may only cause an impact if they happen to coincide with critical life-stages or seasons (e.g. bird nesting season).

Significance Criteria

7.62 IEEM guidelines for Ecological Impact Assessment⁷ therefore move away from the traditional matrix assessment of significant effects. In these matrices, the significance of an adverse impact (or beneficial result) is calculated as the product of the magnitude of the impact and the value or sensitivity of the nature conservation resources affected. IEEM guidelines propose an alternative approach which accommodates factors such as the size or conservation status of a species population, habitat quality or the natural geographical range of species/habitat.

7.63 Other chapters within this ES accord with the more traditional matrix valuation of major, moderate and minor adverse effects and Table 7.1 is provided to illustrate how IEEM impacts are characterised and how, for the purposes of this chapter, they are transposed into the traditional significance matrix. High levels of significance will generally be ascribed to large impacts on receptors/features of high nature conservation value. Low levels of significance will generally be ascribed to small impacts on receptors/features of high nature conservation value or large impacts on receptors/features of low nature conservation value.

Table 7.1: Impact Classification

Effect / Magnitude	Characterisation of Effects Using IEEM Guidance (Applying Geographical Scale)	Traditional Classification of Impact
Negative Effect / High magnitude 	Loss of, permanent damage to or adverse impact on any part of a site of international or national importance; Loss of a substantial part or key feature of a site of county importance; Loss of favourable conservation status (FCS) of a legally protected species; Loss of or moderate damage to a population of nationally rare or scarce species.	Major adverse effects
	Temporary disturbance to a site of international or national importance, but no permanent damage; Loss of or permanent damage to any part of a site of county importance; Loss of a key feature of local importance; A substantial reduction in the numbers of legally protected species such that there is no loss of FCS but the population is significantly more vulnerable; Reduction in the amount of habitat available for nationally rare or scarce species, or species that are notable at a regional or county level.	Moderate adverse effects
Lower Magnitude	Temporary disturbance to a site of county value, but no permanent damage; Loss of, or permanent damage to, a feature with some ecological value in a local context but that has no nature conservation designation; A minor impact on legally protected species, but no significant habitat loss or reduction in FCS; A minor impact on populations of nationally rare or scarce species that are notable at a regional or county level.	Minor adverse effects
No significant effect	No impacts on sites of international, national or county importance; Temporary disturbance or damage to a small part of a feature of local importance; Loss of or damage to land of negligible nature conservation value; No reduction in the population of legally protected, nationally rare, nationally scarce or notable (regional/county level) species on the site or its immediate vicinity.	Negligible effects
Lower Magnitude	Beneficial and adverse impacts balance such that the resulting impact has no overall affect upon the receptor.	Neutral effects
	A small but clear and measurable gain in general wildlife interest, e.g. small-scale new habitats of wildlife value created where none existed before or where the new habitats exceeds in area that which was lost.	Minor positive effects
	Larger new scale habitats (e.g. net gains over 1 ha in area) created leading to significant measurable gains in relation to the objectives of biodiversity action plans	Moderate positive effects

Effect / Magnitude	Characterisation of Effects Using IEEM Guidance (Applying Geographical Scale)	Traditional Classification of Impact
High magnitude / Positive Effect	Major gains in new habitats (net gains of at least 10ha) of high significance for biodiversity being those habitats, or habitats supporting viable species populations, of national or international importance cited in Annexes I and II of the Habitats Directive or Annex I of the Birds Directive.	Major positive effects

Assessment of Cumulative Effects

- 7.64 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. However, when individual effects are considered in combination, the resulting cumulative effect may be significant.
- 7.65 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:
- Port of Blyth Biomass Power Station;
 - Proposed National Grid Electricity Plc (NGET) 400kV GIS Substation;
 - Ferguson Business Park Single Turbine;
 - Earth Balance Single Turbine;
 - Narec Offshore Wind Demonstration Site; and
 - Residential development – 48 dwellings.

Existing Environment

Designated Sites (Statutory)

- 7.66 The desk top survey identified statutory and non statutory sites within 2km of the Proposed Development, these are illustrated in Figure 7.2 and summarised in Table 7.2 and Table 7.3.

Table 7.2: Designated Site (statutory)

Site Name and Designation	Distance from Development	Reasons for Designation	Potential for Impacts
Northumbria Coast Special Protection Area (SPA)/Ramsar Site	1km from northern section	Populations of international importance during breeding season of little tern.	No direct habitat connections. No direct impacts on site, but potential for indirect impacts on designated bird species during construction.
	2km from southern section	Populations of international importance during wintering period of purple sandpiper and turnstone.	

Site Name and Designation	Distance from Development	Reasons for Designation	Potential for Impacts
Northumberland Shore Site of Special Scientific Interest SSSI	Adjacent	<p>It is important for its wintering shore birds. In particular international numbers of purple sandpiper and turnstone and national numbers of sanderling, golden plover, ringed plover and redshank.</p> <p>Also arctic and little tern breed on the shore in the summer and the inter-tidal zone is used all year for feeding by nationally important numbers of eider.</p>	<p>The HVDC cable will be installed through the intertidal zone, which lies within the SSSI boundary.</p> <p>Part of the SSSI lies directly adjacent to the southern boundary of the site, with further areas downstream. Part also lies directly adjacent to the cable landfall areas in the north.</p> <p>There would be temporary disturbance to the intertidal habitat for cable installation. There is also the potential for indirect impacts on designated bird species through disturbance during construction.</p>
Cresswell and Newbiggin Shores SSSI	>400m to the north-east	Geological. Important for Westphalian and Quaternary studies.	No habitat connections. No potential for impacts.
Castle Island Local Nature Reserve LNR	>1km to north-west	Woodland.	No direct habitat connections. No potential for impacts.
Bedlington Country Park LNR	2km to the south-west	Woodland with wild flowers and red squirrels.	No habitat connections as lies upstream from works area. No potential for impacts.
Paddock Wood LNR	>1,5 km to the north	Woodland.	No habitat connections. No potential for impacts.
Ha'penny Woods LNR/LWS	2km to the south-west	Woodland, wildflowers, birds and mammals.	No habitat connections as lies upstream from works area. No potential for impacts.

Table 7.3: Designated Sites (Non-Statutory)

Site Name and Designation	Distance from Site	Reasons for Designation	Potential for Impacts
Wansbeck Estuary Local Wildlife Site (LWS)	Approximately 300m to the north	Coastland/estuarine site designated for its wintering bird populations. Contains estuary, saltmarsh, mudflats, sand dunes	Connected to cable route by woodland and arable farmland. However, no impacts anticipated due to temporary nature of works and distance to LWS.
Sleekburn Fen LWS	2km to the west	Fen, open water, grassland	No habitat connections. No potential for impacts

Site Name and Designation	Distance from Site	Reasons for Designation	Potential for Impacts
Blyth and Sleekburn Estuary LWS	Parts adjacent to southern survey boundary	Coastland/estuarine site designated for its wintering bird populations. Contains estuary, mudflats, saltmarsh.	Could be affected by accidental spillages and localised temporary disturbance of birds could occur during construction. Drainage from the converter station will be discharged into Sleek Burn which has the potential to affect water quality, water flow and erosion of the banks.

Habitats within the Proposed Development

7.67 The results of the Phase 1 Habitat Survey are provided in the Ecological Assessment of the Cambois and East Sleekburn Area and the Phase 1 habitat plans at Figures 7.3.1 to 7.3.3. The following paragraphs provide a summary of the findings of the Phase 1 Habitat Survey.

Semi-Improved Grassland

7.68 There are numerous areas of semi-improved neutral grassland within the survey area, many of which support a similar mix of species. The vast majority are present in the south of the survey area around the existing electricity sub-station and adjacent to the River Blyth and tributary. These areas generally contain a diversity of common and widespread grassland species with scattered scrub. False oat-grass *Arrhenatherum elatius* and Yorkshire fog *Holcus lanatus* are frequently the dominant species, with meadow foxtail *Alopecurus pratensis*, red fescue, crested dog's-tail *Cynosurus cristatus*, soft brome *Bromus hordaceus* and hairy brome *Bromus ramosus* occurring at a lower abundance and frequency. Broadleaf herb species usually include creeping cinquefoil *Potentilla reptans*, bird's-foot trefoil *Lotus corniculatus*, common knapweed *Centaurea nigra* and sedges and rushes in wetter areas, such as common sedge *Carex nigra*, glaucous sedge *Carex flacca* and soft, *Juncus effusus*, hard *Juncus inflexus* and compact rush *Juncus conglomeratus*. Orchids occur at varying frequencies in the different areas and kidney vetch *Anthyllis vulneraria* and yellow rattle *Rhinanthus minor* occur frequently in shorter areas of vegetation. There are patches of tufted hair-grass *Deschampsia cespitosa* in the grassland to the south of the existing sub-station.

7.69 There are smaller areas of semi-improved neutral grassland in the northern section of the site within the survey area for the HVDC cable route. The majority of this is along the coastal area, which is currently grazed by horses, but there is also a diverse area of grassland within a small nature reserve created within the industrial estate. Although some of these areas of grassland are quite diverse, they do not qualify for inclusion as a S.41 habitat, nor as any local BAP habitats.

Species-Poor Semi-Improved Grassland

- 7.70 There are two areas of species-poor semi-improved grassland in the northern section of the site within the arable fields, which are largely dominated by grasses such as Yorkshire fog and false-oat grass, but also patches of tufted hair-grass, curled dock *Rumex crispus* and a horsetail *Equisetum* sp. species. Other species indicative of nutrient enrichment included white clover *Trifolium repens*, creeping thistle *Cirsium arvense* and creeping buttercup *Ranunculus repens*. There are also a number of fields in the southern section of the Proposed Development site which are largely dominated by grass species, with few forbs present.

Ephemeral/Short Perennial

- 7.71 There are two areas of hardstanding in the southern section of the Proposed Development site which have become colonised by ephemeral/short perennial vegetation dominated by kidney vetch and yellow rattle, with various hawkweeds *Hieracium* sp. and hawk's-beards *Crepis* sp. common cat's-ear, biting stonecrop *Sedum acre*, black medick *Medicago lupulina*, groundsel *Senecio vulgaris*, willowherbs *Epilobium* sp. and occasional orchids.

Mixed Plantation Woodland

- 7.72 There are linear blocks of mixed plantation woodland, largely around the arable fields in the north and the centre of the Proposed Development site. These areas all contain a similar mix of species with alder *Alnus glutinosa*, silver birch *Betula pendula*, hawthorn *Crataegus monogyna*, oak species *Quercus* sp., ash *Fraxinus excelsior*, beech *Fagus sylvatica*, sycamore *Acer pseudoplatanus*, willows *Salix* sp, cherry *Prunus* sp field maple *Acer campestre*, rowan *Sorbus aucuparia* and evergreen species. Neutral grassland and/or tall ruderal vegetation form the ground layer, and at least two species of orchid occur quite frequently in the more open areas in the central section of the site.

Trees

- 7.73 There are very few trees present within the Proposed Development outside the areas of plantation woodland, other than trees within the nature reserve area in the industrial estate and screening planting along the roads.

Hedgerows

- 7.74 The majority of hedgerows within the Proposed Development are non continuous or "defunct" species-poor, being composed almost entirely of hawthorn. There is one hawthorn hedge which has been laid in the past and appears old, in the centre of the site towards the west, but this will not be affected by any development proposals. There are other hedgerows and/or lines of scrub in the south of the site which perform the same function as a hedgerow by linking habitats and providing movement corridors for wildlife.

Scrub

- 7.75 Most of the grassland areas are scattered with scrub species, and the ditch network and other field boundaries are mostly heavily overgrown by scrub species. Swedish whitebeam *Sorbus aria* occurs frequently in the southern fields of the application site, with hawthorn, willows and bramble dominating the remaining areas, although other species such as blackthorn *Prunus spinosa* and elder *Sambucus nigra* are also present.

Ponds

- 7.76 There are a number of waterbodies in the vicinity of the cable route corridor. Along the route of the HVDC cable in the north, there is a pond within an unofficial nature reserve which was created as part of the mitigation for the adjacent industrial development. This is located to the west of Section 3 of the indicative cable route. There are also a number of largely ephemeral waterbodies associated with the motorbike scramble track, as well as one or two shallow areas of standing water within the former coal stocking yard to the east of the proposed converter station site. The pond within the nature reserve is well vegetated and surrounded by relatively diverse semi-improved neutral grassland with scrub and trees. The waterbodies within the motorbike scramble track are highly disturbed so the majority are not well vegetated, although some of the more permanent ponds contain bulrush *Typha latifolia*. The waterbodies are used to damp down the scramble track and new ponds are frequently dug and old ones filled in. In the west of the former coal stocking yard there are a number of small, shallow areas which hold water at certain times but are not vegetated and dry out regularly.
- 7.77 In the southern section of the proposed converter station site and adjacent to the existing 275kV electricity substation, there are a number of ponds. Many of these were dry at the time of the Phase 1 Habitat Survey and had a dense stand of bulrush, which has probably contributed to them drying out. These ponds are described in more detail in the Ecological Assessment of the Cambois and East Sleekburn Area, which reports the findings of the great crested newt survey.

Ditches

- 7.78 The majority of ditches within the survey area were dry, or virtually dry, at the time of the survey. The motorbike scramble track has ditches along the west, south and eastern boundaries. The ditch along the eastern boundary is approximately 2-3m wide with deep, slow flowing water and a concrete culvert at the northern end. An outfall, from a chemical factory upstream, discharges into this ditch and a chemical smell was noticed at the time of the survey. Limited aquatic vegetation is present and the ditch is heavily shaded by the hedgerow to the east. It is regularly dredged out to maintain its barrier effect to local youths and vehicles. Anecdotal evidence suggests that European eels are present in the ditch.
- 7.79 A small watercourse known as Cow Gut forms the southern boundary of the motorbike scramble track. It has very steep banks, which are covered with dense scrub making it heavily shaded. It appeared virtually dry at the time of the survey where visible, but access was severely restricted due to the dense scrub. Himalayan balsam *Impatiens glandulifera* was recorded at the western end of Cow Gut. The ditch along the western boundary is similarly overgrown and heavily shaded and appeared largely dry, although a small pool at the northern end contained a number of large frog tadpoles.

Non-Native Invasive Species

- 7.80 Four species listed on Schedule 9 of the Wildlife and Countryside Act (1981) as amended as non-native invasive species have been recorded within the survey area. The majority of this is Japanese rose *Rosa rugosa*, which was recorded in three areas of ornamental planting, two of these adjacent to the coastline in the north-east of the application site and the third in the south-east of the survey area adjacent to tunnel that leads to the sand dune area. A

cotoneaster species, which is considered likely to be one of those listed, was also recorded in two areas in the north of the site, on one on the grass verge adjacent to the industrial site on Wembley Gardens towards the north of the cable route corridor, and another on the north side of the road junction just to the east. Himalayan balsam was recorded along the banks of Cow Gut and two small pieces of Japanese knotweed *Fallopia japonica* were recorded in the north-west of the motorbike scramble track.

Arable

- 7.81 The majority of the northern area is dominated by arable crops, with margins of tall ruderal vegetation dominated by false oat-grass, rosebay willowherb or nettles *Urtica dioica*.

Tall Ruderal

- 7.82 There is a band of tall ruderal around the majority of arable fields in the north of the application site which is dominated by false oat grass, rosebay willowherb or nettles, with hogweed *Heracleum sphondylium* and a horsetail *Equisetum* sp. species also present.

Buildings

- 7.83 There is a small, single storey, flat roof, brick building in the arable fields in the north of the red line boundary and the industrial development is dominated by numerous buildings and areas of hard standing. There are two old bird hides along the riverbank in the south of the application site which are constructed from concrete with a corrugated flat roof and wooden boards along the top. The only other building within the survey boundary is a small brick built building on the south side of Brock Lane opposite the small residential development. This building has a pitched, tiled roof with some slipped tiles. There are several holes on the east-facing and west-facing aspects of the building, as well as a hole into the roof area. The soffit boxes appeared well sealed. There was no access to the interior of this building. None of the buildings will be affected by the proposals and are not considered further.

Protected and Notable Species

Amphibians

- 7.84 There is a historic record of one male and one female great crested newt from a pond in the north-east corner of the former coal stocking yard, but this is dated from 2006. Although this area was resurveyed in 2007, no great crested newts were recorded at that time and it is understood from the council ecologist that extensive surveys in the area since have not recorded any great crested newts, although smooth newts have been recorded in low numbers in the area.
- 7.85 A total of 23 waterbodies were assessed in 2013 in terms of their suitability to support great crested newts. As a number of these waterbodies were considered suitable, and there was a historic record, full great crested newt surveys were carried out in 2013. No great crested newts were recorded in 2013, but again, low numbers of smooth newts and/or common toad were recorded in four waterbodies within the motorbike scramble track, two waterbodies in the former coal stocking yard, the pond within the nature reserve and in the four ponds in the far south of the proposed converter station and existing substation site. The great crested newt survey report is provided within the Ecological Assessment of the Cambois and East Sleekburn Area.
- 7.86 As no great crested newts were recorded, they are not considered further in this Ecology Assessment. However, common toad is a S.41 species of principal importance so potential

impacts on this species will need to be taken into consideration. Toads are likely to be present only along the indicative cable route, and not within the converter station site, so any impacts would be temporary only, with no permanent habitat loss. Precautionary methods of working will be required to avoid impacts on common toads during vegetation clearance works and cable installation.

Bats

- 7.87 Two records of a common pipistrelle bat were provided through consultation, but neither were within the proposed converter station site, nor along the indicative cable route. Surveys carried out by White Young Green in 2007 confirmed low numbers of common pipistrelle bats commuting and foraging in the southern section of the Proposed Development site, as well as the woodland planting along the western boundary of the site adjacent to the main road and along one of the hedgerows in the same area. Common pipistrelle and noctule bats were also recorded during surveys by Northumberland Wildlife Trust in 2006 to the south of the Proposed Development and a dead noctule bat was found in the southern area by the existing sub-station in March 2007 by Entec, although it was thought that this was unlikely to be roosting in the area.
- 7.88 There is only one building within the survey area which has potential for roosting bats, but this is some distance away from any of the working areas and will not be affected by any of the development proposals. There are no trees within the survey boundary which have any potential to support roosting bats but the grassland areas, particularly in the south, and the hedgerows, scrub and trees provide suitable foraging and/or commuting habitat.
- 7.89 Activity surveys were undertaken in 2013 to identify whether any of the hedgerows which will be affected by the development proposals are important commuting and/or foraging routes. Levels of bat activity were very low during both surveys, with the majority of activity recorded along the banks of River Blyth. Most of the records were of common pipistrelle, but soprano pipistrelle and noctule bats were also recorded. The bat survey report is included within the Ecological Assessment of the Cambois and East Sleekburn Area.
- 7.90 The pipistrelle bats are considered most likely to be roosting within the residential housing to the north, so maintaining connectivity between this area and the River Blyth, and a suitable lighting design, will ensure no impacts on foraging or commuting bats.

Water Vole and Otter

- 7.91 There are historic records of otter on both the River Wansbeck to the north and the River Blyth to the south of the Proposed Development site. Evidence of otter was also recorded around the ponds in the south of the site during surveys carried out between July 2007 and June 2008. There are no records of water vole within 2km of the survey area, although Cow Gut was previously considered potentially suitable for this species, but extensive survey in the area has not resulted in any records.
- 7.92 The majority of ditches across the site were considered unsuitable for either otter or water vole during 2013, as they were largely dry and heavily overgrown and shaded. The most suitable ditch was that on the east boundary of the motorbike scramble track, although the concrete culvert at the north end of the ditch limits access, and the regular disturbance by dredging and discharge from the chemical factory upstream reduces the likelihood of either

species being present. Although Cow Gut appeared sub-optimal for water voles in 2013, as a thorough survey was not possible due to the dense scrub, their potential presence on this ditch cannot be entirely ruled out. A pre-construction check for water vole should be carried out on Cow Gut to ensure that there is no potential for impact on this species through disturbance to the banks for cable installation.

- 7.93 The ditch system in the south of the application site was totally dry and is considered unlikely to provide suitable habitat for either water vole or otter, although the grassland and ponds in the southern area could provide some refuge or foraging habitat. No evidence of otter or water vole was recorded during any of the surveys on the site in 2013 but, as construction is not due to commence until 2020, preconstruction checks for both these species are recommended.

Reptiles

- 7.94 There is one record of a slow-worm within 2km of the site, but this is on the far side of the A189 road separating it from the survey area. Two common lizard were recorded in the dune habitat during surveys in 2007 in the area and one to the east of the existing 275kV substation in the far south of the site. As such low numbers were recorded during previous surveys; it is unlikely that a significant population of this species is present. Although there are habitats suitable for common lizard in the vicinity of the indicative cable route, all works in these areas will be temporary, so there will be no permanent habitat loss. The only potential for impact is during vegetation clearance and construction works, so a precautionary working method statement will be required to avoid impacts to reptiles during this period.

Wintering Birds

- 7.95 The results of the 2012-2013 winter bird survey are detailed in the Winter and Breeding Bird Survey 2012 to 2014 and displayed on Figures G2336.130 to G2336.133 and G2336.135 to G2336.142 within the Winter and Breeding Bird Survey 2012 to 2014. In total 44 species were recorded during the winter bird survey of NSN Link route corridor. Turnstone was the only qualifying SPA species to be recorded within the survey area, with a peak count of eight birds in intertidal habitat north of the Wansbeck Estuary. Cambois Beach itself is considered of low value to wintering birds associated with the SPA and SSSI, although a peak count of 22 sanderling were recorded within the proposed landfall site during the winter bird survey, as well as smaller numbers of oystercatcher, curlew, redshank and lapwing.
- 7.96 There were 29 Birds of Conservation Concern (BoCC) and protected species observed including 16 amber-listed, 11 red-listed, 12 Section 41 and four Schedule 1 species. The wider survey area, which extended as far north as Sandy Bay Holiday Park, west to the A189 spine road and south to the River Blyth resulted in a total of 71 bird species recorded. Of these, 49 were BoCC and protected species, with ten Schedule 1 species, 15 S.41, 13 red listed and 29 amber listed. Wintering fieldfare and redwing, both Schedule 1 species, were largely recorded in the arable fields associated with Section 2A and 2B of the HVDC cable route.
- 7.97 The results of the 2013-2014 winter bird survey are also detailed in the Winter and Breeding Bird Survey 2012 to 2014 and displayed on Figures G2336.176 to G2336.183 within the Survey. Turnstone was the only SPA species recorded within the survey area, with a peak count of three birds being recorded on the Mount Pleasant peninsula. Five Northumberland

Shore SSSI species were recorded in the Blyth and Sleekburn Estuary section of the survey area including redshank, curlew, oystercatcher and ringed plover. Redshank was the most numerous with 112 birds being recorded on one visit, the majority feeding on the Sleekburn Estuary. A peak count of 24 sanderling was recorded in the vicinity of the landfall site in the north with small numbers of redshank and curlew being recorded on the Wansbeck estuary to the north.

Breeding Birds

- 7.98 The results of the 2013 breeding bird survey are detailed in the Winter and Breeding Bird Survey 2012 to 2014 and displayed on Figures G2336.148 to G2336.149 within the survey. A total of 48 of the species recorded during the 2013 breeding bird survey were observed within the route corridor. Of these, 22 were BoCC and protected species including 13 amber-listed, nine red-listed, 11 Section 41 and one Schedule 1 species.
- 7.99 Although Cambois Beach is considered of low value to breeding birds associated with the SPA and SSSI, two little tern were recorded on intertidal habitat within the proposed landfall on one occasion during the 2013 breeding bird survey. There was however no evidence to indicate that little tern were breeding within the study area.
- 7.100 Installation of the HVDC cables has the potential to result in the temporary loss of nesting habitat for a number of S.41 species including dunnock, whitethroat, grasshopper warbler, meadow pipit and skylark.

Badger

- 7.101 A number of badger records were provided through consultation. The results of consultation confirmed that whilst there were no records of badgers within the Proposed Development area evidence of badger activity has been reported within the study area. There are no records of setts within the Proposed Development and no evidence of badger was found during the site surveys.
- 7.102 Owing to dense scrub vegetation it was not possible to fully survey areas adjacent to the A189 which whilst outside the Proposed Development site will require a check for badgers prior to the commencement of construction.

S.41 Species

- 7.103 A number of records were provided of wall and grayling butterflies within the search area, as well as dingy skipper and small heath butterflies. Wall butterflies were also recorded within the motorbike scramble track during the surveys in 2013. Numerous other invertebrates were noted during surveys, particularly along the southern side of Cow Gut, and it is likely that other S.41 or other notable terrestrial invertebrate species occur within the survey area. There are also records of European eel within the search area and anecdotal evidence that this species is present on the ditch along the eastern boundary of the motorcycle scrambling field.

Selection of Receptors

Local Planning Policy

- 7.104 Taking account of the survey findings, the size/range of the receptor in relation to local and national trends and the potential for impacts; the following Key Receptors have been identified and will be taken forward in the assessment of impacts:

-
- Northumbria Coast SPA/Ramsar;
 - Northumberland Coast SSSI;
 - Blyth and Sleekburn Estuary LWS;
 - Semi-improved grassland;
 - Plantation Woodland;
 - Trees;
 - Hedgerows;
 - Ditches;
 - Non-native invasive species;
 - Amphibians;
 - Bats;
 - Water vole and otter;
 - Reptiles;
 - Birds (wintering and breeding); and
 - Other S.41 species.

7.105 The remaining statutory and non-statutory sites listed in Tables 7.2 and 7.3 have not been included as key receptors because their distance and separation from the Proposed Development site is such that no impacts are predicted.

Conservation Valuation of Receptors

7.106 National Planning Policy Framework (NPPF) and Section 40 of the NERC Act (biodiversity duty) are relevant to all potential ecological receptors, designated sites, habitats and species. Table 7.4 summarises the policy and legal framework relevant to the potential ecological receptors that could be impacted by the Proposed Development, the ecological value assigned to each receptor and comments relating to the functions of each receptor within the ecosystem of the site.

Table 7.4: Valuation of Potential Ecological Receptors

Site/ Habitat/ Species	Policy/ Legislation	Ecological Value	Comments
Northumbria Coast SPA/Ramsar	EC Directive on the conservation of wild birds (79/409/EEC) The Conservation of Habitats and Species Regulations 2010 (as amended) Convention on Wetlands of International Importance (Ramsar Convention) 1971	International	Potential for indirect impacts on designated bird species through temporary disturbance
Northumberland Shore SSSI	The Wildlife and Countryside Act (1981) (as amended) The Countryside and Rights of Way Act (2000)	National	Potential for direct impacts on the SSSI and indirect impacts on designated bird species through temporary disturbance during cable installation
Blyth and Sleekburn Estuary LWS	The Town and Country Planning Act 1990	County	Potential for direct impacts due to discharge into Sleekburn Estuary. Potential for indirect impacts through accidental pollution incidents
Semi-Improved Neutral Grassland	None	Site	Temporary loss of semi-improved neutral grassland during cable installation. The value of this habitat type is derived from its potential functional role as wildlife corridors and potential nesting and foraging habitat for birds, foraging habitat for bats and foraging, refuge habitat for a variety of S.41 invertebrate species and amphibians and reptiles.

Site/ Habitat/ Species	Policy/ Legislation	Ecological Value	Comments
Plantation Woodland	<p>The Town and Country Planning Act 1990</p> <p>British Standard 5837: 2012 Trees in relation to construction</p>	Local	<p>There are blocks of mixed plantation woodland forming wide margins around the arable fields in the north and centre of the survey area and a smaller block of semi-natural broadleaf woodland adjacent to the A189 to the north of Cow Gut.</p> <p>The value of this habitat type is derived from its potential functional role as wildlife corridors and potential nesting and foraging habitat for birds and foraging and commuting habitat for bats.</p>
Trees (outside plantation woodland)	<p>The Town and Country Planning Act 1990</p> <p>British Standard 5837: 2012 Trees in relation to construction</p> <p>LBAP Habitat</p>	Site	<p>There are very few trees outside the plantation woodland areas, but those that are present are concentrated along the south side of Brock Lane.</p> <p>The value of this habitat type is derived from its potential functional role as nesting and foraging habitat for birds and/or roosting and foraging habitat for bats.</p>
Hedgerows	<p>Hedgerow Regulations 1997</p> <p>NERC Act 2006</p> <p>S.41</p> <p>LBAP Habitat</p>	Site	<p>Hedgerows form a number of boundaries within the search area, but these are all species-poor and many are defunct. None are classed as 'Important' under the Hedgerow Regulations with respect to nature conservation criteria.</p> <p>The value of this habitat type is derived from its potential functional role as wildlife corridors and potential nesting and foraging habitat for birds and foraging and commuting habitat for bats.</p>
Ditches	None	Site	<p>There are a number of ditches throughout the survey area, although many of these were dry at the time of the survey and are heavily overgrown and shaded. The value of this habitat type is derived from its potential functional role as a wildlife corridor and potential water vole, otter or eel habitat.</p>

Site/ Habitat/ Species	Policy/ Legislation	Ecological Value	Comments
Non-native invasive species	Schedule 9 Wildlife & Countryside Act (1981) (as amended)	Site	Four Schedule 9 species were recorded on site. Japanese knotweed being the most problematic. There is the potential to disturb these species and cause them to spread further.
Amphibians (excluding great crested newt)	Schedule 5 Wildlife & Countryside Act (1981) (as amended) NERC Act (2006) S.41	Site	Common toad has been recorded in a number of areas within the Proposed Development. There is the potential to harm or injure common toads during works associated with the indicative cable route. Temporary loss of foraging and/or refuge habitat.
Bats	Conservation of Habitats and Species Regulations 2010 (as amended). Schedule 5 Wildlife & Countryside Act (1981) (as amended) NERC Act (2006) S.41 LBAP Species	Local	Potential for disruption to foraging and / or commuting routes.
Water Vole	Wildlife & Countryside Act 1981 (as amended) NERC Act (2006) S.41 LBAP Species	Site	Potential for disturbance or damage to burrows if present on Cow Gut during cable installation

Site/ Habitat/ Species	Policy/ Legislation	Ecological Value	Comments
Otter	Conservation of Habitats and Species Regulations 2010 (as amended). Schedule 5 Wildlife & Countryside Act (1981) NERC Act (2006) S.41 LBAP Species	Site	Potential for disturbance during installation of HVAC cables only
Reptiles (common lizard)	Schedule 5 Wildlife & Countryside Act (1981) (against killing only) NERC Act (2006) S.41	Site	Potential for injury/harm during works associated with cable installation. Temporary loss of foraging habitat
Wintering Birds	The Conservation of Habitats and Species Regulations 2010 (as amended) NERC Act (2006) S.41 Birds of Conservation Concern	Site	Potential for disturbance of wader birds on the shore and within fields.
Breeding Birds	The Conservation of Habitats and Species Regulations 2010 (as amended) Wildlife & Countryside Act 1981 (as amended) NERC Act (2006) S.41 Birds of Conservation Concern	Site	Potential for injury/harm during works associated with cable installation.
Other S.41 species (e.g. invertebrates, eels)	NERC Act (2006) S.41	Site	Potential for temporary loss of or disturbance to foraging, refuge and hibernation habitat

Baseline Projection

- 7.107 An integral part of ecological impact assessment is to consider the predicted trends of each of the ecological features if no development and mitigation were to be carried out.
- 7.108 The ecology of the site is the product of the managed landscape (agriculture, grazing and industrial), there is no indication that in the absence of development the use and therefore management of the majority of the site would not alter. In the absence of development, the ecological interest of the site, including plantation woodland, hedgerows and grasslands would remain more or less at existing levels. However, the ponds on site will continue their succession, becoming drier and more overgrown, reducing their value to local wildlife, but the development of scrub on the Proposed Development site would provide more opportunities for tree-dwelling nesting birds, which are currently largely limited to the network of hedgerows within the Proposed Development site.
- 7.109 The only area likely to change significantly before commencement of works is the arable land between the River Wansbeck and Wembley Gardens, which falls within the proposed route of the HVDC cable. This area has been identified as a mitigation area for potential impacts resulting from the East Sleekburn Local Development Order. It will be managed by NCC for wintering shorebirds associated with the Northumberland Shore SSSI. The intention is to convert the arable land to grassland, creating scrapes and footdrains to provide a high tide roost and feeding area for migratory and wintering waders, as well as breeding habitat for lapwing and other species. The first stage of the conversion is due to take place in August 2014.

Potential Effects

- 7.110 The following sections quantify and characterise the potential effects of the Proposed Development on ecological receptors during both the construction and operational phases and in the absence of mitigation and compensation measures.
- 7.111 The primary impacts resulting from construction activities would be the loss and disturbance of habitats, and the subsequent loss or disturbance of species during clearance activities.

Assessment of Effects of HVDC Cables

Construction Phase

- 7.112 The key activities which will have a potential effect on the ecological resources of the Proposed Development site include vegetation clearance, trench and launch pit excavation works, cementing works, backfilling of trenches, installation of drainage and relevant infrastructure.
- 7.113 Construction is planned to start on site in 2016 and be complete by 2020. Installation of the cables is programmed to take approximately 12 months commencing in 2019.
- 7.114 Potential effects likely to arise during the construction phase will include, but may not be limited to:

- Degradation of designated nature conservation sites and/or disturbance to the designated species;
- Loss of and / or degradation to habitats of ecological value e.g. hedgerows, trees;
- Spreading of Schedule 9 non-native invasive species;
- Killing or injuring of protected species; and
- Disturbance or displacement of protected species or those of conservation concern, caused by noise, light and/or physical activity.

7.115 Table 7.5 details the potential effects of the Proposed Development during the construction phase on identified ecological receptors, prior to mitigation.

Table 7.5: Potential Effects of HVDC Cables during Construction (Prior to Mitigation)

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Northumbria Coast SPA/Ramsar – International Value							
Disturbance to designated bird species during cable installation (three species to assess - Little tern, purple sandpiper and turnstone).	Extremely unlikely	Low – irregular use of shore by turnstone. Peak count 4 birds. 2 little tern recorded during breeding period, but not nesting. The area is already disturbed by dog walkers.	Temporary	Avoidable/ preventable	Limited to installation of cables within Section 1. Three works periods, 6-8 weeks followed by two periods of 8-10 days	Adverse	Not significant
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents, surface water run-off from the site and changes in sediment deposition	Extremely unlikely	Low	Temporary	Reversible/ preventable	Limited to Installation of cables within Section 1	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Northumberland Coast SSSI – National Value							
Physical damage/disturbance to intertidal habitats during cable installation - although habitats themselves are not a designated feature, but the birds are dependent upon them	Certain	Low – No rare or protected species or habitats of conservation importance recorded during intertidal survey. Intertidal species are exposed to regular disturbance by tidal and wave action so recover quickly from physical disturbance (See Chapter 10 for further details on intertidal species)	Temporary	Reversible – Habitats will be reinstated following cable installation	Limited to intertidal zone only.	Adverse	Not significant
Disturbance to designated bird species during cable installation	Probable	Low – low numbers of redshank, oystercatcher and sanderling occasionally recorded and small numbers of Curlew recorded in agricultural fields	Temporary	Avoidable/ preventable	Limited to Installation of cables in Sections 1 and 2	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off from the site	Probable	Low	Temporary	Reversible/ preventable	Limited to Installation of cables within Section 1	Adverse	Minor
Semi-Improved Grassland – Site Value							
Physical loss of semi-improved grassland for cable installation	Certain	Low – Cable route at east of Section 1 is close to road where grassland is more improved and heavily grazed. Cable route at west end crosses small field with orchids Low – Section 2. The conversion process of arable land to grassland along Section 2 will have commenced, but would not be well established at that time.	Temporary	Reversible through mitigation on site. Will be reinstated following cable installation Minimise works within wider mitigation area as far as possible. Reinstatement of habitats following cable installation	Sections 1 and 2 only	Adverse	Not significant

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Plantation Woodland – Local Value							
Physical loss of plantation woodland for cable installation	Extremely unlikely	Low – Assume Section 2 avoids plantation woodland	Temporary	Reversible through replacement planting on site (except for permanent 7m easement over cables)	Western end of Section 2 and Section 6 only	Adverse	Section 2 -Not significant
	Certain	Low – Section 6 limited to 16m working width through band of plantation woodland on south side of Cow Gut only					Section 6 -Minor
Damage to retained areas of plantation woodland	Certain	Low - Section 6 south side of Cow Gut only	Permanent	Avoidable / preventable	South side of Cow Gut only	Adverse	Minor
Trees (Outside Plantation Woodland) – Site Value							
Physical loss of trees for cable installation	Extremely unlikely	Low	Temporary	Avoidable. Reversible through replacement planting on site	Section 4 only	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Physical damage to retained trees during cable installation	Unlikely	Low - knocking, breakage of branches, compaction of soil and root damage from construction machinery	Short to medium term but severe impacts could be permanent	Reversible/ preventable	Section 4 only	Adverse	Minor
Hedgerows – Site Value							
Physical loss of hedgerows for cable installation	Certain	Low – Section 2 limited to 16m working width of one defunct species-poor hedgerow	Temporary	Reversible. Hedgerow to be reinstated following cable installation	Section 2 only	Adverse	Not significant
Physical damage to retained hedgerows during cable installation	Probable	Low – one defunct species-poor hedgerow affected and knocking, damage to structure, compaction of soil and root damage from construction machinery	Short to medium term but severe impacts could be permanent	Avoidable/ preventable	Section 2 only	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Ditches – Site Value							
Physical damage to ditch and banks of Cow Gut	Unlikely	Low if cables use existing culvert in Section 5	Temporary	Minimise damage/ reinstate habitats	At crossing of Cow Gut only	Adverse	Not significant
	Certain	Low if a new crossing at Cow Gut is required in Section 5	Permanent	Reversible through mitigation on site	At crossing of Cow Gut only	Adverse	Minor
Indirect effects via accidental pollution incidents and surface water run-off from the site	Probable	Low. Limited to crossing of Cow Gut only	Temporary	Reversible/ preventable	Section 5 where new crossing required at crossing of Cow Gut	Adverse	Minor
Non-Native Invasive Species – Site Value							
Potential to spread these species during cable installation works	Unlikely	Low. Japanese rose in shrub planting	Permanent	Avoidable/ reversible through mitigation on site	Section 1 only if disturb shrub planting south of slipway	Adverse	Minor
	Unlikely	Low. Section 2 cotoneaster adjacent to road.	Permanent	Avoidable/ reversible through mitigation on site	Section 2 depending on precise routing at western end.	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
	Unlikely	Low. Himalayan balsam recorded at western end of Cow Gut only	Permanent	Avoidable/ Reversible through mitigation on site	Through Section 5 and at crossing of Cow Gut	Adverse	Minor
Amphibians (Excluding Great Crested Newt) – Site Value							
Loss of breeding habitat	Unlikely	Low. One ephemeral pond in part of Section 5 only. Dry throughout surveys in 2013. No amphibians recorded.	Permanent	Avoidable / reversible through mitigation on site	Western edge of Section 5 only	Adverse	Not significant
Potential harm or injury during cable installation works	Probable	Low	Temporary	Avoidable through mitigation on site	Largely restricted to Sections 1, 5 and 6 only	Adverse	Minor
Loss of foraging and refuge habitat during cable installation works	Probable	Low	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	Largely restricted to Sections 1, 5 and 6	Adverse	Not significant

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Bats – Local Value							
Loss of foraging habitat i.e. arable fields, semi-improved grassland, hedgerows and disruption to commuting routes	Certain	Low – Habitats not high value for foraging and only one defunct hedgerow will be affected	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	During May to October when bats active	Adverse	Not significant
Disturbance to foraging and commuting bats due to light	Certain	Low	Temporary	Avoidable through mitigation on site	During May to October when bats active	Adverse	Minor
Water Vole – Site Value							
Potential for disturbance or damage to burrows if present on Cow Gut during cable installation or if ditch on east side of motorbike scramble track is affected	Unlikely	Low. No confirmation water voles on site and most waterbodies unsuitable	Temporary	Preventable through mitigation	Cable Installation across Cow Gut to the far west of Section 5	Adverse	Minor
Disturbance due to reduction of water quality through run-off and pollution events.	Probable	Low	Temporary	Reversible/ preventable	Western part of Sections 5 only	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Reptiles (Common Lizard) – Site Value							
Potential harm or injury during cable installation works	Unlikely	Low	Temporary	Avoidable through mitigation on site	Limited to Section 1 only	Adverse	Minor
Loss of foraging and refuge habitat during cable installation works	Probable	Low	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	Limited to Section 1 only	Adverse	Not significant
Wintering Birds – Site Value							
Loss of foraging habitat i.e. arable fields, hedgerows	Certain	Low – cable to be installed in sections so large areas of suitable foraging habitat will remain unaffected	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	During winter period only (October to March). Sections 1 to 6.	Adverse	Not significant
Disturbance from the site due to light, noise and physical activity	Certain	Low	Temporary	Avoidable through mitigation on site	Section 1 only. During winter period only (October to March)	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
					Sections 2 to 6.	Adverse	Not significant
Breeding Birds – Site Value							
Loss of nesting habitat i.e. arable fields, hedgerows and plantation woodland.	Certain	Low – very localised.	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	During the breeding season (March to August). Sections 1 to 6.	Adverse	Minor
Disturbance from the site due to light, noise and physical activity	Probable	Low	Temporary	Avoidable through mitigation on site	During the breeding season (March to August)	Adverse	Minor
Physical injury/ death of breeding birds and/ or damage to nests during habitat clearance of the site	Probable	Low – only if vegetation clearance takes place during the breeding season.	Temporary during site clearance works	Avoidable through mitigation on site	During the breeding season (March to August)	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Other S.41 Species – Site Value							
Loss of or disturbance to foraging, refuge and hibernation habitat for invertebrate species	Certain	Low	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	Largely restricted to Sections 1, 2, 5 and 6	Adverse	Not significant
Indirect impacts on European eels through accidental pollution incidents and surface water run-off into ditch system	Probable	Low	Temporary	Avoidable through mitigation on site	Western part of Section 5 only	Adverse	Minor

Operational Phase of HVDC Cables

7.116 No operational effects from the HVDC cables are predicted assuming there is no regular maintenance required along the cable routes.

Assessment of Effects of Converter Station

Construction Phase

7.117 The area required for the Converter Station itself is approximately 5 hectares with an additional temporary lay down area of approximately 1.5 hectares during construction. The key activities which will have a potential effect on the ecological resources of the Proposed Development site and vicinity include vegetation clearance, bulk earthworks, installation of drainage, construction of the buildings and relevant infrastructure, and landscaping works..

7.118 Construction is planned to start on site in 2016 and be complete by 2020. Potential effects likely to arise during the construction phase will include, but may not be limited to:

- Loss of and / or degradation to habitats of ecological value e.g. hedgerows, trees;
- Killing or injuring of protected species; and
- Disturbance or displacement of protected species or those of conservation concern, due to noise, light and physical activity.

7.119 Table 7.6 details the potential effects of the Proposed Development during the construction phase of the converter station on identified ecological receptors, prior to mitigation.

Table 7.6: Potential Effects of Converter Station during Construction (prior to mitigation)

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Northumbria Coast SPA/Ramsar – International Value							
Disturbance to designated bird species during construction phase and/or degradation of habitats downstream of outfall	Extremely unlikely	Low – No direct effects on SPA birds with possible exception of a small number of turnstone occasionally found at Mount Pleasant Peninsula	Temporary	Avoidable	Most likely during construction of the outfall into Sleekburn Estuary in winter period October to March	Adverse	Minor
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off .	Extremely unlikely – but downstream from Blyth and Sleekburn Estuary LWS	Low – due to distance from outfall	Temporary	Reversible/ Preventable	During construction of outfall into Sleekburn Estuary	Adverse	Not significant

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Northumberland Coast SSSI – National Value							
Disturbance to designated bird species during construction	<p>Probable – lapwing</p> <p>Unlikely – golden plover and curlew.</p> <p>Extremely unlikely – all other SSSI species.</p> <p>Probable – redshank at proposed outfall on Sleekburn only</p>	Low – flock of up to 91 lapwing occasionally recorded within field.	Temporary	Avoidable/ Preventable	Construction of converter station and outfall into Sleekburn Estuary and creation of drainage system through arable field	Adverse	Minor
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off	Unlikely – but downstream from Blyth and Sleekburn Estuary LWS	Low	Temporary	Reversible/ Preventable	During construction of outfall into Sleekburn Estuary	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Physical loss of arable habitat which provides some limited foraging opportunities for wader birds	Certain	Low – used by lapwing occasionally. Abundant arable land will remain unaffected in the surrounding area	Permanent	Irreversible	Mainly during winter period – October to March	Adverse	Not significant
Blyth and Sleekburn Estuary LWS – County Value							
Disturbance to designated bird species during construction	Probable – Sleekburn is used by small/moderate groups of redshank for feeding. Up to 25 curlew roost on the Mount Pleasant peninsula on the south bank of the Sleekburn Estuary.	Low – area is already disturbed due to public access, especially to Blyth Estuary.	Temporary	Avoidable/ Preventable	Construction of outfall into Sleekburn and drainage system across arable field Winter period – October to March.	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off from the site.	Probable – adjacent to works area to the south	Low	Temporary	Reversible/ preventable	During construction of outfall and drainage system across arable field	Adverse	Minor
Semi-Improved Grassland – Site Value							
Physical loss of semi-improved grassland for access route	Certain	Low – small area of poor semi-improved grassland at start of access road only	Permanent	Can be mitigated through replacement planting on site	Construction of access road only	Adverse	Not significant
Plantation Woodland – Local Value							
Physical loss of plantation woodland	Certain	Low – small area of plantation woodland on east side	Permanent	Can be mitigated through replacement planting on site	During site clearance only	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Physical damage to retained plantation woodland during construction	Probable – knocking, damage to structure, compaction of soil and root damage from construction machinery	Low	Short to medium term but severe impacts could be permanent	Avoidable/ preventable	Constant throughout construction period	Adverse	Minor
Trees (Outside Plantation) – Site Value							
Physical loss of trees for development of converter station	Certain	Low – one ash tree only in defunct hedgerow	Permanent	Can be mitigated through replacement planting on site	Site clearance works only	Adverse	Minor
Hedgerows – Site Value							
Physical loss of hedgerow for development of converter station	Certain	Low – one defunct hawthorn hedgerow (approximately 265m but very gappy)	Permanent	Can be mitigated through replacement planting on site	Site clearance works only	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Physical damage to retained hedgerow during construction	Probable – knocking, damage to structure, compaction of soil and root damage from construction machinery	Low	Short to medium term but severe impacts could be permanent	Avoidable/ preventable	Constant throughout construction period	Adverse	Minor
Amphibians (Excluding Great Crested Newts) – Local							
Potential harm or injury during construction works	Probable	Low	Temporary	Avoidable through mitigation on site	Small areas of plantation woodland only	Adverse	Minor
Loss of foraging and refuge habitat during construction works	Probable	Low	Temporary	Reversible through replacement planting on site	Small areas of plantation woodland only	Adverse	Not significant
Bats – Local Value							
Loss of foraging habitat i.e. arable fields and hedgerows	Certain	Low. Very low levels of activity	Permanent	Reversible through replacement planting on site	During May to October when bats active	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Disturbance to foraging and commuting due to construction lighting	Probable	Low	Temporary	Avoidable through mitigation on site	During May to October when bats active	Adverse	Minor
Otter – Local Value							
Potential loss of otter holt or couch and disturbance to otter during construction of drainage outfall	Certain	Low	Permanent	Avoidable through mitigation on site	During construction of outfall only	Adverse	Minor
Wintering Birds – Site Value							
Loss of foraging habitat i.e. arable fields, hedgerows	Certain	Low – large areas of foraging habitat in the surrounding area will remain unaffected	Permanent	Irreversible in terms of arable fields. Limited opportunities to mitigate on site	During winter period only (October to March)	Adverse	Not significant
Disturbance from the site due to light, noise and physical activity	Probable	Low	Temporary	Avoidable / Reversible through mitigation on site	During winter period only (October to March)	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Significance
Breeding Birds – Site Value							
Loss of nesting habitat i.e. arable fields, hedgerows, plantation	Certain	Low – mainly affects common passerine species. No ground nesters present in this location	Temporary	Reversible through replacement planting on site	During the breeding season (March to August)	Adverse	Minor
Disturbance from the site due to light, noise and physical activity	Probable	Low	Temporary	Avoidable / reversible through mitigation on site	During the breeding season (March to August)	Adverse	Minor
Physical injury/ death of breeding birds and/ or damage to nests during habitat clearance of the site	Unlikely	Low – only if vegetation clearance takes place during the breeding season.	Temporary during site clearance works	Avoidable through mitigation	During the breeding season (March to August)	Adverse	Minor
Other S.41 species – Site Value							
Loss of or disturbance to foraging, refuge and / or hibernation habitat for invertebrate species	Certain	Low – Limited to plantation woodland only	Permanent	Reversible through replacement planting	Throughout construction	Adverse	Not significant

Operational Phase Converter Station

- 7.120 The key activities which will have a potential effect on the ecological resource of the Proposed Development site and vicinity during operation of the converter station include vehicle and pedestrian traffic movements and lighting. The predicted effects associated with the numbers of permanent and visiting staff at the proposed converter station are not considered too significant.
- 7.121 Potential effects likely to arise during the operational phase will include, but may not be limited to:
- Movement of vehicles into, around and out of the site;
 - Movement of pedestrians into, around and out of the site including landscaped areas;
 - Operation of a new lighting regime across the site;
 - Drainage discharge into Sleekburn Estuary and maintenance works to the drainage system and outfall; and
 - Maintenance of landscaped areas.
- 7.122 Table 7.7 details the potential effects of the Proposed Development during the operational phase on identified ecological receptors, prior to mitigation.

Table 7.7: Potential Effects of Converter Station During Operation (Prior to Mitigation)

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Northumbria Coast SPA/Ramsar – International Value							
Potential degradation of habitats downstream of drainage outfall into Sleekburn Estuary and associated impacts on designated bird species	Unlikely	Low	Permanent	Avoidable through mitigation on site	Throughout operation of converter station (40 years)	Adverse	Minor
Northumberland Coast SSSI – National Value							
Potential degradation of habitats downstream of drainage outfall into Sleekburn Estuary and associated impacts on designated bird species	Unlikely	Low	Permanent	Avoidable through mitigation on site	Throughout operation of converter station (40 years)	Adverse	Minor
Potential loss of foraging/roosting habitat for designated bird species as presence of large buildings deters birds from area	Likely	Low – site occasionally used by lapwing.	Permanent – although some birds will habituate to the presence of the buildings	Irreversible	Every October to March throughout operation of converter station (40 years).	Adverse	Not significant

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Blyth and Sleekburn Estuary LWS – County Value							
Degradation of habitats through discharge of water into Sleekburn Estuary resulting in potential erosion of banks and changes to water flow and quality within Sleekburn Estuary. Freshwater discharge could also affect salinity, having knock-on effects on invertebrates and bird feeding	Probable	Low	Permanent	Avoidable through mitigation on site	Throughout operation of the converter station (40 years)	Adverse	Minor
Bats – Local Value							
Possible disturbance to foraging and/or commuting bats from external lighting	Extremely unlikely – low levels of bat activity and mostly common pipistrelle which are adaptable. Bats can also benefit by foraging around lighting	Low	Permanent	Can minimise through mitigation on site	Every May to August when bats active over 40 year life of converter station	Adverse to Beneficial (Neutral)	Not significant

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Otter – Site Value							
Potential degradation of habitats in Blyth and Sleekburn Estuary LWS from water discharge, resulting in loss of habitat for otter	Unlikely	Low	Permanent	Avoidable through mitigation on site	Throughout operation of the converter station (40 years)	Adverse	Minor
Wintering Birds – Site Value							
Potential loss of foraging/roosting habitat as presence of large buildings deters birds from area	Likely	Low	Permanent – although some birds will habituate to the presence of the buildings	Irreversible	Every October to March throughout 40 year life of converter station.	Adverse	Not significant
Degradation of habitats through discharge of water into Sleekburn Estuary resulting in potential erosion of banks and changes to water flow and quality within Sleekburn Estuary. Freshwater discharge could also affect salinity, having knock-on effects on invertebrates and bird feeding	Likely	Low	Permanent	Can be avoided through mitigation on site	Throughout operation of converter station (40 years)	Adverse	Minor

Assessment of Effects of HVAC Cable

Construction Phase

- 7.123 The key activities which will have a potential effect on the ecological resources of the site include vegetation clearance, trench and launch pit excavation works, cementing works, backfilling of trenches, installation of drainage and relevant infrastructure.
- 7.124 Construction is planned to start on site in 2016 and be complete by 2020. Construction activities will be phased as indicated in Chapter 4.
- 7.125 Potential effects likely to arise during the construction phase will include, but may not be limited to:
- Degradation of designated nature conservation sites and/or disturbance to the designated species;
 - Loss of and / or degradation to habitats of ecological value e.g. hedgerows, trees;
 - Killing or injuring of protected species; and
 - Disturbance or displacement of protected species or those of conservation concern, due to noise, light and physical activity.
- 7.126 Table 7.8 details the potential effects of the Proposed Development during the construction phase on identified ecological receptors, prior to mitigation.

Table 7.8: Potential Effects of HVAC Cables During Construction (Prior to Mitigation)

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Northumbria Coast SPA/Ramsar – International Value							
Disturbance to designated bird species during cable installation (three species to assess - Little tern, purple sandpiper and turnstone).	Extremely unlikely - little tern and purple sandpiper Unlikely - turnstone	Low – No direct effects on SPA birds with possible exception of small number of turnstone occasionally found at Mount Pleasant Peninsula.	Temporary	Avoidable/ preventable	Winter period – October to March.	Adverse	Not significant
Northumberland Coast SSSI – National Value							
Disturbance to designated bird species during cable installation	Extremely unlikely - Sleekburn is used by small/ moderate groups of redshank for feeding.	Low – existing screening protects birds using Blyth and Sleekburn estuaries from disturbance. No SSSI species recorded in works area	Temporary	Avoidable/ preventable	Winter period – October to March.	Adverse	Not significant

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off from the site	Unlikely – but downstream from Blyth and Sleekburn Estuary LWS adjacent to site	Low	Temporary	Reversible/ preventable	Constant throughout construction period	Adverse	Minor
Blyth and Sleekburn Estuary LWS – Local Value							
Disturbance to designated bird species during construction	Extremely unlikely – Sleekburn is used by small/ moderate groups of redshank for feeding.	Low – existing screening protects birds using Blyth and Sleekburn estuaries from disturbance. Area is already disturbed due to public access, especially to Blyth Estuary.	Temporary	Avoidable/ preventable	Winter period – October to March.	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off from the site	Probable – adjacent to works area to the south	Low	Temporary	Reversible/ preventable	Constant throughout construction period	Adverse	Minor
Semi-Improved Grassland – Site Value							
Physical loss of semi-improved grassland for cable installation	Certain	Low	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	Constant throughout construction period	Adverse	Not significant
Plantation Woodland – Local Value							
Physical loss of plantation woodland to facilitate cable installation	Certain	Low – maximum of 16m working width through young plantation at south end of converter station	Temporary (except for 7m permanent easement)	Can be mitigated through replacement planting on site	During installation of cable directly south of new converter station	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Physical damage to retained areas of plantation woodland during cable installation	Probable – knocking, damage to structure, compaction of soil and root damage from construction machinery	Low	Short to medium term but severe impacts could be permanent	Avoidable/ preventable	During installation of cable directly south of new converter station	Adverse	Minor
Hedgerows – Site Value							
Physical loss of hedgerows for cable installation	Certain	Low – 4 hedgerows. Minimise working width at hedgerow crossings	Temporary	Reversible. Hedgerow to be reinstated following cable installation	Constant throughout construction period	Adverse	Not significant
Physical damage to retained hedgerows during cable installation	Probable – knocking, damage to structure, compaction of soil and root damage from construction machinery	Low	Short to medium term but severe impacts could be permanent	Avoidable / preventable	Constant throughout construction period	Adverse	Minor
Ditches – Site Value							

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Indirect effects via accidental pollution incidents and surface water run-off from the site	Highly unlikely – ditch network all totally dry during surveys	Low	Temporary	Reversible/ preventable	Constant throughout construction period	Adverse	Minor
Amphibians (Excluding Great Crested Newt) – Site Value							
Potential harm or injury during cable installation works	Probable	Low	Temporary	Avoidable through mitigation on site	Constant throughout construction period	Adverse	Minor
Loss of foraging and refuge habitat during cable installation works	Probable	Low	Temporary	Reversible. Habitats will be reinstated following completion of cable installation	Constant throughout construction period	Adverse	Not significant
Bats – Local Value							
Loss of foraging habitat i.e. arable fields, semi-improved grassland, hedgerows and disruption to commuting routes	Certain	Low – low levels of bat activity recorded	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	During May to October when bats active	Adverse	Not significant

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Disturbance to foraging and commuting bats through lighting	Certain	Low – low levels of bat activity	Temporary	Avoidable through mitigation on site	During May to October when bats active	Adverse	Minor
Water Vole – Site Value							
Potential for disturbance to burrows, if present.	Extremely unlikely	Low – ditches all dry at time of survey so unsuitable for water voles	Temporary during construction period	Avoidable through mitigation	Southern end of cable route only	Adverse	Minor
Disturbance due to reduction of water quality through run-off and pollution events.	Unlikely	Low – ditches all dry at time of survey so unsuitable for water voles	Temporary	Avoidable through mitigation/ Reversible	Constant throughout construction period	Adverse	Minor
Otter – Site Value							
Potential for disturbance of lie up or couch during cable installation	Extremely Unlikely	Low – small area of grassland affected only	Temporary during construction period	Reversible. Habitats to be reinstated following completion of cable installation	Southern end of cable route across grassland only	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Disturbance due to accidental pollution incidents and surface water run-off into Sleekburn Estuary	Unlikely	Low – but could affect protected areas downstream	Temporary during construction period	Avoidable through mitigation/ Reversible	Throughout construction	Adverse	Minor
Reptiles (Common Lizard) – Site Value							
Potential harm or injury during cable installation works	Probable	Low - small area of grassland affected only	Temporary	Avoidable through mitigation on site	Constant throughout construction period	Adverse	Minor
Loss of foraging and refuge habitat during cable installation works	Probable	Low - small area of grassland affected only	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	Constant throughout construction period	Adverse	Not significant
Wintering Birds – Site Value							

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Loss of foraging habitat i.e. arable fields, hedgerows	Certain	Low – cable to be installed in sections so large areas of suitable foraging habitat will remain unaffected	Temporary	Reversible. Habitats to be reinstated following completion of cable installation.	During winter period only (October to March)	Adverse	Not significant
Disturbance from the site due to light, noise and physical activity	Probable	Low	Temporary	Avoidable through mitigation on site	During winter period only (October to March)	Adverse	Not significant
Breeding Birds – Site Value							
Loss of nesting habitat i.e. arable fields, hedgerows	Certain	Low – 2 x 15m working width only	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	During the breeding season (March to August)	Adverse	Not significant
Disturbance from the site due to light, noise and physical activity	Probable	Low	Temporary	Avoidable through mitigation on site	During the breeding season (March to August)	Adverse	Minor

Effect Description	Degree of Certainty	Magnitude/ Extent	Duration	Reversibility	Timing/ Frequency	Direction of Effect	Potential Effect Significance
Physical injury/ death of breeding birds and/ or damage to nests during habitat clearance of the site	Unlikely	Low – only if vegetation clearance takes place during the breeding season.	Temporary during site clearance works	Avoidable through mitigation on site	During the breeding season (March to August)	Adverse	Minor
Other S.41 species – Site Value							
Loss of or disturbance to foraging, refuge and hibernation habitat for invertebrate species	Certain	Low	Temporary	Reversible. Habitats to be reinstated following completion of cable installation	Throughout construction	Adverse	Not significant

Operational Phase of HVAC Cables

7.127 No operational effects from the HVAC cables are predicted assuming there is no regular maintenance required along the cable routes.

Mitigation

7.128 This section describes the mitigation measures proposed to minimise significant adverse effects upon ecological receptors.

7.129 In considering the effectiveness of different mitigation measures, the time required for the mitigation to become effective is an important factor; works such as planting, for example, require an establishment period and a maturation period before they have the potential to replace mature and structured habitats that might be damaged or lost during the construction phase. In some instances though, mitigation measures would have an immediate effect. Time periods are considered as follows:

- Immediate – effective immediately;
- Short term – effective within 2 years;
- Medium term – effective within 2 – 5 years;
- Long term – effective within 5 – 10 years.

7.130 The mitigation measures can be described as inherent i.e. those which have been ‘designed in’ to the scheme, standard i.e. those which form part of normal construction practices and actionable i.e. those which require specific action for identified impacts on an ecological receptor. These are described more fully below.

Inherent Mitigation Measures

7.131 Inherent mitigation measures are those which have been ‘designed in’ to the scheme as part of the iterative environmental assessment process and are included within the development parameters. Those of particular relevance to ecological receptors are as follows:

- Preferred route selected to avoid features of ecological interest as far as possible;
- Minimising working width for cable installation at hedgerow crossings;
- Retention of band of existing plantation woodland to south and east of converter station to maintain connectivity;
- Horizontal direction drilling will be used to minimise impacts where required; and
- Lighting will only operate when access to the site is required for maintenance or emergencies or when intruders trigger lights. The perimeter will not be illuminated and unnecessary spillage of light and upward lighting will be kept to a minimum.

Standard Construction Mitigation Measures

7.132 Standard mitigation measures include those which are usually followed on construction sites and most often included in a construction environmental management plan (CEMP). The CEMP often also includes an Emergency Spill Response Plan. Those measures to be implemented prior to or during construction that are relevant to the ecological constraints are as follows:

- Trees and Hedges: Appropriate tree protection measures will be implemented for all retained woodland and tree areas. These measures will accord with current standards (BS5837:2012 Trees in relation to design, demolition and construction – recommendations). These measures will minimise accidental damage and disturbance to the habitats and the species they support. These measures will be effective immediately.
- Watercourses and Habitats: The effects of construction will be minimised by preventing runoff and works pollution from entering watercourses. This will be achieved through the use of bunds to catch and divert runoff, drip trays to prevent any oil and fuel spillages spreading. Windblown dust will be minimised by using wheel washing and damping down, while net fencing will catch windblown rubbish. These measures will be effective immediately.
- Any fuel or oil storage areas will be bunded to avoid spread of any spillage.
- Nesting Birds: Any tree, hedge and scrub vegetation removal will take place outside the bird nesting season (avoiding the period March to August inclusive). If this is not achievable, removal will only be allowed on confirmation by an ecologist that no nesting birds are present. Nesting bird checks are less suitable for large areas of dense vegetation such as mature woodland in foliage. In these situations it may not be possible to confidently confirm absence of nesting birds and removal may have to wait until after the nesting season. Retained hedges and trees adjacent to working areas will be protected from encroaching traffic using fencing (BS5837:2012), this will minimise disturbance to nesting birds in retained habitat. These measures will be effective immediately.
- Pre-construction surveys for breeding birds, badgers, water vole and otter to ensure no change in the status of these species during the period up to commencement of construction.
- Standard precautionary working measures will be implemented during site clearance works to ensure no injury to legally protected and/or S.41 species such as common lizard or common toad, which may be present within some areas of grassland. This would include appropriate timing of works to minimise impacts, including avoidance of disturbance to animals during the hibernation period as they would be unlikely to survive. These measures will also need to ensure no spread of Schedule 9 invasive species.

Actionable Mitigation Measures

- 7.133 Actionable mitigation measures are required when potential effects are still present and require a specific approach to deal with the issue. On this site the key actionable mitigation measures are:
- 7.134 Final details of the drainage system will be agreed at the detailed design stage of the project, but drainage quantities will be managed to avoid flood risk. A swale will be constructed around the converter station which will eventually discharge into Sleekburn Estuary. A minimum of two linked SuDS components will be constructed to filter the water prior to discharge. The outfall will be designed in consultation with the Environment Agency to avoid degradation of Sleekburn Estuary and this will include flow energy dissipation to prevent

erosion of the banks. The drainage design will also maximise the use of native plants and ecological connectivity.

- 7.135 Reinstatement of all habitats along both the HVDC and HVAC cable routes, although tree planting cannot be reinstated within a permanent 7m easement over the cables. This aspect of mitigation would be effective in the medium to long term.
- 7.136 The lighting plan for use during construction and operation of the converter station will be designed to avoid impacts on bats.
- 7.137 Enhancement measures will be incorporated along the cable routes and in the areas of plantation woodland in the form of boxes on trees for nesting birds and roosting bats. Any wood or brash which is removed for the proposals will be retained in a suitable area along the routes or within the plantation woodland to provide refuge opportunities for invertebrates, small mammals and toads. This aspect of mitigation would be effective immediately.
- 7.138 The landscaping scheme for the site should include the planting of a variety of native wildlife friendly trees and shrubs. These should include nectar and berry bearing species to increase foraging opportunities for wildlife and the planting should be located to maximise connectivity across the site for wildlife. This will be effective in the medium to long-term.

Residual Effects

- 7.139 Residual effects for the construction and operational activities of the Proposed Development take into account the mitigation measures described above and provide an indication of how the initial potential effects have been reduced.
- 7.140 Table 7.9 details the anticipated residual effects of the Proposed Development during the construction phase on identified ecological receptors, having taken mitigation measures into account.

Table 7.9: Mitigation and Residual Effects During Construction of the HVDC Cables

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Northumbria Coast SPA/Ramsar – International Value			
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off from the site during cable installation	Minor	Standard mitigation measures included within a CEMP	Not significant
Northumberland Coast SSSI – National Value			

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Disturbance to designated bird species during cable installation	Minor	Avoid artificial light and night time working at landfall site. Works to be undertaken outside wintering period of October to March at landfall site.	Not significant
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off from the site	Minor	Standard mitigation measures included within a CEMP	Not significant
Plantation Woodland – Local Value			
Physical loss of plantation woodland for cable installation	Minor – Section 6 only, south side of Cow Gut	Minimise loss of woodland for working area. Reinstatement of plantation woodland (except for permanent 7m easement where only shrubs and grassland can be created) over cable routes. Retention of habitat connections Replacement planting on site of native trees will be included within the landscape plan at the detailed design stage.	Not significant
Physical damage to retained areas of plantation woodland	Minor. South side of Cow Gut only	Implementation of standard mitigation measures following BS5837:2012	Not significant
Trees – Site Value			
Physical loss of trees for cable installation	Minor. Section 4 only	Replacement planting on site of native trees will be included within the landscape plan at the detailed design stage.	Not significant
Physical damage to retained trees during cable installation	Minor. Section 4 only	Implementation of standard mitigation measures following BS5837:2012	Not significant
Hedgerows – Site Value			
Physical damage to retained hedgerows during cable installation	Minor. Section 2 only	Implementation of standard mitigation measures following BS5837:2012	Not significant

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Ditches – Site Value			
Physical damage to ditch and banks (Cow Gut)	Minor. Section 5 if new crossing required for Cow Gut only	Minimise area of bank to be affected. Pre-construction check to ensure no water voles or Schedule 9 species affected. Micro siting on site to avoid any potential impacts	Not significant
Indirect effects via accidental pollution incidents and surface water run-off from the site	Minor. Section 5 only	Standard mitigation measures included within a CEMP	Not significant
Non-Native Invasive Species – Site Value			
Potential spread of invasive species during site works	Minor. Sections 1, 2 and 5	Precautionary working method statement to avoid spread. Could eradicate from site as enhancement measure	Not significant to Minor Beneficial (if eradicate from site)
Amphibians (Excluding Great Crested Newts) – Site Value			
Potential harm or injury during cable installation works	Minor	Precautionary working method statement to avoid impacts on amphibians to include staged strim of vegetation and no trenches left open overnight	Not significant
Bats – Local Value			
Disturbance from the site due to light, noise and physical activity	Minor	Construction lighting designed to minimise impacts on bats in accordance with BCT Guidelines.	Not significant
Water Vole – Site Value			
Potential for disturbance or damage to burrows, if present, on Cow Gut or ditch on east side of scramble field during cable installation.	Minor. Parts of Section 5	Pre-construction check for water voles. May require some strimming of vegetation for full access. Micro siting of cable route if necessary to avoid impacts	Not significant
Disturbance due to reduction of water quality through run-off and pollution events	Minor. Parts of Section 5	Standard mitigation measures included within a CEMP	Not significant
Reptiles - Site Value			
Potential harm or injury during cable installation works	Minor. Section 1 only	Precautionary working method statement to avoid impacts on amphibians to include staged strim of vegetation and no trenches left open overnight.	Not significant

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Wintering Birds – Site Value			
Disturbance from the site due to light, noise and physical activity	Minor	<p>Minimise disturbance in areas utilised by wintering birds between October and March.</p> <p>All works (including compounds) to be contained within agreed working corridor.</p> <p>Cable installation will be implemented in sections, such that disturbance will not affect the whole site at the same time.</p>	Not significant
Breeding Birds – Site Value			
Loss of nesting habitat i.e. arable fields, hedgerows, plantation woodland	Minor	<p>Habitats will be largely reinstated following completion of cable installation, other than 7m easement through plantation woodland.</p> <p>Cable installation will be implemented in sections so there will be abundant nesting habitat remaining in the surrounding area.</p> <p>The landscaping plan for the site will include native tree and shrub planting.</p>	Not significant
Disturbance from the site due to light, noise and physical activity	Minor	<p>Continue monitoring breeding bird activity throughout breeding season in area of works. If breeding birds present, implement appropriate buffer zone to avoid nest failure.</p> <p>Cable installation will be implemented in sections so not all areas will be subject to disturbance at the same time. Some birds will become habituated.</p>	Not significant
Physical injury/ death of breeding birds and/ or damage to nests during habitat clearance of the site	Minor	<p>Implement standard mitigation measures i.e. habitat clearance outside nesting season (March to August), or with pre-construction nesting bird checks</p>	Not significant

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Other S.41 Species – Site Value			
Indirect impacts on European eels through accidental pollution incidents and surface water run-off into ditch system	Minor – Section 5 only	Standard mitigation measures included within a CEMP	Not significant

7.141 No residual impacts are predicted from the operation of the HVDC cables.

7.142 Table 7.10 details the residual effects associated with the construction of the Converter Station.

Table 7.10: Mitigation and Residual Effects During Construction of the Converter Station

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Northumbria Coast SPA/Ramsar – International Value			
Disturbance to designated bird species during construction works	Minor	Avoid outfall works on Sleekburn during October to March	Not significant
Northumberland Coast SSSI – National Value			
Disturbance to designated bird species during converter station construction	Minor	Avoid outfall works on Sleekburn during October to March	Not significant
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off from the site	Minor	Standard mitigation measures included within a CEMP	Not significant
Blyth and Sleekburn Estuary LWS – County Value			
Disturbance to designated bird species during installation of outfall into Sleekburn Estuary	Minor	Avoid outfall works on Sleekburn during October to March	Not significant
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off from the site	Minor	Standard mitigation measures included within a CEMP	Not significant

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Woodland – Local Value			
Physical loss of plantation woodland cover to facilitate development of the site	Minor	Minimise loss of woodland. Reinstatement of plantation woodland (except for permanent 7m easement where only shrubs and grassland can be created) over cable routes. Retention of habitat connections. Replacement planting on site of native trees will be included within the landscape plan at the detailed design stage.	Not significant
Physical damage to retained areas of plantation woodland	Minor.	Implementation of standard mitigation measures following BS5837:2012	Not significant
Trees – Site Value			
Physical loss of one ash tree	Minor	Replacement planting on site of native trees will be included within the landscape plan at the detailed design stage. There will also be native screening planting around the converter station	Not significant
Hedgerows – Site Value			
Physical loss of hedgerow to facilitate development of converter station	Minor.	Areas removed could be used to gap up existing retained hedgerows within the site or provide refuge piles. Landscape scheme for the site will include planting of native trees and shrubs.	Not significant
Physical damage to retained hedgerows during construction	Minor	Implementation of standard mitigation measures following BS5837:2012	Not significant
Amphibians (excluding great crested newts) – Site Value			
Potential harm or injury during construction works	Minor	Precautionary working method statement to avoid impacts on amphibians to include staged strip of vegetation and no trenches left open overnight.	Not significant

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Bats – Local Value			
Loss of foraging habitat i.e. arable fields and hedgerow	Minor. Low levels of activity only	Landscape scheme for the site will include planting of native trees and shrubs, including nectar and berry bearing species to enhance foraging opportunities.	Not significant
Disturbance from the site due to light, noise and physical activity	Minor	Construction lighting designed to minimise impacts on bats in accordance with BCT Guidelines.	Not significant
Otter – Local Value			
Potential loss of holt or couch and disturbance of otter during installation of drainage outfall into Sleekburn Estuary	Minor	Pre-construction check for otter prior to works near Sleekburn Estuary. Micro siting of cables and outfall into Sleekburn Estuary, if necessary, to avoid impacts	Not significant
Wintering Birds – Site Value			
Disturbance from the site due to light, noise and physical activity	Minor	Minimise disturbance in areas utilised by wintering birds between October and March. All works (including compounds) to be contained within agreed working corridor.	Not significant
Breeding Birds – Site Value			
Loss of nesting habitat i.e. arable fields, hedgerows and plantation woodland	Minor	Landscape scheme for the site will include replacement planting of native trees and shrubs, Nest boxes would be installed on trees within the site to increase nesting opportunities.	Not significant
Disturbance from the site due to light, noise and physical activity	Minor	Continue monitoring breeding bird activity throughout breeding season in area of works. If breeding birds present, implement appropriate buffer zone to avoid nest failure. Some birds will become habituated.	Not significant

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Physical injury/ death of breeding birds and/ or damage to nests during habitat clearance of the site	Minor	Implement standard mitigation measures i.e. habitat clearance outside nesting season (March to August), or with nesting bird checks	Not significant

7.143 Table 7.11 details the residual effects associated with the operation of the Converter Station.

Table 7.11: Mitigation and Residual Effects During Operation of the Converter Station

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Northumbria Coast SPA/Ramsar – International Value			
Degradation of habitats and resultant effects on the species they support through drainage outfall into Sleekburn Estuary	Minor	Drainage scheme to include use of at least two linked SuDS treatments. Drainage scheme to be designed in consultation with EA and to include flow energy dissipation.	Not significant
Northumberland Coast SSSI – National Value			
Degradation of habitats and resultant effects on the species they support through drainage outfall into Sleekburn Estuary	Minor	Drainage scheme to include use of at least two linked SuDS treatments. Drainage scheme to be designed in consultation with EA and to include flow energy dissipation.	Not significant
Blyth and Sleekburn Estuary LWS - County Value			
Degradation of habitats and resultant effects on the species they support through drainage outfall into Sleekburn Estuary	Minor	Drainage scheme to include use of at least two linked SuDS treatments. Drainage scheme to be designed in consultation with EA and to include flow energy dissipation.	Not significant
Otter – Site Value			
Degradation of habitats in Blyth and Sleekburn Estuary LWS from water discharge, resulting in loss of habitat for otter	Minor	Drainage scheme to include use of at least two linked SuDS treatments. Drainage scheme to be designed in consultation with EA and to include flow energy dissipation.	Not significant

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Wintering Birds – Site Value			
<p>Degradation of habitats through discharge of water into Sleekburn Estuary resulting in potential erosion of banks and changes to water flow and quality within Sleekburn Estuary.</p> <p>Freshwater discharge could also affect salinity, having knock-on effects on invertebrates and bird feeding</p>	Minor	<p>Drainage scheme to include use of at least two linked SuDS treatments. Drainage scheme to be designed in consultation with EA and to include flow energy dissipation.</p>	Not significant

7.144 Table 7.12 details the residual effects associated with the construction of the HVAC Cables.

Table 7.12: Mitigation and Residual Effects During Construction of the HVAC Cables

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Northumberland Coast SSSI – National Value			
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off from the site	Minor	Standard mitigation measures included within a CEMP	Not significant
Blyth and Sleekburn Estuary LWS – County Value			
Degradation of habitats and resultant effects on the species they support – due to windblown dust and rubbish, accidental pollution incidents and surface water run-off from the site	Minor	Standard mitigation measures included within a CEMP	Not significant

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Woodland – Local Value			
Physical loss of plantation woodland cover for installation of HVAC cables	Minor	Minimise loss of woodland for working area. Reinstatement of plantation woodland (except for permanent 7m easement where only shrubs and grassland can be created) over cable routes. Retention of habitat connections Replacement planting on site of native trees will be included within the landscape plan at the detailed design stage.	Not significant
Physical damage to retained areas of plantation woodland	Minor.	Implementation of standard mitigation measures following BS5837:2012	Not significant
Hedgerows – Site Value			
Physical damage to retained hedgerows during construction	Minor	Implementation of standard mitigation measures following BS5837:2012	Not significant
Ditches – Site Value			
Indirect effects via accidental pollution incidents and surface water run-off from the site.	Minor	Standard mitigation measures included within a CEMP	Not significant
Amphibians (Excluding Great Crested Newts) – Site Value			
Potential harm or injury during cable installation works	Minor	Precautionary working method statement to avoid impacts on amphibians to include staged strip of vegetation and no trenches left open overnight	Not significant
Bats – Local Value			
Disturbance to foraging and commuting bats through lighting	Minor	Construction lighting designed to minimise impacts on bats in accordance with BCT Guidelines.	Not significant
Water Vole – Site Value			
Potential for disturbance to water vole burrows	Minor	Pre-construction check for water voles. May require some strimming of vegetation for full access. Micro siting of cable route if necessary to avoid impacts	Not significant
Disturbance due to reduction of water quality through run-off and pollution events	Minor	Standard mitigation measures included within a CEMP	Not significant

Effect Description	Effect Significance (in the absence of mitigation)	Mitigation	Residual Effect (after mitigation)
Otter - Site Value			
Potential for disturbance of lie up or couch during cable construction	Minor	Pre-construction check and micro-siting of cables, if necessary, to avoid impacts. Precautionary working method statement to include no trenches left open overnight.	Not significant
Disturbance due to accidental pollution incidents and surface water run-off into Sleekburn Estuary	Minor	Standard mitigation measures included within a CEMP	Not significant
Reptiles - Site Value			
Potential harm or injury during cable installation works	Minor	Precautionary working method statement to avoid impacts on amphibians to include staged strip of vegetation and no trenches left open overnight	Not significant
Breeding Birds – Site Value			
Disturbance from the site due to light, noise and physical activity	Minor	Continue monitoring breeding bird activity throughout breeding season in area of works. If breeding birds present, implement appropriate buffer zone to avoid nest failure. Cable installation will be implemented in sections so not all areas will be subject to disturbance at the same time. Some birds will become habituated.	Not significant
Physical injury/ death of breeding birds and/ or damage to nests during habitat clearance of the site	Minor	Implement standard mitigation measures i.e. habitat clearance outside nesting season (March to August), or with nesting bird checks	Not significant

7.145 No residual impacts are predicted from the operation of the HVAC cables.

7.146 Table 7.13 summarises the net impacts on the ecological receptors from the Proposed Development. It also includes assessment of the long-term mitigation measures such as the proposed landscaping plan for the site and its future management.

Table 7.13: Net Impact of Development on Identified Ecological Receptors

Receptor	Value	Net Impact
Northumbria Coast SPA/Ramsar	International	Not significant
Northumberland Shore SSSI	National	Not significant
Blyth and Sleekburn Estuary LWS	County	Not significant
Semi-improved neutral grassland	Site	Not significant
Plantation Woodland	Local	Not significant
Trees (outside plantation woodland)	Site	Not significant
Hedgerows	Site	Not significant
Ditches	Site	Not significant
Non-native invasive species	Site	Not significant to minor beneficial
Amphibians (excluding great crested newts)	Site	Not significant
Bats	Local	Not significant
Water vole	Site	Not significant
Otter	Site	Not significant
Reptiles	Site	Not significant
Wintering Birds	Site	Not significant
Breeding Birds	Site	Not significant
Other S.41 species (e.g. invertebrates, eels)	Site	Not significant

7.147 The remaining adverse impacts associated with the converter station development relate to potential disturbance of wintering and breeding birds due to construction and operational activities. Although there will also be an overall loss of one defunct hedgerow and small areas of plantation woodland, which cannot be reinstated over the cable routes, these losses will all be compensated for by replacement planting of native trees and shrubs on site as part of the landscape plan at the detailed design stage.

Decommissioning Effects

7.148 At this time, it is not known whether the cables will be removed, or remain in situ at the end of the operational stage of the converter station. If the cables remain in situ, there will be no decommissioning effects. If the cables are removed, the impacts would be the same as those identified for the construction phase of the cables, so if the same mitigation is put in place, there would be no significant impacts from decommissioning of the cable routes.

7.149 Decommissioning effects for the converter station itself would be similar to those identified for the construction phase in terms of disturbance, but there would be no additional habitat loss. If the same mitigation is implemented as recommended for the construction stage, there would be no significant impacts relating to the decommissioning phase of the converter station. Removal of the converter station buildings could encourage wintering birds, which had been deterred by the presence of the buildings, to return to forage in the surrounding land. However, it is not known at this stage what the after use of the converter station site will be, but it may be redeveloped in the future.

In-Combination Effects

7.150 The ecological value of a site can also be affected by a variety of direct and indirect impacts relating to other hydrology (Chapter 13), noise and vibration (Chapter 15) and air quality (Chapter 16). Any potential in-combination effects from these disciplines have been assessed within the Impact Assessment presented in Tables 7.6 to 7.8.

Cumulative Effects

7.151 The following major development proposals have been considered as part of the assessment of potential cumulative effects:

- Port of Blyth Biomass Power Station
- Proposed NGET 400kV GIS Substation
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site; and
- Residential development – 48 dwellings.

Port of Blyth Biomass Power Station

7.152 In the absence of mitigation the Port of Blyth Biomass Power Station would have construction impacts on birds, including some SPA and SSSI species, due to noise from piling operations during the construction phase. The applicant states that this effect is mitigated by implementing noise level restrictions and using acoustic boarding. Construction works within the SPA to the east of the Proposed Development would be done using a trenchless technology and works would be programmed to avoid the winter period. Maintenance activities during the operational stage, which could generate excessive noise, would be restricted to the period April to September.

7.153 The Port of Blyth Biomass Power Station Environmental Statement concludes that it would be unlikely that there would be any long term impact on the integrity of the study area's ornithological features. Overall, the predicted level of ornithological impacts would be of low/negligible magnitude, and hence not significant with regard to the EIA regulations or the Habitats Regulations.

7.154 A No Likely Significant Effects report was prepared for the SPA species little tern, since this species was not recorded within the study area during surveys. The Assessment of Likely Significant Effects (ALSE) report therefore focussed on the SPA species purple sandpiper and turnstone. The ALSE predicted that turnstone and purple sandpiper would be subject to disturbance up to 250m from piling activities as a worst-case, although the effects were more likely to extend to only 100m. Field survey showed that very few purple sandpiper and turnstone occurred within 250m of the proposed piling activities. The ALSE concluded that the project would not affect the ecological integrity of the Northumbria Coast SPA, either alone or in combination with any other plan or project.

7.155 Therefore there are no predicted effects associated with the Port of Blyth Biomass Power Station which would contribute towards a cumulative impact with NSN Link project.

NGET 400kV GIS Substation

7.156 This development is a new proposed substation to the south of the converter station site, on land adjacent to Sleekburn Estuary. The development will result in the loss of areas of semi-improved neutral grassland, species-poor semi-improved grassland, ephemeral/short perennial vegetation, scattered scrub and ditch crossings. The development of the GIS substation will result in a greater loss of areas of semi-improved neutral grassland, which increases the likelihood of disturbance to amphibians or reptiles during site clearance works. No cumulative impacts are predicted as large areas of suitable terrestrial habitat will remain

within the surrounding area and precautionary methods of working can be implemented to avoid harm or injury during site clearance works.

- 7.157 The site for the proposed new GIS substation is not used by bird species associated with the Northumbria Coast SPA or Northumberland Coast SSSI. The predicted disturbance effects of the proposed substation would be similar to those associated with NSN Link. There are no significant distance effects predicted on shorebirds associated with the Blyth Estuary as a result of the construction of the proposed substation. This is because the works areas are located some distance from the Blyth Estuary, including approximately 360m from the Blyth Estuary SSSI and 150m from the Blyth and Sleekburn LWS. Furthermore existing screening, including trees and scrub, would block any direct line of sight between the works area and birds using the Blyth Estuary. There are no predicted effects associated with the NGET 400kV Substation which would contribute towards a cumulative impact with the two Projects.

Ferguson Business Park Single Turbine:

- 7.158 The Ferguson Business Park Turbine will be located approximately 390m west of the cable route and approximately 550m to the northwest of the proposed converter station site.
- 7.159 There is no ecology baseline information available for this consented 53.3 metre single turbine, however planning conditions 13 and 14 relate to protected species. Planning condition 13 stipulates that the turbine location must be 50 metres from any hedgerow or similar feature to protect bats. Planning condition 14 concerns the preparation of a construction method statement to safeguard protected species during all phase of the project. The wind turbine site and adjacent habitats are unlikely to be used by bird species associated with the Northumbria Coast SPA or Northumberland Coast SSSI. Taking into account the distant location of the wind turbine site and the small scale of the wind turbine development it is considered unlikely that there will be any cumulative impact with the two Projects.

Earth Balance Single Turbine:

- 7.160 The Earth Balance Single Turbine will be located approximately 2km to the west/northwest of the proposed converter station site.
- 7.161 There is no ecology baseline information available for this proposed 43.5 metre single turbine. The wind turbine site is in a residential area on the A1147 road. There appear to be several landscaped ponds in the vicinity of the wind turbine site. The wind turbine site and adjacent habitats are unlikely to be used by bird species associated with the Northumbria Coast SPA or Northumberland Coast SSSI. Taking into account the distant location of the wind turbine site and the small scale of the wind turbine development it is considered extremely unlikely that there will be any cumulative impact with the two Projects .

Narec Offshore Wind Demonstration Site:

- 7.162 The Narec Offshore Wind Demonstration Site is located 8km to 17km off the Blyth Coast.
- 7.163 There is no ecology baseline information available for this proposed offshore wind demonstration site. The wind demonstration site is unlikely to be used by bird species used by Northumbria Coast SPA or Northumberland Coast SSSI. The majority of bird SPA and SSSI birds are associated within inter-tidal habitats and would only cross marine habitats

when on migration. The only possible exception is little tern however the breeding colony associated with this species is at Beadnell Bay, 39km to the north of the proposed demonstration site. Taking into account the distant location of the wind demonstration site and the offshore location of the site, it is considered unlikely that there will be any cumulative impact with the two Projects.

Residential Development – 48 Dwellings

- 7.164 This project is for a housing development, located to the south of Brock Lane at East Sleekburn, approximately 500m from the closest point of the Proposed Development (converter station site). A review of aerial photography shows that the site for the proposed residential development is dominated by areas of hardstanding, with a band of trees along the western boundary and grassland bunds with tall ruderal vegetation and scrub which could provide some limited nesting sites for common and widespread bird species. The residential site is unlikely to be used by bird species used by Northumbria Coast SPA or Northumberland Coast SSSI. There are no significant impacts associated with breeding birds from the Proposed Development and therefore no cumulative impacts on nesting birds from the residential development. It is considered unlikely that there will be any cumulative impacts with the two Projects.

Summary

- 7.165 In summary no significant cumulative effects are expected between the Proposed Development and nearby proposed developments. In addition an assessment has been undertaken assuming that NSN Link and the planned development all come forward at the same time. The assessment has concluded there to be no likely significant in-combination effects.

Impacts on Northumbrian Coast SPA - Report to Inform Appropriate Assessment

- 7.166 Under the Conservation of Habitats and Species Regulations 2010, otherwise known as the Habitats Regulations, any development unconnected with the nature conservation management of a Natura 2000 site which risks adversely affecting the integrity of the site, either alone or in combination with other projects, requires an Appropriate Assessment to be carried out by the relevant competent authority to assess the implications for the conservation interests for which the area has been designated. The requirement for an Appropriate Assessment is triggered if it is identified that a development will have a 'likely significant effect' on the notified features of the Natura 2000 site.
- 7.167 As detailed in Table 7.2 under Existing Environment (Baseline Conditions), the Northumbria Coast SPA is a statutory site supporting internationally important numbers of birds which lies within the search area. It incorporates much of the coastline between the Tweed and Tees estuaries in north east England. Protected areas are mainly discrete sections of rocky shore and pebble beaches. One section of the SPA is located approximately 900m to the north of the proposed landfall site (Refer to Figure 7.2). Another section of the SPA is located 1.2km to the east of the southernmost extent of the works (HVAC cable installation).

7.168 The purpose of this section is to provide information to assist the competent authority in reaching a decision on whether the development is likely to have a significant effect on the Northumbria Coast SPA.

Conservation Objectives

7.169 The Northumbria Coast SPA has the following conservation objectives:

- To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the birds directive; and
- Subject to natural change, to maintain or restore:
 - The extent and distribution of the habitats of the qualifying features;
 - The structure and function of the habitats of the qualifying features;
 - The supporting processes on which the habitats of the qualifying features rely;
 - The populations of the qualifying features;
 - The distribution of the qualifying features within the site.

Qualifying Species

7.170 Three bird species, wintering turnstone, purple sandpiper and breeding little tern, form the qualifying features of this SPA.

7.171 Turnstone and purple sandpiper overwinter in internationally important numbers on this coastline. The SPA turnstone population is 1,739 individuals (five-year peak mean 1992/3-1996/7). The SPA purple sandpiper population is 787 individuals (five-year peak mean 1992/3-1996/7).

7.172 The Northumbria Coast SPA provides breeding grounds for little tern which nest in internationally important numbers. The SPA little tern population is 40 pairs (five-year peak mean 1992/3-1996/7).

7.173 The Ramsar citation sheet confirms that the Northumbria Coast Ramsar site supports:

- Nationally important numbers of **turnstone** during the winter period (978 individuals representing an average of 1% of the GB population – 5 year peak mean 1998/9-2002/3);
- Nationally important numbers of **purple sandpiper** during the winter period (291 individuals representing an average of 1.6% of the GB population – 5 year peak mean 1998/9-2002/3);
- Nationally important numbers of **little tern** during the breeding period (43 pairs representing an average of 2.2% of the GB population – 5 year peak mean 1998/9-2002/3).

Baseline Information

7.174 The Blyth-Cambois Wader Study undertaken by SKM Enviros for Northumberland County Council in July 2011 identifies areas of land associated with NSN Link as being of low potential for SPA species (SKM Enviros, 2011). Elsewhere, the study recorded 34 purple sandpiper at Crab Law to the south of the TEP survey area in winter 2008-2009; Crab Law is an area of rocky shore at least 2.3km to the southern extent of the proposed works. A peak

count of 51 turnstone was recorded on the rocky shore at low tide to the south of the Blyth estuary.

- 7.175 Desktop survey records (RSPB, 2013) indicate that peak counts of SPA birds tend to be recorded at low tide. High tide roosts were recorded at north Blyth beach in the mouth of the Blyth Estuary and alongside East Pier near Blyth, well to the south of the Blyth Estuary. Overall peak counts for SPA species tended to be recorded in the south at the Blyth Estuary and around Blyth town. Existing high disturbance on the sandy beach at Cambois was identified as a likely factor influencing the bird distribution.
- 7.176 The winter bird survey undertaken in 2012-2013 recorded a peak count of four turnstone; these birds were recorded on the beach at high tide to the south of the Wansbeck Estuary. No purple sandpiper were recorded during the 2012-2013 winter bird survey. Little tern do not occur within the survey area during the winter.
- 7.177 The only SPA species recorded during the survey of the Rivers Blyth and Sleekburn during the 2013-2014 winter bird survey was turnstone. Three individuals were counted on three occasions during Visits 1 and 3 in December and February respectively. At high/ebb tide on 22nd December 2013 and high tide on 22nd February 2014 three turnstone were observed in habitat on the Mount Pleasant peninsular, where the Sleekburn Estuary meets the Blyth Estuary. At low tide on the 22nd February three turnstone were also seen roosting on the side of the tidal basin. No SPA species were recorded in the vicinity of the landfall site, the River Wansbeck or habitat at the proposed substation site during the 2013-14 winter bird survey.
- 7.178 Two little tern were observed off the coast in the vicinity of the Wansbeck Estuary during the 2013 breeding bird survey. Little tern were not found to be breeding within the route corridor or elsewhere within the survey area.

Direct Habitat Loss

- 7.179 One section of the SPA is located approximately 900 metres to the north of the proposed landfall site. Another section of the SPA is located 1.2km to the east of the southernmost extent of the works (HVAC cable installation). Therefore no direct habitat loss will occur as a result of the proposed development.

Disturbance to Qualifying Species

- 7.180 Desktop and field survey evidence confirms that purple sandpiper do not occur within the survey area. This species is associated with an area of rocky shore at least 2.3km to the south east of the proposed works. Therefore the proposed development will not result in disturbance effects on purple sandpiper during construction or operational phases.
- 7.181 Two little tern were recorded in the vicinity of the River Wansbeck on one occasion during the 2013 breeding bird survey; however this species does not nest in the vicinity of the survey area. The little tern colony associated with the Northumbrian Coast SPA is located at Beadnell Bay, approximately 39km to the north of the proposed works. Therefore the proposed development will not result in disturbance effects on little tern during construction or operational phases.

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- 7.182 Small groups of turnstone have been occasionally recorded in the vicinity of the landfall site (peak count 4) and on the Mount Pleasant peninsular where the Sleekburn Estuary meets the Blyth Estuary at least 230m from the proposed works (peak count 3).
- 7.183 Turnstone is thought to be an extremely tolerant species which habituates rapidly. This species is tolerant to people, allowing them to approach to within 30 to 50m before flushing. There is no published evidence with regard to their reaction to noise or works, but it is likely that they have a high threshold. Walkers (and dog walkers in particular) cause the greatest reaction. Anecdotal evidence indicates that turnstone do not react to noise which reached 90dB due to piling. They will forage extremely close to electrical generator plants (less than 50m and often within 10m)(Cutts *et al.*, 2013).
- 7.184 It is considered extremely unlikely that the construction phase of the HVDC cable, the convertor station (including the proposed outfall) and the HVAC cable would result in disturbance of turnstone. The potential for turnstone disturbance to occur during HVDC and HVAC cable construction is assessed as being not significant. The part closure of Cambois beach and car park during cable installation works may reduce the number of visitors/dog walkers on the beach. This may benefit the bird assemblages using the coastline through reduced anthropogenic disturbance..
- 7.185 The construction of the outfall on the Sleekburn Estuary is assessed as being a minor significant impact (without mitigation). To mitigate for this potential disturbance effect on turnstone the outfall construction works within 50m of the Sleekburn Estuary will not be undertaken during the period October to March. The residual impact is assessed as being not significant..

Degradation of Habitats

- 7.186 It is considered extremely unlikely that the construction phase of the HVDC cable, the convertor station (including the proposed outfall) and the HVAC cable would result in degradation of habitats and resultant effects on the species they support. Degradation of habitats could potentially be caused by windblown rubbish/dust or accidental pollution events resulting from surface run off from works areas.
- 7.187 The wind typically prevails from the south or south west but as the depression moves away prevails from west or north west. For the majority of the year the prevailing wind is south west therefore there is the potential for longshore drift to move sediments northwards. In the spring the prevailing wind direction can switch to north west (www.metoffice.gov.uk).
- 7.188 One section of the SPA is located approximately 900m to the north of the proposed landfall site. So there is the potential for longshore drift to move displaced sediment northwards from the landfall site to the nearest section of the SPA, just north of Sandy Bay Holiday Park. This effect is assessed as being of minor significance (without mitigation). Standard mitigation measures including the implementation of a CEMP will reduce any potential effects to not significant.
- 7.189 Potential degradation effects on SPA habitat associated with the construction of the HVAC cable and the convertor station are assessed as being not significant (without mitigation).
- 7.190 Another section of the SPA is located 1.2km to the east of the southernmost extent of the works (HVAC cable installation). It is considered extremely unlikely that windblown materials from the HVAC works area could significantly affect this SPA habitat. The potential for

sediment and other materials to be washed down the River Sleekburn and Blyth Estuary to these SPA habitats during the construction phase is also extremely unlikely. Therefore overall potential habitat degradation to occur on SPA habitats due to construction works associated with the HVAC cable and the convertor station (and associated outfall) is assessed as being not significant (without mitigation).

- 7.191 No operational effects on the Northumbria Coast SPA from the HVDC cables or the HVAC cables are predicted, assuming there is no regular maintenance required along the cable routes.
- 7.192 It is considered unlikely that, during the operational phase, the outfall associated with the convertor station would result in degradation of habitats and resultant effects on the species they support. Water discharge associated with the outfall could have a very minor effect on the salinity of the Sleekburn Estuary; however this effect would be much reduced as the freshwater discharge would mix with water in the Blyth Estuary. Therefore habitats associated with the Northumbria Coast SPA would not be adversely affected. There is a remote chance that a pollution event associated with the outfall could affect downstream SPA habitats. This effect is assessed as being of minor significance (without mitigation).
- 7.193 The drainage system associated with the proposed outfall onto the Sleekburn Estuary will include the use of at least two linked SuDS (Sustainable Urban Drainage Systems). The drainage system will be designed in consultation with the EA and will include flow energy dissipation measures. The residual impact is assessed as being not significant.
- 7.194 Taking into account mitigation measures proposed, no likely significant effects have been identified for the Northumbria Coast SPA.

Conclusion to inform Appropriate Assessment

- 7.195 In consideration of the above it is recommended that an Appropriate Assessment will not be required for the Northumbria Coast SPA.

Conclusions

- 7.196 This ecological assessment identified one ecological receptor of international value (Northumbria Coast SPA/Ramsar), one receptor of national value (Northumberland Shore SSSI), one receptor of county value (Blyth and Sleekburn Estuary LWS), two receptors of local value (plantation woodland and bats) and 12 receptors of site value (semi-improved neutral grassland, trees, hedgerows, ditches, non-native species, amphibians (excluding great crested newts), water voles, otter, reptiles, wintering birds, breeding birds and other S.41 species (e.g. invertebrates and eels).
- 7.197 There will be no direct impacts on receptors of international value. The assessment has identified there to be direct impacts in the intertidal zone of the Northumberland Shore SSSI during cable installation. These effects will be temporary only and very localised. No rare or protected species or habitats of conservation importance were identified in the vicinity of the cable works and intertidal species recover quickly from physical disturbance so the impact will not be significant.

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- 7.198 Without mitigation, there is the potential for indirect impacts on international and national sites through disturbance to designated bird species. There is also the potential for indirect impacts on the Blyth and Sleekburn Estuary LWS through potential pollution due to the drainage outfall and/or disturbance of wintering and breeding birds.
- 7.199 There are no predicted likely significant effects on the Northumbria Coast SPA as a result of NSN Link project alone or in-combination with other projects. There is no requirement to undertake an Appropriate Assessment.
- 7.200 The majority of impacts relating to both cable routes during construction are temporary only as all habitats will be reinstated following completion of cable installation. The only permanent loss of habitat for the cable routes will be due to the 7m easement above the cables where plantation woodland cannot be reinstated. Shrubs and grassland will be planted in these areas.
- 7.201 The inherent mitigation measures relating to ecological constraints include: cable route selection to avoid features of high ecological value, reinstatement of all habitats along cable routes following installation, except for plantation woodland within the 7m easement, retention of the band of existing plantation woodland to south and east of the converter station to maintain connectivity, and the use of horizontal directional drilling, where required, to avoid impacts.
- 7.202 Standard mitigation measures which would be included in the CEMP include protection of retained trees and hedgerows in accordance with BS5837:2012, standard pollution prevention measures such as drip trays, bunds, wheel washing, net fencing and an Emergency Spill Response Plan, and ensuring no vegetation removal occurs within the bird breeding season.
- 7.203 Actionable mitigation measures include timing of works to minimise any potential for impacts on species such as wintering and breeding birds, minimising the working width for cable installation where it crosses hedgerows, construction and operational lighting designed to minimise impacts on foraging/commuting bats, implementing precautionary working measures to avoid impacts on reptiles and amphibians during site clearance works, pre-commencement checks for water voles and Schedule 9 species in the vicinity of the crossing of Cow Gut, installing nest boxes and bat roosting boxes on retained trees and creating refuge piles from removed vegetation.
- 7.204 The inherent design, standard mitigation measures and actionable mitigation measures serve to ensure that the remaining adverse impacts associated with the development relate to a small reduction in an area of plantation woodland and hedgerow due to a 5-15m easement above the cable routes, and the loss of one defunct hedgerow for the development of the converter station itself. However, the majority of plantation woodland and hedgerows will be unaffected by the development proposals, so this minor loss will not result in any significant impacts.

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8 LANDSCAPE

- 8.1 This chapter examines the effects associated with the proposed onshore components of NSN Link (“the Proposed Development”) on the landscape. The visual assessment is presented separately at Chapter 9, although it is acknowledged that there is a relationship between the perception of landscape and the experience of visual receptors.
- 8.2 For details of the project description, reference should be made to Chapter 4 of this Environmental Statement (ES).
- 8.3 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance. The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (“NSN Link Ltd”) and their contractors, in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the scheme design to reduce identified impacts.

Legislation and Policy Context

- 8.4 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on landscape conditions associated with the Proposed Development. This section should be read in conjunction with Chapter 5 which provides a more detailed overview of the policy context however the key policies relevant to this chapter are discussed below.

National Policy

- 8.5 The National Planning Policy Framework (NPPF) published in March 2012 sets out the Government’s planning policies for England. The NPPF sets out 13 sub-topics beneath the goal of Delivering Sustainable Development. The most relevant to this chapter is Section 11: Conserving and Enhancing the Natural Environment.

Regional Planning Policy

- 8.6 Of particular reference to this assessment is the Northumberland Consolidated Planning Policy Framework which forms the statutory Development Plan for Northumberland, and comprises ‘saved’ policies. The Development Plan is amended by Local Development Framework documents as they are adopted.
- 8.7 The Proposed Development falls within the former District of Wansbeck. The Wansbeck District Local Plan was adopted in July 2007 and currently forms part of the Consolidated Planning Policy Framework for NCC.
- 8.8 The Localism Act contains provisions to alter the planning system and allow the Secretary of State to make orders revoking Regional Spatial Strategies (RSS). An order was laid before Parliament to formally revoke the North East RSS on 22nd March 2013. The Northumberland County and National Park Joint Structure Plan Alteration (February 2005) was also revoked as part of the Order, with the exception of Policy S5, concerning the Green Belt extension around Morpeth.

Local Development Order

- 8.9 The proposed converter station site and part of the HVDC cable route corridor, south of Ferguson's Business Park are located on land which forms one of the Blyth Estuary Renewable Energy Zone (BEREZ) strategic sites. The East Sleekburn Strategic Site is also subject to a Local Development Order (LDO), which offers a potential fast-track planning approval for developments specified within the order.

Wansbeck District Local Plan

- 8.10 The Proposed Development falls within the former District of Wansbeck. The Wansbeck District Local Plan was adopted in July 2007 and currently forms part of the Consolidated Planning Policy Framework for NCC.

- 8.11 Preparation of the Northumberland Local Development Plan (the Local Plan) has commenced and the emerging plan has policies related to landscape and views from the Wansbeck Local Plan in relation to landscape character, trees and hedgerows, visual impact and landscaping and public realm. These policies set the context for undertaking the landscape assessment. The following specific references to landscape are made in the Wansbeck District Local Plan:

- Policy GP5 Landscape Character – this policy recognises that landscape and topographical features make an important contribution to the character and attractiveness of the District. It seeks to ensure that development that would have an adverse effect on the character or appearance of those areas which contribute most to the quality and distinctiveness of the local landscape will not be permitted.
- GP6 Trees and Hedgerows – this policy seeks to protect trees, woodlands and hedgerows and encourages new planting (particularly of native species). The policy states that development which would result in the loss of healthy trees will not be permitted unless there are overriding social or economic benefits of doing so.
- Policy GP30 Visual Impact – this policy states that all proposed development will be assessed in terms of its visual impact. Developments which in visual terms would cause significant harm to the character or quality of the surrounding environment will be refused.
- Policy GP32 Landscaping and Public Realm - This policy requires developers to incorporate a high standard of landscape treatment in their developments.
- Policy 51 Natural Environment – this policy states that development proposals should seek to conserve and enhance Northumberland's natural environment. Proposals that would result in significant harm to Northumberland's natural environment will only be permitted where the harm cannot be avoided, adequately mitigated or, as a last resort, compensated
- Policy 52 Landscape - this policy states that development proposals should seek to conserve and enhance the distinctive character and quality of Northumberland's landscape having regard to the Northumberland Landscape Character Assessment.

Best Practise and Guidance

- 8.12 In addition to relevant planning policy the following guidelines have been considered in the development of the project and the assessment:

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- Guidelines for Landscape and Visual Assessment, Third Edition (GLVIA 3), Landscape Institute and Institute of Environmental Management and Assessment, 2013;
 - Landscape Institute Advice Note 01/11 Photography and Photomontage in landscape and Visual Assessment.

Methodology

Study Area

- 8.13 The assessment of the likely significant effects of the Proposed Development on landscape character has been undertaken by Chartered Landscape Architects experienced in landscape assessment.
- 8.14 The methodology is considered to be applicable for the construction, operational and decommissioning phases and for the purposes of this chapter and in relation to landscape conditions, the activities associated with decommissioning are considered to be similar in nature to those of construction. The cables might require repair during the operational phase in which case there may be a need to excavate down to them. In terms of decommissioning it is understood that the redundant cables would either be left in situ or removed.
- 8.15 This method has been established with reference to GLVIA 3 and there are six stages to the landscape assessment:
- Baseline landscape assessment including an appreciation of the existing features which shape the character of the landscape;
 - Assessing the sensitivity of the receiving landscape including consideration of the landscape's susceptibility to change to the proposed change, and the value of the landscape;
 - Understanding the nature, form and features of the proposed development;
 - Assessing the magnitude of effect likely to result from the proposed development;
 - Evaluating the significance of the effects identified based on the sensitivity of the landscape and the magnitude of effect; and
 - Assessing the potential to mitigate visual effects.
- 8.16 The physical scope of this landscape assessment (and the visual assessment in Chapter 9) has been informed by a review of the Northumberland Landscape Character Assessment and field assessment.
- 8.17 The Proposed Development comprises two distinct elements which would give rise to different effects. The construction and operation of the converter station would result in long term or permanent effects on the landscape. The installation of the underground cables from landfall to the converter station and from the converter station to the proposed National Grid Electricity Transmissions Plc (NGET) substation would give rise to temporary effects on the landscape. Full reinstatement on completion would minimise long term effects. These differences are noted in the assessment.

Desk Based Assessment

8.18 A review of published information on landscape character relating to the Proposed Development area was undertaken. The desk based assessment has included a review of mapping, aerial photography and the following published landscape character assessments:

- Countryside Character Area Descriptions, Countryside Agency, 1998
- National Character Area Profiles, Natural England, 2014; and
- Northumberland Landscape Character Assessment, 2010.

Site Walkovers and Site Assessment

8.19 Landscape and visual effects have been considered in the feasibility and siting studies during the project development. A number of site visits have been carried out during the feasibility stage with the final assessment visits carried out by TEP in November and December 2013. The objective of the walkover was to consider the effects of the Proposed Development on the landscape and included a walkover of the cable route and converter station site.

8.20 Site assessment has involved visits to the area by car and on foot to consider the development site and the wider landscape from publicly accessible locations.

Consultation

8.21 Consultation with NCC has been undertaken as part of the Scoping stage and as the assessment progressed.

Assessing the Significance of Landscape Effects

8.22 The method for the assessment of the likely effects of the Proposed Development on the landscape is described below, and considers the sensitivity of the landscape (including its susceptibility to change and its value) and the magnitude of the effect (size or scale; geographical extent; nature of the effect (adverse or beneficial); and its duration and reversibility) on the landscape. The significance of the effect is a judgement based on the sensitivity of the landscape and the magnitude of effect or scale of change arising due to the Proposed Development.

8.23 The Northumberland Landscape Character Assessment has been used as the basis for the landscape assessment and has been supplemented with field observations where differences or refinements were noted. An evaluation has been made of the sensitivity of the landscape to accommodate the Proposed Development without significantly affecting its character, features and value.

Landscape Sensitivity

8.24 Landscape sensitivity considers the value of the landscape and the landscape's susceptibility to change.

Value of the Landscape

8.25 Landscape value assessment considers the relative value that is attached to a landscape. Highly valued landscapes are typically identified by national level designations such as National Parks and AONB.

8.26 Undesignated landscapes and features are also valued. Consideration of condition, quality, rarity, representativeness, perceptual aspects and associations are considered in the identification of valued landscapes. A review of the Northumberland Landscape Character Assessment has been used to help identify locally valued landscapes and features.

Susceptibility to Change

8.27 The susceptibility of a landscape to change is dependent on the characteristics of the receiving landscape and the type and nature of the development proposed. Landscape types also have varying sensitivity to the types of development they are able to accommodate. The judgement on the susceptibility of a landscape is recorded as high, moderate or low; with high being a landscape which is highly susceptible or sensitive to change and low being a more robust landscape which is less susceptible to change.

8.28 The susceptibility of the landscape to the Proposed Development has been assigned to the landscape in accordance with the criteria set out in Table 8.1 below.

Table 8.1: Susceptibility to Change

Susceptibility to Change	Typical Criteria
High	<ul style="list-style-type: none"> • there is no or little similar development present in the landscape; and or • there is limited or no backgrounding by landform, woodland, and or built form; and or • the landscape cannot accommodate the Proposed Development without suffering detrimental effects on its character.
Medium	<ul style="list-style-type: none"> • there is some similar development present in the landscape; and or • there is some backgrounding by landform, woodland, and or built form; and or • the landscape is generally able to accommodate the Proposed Development without suffering detrimental effects on its character.
Low	<ul style="list-style-type: none"> • there is large scale development or a similar nature present in the landscape; and or • there is backgrounding by landform, woodland, and or built form; and or • the landscape is able to accommodate the Proposed Development without suffering detrimental effects on its character.

Landscape Sensitivity

8.29 As set out above, landscape sensitivity considers the value of the landscape and the landscape's susceptibility to change to the development proposed. The criteria for this are set out in the Table 8.2.

Table 8.2: Landscape Sensitivity

Landscape Sensitivity	Typical Criteria
High	The landscape has a high susceptibility to change and has national or regional value; or The landscape has a medium susceptibility to change and has national value.
Medium	The landscape has a high susceptibility to change and has local value; or The landscape has a medium susceptibility to change and has local and or regional value.
Low	The landscape has a low susceptibility to change and has local, regional and or national value.

Magnitude of Effect

8.30 The magnitude of effect on the landscape is considered with regard to the size or scale of change in the landscape likely to be experienced as a result of a development; the geographical extent of the area influenced; and the duration and reversibility of the effect. More weight is usually given to effects that are greater in scale and long-term in duration. In assessing the duration of the effect, consideration is given to the effectiveness of mitigation, particularly where planting is proposed as part of the works which would change the scale of the landscape effect. The following aspects have been taken into consideration in determining the magnitude of effects on landscape character.

Size or Scale

8.31 Determining the size or scale of landscape effect takes account of the loss or the addition of features in the landscape and the changes anticipated in its composition as a result of the development proposed. Consideration is also given to whether the predicted landscape effect changes the key characteristics of the landscape that influences the distinctive character of the landscape.

Geographical Extent

8.32 The geographical area likely to be affected by the development proposed is considered in the landscape assessment. Landscape effects can be experienced at the site level (i.e. within the Proposed Development site), at the scale of the landscape character area within which the Proposed Development is; and also at a large scale where the Proposed Development would influence several landscape character areas either by directly affecting different character areas or in its visibility from these areas.

Duration and Reversibility of Visual Effects

- 8.33 These are separate but linked considerations. Duration has been judged on a scale of:
- short-term: 0 to 5 years including the construction period and on completion;
 - medium-term: 5 to 15 years including establishment of replacement and proposed mitigation planting; and
 - long-term: 15 years onwards for the life of the Proposed Development
- 8.34 Reversibility is a judgement about the prospects and the practicality of the landscape effects being reversed. For example, while some forms of development such as a substation can be considered permanent, others such as underground cables can be considered as reversible since the landscape will be reinstated on completion of the installation land

reinstated. Reversibility is particularly relevant to construction effects as works will cease and land and most landscape features will be reinstated in the short-term.

Magnitude of Effect

- 8.35 The magnitude of effect considers the scale of change (i.e. whether it is high, medium, low or negligible); its nature (adverse, beneficial or neutral); and its duration (short, medium or long-term) and its reversibility.
- 8.36 Table 8.3 describes the magnitude criteria for the landscape assessment, which can be adverse or beneficial.

Table 8.3: Criteria for the Assessment of the Magnitude of Effect on Landscape Character

Magnitude of Effect	Typical Criteria
High	Major alteration to key features or characteristics in the existing landscape and/or the introduction of elements considered totally uncharacteristic. Typically this would be where there would be a great scale of change to the character of the landscape for the long term.
Medium	Partial alteration to key features or characteristics of the existing landscape and/or the introduction of prominent elements. Typically this would be where there would be a perceivable scale of change to the character of the landscape for the medium and long-term; or where there would be a great scale of change on the landscape for the short term.
Low	Minor alteration to key features and characteristics of the existing landscape and/or the introduction of features which may already be present in the landscape. Typically this would be where there is a low scale of change to the character of the landscape for the short term.
Negligible	A very minor alteration to key features or characteristics of the existing landscape. Typically this would be where the scale of change on landscape character would be barely perceptible.

Assessment of Cumulative Effects

- 8.37 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. However, when individual effects are considered in combination, the resulting cumulative effect may be significant.
- 8.38 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:
 - Port of Blyth Biomass Power Station;
 - Proposed NGET 400kV GIS Substation;
 - Ferguson Business Park Single Turbine;
 - Earth Balance Single Turbine;
 - Narec Offshore Wind Demonstration Site; and
 - Residential development – 48 dwellings.

Significance of Effect

- 8.39 The assessment of the significance of the effect of the Proposed Development on the landscape is not an absolute scale but is a judgement based on the magnitude of the anticipated effect and the sensitivity of the landscape to the Proposed Development.
- 8.40 Judgements on the significance of effect on landscape character can be beneficial (enhance the landscape) or adverse (at odds with or harmful to the landscape’s key features or character). Judgements on the significance of landscape effects have considered the examples presented in Table 8.4.

Table 8.4: Significance of Landscape Effects

Significance	Definition
Major adverse	The Proposed Development would: <ul style="list-style-type: none"> • be at complete variance with the landform, scale and pattern of the landscape; • would permanently degrade, diminish or destroy the integrity of valued characteristic features and/or their setting; • would substantially damage a high quality, highly valued landscape.
Moderate adverse	The Proposed Development would: <ul style="list-style-type: none"> • be at considerable variance with the landform, scale and pattern of the landscape; • would degrade, diminish or destroy the integrity of some characteristic features and/or their setting; • would cause damage to the character of a valued landscape.
Minor adverse	The Proposed Development would: <ul style="list-style-type: none"> • not quite fit into the landform, scale and pattern of the landscape; • have an adverse effect on an area of recognised landscape character.
Neutral	The Proposed Development would: <ul style="list-style-type: none"> • be in keeping with the scale, landform and pattern of the existing landscape; • maintain the existing landscape quality.
Minor beneficial	The Proposed Development would: <ul style="list-style-type: none"> • fit with the scale, landform and pattern of the landscape; • enable the restoration of valued characteristic features partially lost through other land uses to improve the landscape quality and character.
Moderate beneficial	The Proposed Development would: <ul style="list-style-type: none"> • fit well with the existing scale, landform and pattern of the landscape; • improve the quality of the landscape through removal of damage caused by previous or existing land uses.
Major beneficial	The Proposed Development would: <ul style="list-style-type: none"> • enhance and redefine the landscape character in a beneficial manner • repair or restore landscape badly damaged or degraded through previous or existing land uses.

- 8.41 The assessment has considered short-term effects arising during construction; and the effects on completion and the effects of site-specific mitigation proposals including the differences anticipated between the year of completion and during the long-term duration at 15 years following the establishment of mitigation planting.

Existing Environment

- 8.42 There are no landscape designations within or surrounding the Proposed Development site.
- 8.43 There are a number of published Landscape Character Assessments relevant to the site and immediate surrounding area. A review of these published assessments has been undertaken to consider the existing landscape character of the area. A summary of these assessments follows below.

National Character Areas, Natural England, 2014

- 8.44 The site is on the eastern edge of Character Area 13: South East Northumberland Coastal Plain.

National Character Area 13: South East Northumberland Coastal Plain

- 8.45 The area is described as having widespread urban and industrial development, extending north from the urban edge of Newcastle across the coastal plain, with former mining towns and villages, merging into rural landscape towards the north. There are large-scale, open-cast coal mines and restored sites which include deep mine spoil heaps. Sweeping sandy beaches and rocky headlands remain within largely developed coast. There are large open arable fields, with large scattered country houses, and institutional establishments. The area is also typified by prominent blocks of mixed and coniferous woodland on reclaimed colliery sites, with broadleaved woods on steeper valley sides, and within estate parkland.

Northumberland Landscape Character Assessment (2010)

- 8.46 The Proposed Development falls on the boundary of 41a Blyth and Wansbeck Estuaries (Developed Coast) and 42a Ashington, Blyth and Cramlington (Urban and Urban Fringe). The underground cables fall largely within the former. These LCAs are illustrated on Figure 8.1 and brief descriptions of the Blyth and Wansbeck Estuaries and 42a Ashington, Blyth and Cramlington LCAs is provided below.

Blyth and Wansbeck Estuaries (Developed Coast)

- 8.47 The low-lying coastal strip is centred on broad bay, into which the Rivers Blyth and Wansbeck emerge. The bay is framed by rocky promontories, with wave-cut platforms extending into the sea at Newbiggin Point, Spital Carrs, and Crab Law, and rocky offshore islets. The topography of this area does not rise above 10m.
- 8.48 The main land uses are urban and industrial. Arable farming, with remnant hedgerows, persists in fragmented areas around the mouth of the Wansbeck. The banks of the Wansbeck are fringed with deciduous scrub woodland, with more scrubby woodland along the Sleek Burn and River Blyth. The coast is protected as part of the Northumbria Coast Ramsar site and SPA, and there are overlapping SSSI designations.
- 8.49 This is the most developed section of Northumberland's coastline, and is dominated by the large-scale industrial developments around Blyth Harbour, including large silos and wind turbines. Formerly a major coal port, the harbour now has significant areas of derelict and 'brownfield' land. The site of the now-demolished Blyth Power Station occupies extensive areas between the two river mouths. Associated railway sidings are interspersed with rows of former miners' housing, as at Cambois.

- 8.50 Industrial elements are present in all views from this area, the most visually prominent being the chimneys of the Alcan smelter, the silos at Blyth Harbour, and the wind turbines on the quay and offshore. Other landmarks include the church on Newbiggin Point and the 'Couple' sculpture in Newbiggin Bay. Coastal views from Newbiggin are the least affected by industry, although northward views to Druridge Bay are not possible due to the alignment of the coast.
- 8.51 The defining characteristics of this area are described as:
- Intensively developed landscape, comprising a coastal urban edge;
 - River mouths with mudflats or modified to form harbours;
 - Large-scale industrial structures and former industrial sites;
 - Fragmented farmland amongst urban development.
- Ashington, Blyth and Cramlington (Urban and Urban Fringe).*
- 8.52 The generally flat land, with some gentle summits, falls towards the coast and is underlain by the coal measures. The landscape is cut through by the valleys of the Rivers Wansbeck and Blyth, as well as several smaller burns. In places, the natural landform has been modified, and is often obscured by development.
- 8.53 Most of the area is built up, but pockets of fragmented farmland remain, mostly arable. Fields are a range of shapes and sizes, having been modified by surrounding land uses, but are generally large and rectilinear. Field boundaries often comprise gappy or outgrown hedges, with post and wire fences replacing hedges entirely in places. Tree cover includes coniferous plantations and deciduous woodlands, both often sited on reclaimed or restored land. Some deciduous woodland has nature conservation value, as do wetlands and ponds caused by mining subsidence. There is a SSSI at Willow Burn Pasture.
- 8.54 There is extensive settlement in this character area. The main settlements of Ashington, Blyth and Cramlington comprise a range of ages and styles of development. Blyth has a strong 19th-century core related to the harbour. Ashington is more dispersed, though concentrated around long terraces of housing built as miners' homes. Cramlington was chiefly developed in the 1960s as a new town, and its character is defined by the approaches to planning prevalent in that era. Bedlington has a more traditional central core of stone buildings along the main street, though again this is surrounded by modern development. There are areas of derelict land associated with former workings or industrial buildings.
- 8.55 Views are generally limited by the density of built development, although elevated locations allow occasional long views north-west to the Cheviot Hills. The chimneys of the Alcan smelter are a prominent landmark and pylons are often features in the view.
- 8.56 There are a number of public rights of way across the farmland and urban fringe areas, including along the wooded valleys of the Blyth and Wansbeck.
- 8.57 The defining characteristics of this area are described as:
- Large built-up areas including former mining towns;
 - Large-scale industrial and commercial land uses;
 - Significant human features, including dual carriageways, railways, pylons, and chimneys;

- Residential areas of a range of ages.

Description of the Site and Surrounding Landscape Character

- 8.58 The Proposed Development site comprises a DC underground cable corridor from the mean low water mark at North Cambois to the converter station site, a converter station on a site in East Sleekburn; and AC underground cables from the converter station site to the proposed NGET substation adjacent the existing Blyth Substation.
- 8.59 The proposed converter station site is a greenfield site in East Sleekburn. It comprises arable land bounded by maintained fields with juvenile woodland planting to the site boundaries.
- 8.60 The East Sleekburn site is bounded by the A189 to the west; a scramble track and industrial estate to the north; the former coal stocking site of Blyth Power Station and a small residential area to the east; and an area of agricultural land adjacent the proposed NGET substation and former Blyth Power Station site to the south of Brock Lane.
- 8.61 The area between the River Wansbeck and River Blyth is largely flat and low lying. The former Blyth Power Station site occupies a large area of land between the River Wansbeck and the River Blyth although there is some established screen planting to its boundaries which minimises its influence. There are industrial buildings and energy related development in the area which include Fergusons Business Park to the northwest and Blyth Substation and North Blyth Dock to the southeast. There are also small pockets of housing at East Sleekburn, East Sleekburn (West) and at Cambois to the east and Wembley Gardens to the north-east.
- 8.62 To the east the coastline is defined by sand dunes and a sandy beach. The area to the south of the River Wansbeck and along the east of the A189, with the exception of the industrial estate and sewerage works, is agricultural. The estuary landscape of the Sleek Burn and River Blyth is low lying and comprises areas of agricultural land, with port related development increasing to the east. There is large scale industrial development to the south of the Blyth Estuary with the urban area of Blyth beyond.
- 8.63 The metal clad NGET substation is on the northern bank of the estuary and several overhead lines converge at this location. Several overhead lines (one 400kV, one 275kV and three 132kV) run west from the substation across agricultural land between the Sleek Burn and the River Blyth. A 400kV and a 132kV overhead line run northwest from the substation over the A189 and a 132kV overhead line runs around the housing on Brock Lane before running north over the River Wansbeck parallel to the A189.

Landscape Sensitivity

- 8.64 There are no landscape designations in the area and the landscape is of local value.
- 8.65 The proposed converter station site comprises an area of arable land with existing juvenile woodland planting around the perimeter. The surrounding area is influenced by energy related development including the former Blyth Power Station site; the existing substation; wind turbine development; and port related development. The area is considered to be of low susceptibility to change to a development of this nature. A converter station would be consistent with the scale of existing industrial built form in the area.

- 8.66 Underground cables would give rise to temporary effects on the landscape. The underground cables run through the intertidal area, along the beach access track, through agricultural land and through an industrial estate. All of these landscape types are considered to have low susceptibility to change to underground cable installation and would be readily reinstated.
- 8.67 The sensitivity of the landscape to the construction and operation of a converter station and associated underground cables is considered to be **low** given that the value of the landscape is local and the susceptibility to change is low.

Description of the Development

- 8.68 A full description of the Proposed Development during the construction and operational phases is given in Chapter 4. Those features and assumptions relevant to this chapter which could potentially affect landscape effects are summarised below.
- 8.69 The Proposed Development comprises two distinct elements which would give rise to different effects on the landscape:
- The construction and operation of the converter station would give rise to long term or permanent effects on the landscape;
 - The installation of the underground cables from landfall to the converter station and from the converter station to the proposed NGET substation would give rise to temporary effects on the landscape. Full reinstatement on completion will minimise longer term effects of the underground cables.

Converter Station

- 8.70 The construction of the converter station is planned to be undertaken over a period of approximately 3-4 years. Work is expected to commence on the preparatory site works in 2016/17, followed by the converter site development, which includes the erection, installation, connection and testing of equipment between 2018 and 2020 which is when the converter station is expected to be commissioned.
- 8.71 Access to the proposed converter station will be from a new access road off Brock Lane at an existing field gate. The site will comprise a collection of metal clad buildings within a secure fenced compound. The majority of electrical equipment will be indoors to prevent exposure to saline air.
- 8.72 The converter station will comprise a series of interconnected buildings up to 25m in height although many will be 15m high and 20m high. Figures 4.1-4.4 show an indicative arrangement for the converter station. The converter station building will be constructed from a steel frame and clad with insulated metal panels. Panels will be grey in colour and graduate from dark grey to light grey to the roofline.
- 8.73 Internal and perimeter roads will enable access around the site for maintenance and a small amount of car parking will be provided.
- 8.74 Lighting (when required) will be controlled to avoid the unnecessary illumination of areas beyond the development. Glare and the spread of upward light will be kept to a minimum to reduce sky glow and minimise visual intrusion. It is not necessary to illuminate the whole

perimeter however the entrance and walkways for access and egress and emergency exits will need illuminating for safety reasons.

- 8.75 The existing native planting to the road frontage and around the site will be retained on the whole, although there will be some removal for the converter station site and associated cable routes and access. This will be supplemented with additional native planting around the converter station site to help integrate the Proposed Development site into the wider development site.

Underground Cable Installation

- 8.76 Cable installation will include excavation, laying the cables, jointing and terminating and testing the cables and will be undertaken in parallel as the construction of the converter station between 2019 and 2020.
- 8.77 Temporary works compounds are anticipated to be established close to or on the existing car parking area at North Cambois Beach, adjacent to the waste water treatment works, and immediately south of the Ferguson Business Centre. The compounds will form the bases for the onshore underground cable installation works.
- 8.78 Secure temporary fencing will be erected around the working area (which will vary as the onshore underground cables installation progresses). The fencing will define the working area, protect any sensitive areas and prevent third party access. Access gates will be installed that are suitable for both personnel and for movement of plant and equipment.
- 8.79 The onshore underground cables will be installed primarily in excavated trenches; either direct placed or in pre placed ducts. Where the onshore underground cables will cross obstructions, such as the railway a “trenchless technology”, such as horizontal directional drilling (HDD), thrust boring or pipe jacking will be considered.
- 8.80 The installation swathe for DC cables will be approximately 16m. This will allow for a haul route along the length of the cable, sufficient operating space around the works, areas for stockpiling top soil and excavated material, and space for security fencing.
- 8.81 Joint bays will be required at approximately 500m centres where separate cable lengths are jointed. A transition joint pit will be required at the coast where the marine cables are jointed to the terrestrial cables and a further three joint bays will be required with approximate locations at the railway crossing adjacent the Northumbria Water treatment works; to the south of Ferguson’s Business Park; and close to Cow Gut. These structures are below ground chambers and the ground will be reinstated on completion.
- 8.82 Six 400kV HVAC cables will connect the converter station to the new Blyth Substation. The HVAC cables will be laid in two groups of three, with a separation gap between them. A construction corridor of 20m will be required for each which will accommodate a haul route along the length of the cable, sufficient operating space around the works, areas for stockpiling top soil and excavated material, and space for drainage and temporary security fencing.
- 8.83 On completion of the cable installation works the existing ground cover will be reinstated. Hedgerow and shrub planting can be reinstated over the cables, however tree planting would not be acceptable due to the issues with tree roots.

Assessment of Effects

- 8.84 An assessment of the effects of the Proposed Development during construction and operation follows below. Proposed mitigation measures are outlined followed by an assessment of effects at 15 years following the establishment of proposed mitigation. The cumulative effects with other developments proposed in the area are also considered.

Assessment of Effects during Construction

Underground Cables

- 8.85 The underground cable installation for both HVDC and HVAC cables would comprise site preparation, establishment of site compounds and temporary fencing and signage. Construction machinery would excavate the underground cable trenches and stockpile material prior to cable installation and reinstatement.
- 8.86 The installation of the underground cables would give rise to short term effects over a small geographical area. The routing studies sought to identify a route to minimise effects on landscape features such as trees and hedgerows. The effects would be reversible with the landscape reinstated to its original condition following installation. The underground cable installation would give rise to a **low magnitude** of effect on a landscape of **low sensitivity**. The significance of effect is **minor adverse** during the construction phase of the development.

Converter Station

- 8.87 The converter station construction would comprise site preparation works; the creation of a new access road and internal roads, and building the individual components of the converter station. The works would be typical of a large scale construction site for an industrial development.
- 8.88 The construction works would result in the permanent loss of an area of approximately 5 hectares of arable land and the temporary loss of a further 1-2 hectares for a temporary laydown area. The works would result in the permanent removal of a short section of hedgerow and woodland planting from the road frontage to enable access; and the permanent removal of a hedgerow running north south through the site and an area of juvenile planting to the eastern boundary (although the majority of this planting would be protected and retained) to site the converter station.
- 8.89 The construction works would result in the loss of a small number of landscape features on the site however the magnitude of effect on wider landscape character is considered to be **low**. The sensitivity of the landscape is low and the significance of the effect is considered to be **minor adverse** during construction.

Assessment of Effects during Operation

Underground Cables

- 8.90 The operation of the underground cables would not give rise to effects on the landscape. Following the reinstatement of the cable swathe the operation of the cables would give rise to an effect of **neutral** significance.
- 8.91 Any maintenance repair work on the underground cables would give rise to short term temporary ground disturbance, stockpiling and construction activity, similar to that experienced during installation but on a more local scale. The significance of this short term effect on landscape character if it occurred would be **minor adverse**.

Converter Station

- 8.92 The converter station would be consistent with existing industrial development in the coastal area between the River Blyth and Ashington. There are several large scale buildings in the area including the existing substation; industrial development at the port and along the southern bank of the River Blyth; industrial properties on Fergusons Business Park; and the recently constructed paint factory at North Seaton. The former Blyth Power Station site and overhead lines increase the industrial influences in the landscape. Vegetation associated with open space, screen planting around the former coal stocking site, and the railway lines assists in accommodating existing development within the coastal landscape and wider landscape context. Although the development would introduce elements that are generally characteristic of the surrounding landscape, it would extend built development across a greenfield site, which would increase the extent of industrial development presently evident in the locality.
- 8.93 The operation of the converter station would give rise to a low magnitude of effect on the landscape character of the area as it is consistent with existing development and the sensitivity of the landscape to this type of development is low. The operation of the converter station would give rise to a permanent presence in the landscape, but siting and design have been considered in the development of the project to reduce the significance of effect. It is considered to give rise to a **minor adverse** significance of effect.

Mitigation

- 8.94 Embedded mitigation has been built into NSN Link with consideration of siting and design of the Project Development to minimise effects on the environment including landscape and views. There is a band of juvenile planting around the periphery of the East Sleekburn site which is beginning to establish and will increase filter views into the site and minimise the influence of any development on the site on the wider landscape. The retention of a sufficient depth of existing juvenile tree and shrub planting to the periphery of the site has been built into the siting and design to maximise the benefit of this existing screen planting
- 8.95 The use of colour graded cladding to the converter station buildings, ranging from a dark grey at the base of the building to off-white at the roofline would assist in breaking up the form and minimising its visibility in the wider landscape.

- 8.96 New tree and shrub planting to the western boundary of the converter station site would filter views of the converter station from the west and northwest and reduce its influence on adjacent development site.

Residual Impacts

- 8.97 The proposed embedded mitigation has been considered in the assessment which concluded that the significance of effect of the proposed converter station on the landscape character would be **minor adverse**. Additional planting to the western boundary would improve the landscape quality of the site and would assist in integrating the Proposed Development into the landscape minimising effects on the adjacent East Sleekburn development site.
- 8.98 The significance of effect on landscape of the underground cable route would remain **neutral** on completion with mitigation and after establishment of the reinstatement.

Assessment of Effects during Decommissioning

- 8.99 The anticipated operational life of the converter station and cables is approximately 40 years. This could however be extended dependent on the operation of the component parts and will be assessed during the operation of the link.
- 8.100 The decommissioning of the converter station would involve similar activities to those described previously for construction. The main components would be dismantled and removed for recycling wherever possible or for disposal in accordance with the relevant waste disposal regulations at the time of decommissioning. It is likely that the land would be returned to a grassed surface for future use for employment or industry. In the short term there would be a **minor beneficial** effect on the landscape as the building is removed.
- 8.101 The underground cables may be cut and left in the ground at the end of their operational lives or could be removed. If they are left in situ there would be no effects on the landscape. Removal would involve similar activities to installation and would give rise to temporary effects.

Cumulative Effects

- 8.102 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. However, when individual effects are considered in combination, the resulting cumulative effect may be significant.
- 8.103 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:
- Port of Blyth Biomass Power Station;
 - Proposed NGET 400kV GIS Substation;
 - Ferguson Business Park Single Turbine;
 - Earth Balance Single Turbine;

- Narec Offshore Wind Demonstration Site; and
- Residential development – 48 dwellings.

8.104 The following paragraphs consider the cumulative effect of the proposed converter station and underground cables on completion (with mitigation and after establishment), in combination with the development proposals outlined below.

Port of Blyth Biomass Power Station

8.105 The Port of Blyth Biomass Power Station will be located at Blyth Harbour approximately 1.5km to the south-east of the proposed converter station site. The proposed site is that of the existing Blyth Battleship Wharf accessed from West Bridge Street. The development would comprise a boiler house (up to 65m in height); a steam turbine building; a chimney stack (proposed to be up to 105m in height); a water treatment plant; a control building; a cooling water intake and outfall; a grid connection by underground cable; biomass fuel storage buildings, a biomass fuel preparation area and conveyors. The majority of the development would be up to 20m in height except where specified to be higher above.

8.106 The Port of Blyth Biomass Power Station, if constructed, would reinforce and increase the existing industrial and built character of the Port of Blyth and the surrounding area. The cumulative effects of the proposed Port of Byth Biomass Power Station and the Proposed Development on the landscape would be **minor adverse**, as recorded in relation to the proposed converter station.

NGET 400kV GIS Substation

8.107 The proposed 400kV GIS Substation will be located approximately 400m to the south-east of the proposed converter station site, adjacent to the existing Blyth 275kV Substation. Importantly, it is located within Section 7 of the Proposed Development area.

8.108 The substation and the cable routes for the Proposed Development are being designed sympathetically in order that there are no clashes in the layout and engineering design. The Proposed Development components to be installed within that area comprise the HVAC cable route only.

8.109 The proposed substation would likely be a GIS substation requiring a metal clad building of approximately 200m x 240m x 15m high. The proposals would also likely require minor modifications to the location of pylon(s) on the existing 400kV overhead line northwest corner of Blyth Substation.

8.110 The proposed site of the development is immediately adjacent the existing metal clad NGET substation in an area where there are several overhead lines converging at the substation. The proposed GIS substation development is of a similar type and character to existing development and to the Proposed Development. The landscape has a low sensitivity to this type of change and cumulative residual effects (with mitigation and after establishment) for the proposed GIS substation and the Proposed Development on the landscape would be **minor adverse**, as recorded in relation to the proposed converter station.

Narec Offshore Wind Demonstration Site

8.111 The Narec Offshore Wind Demonstration Site is located 8km to 17km off the Blyth coast. This facility would comprise 15 turbines in 3 arrays (Array 2, Array 3 and Array 4) offshore

ranging from 5.7km to 17km from Blyth Harbour. Turbines are 1km apart with over 5km between arrays. Turbine hubs would be up to a maximum height of 100m, with a 195m tip height above ordnance datum.

- 8.112 The Narec Offshore Wind Demonstration Site would change the landscape baseline potentially affected by the Proposed Development in the vicinity of the coast and the immediate hinterland. Wind turbines are however already a feature in this landscape. The sensitivity of the landscape to the change proposed is **low** due to its developed and industrial character, however the introduction of the Demonstration Site will introduce a large scale man made features into a currently undeveloped part of the North Sea. Beyond the immediate coastal edge the vegetated nature of the landscape, local terrain and existing built form limit the influence of the Demonstration project on landscape character.
- 8.113 The cumulative effects of the proposed Narec Offshore Wind Demonstration and the Proposed Development on the landscape would be **minor adverse**, as recorded in relation to the proposed converter station.

Ferguson Business Park Single Turbine

- 8.114 The Ferguson Business Park Turbine will be located approximately 390m west of the cable route and approximately 550m to the northwest of the proposed converter station site.
- 8.115 The wind turbine (53.5m to turbine tip) would be close to an existing industrial area and would be a vertical structure of similar height to existing overhead line infrastructure in the area. There are also other wind turbines in the wider area. The landscape has a low sensitivity to this type of change and cumulative residual effects (with mitigation and after establishment) for the proposed wind turbine and Proposed Development would be **minor adverse** as recorded in relation to the proposed converter station.

Earth Balance Single Turbine

- 8.116 The Earth Balance Single Turbine will be located approximately 2km to the west/northwest of the proposed converter station site. The proposed single turbine (43.5m to turbine tip) would be installed at the Earth Balance site off the A1147 near Bomarsund. The single turbine structure would have a similar vertical emphasis as the 275kV overhead line which runs over the A1147 south of Bomarsund.
- 8.117 The wind turbine would have similarities to the existing overhead line infrastructure in the area. The landscape has a low sensitivity to this type of change and cumulative residual effects (with mitigation and after establishment) for the proposed wind turbine and Proposed Development would be **negligible**.

Residential Development – 48 Dwellings

- 8.118 A planning application for 48 dwellings and public open space on a green field site to the north of the settlement of East Sleekburn has been submitted to NCC.
- 8.119 The Proposed Development would be visually contained as it is screened to the north, east and west by woodland planting and it would not affect the landscape character baseline of the Proposed Development.
- 8.120 The housing development would be consistent in landscape character terms to the adjacent settlement of East Sleekburn. There is visual separation between the housing proposed in

this application and the Proposed Development and cumulative residual effects (with mitigation and after establishment) for the proposed housing development and Proposed Development would be **minor adverse** as recorded in relation to the proposed converter station.

Summary

- 8.121 The significance of residual cumulative effects on landscape character of the proposed converter station and underground cable in combination with all of the development proposals outlined above is considered to give rise to a slightly greater adverse effect than reported for the proposed converter station and underground cable in isolation, but no greater than **minor adverse** overall. The development proposals will increase the extent of development in the area, however the nature and scale of these developments is consistent with existing development in the area which already includes large scale industrial buildings; energy development including wind turbines, overhead lines and substations; and small areas of residential development.
- 8.122 An assessment of the effects of NSN Link and all planned developments coming forward at the same time has been undertaken and concludes there to be no likely significant “in-combination” effects.

Conclusion

Underground Cables

- 8.123 The installation of the underground cable would give rise to short term minor adverse effects on the local landscape. Following the reinstatement of the cable swathe the operation of the cables would give rise to an effect of **neutral** significance.

Converter Station

- 8.124 The converter station would be consistent with existing industrial development in the coastal area between the River Blyth and Ashington. The converter station would be a large structure in the landscape, but siting and design have been considered in the development of the project to reduce the significance of effect. There are several large scale metal clad buildings in the area and the former Blyth Power Station site and overhead lines increase the industrial influences in the landscape. The use of colour graded cladding to the converter station buildings, ranging from a dark grey at the base of the building to off-white at the roofline would assist in breaking up the form and minimising its visibility in the wider landscape. Existing vegetation in the area would be retained and would assist in accommodating the Proposed Development within the wider landscape context. The construction and operation of the converter station on the East Sleekburn site is considered to give rise to a **minor** adverse significance of effect in the landscape.

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9 VIEWS

- 9.1 This chapter examines the effects associated with the proposed onshore components of the NSN Link (“the Proposed Development”) on views. The landscape assessment is presented separately in Chapter 8 of this Environmental Statement (ES), although it is acknowledged that there is a relationship between the perception of landscape and the experience of visual receptors.
- 9.2 For details of the project description, reference should be made to Chapter 4 of this ES.
- 9.3 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance. The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (“NSN Link Ltd”) and their contractors, in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the scheme design to reduce identified impacts.
- 9.4 The assessment of the likely significant effects of the proposed development on views has been undertaken by Chartered Landscape Architects experienced in landscape assessment. This method has been established with reference to the Guidelines for Landscape and Visual Impact Assessment – Third Edition’, *Landscape Institute/Institute of Environmental Management and Assessment, 2013 (GLVIA 3)*.

Legislation and Policy Context

- 9.5 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on views associated with the Proposed Development. This section should be read in conjunction with Chapter 5 which provides a more detailed overview of the policy context however the key policies relevant to this chapter are discussed below.

National Policy

- 9.6 The National Planning Policy Framework (NPPF) published in March 2012 sets out the Government’s planning policies for England. The NPPF sets out 13 sub-topics beneath the goal of Delivering Sustainable Development. The most relevant to this chapter is Section 11: Conserving and Enhancing the Natural Environment.

Regional Planning Policy

- 9.7 Of particular reference to this assessment is the Northumberland Consolidated Planning Policy Framework which forms the statutory Development Plan for Northumberland, and comprises ‘saved’ policies. The Development Plan is amended by Local Development Framework documents as they are adopted.
- 9.8 The Proposed Development falls within the former District of Wansbeck. The Wansbeck District Local Plan was adopted in July 2007 and currently forms part of the Consolidated Planning Policy Framework for NCC.
- 9.9 The Localism Act contains provisions to alter the planning system and allow the Secretary of State to make orders revoking Regional Spatial Strategies (RSS). An order was laid before

Parliament to formally revoke the North east RSS on 22nd March 2013. The Northumberland County and National Park Joint Structure Plan Alteration (February 2005) was also revoked as part of the Order, with the exception of Policy S5, concerning the Green Belt extension around Morpeth.

Local Development Order

- 9.10 The proposed converter station site and part of the HVDC cable route corridor, south of Ferguson's Business Park are located on land which forms one of the Blyth Estuary Renewable Energy Zone (BEREZ) strategic sites. The East Sleekburn Strategic Site is also subject to a Local Development Order (LDO), which offers a potential fast-track planning approval for developments specified within the order.

Wansbeck District Local Plan

- 9.11 Preparation of the Northumberland Local Development Plan (the Local Plan) has commenced and the emerging plan has policies related to landscape and views from the Wansbeck Local Plan in relation to landscape character, trees and hedgerows, visual impact and landscaping and public realm. These policies set the context for undertaking the landscape assessment. The following specific references to landscape are made in the Wansbeck District Local Plan:

- Policy GP5 Landscape Character – this policy recognises that landscape and topographical features make an important contribution to the character and attractiveness of the District. It seeks to ensure that development that would have an adverse effect on the character or appearance of those areas which contribute most to the quality and distinctiveness of the local landscape will not be permitted.
- GP6 Trees and Hedgerows – this policy seeks to protect trees, woodlands and hedgerows and encourages new planting (particularly of native species). The policy states that development which would result in the loss of healthy trees will not be permitted unless there are overriding social or economic benefits of doing so.
- Policy GP30 Visual Impact – this policy states that all Proposed Development will be assessed in terms of its visual impact. Developments which in visual terms would cause significant harm to the character or quality of the surrounding environment will be refused.
- Policy GP32 Landscaping and Public Realm - This policy requires developers to incorporate a high standard of landscape treatment in their developments.
- Policy 51 Natural Environment – this policy states that development proposals should seek to conserve and enhance Northumberland's natural environment. Proposals that would result in significant harm to Northumberland's natural environment will only be permitted where the harm cannot be avoided, adequately mitigated or, as a last resort, compensated
- Policy 52 Landscape - this policy states that development proposals should seek to conserve and enhance the distinctive character and quality of Northumberland's landscape having regard to the Northumberland Landscape Character Assessment.

Best Practise and Guidance

- 9.12 In addition to relevant planning policy the following guidelines have been considered in the development of the project and the assessment:

- Guidelines for Landscape and Visual Assessment, Third Edition (GLVIA 3), Landscape Institute and Institute of Environmental Management and Assessment, 2013;
- Landscape Institute Advice Note 01/11 Photography and Photomontage in landscape and Visual Assessment.

Methodology

Study Area

- 9.13 The methodology is considered to be applicable for the construction, operational and decommissioning phases and for the purposes of this chapter and in relation to views the activities associated with decommissioning are considered to be similar in nature to those of construction. The cables might require repair during the operational phase in which case there may be a need to excavate down to them. In terms of decommissioning it is understood that the redundant cables would either be left in situ or removed.
- 9.14 This method has been established with reference to GLVIA 3 and there are six stages to the assessment of visual effects:
- Identification and recording of baseline views through desk based assessment, consultation and site assessment;
 - Consideration of the sensitivity of receptors including consideration of the susceptibility to change of identified views, and the value of views;
 - Understanding the nature, form and features of the Proposed Development;
 - Assessing the magnitude of effect that would likely result from the Proposed Development;
 - Evaluating the significance of the effects identified based on the sensitivity of the visual receptor and the magnitude of effect; and
 - Assessing the potential to mitigate visual effects.

Desk Based Assessment

- 9.15 The physical extent of this visual assessment has been informed by a review of mapping and aerial photography, ZTV mapping and field assessment.
- 9.16 The Proposed Development comprises two distinct elements which would give rise to different effects:
- The construction and operation of the converter station would result in long term or permanent effects on the effects on views;
 - The installation of the underground cables from landfall to the converter station and then from the converter station to the proposed National Grid Electricity Transmission Plc (NGET) 400kV substation and would give rise to temporary effects on the landscape and temporary effects on views. Full reinstatement on completion would minimise longer term effects of the underground cables. These differences are noted in the assessment.
- 9.17 The converter station site is on relatively low lying land near the coast between the River Wansbeck and River Blyth. Higher ground north of the River Wansbeck limits wider visibility to

the north and forms the northern extent of the study area. The built up area of Blyth forms the southern boundary of the study area, while the undulating topography to the west of the A189 limits visibility from the west.

- 9.18 Previous work on similar infrastructure proposals suggests that large structures may be discerned at distances of up to 10km, however from distances of over 3km they would not form a prominent part of that view with the greatest effect usually experienced in close proximity diminishing with distance.
- 9.19 The cable installation would result in temporary effects over a limited geographic area focused on the working area of the cables corridor.
- 9.20 The extent of the visual assessment has been determined through ZTV mapping (outlined below) and field visits.

Zone of Theoretical Visibility (ZTV) Mapping

- 9.21 ZTV mapping has been generated to determine the area over which the proposed converter station would theoretically be seen. The ZTV maps have been generated by computer from a Digital Terrain Model (DTM) representing the bare ground topography overlaid on a map base with significant areas of woodland vegetation and settlements included to understand how this affects visibility. Spot heights of 20m and 25m have been used across the converter station footprint to represent the highest parts of the equipment and are considered to represent the worst case. The ZTV has also taken into account a level site balanced by cut and fill. The Zone of Theoretical Visibility map is included as Figure 9.1.
- 9.22 The ZTV mapping has been graded to show from where these highest points are visible; graded from the highest number of points visible to lowest number of points visible. The ZTV mapping also shows areas from where no potential visibility is likely.
- 9.23 The information presented in the ZTV is subject to interpretation and provides a basis for the field survey work. The ZTV mapping does not show the extent of the elevation visible, just the highest points. For example all of the points may be visible, however only the top 0.5m of the development may be visible above the landform or vegetation with the lower elevations completely screened. Conversely the ZTV may show that relatively few points are visible, however this may represent a view in close proximity of a full elevation with no intervening screening. The field survey verifies this and considers the potential change to the existing view.

Site Walkover and Site Assessment

- 9.24 Landscape and visual effects have been considered in the feasibility and siting studies during the Project Development. A number of site visits have been carried out during the feasibility stage with the final assessment visits carried out by TEP in November and December 2013. The objective of the walkover was to consider the effects of the Proposed Development on views and included a walkover of the cable route and converter station site.
- 9.25 Site assessment of the Proposed Development has involved visits to the area by car and on foot and views have been considered from publicly accessible locations. Where views from private properties have been considered, the assessment has been based on the nearest publicly accessible viewpoint.

9.26 The land use planning system generally considers that public views are of greater value than views from private property although effects on amenity are material to assessment. The visual assessment work has considered public and private views of receptors affected by the Proposed Development.

9.27 The following parameters have been used as the basis for undertaking detailed field assessment during November 2013 to assess the effects of the Proposed Development on views.

Within 1km of Proposed Converter Station

9.28 All receptors within 1km of the proposed converter station likely to have a view of the development have been considered in the visual assessment. Visual receptors have been divided into public and private views to assist with categorising receptor types. Settlements and groups of properties have been assessed from representative receptors usually on the edge of settlements where views would be greatest. Views along Public Rights of Way (PRoW) and roads have been assessed sequentially to recording changes to views as the receptor travels along the identified route.

Representative Views between 1 and 3km from the Proposed Converter Station

9.29 Between 1 and 3km from the proposed converter station representative visual receptors have been selected to represent different types of visual receptor, These viewpoints comprise a mix of publicly accessible views from PRoW and roads, and views from private property.

Valued Views over 3km from the Proposed Converter Station

9.30 Views over 3km from the proposed converter station have also been assessed. These views are considered as valued or important and are typically from elevated ground and include popular viewpoints. Valued views considered in this assessment include the coastal area to the north at Newbiggin-By-The-Sea and the tourist attraction of Northumberlandia which is 8km to the south east

Summary

9.31 The visual receptors identified for the onshore development are illustrated on Figure 9.2. The effect of the Proposed Development has been assessed for each of these receptors.

Photomontage Views

9.32 Six photomontage views have been produced to accurately present the change to the view resulting from the converter station development from a small number of representative views. The photomontage views have been produced in accordance with current best practice (Landscape Institute Advice Note 01/11 Photography and Photomontage in Landscape and Visual Impact Assessment and Scottish Natural Heritage Visual Representation of Windfarms Good Practice Guidance (presently under review). The photomontage viewpoint locations are shown on Figure 9.3 and the photomontage views are presented on Figures 9.11-9.16.

Identification of Visual Receptors for the Landfall and Underground Cable Route

9.33 The cables would give rise to effects of a shorter duration compared to the converter station development which would have a longer term or permanent enduring effect.

- 9.34 The effect of the cable installation would also have a limited geographic influence as the operations are at ground level which reduces more widespread effects in views. A 0.5km buffer from the outer edge of the working corridor has been assumed for the consideration of visual effects of the cable installation with key viewpoints from higher ground and along the coast identified outside this buffer area.
- 9.35 The effect of the landfall and cable installation is considered to be reversible as once the installation is complete most landscape features would be reinstated in the short-term. The visual effects of the landfall and cable installation are therefore considered to be of less significance than the effects of the enduring presence of the converter station.

Summary

- 9.36 The representative visual receptors identified for the landfall and underground cables element of the onshore development are illustrated in Figure 9.2. These views include those which are publicly accessible, views from residential properties and views from the coastline where the landfall and underground cable installation would be visible.

Consultation

- 9.37 Consultation with NCC has been undertaken as part of the Scoping stage and as the assessment progressed.

Assessing the Significance of Visual Effects

- 9.38 The following method for the assessment of the likely visual effects of the Proposed Development follows GLVIA3 guidelines, and considers receptor sensitivity (susceptibility to change and value of the view), the magnitude or scale of change resulting from the proposed change to the view and the significance of the effect. This method is explained below.

Receptor Sensitivity

- 9.39 Visual receptors are people who potentially would have a view of the Proposed Development. The sensitivity of a visual receptor depends on the susceptibility of the visual receptor to change and the value of the view.

Susceptibility to Change

- 9.40 The susceptibility of visual receptors to a potential change in the view is a function of their occupation and activity and the extent to which their attention is focused on the views
- 9.41 The land use planning system considers that public views are of greater value than views from private property. Visual assessment work gives equal weight to the assessment of public views and private views.
- 9.42 As detailed in GLVIA3 the visual receptors most susceptible to change are generally likely to include:
- Residents at home;
 - People, whether residents or visitors, who are engaged in outdoor recreation, including use of PRow, whose attention or interest is likely to be focused on the landscape and on particular views;

-
- Visitors to heritage assets, or tourist attractions, where views of the surroundings are an important contributor to the experience; and
 - Communities where views contribute to the landscape setting enjoyed by residents in the area.
- 9.43 Travellers on roads, rail or other transport routes tend to fall into an intermediate category of medium susceptibility to change. Where travel involves recognised scenic routes such as rural lanes and tourist routes awareness of views is likely to be higher. Where travel involves main roads or motorways awareness of views is likely to be lower.
- 9.44 As detailed in GLVIA3 visual receptors likely to be less sensitive to change include:
- people engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape; and
 - people at their place of work whose attention may be focused on their work or activity, not on their surroundings, and where the setting is not important to the quality of working life (although there may on occasion be cases where views are an important contributor to the setting and to the quality of working life).
- 9.45 In visual assessment, lower storey views from residential properties are generally considered to be of greater susceptibility to change than upper storey views, as these are the rooms in which residents spend more time experiencing the view. There are exceptions to this as some residences have living rooms on upper storeys and this has been taken into consideration if evident.
- 9.46 GLVIA3 states that projects need to consider the nature of the groups of people who would potentially be affected and the extent to which their attention is likely to be focused on views and visual amenity. Judgements about the susceptibility of receptor views to change should be recorded on a scale (such as high to low) with a clear basis for this, linked back to evidence from the baseline study.
- 9.47 For this visual assessment Susceptibility to Change has generally been assigned to receptors as shown in Table 9.1

Table 9.1: Susceptibility to Change

Receptor	Susceptibility to Change
Residential properties (Lower storeys and gardens)	High
Residential properties (Upper storeys)	Medium
Users of PRow and other recreation routes	High
Public Open Space/attractions where surroundings are important to the experience	High
Users of Sports Pitches	Low
Users of Golf Courses	Medium
Workers in their work place where setting not important to quality of working life	Low
Workers on the land and in other situations where setting is important	Medium
Motorists and passengers on main roads	Low-Medium
Motorists and passengers on rural lanes and tourist routes	Medium-High
Rail Passengers	Medium

Value of the View

9.48 Judgements about the value attached to the views experienced has been considered in the context of the value placed on a scene, alternatives available and the relative scenic quality of a view. Most views are appreciated by the person experiencing them as they are preferable to not having a view and they provide some interest. The judgement of the value of a view is subjective and as detailed in GLVIA3 takes account of:

- recognition of the value attached to particular views, for example in relation to heritage assets, or through planning designations; and
- indicators of the value attached to views by visitors, for example through reference to a view in a guidebook or on a tourist map, provision of facilities for their enjoyment (such as parking places, sign boards and interpretative material) and references to them in literature and art that indicates a highly valued view, which often can be experienced by many people.
- Locally important views have been identified through discussions with NCC and during public information events held in December 2013

Receptor Sensitivity

9.49 As identified above the sensitivity of identified visual receptors depends on the susceptibility of the view to change, and the value attached to the view experienced. Receptor sensitivity has been assigned to receptors in accordance with Table 9.2.

Table 9.2: Receptor Sensitivity

Receptor Sensitivity	Typical Criteria
High	The receptor view has a high susceptibility to change and is of national or regional value.
Medium	The receptor view has a high susceptibility to change and is of local value; or The receptor view has a low or medium susceptibility to change and is of national value.
Low	The receptor view has a low susceptibility to change and is of local, value.

Magnitude of Effect

- 9.50 The magnitude of effect evaluates the visual effects identified in terms of the size or scale of a development; the geographical extent of the area influenced; the nature of the effect (adverse or beneficial); and its duration and reversibility. More weight is usually given to effects that are greater in scale and long-term in duration. In assessing the duration of the effect, consideration is given to the effectiveness of mitigation, particularly where planting is proposed as part of the works which would change the scale of visual effect. The following aspects have been taken into consideration in determining the magnitude of visual effects on a receptor.

Size or Scale

- 9.51 The relative size or scale of the development within the view varies and reflects:

Scale of Change

- 9.52 The scale of change from the present views experienced has been considered with respect to the loss or addition of features in the view and changes in its composition, including the proportion of view occupied by the Proposed Development. For example the introduction of a development into a view where similar developments are already present is more likely to result in a lower scale of change than the introduction of a new development into a view where there is no or little development present.

Nature of the View

- 9.53 The relative amount of time over which views of the Proposed Development would be experienced on each occasion, for example along a short length of a PRow, and whether views would be full, partial or glimpsed. Any filtering or screening of a view by vegetation, landform or built form as the filtering or screening of even part of a development can reduce the scale of change on the view. Consideration has also been given to the extent of filtering in 'full leaf' and during winter.

Backgrounding

- 9.54 The converter station development is more difficult to make out when viewed against a textured background than against an open sky background. Any backgrounding of a view by vegetation, landform or built form has been taken into consideration as backgrounding generally minimises the scale of change on the view.

Geographical Extent

- 9.55 The geographical extent of visual effects varies with different viewpoints and reflects:

Angle of View

- 9.56 The angle of view has been considered with changes to direct views generally considered to be of greater importance than changes in oblique or indirect views..

Distance between the Receptor and the Overhead Line or Development

- 9.57 The distance between the receptor and the Proposed Development is important with the magnitude generally decreasing with distance.

Proportion of View Affected

- 9.58 The proportion of view affected is an important consideration, with a change to a large proportion generally having a greater effect than a change to a small proportion.

Topography and Landform

- 9.59 Consideration has been given to whether the Proposed Development would be looked down to, looked up to or whether it would be viewed on a level. Views up to a development are generally considered to be of greater magnitude due to the enhanced verticality of the structures than views down to a development where the apparent height appears reduced.

Duration and Reversibility of Visual Effects

- 9.60 These are separate but linked considerations. Duration has been judged on a scale of:
- short-term: 0 to 5 years including the construction period and on completion;
 - medium-term: 5 to 15 years including the establishment of replacement and proposed mitigation planting; and
 - long-term: 15 years onwards for the life of the Proposed Development.
- 9.61 Reversibility is a judgement about the prospects and the practicality of the visual effects being reversed. For example, while some forms of development can be considered permanent, others such as underground cable installation can be considered as reversible since the land would be reinstated. Reversibility is particularly relevant to construction effects as works would cease and land and most landscape features would be reinstated in the short-term.
- 9.62 Table 9.3 describes magnitude criteria for visual assessment, which can be adverse or beneficial.

Table 9.3: Criteria for Assessment of Magnitude on Effects of View

Magnitude of Effect	Typical Criteria
High	High alteration to the existing view and/or the introduction of elements considered totally uncharacteristic in the view. Typically this would be where a development would be seen in close proximity with a large proportion of the view affected with little or no filtering or backgrounding and there would be a great scale of change from the present situation for the long or medium-term.
Medium	Partial alteration to the existing view and/or the introduction of prominent elements in the view. Typically this would be where a development would be seen in views for the long or medium-term where a moderate proportion of the view is affected. There may be some screening or backgrounding which minimise the scale of change from the present situation. This would also be where a development would be seen in close proximity with a large proportion of the view affected for the short-term.
Low	Low alteration to the existing view and/or the introduction of features which may already be present in views. Typically this would be where a moderate or low proportion of the view would be affected for the short-term or the development would be visible for the long-term in distant views; where only a small proportion of the view is affected in the medium-term or long-term; where the medium-term or long-term effect is reduced due to a high degree of filtering, screening or backgrounding or where there is a low scale of change from the existing view.
Negligible	Very low alteration to the existing view. Typically this would be where, in the short, medium or long-term, a development would be barely perceptible within a long distance panoramic view and/or where a very small proportion of the view is affected. The scale of change from the existing view would be barely perceptible.

Assessment of Cumulative Effects

- 9.63 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. However, when individual effects are considered in combination, the resulting cumulative effect may be significant.
- 9.64 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:
- Port of Blyth Biomass Power Station;
 - Proposed NGET 400kV GIS Substation;
 - Ferguson Business Park Single Turbine;
 - Earth Balance Single Turbine;
 - Narec Offshore Wind Demonstration Site; and
 - Residential development – 48 dwellings.

Significance of Effect

- 9.65 The assessment of the significance of visual effects of the Proposed Development is a judgement based on the sensitivity of the receptor and the magnitude of the effect. Large-

scale changes which introduce new, discordant or intrusive elements into the view of a sensitive receptor are considered to be more likely to be more significant than small changes or changes involving features already present in the view or changes in the views of less sensitive receptors. Changes in views from recognised and important viewpoints, such as scheduled monuments or outdoor tourist attractions, or from important amenity routes, such as long distance footpaths or national cycle routes, are likely to be most significant.

9.66 Judgements on the significance of visual effects, which can be either adverse or beneficial, have considered the typical criteria shown in Table 9.4 below.

Table 9.4: Significance of Visual Effects

Significance	Typical Criteria
Major	An effect of major significance is generally recorded where a high magnitude of effect occurs to a highly sensitive receptor. For example where an unobstructed view of development would represent a large part of the view from a recreational footpath where views are presently open and of high scenic quality.
Moderate	An effect of moderate significance is generally recorded where a moderate magnitude of effect is experienced by a receptor of high or medium sensitivity. For example where part of a development is visible in a view from a private property for the long or medium-term, but where it does not comprise the whole view; or where an unobstructed view of development is visible for the short-term.
Minor	An effect of minor significance generally relates to a low magnitude of effect and often relates to a change in a view for the short-term; to a change in a distant view or a change in only a small part of a view, possibly because the view is already screened to a large extent.
Negligible	An effect of negligible significance is where the change to a view would be barely perceptible from the view presently experienced.

9.67 The assessment has considered short-term effects arising during construction; and the effects on completion and the effects of site-specific mitigation proposals including the differences anticipated between the year of completion and during the long-term duration at 15 years following the establishment of mitigation planting.

9.68 The visual assessment also considers the potential for cumulative visual effects arising from other projects of a similar scale identified within the study area.

Existing Environment “Baseline Visual Assessment”

9.69 The visual influence of the converter station has been determined through a combination of ZTV mapping, topographic analysis and field evaluation of features affecting visibility such as built form, landform, trees, hedgerows and woodland that would filter and screen view.

9.70 Field survey has considered all receptors from where views of the proposed converter station are likely. This survey has considered what the existing views comprise and what the anticipated change to the view would be. No access has been sought to private properties

or land and an assessment has been made from the nearest publicly accessible viewpoint. Single frame and panoramic photographic views were taken from a number of these locations to record existing views against which the Proposed Development is assessed (as presented on Figure 9.3 Photographic Viewpoint Locations and Figures 9.4-9.10).

- 9.71 Public views would be experienced by visitors to areas of public open space, walkers on PRow, and motorists using the local road network. Private views would be experienced from residential properties and businesses.
- 9.72 The ZTV extends from the seafront promenade and headland at Newbiggin-By-The-Sea in the northeast; to the southern edges of Ashington and River Wansbeck to the north; to the A1147 road linking Ashington and Bedlington in the east; and to built development south of the River Blyth. To the east the study area extends to Cambois Beach and North Blyth to the mouth of the River Wansbeck.
- 9.73 To the east of the proposed converter station site, the generally flat and open landscape allows views west towards the Proposed Development from the coastal road (adjacent Cambois County First School), the parking areas to the dunes and from the dunes. Built development at the coast obscures some views from the dunes. The ZTV also confirms that there would be potential views out at sea.
- 9.74 To the south there are views towards the proposed converter station site from the southern bank of the River Blyth where there is a PRow and a public open space in an industrial estate. Visibility from the rest of Blyth is restricted by large scale industrial buildings to the north of Cowpen Road along the southern bank of the River Blyth. There are also potential views from land between the River Sleekburn and the River Blyth to the east of the A189, although there are a number of existing overhead power lines closer in this view. There are two farms and a network of PRow in this area.
- 9.75 To the west, the ZTV indicates there would be some views to the west of the A189, although these would be limited. It is anticipated that Bedlington Community High School would not have views due the mounding and woodland planting associated with the A189 and A1147 road interchange. Woodland planting on the eastern edges of Bedlington and the A1147 would filter and limit many views towards the Proposed Development. There are views from the PRow linking West Sleekburn Farm and East Sleekburn. The ZTV indicated views from the rear of properties in Stakeford, however the field survey confirmed there are a number of areas of woodland that screen views to the southeast. The ZTV also indicated views from Brock Lane and High Brockland Farm, although there is substantial woodland planting on the embankment to the A189. There are views south east from Ashington Cemetery, however these are filtered or screened by vegetation to the southern edge of the cemetery.
- 9.76 To the north the ZTV indicates there would be views from Ferguson Business Park and from the rear of properties on Wembley Terrace towards the proposed converter station site which was confirmed in field visits. There are also views south from higher ground north of the River Wansbeck including the Sandy Bay Holiday Park area and PRow including the coastal footpath as far as the south of Newbiggin-By-The-Sea.
- 9.77 Distant views towards the proposed converter station site are possible from higher ground at Choppington 4km to the west and from Newbiggin Point 5km to the north-east. There are also very distant views from the high point on the visitor attraction of Northumberlandia 8km

to the south-west from where there are expansive views over the surrounding landscape. From here the coastal area around Blyth is visible in the distance.

- 9.78 Existing views of the underground cable corridor are generally restricted to visual receptors in close proximity, which include residents living in Wembley Gardens, workers at Ferguson Business Park and users of Brock Lane, Wembley Gardens road and The Bucca. The exception is the route across the intertidal beach at Cambois which is open and visible from a number of more distant visual receptors at Newbiggin-By-The-Sea and North Blyth.

Visual Receptors

- 9.79 The visual receptors listed below have been identified for the visual assessment and these are presented on Figure 9.2:

Public Views

Walkers along the following Public Rights of Way (PRoW):

- P1 - Coastal PRoW south of Newbiggin-by-the-Sea* (NCC 600/071)
- P2 - Coastal PRoW adjacent Sandy Bay Holiday Park* (NCC 600/071)
- P3 - PRoW adjacent River Wansbeck (NCC 600/082)
- P4 - PRoW adjacent Ashington Cemetery (NCC 600/083)
- P5 - PRoW north of Cambois County First School, Cambois (NCC 600/059)
- P6 - PRoW adjacent Ferguson Business Park, Cambois* (NCC 600/054 & 600/062)
- P7 - PRoW adjacent West Sleekburn Farm (600/064)
- P8 - PRoW east of West Sleekburn Farm (NCC 600/064)
- P9 - PRoW northeast of Sleekburn Grange Farm (NCC 600/055)
- P10 - Intersection of PRoWs north of Mount Pleasant Farm ((NCC 600/057)
- P11 - PRoW on south bank of River Blyth (NCC 300/107 &008)
- P12 - PRoW on south bank of River Blyth near to Coniston Road, Blyth (NCC 300/0147)

Users of the following public open spaces and outdoor tourist attractions

- P12a – Cyclists using National Cycle Route 1 following the coastal road (adjacent Cambois County First School) *
- P13 - The Promenade at Newbiggin-by-the-Sea*
- P14 - Spital Point, south of Newbiggin-by-the-Sea*
- P15 - Sandy Bay Holiday Park*
- P16 - Parking area adjacent beach at Cambois*
- P17 - Parking area adjacent beach at Cambois*
- P18 - Cemetery at Ashington
- P19 - Cambois County First School

Users of the following roads:

- P20 - B1334 North Seaton Road, Newbiggin-by-the-Sea
- P21 - A189 (Blyth to Ashington)
- P22 - Brock Lane north of East Sleekburn
- P23 - Road near Cambois First School
- P24 - Road near Ferguson Business Park, Cambois*
- P25 - Road near High Brockland Farm
- P26 - West Bridge Street, North Blyth

P27 - Cowley Road, Blyth
P28 - A193 Bebside Road, Bebside
P29 - Bebside Furnace Road
P30 - A1147 (road between Bedlington and Ashington)

Private Views

Residents living at the following properties:

PR1 - Houses on North View, Cambois
PR2 - Houses on Wembley Terrace, Cambois
PR3 - Houses on West View, Cambois
PR4 - Houses on Paddock Mews, Cambois*
PR5 - Houses on Selbourne Terrace, Cambois
PR6 - Houses on Ridley Terrace, Cambois
PR7 - Houses on Northfield, Waterfield Road, Wilson Avenue, Cambois
PR8 - Houses in North Blyth
PR9 - Houses on Parkfield, Bedlington

Workers and customers at the following businesses:

C1 - Ferguson Business Park*
C2 – Charlton's Public House, Cambois*
C3 - Industrial estate, Blyth

* denotes receptor for both the proposed converter station and underground cable element of the Proposed Development

Sensitivity of Visual Receptors Identified

9.80 The sensitivity of a visual receptor depends on the susceptibility of the visual receptor to change and the value of the view.

Susceptibility to Change

9.81 The susceptibility of visual receptors to a potential change in the view is a function of their occupation and activity and the extent to which their attention is focused on the views.

9.82 Leisure walkers using PRow and users of public open space are considered to have high susceptibility to visual change whereas visual receptors using the local road network are anticipated to be primarily motorists and are assigned a low susceptibility to visual change. Cyclists using the National Cycle Route 1 along the coastal road at Cambois are assigned a high susceptibility to visual change as views from the cycleway are part of the experience.

9.83 Residents are also considered to have a high susceptibility to change, particularly from lower storeys where a larger proportion of time is spent experiencing the view.

9.84 Generally workers and visitors to private businesses are considered to have a low susceptibility to visual change, unless appreciation of the setting of the business premises and the views from it are part of the customer experience.

- 9.85 Visitors to Sandy Bay Holiday Park and Cambois Beach are considered to have a high susceptibility to visual change, and public houses have been assessed as being of moderate susceptibility to visual change.

Importance of Views

- 9.86 The majority of views are of local (low) importance to local residents and a relatively small number of visitors and tourists. No views in the study area are recorded as being high (national or regional) importance.

Summary

- 9.87 The sensitivity of each visual receptor and a description of the baseline view for each identified receptor is recorded in Table 9.5 presented in the Assessment Section. Photographs of the baseline views are presented on Figures 9.4-9.10 with viewpoint locations on Figure 9.3.

Description of the Development

- 9.88 A full description of the Proposed Development during the construction and operational phases is given in Chapter 4. Those features and assumptions relevant to this chapter which could potentially affect visual effects are summarised below.

- 9.89 The Proposed Development comprises two distinct elements which would give rise to different effects on the landscape:

- The construction and operation of the converter station would give rise to long term or permanent effects on the landscape;
- The installation of the underground cables from landfall to the converter station and from the converter station to the proposed NGET substation would give rise to temporary effects on the landscape. Full reinstatement on completion would minimise longer term effects of the underground cables.

Converter Station

- 9.90 A full description of the proposals is provided in Chapter 4 however the following bear most relevance to this chapter:

- Construction commences in 2016/2017 with completion planned for 2020;
- Access will be from a new access road off Brock Lane at an existing field gate.
- The converter station housing electrical equipment will be a steel frame construction, clad with insulated and colour graduated metal panels;
- Buildings will be up to 25m in height although many would be 15m high and 20m high. Internal and perimeter roads would enable access around the fenced site
- An area of designated car parking will be provided.
- Lighting will be provided and designed to reduce sky glow and minimise visual intrusion;
- Where possible existing native planting will be retained although there will be a need for some removal for the converter station site, cable routes and access. Additional native planting around the converter station site will help integrate the Proposed Development site into the wider development site.

9.91 Photomontage Views of the proposed converter station development are presented on Figures 9.11-9.16.

Underground Cable Installation

9.92 A full description of the proposals is provided in Chapter 4 however the following bear relevance to this chapter:

- Cable installation works are planned for 2019 and 2020;
- Temporary works compounds will be required along the cable route, the final locations have yet to be determined;
- Fencing will be erected around working areas protect any sensitive areas and prevent third party access. Access gates would be installed that are suitable for both personnel and for movement of plant and equipment;
- Onshore underground cables would be installed in excavated trenches or using “trenchless technology”;
- The construction corridor for HVDC cables would be approximately 16m. This would allow for a haul route along the length of the cable, sufficient operating space around the works, areas for stockpiling top soil and excavated material, and space for security fencing.
- Joint bays would be required at approximately 500m centres where separate cable lengths are jointed.
- Two pairs of three 400kV HVAC cables would connect the converter station to the new Blyth Substation. A construction corridor of 20m would be required for each pair of cables;
- Following installation ground cover would be reinstated to include hedgerow and shrub planting. Tree stock would be excluded to minimise issue with tree roots.

Assessment of Effects

9.93 An assessment of the effects of the Proposed Development during construction and operation follows below. Proposed mitigation measures are outlined followed by an assessment of effects at 15 years following the establishment of proposed mitigation. The cumulative effects with other developments proposed in the area are also considered.

9.94 A detailed assessment for each identified receptor is included within Table 9.5 and the location of the receptors is presented on Figure 9.2. A summary of the assessment of effects during construction, operation and decommissioning and follows after the table.

Table 9.5 – Effects on View from Visual Receptors

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
PUBLIC VIEWS						
P1	Coastal PRoW south of Newbiggin-by-the-Sea Distance from converter station site: approx. 3km Direction of view: SW See Photomontage Viewpoint 4 (Figure 9.15)	High	Local	Medium	Existing view: Prominent in the view southwest from this section of the PRoW are the sea, rocky coastline and Sandy Bay Holiday Park. Also in the view above hedgerows and trees is the 132kV/275kV overhead line from Lynemouth Power Station to the Blyth Substation. The horizon is in view in the long distance. Within the horizon line is the Blyth Substation which is barely perceptible in views. During construction: Negligible for converter station / Low adverse for cable installation Views of the subsea cable trenching in the intertidal area would be visible as the cable laying vessels come onshore at Cambois Beach beyond the rocky headland. The construction works at the converter station would not be visible due to landform and vegetation with large cranes possibly visible working at height. On completion: Negligible On completion there would no views towards the underground cable as the open trench landfall would be reinstated. The proposed converter station would be in view but the roofline of the building would sit just below the horizon line. The view would not be discernibly different to the existing	Minor adverse during construction (short term during cables installation in intertidal area) Negligible adverse on completion
P2	Coastal PRoW adjacent Sandy Bay Holiday Park Distance from site: approx. 2km km Direction of view: SW See Photographs 3 and 4 (Figure 9.4)	High	Local	Medium	Existing view: The existing view southwest from this part of the PRoW is across the estuary of the River Wansbeck with the landform rising on the south of the river visible. The top sections of the Lynemouth to Blyth overhead line pylons are visible and the roofline of the Blyth Substation is also in the view. Further in the distance to the southeast the industrial buildings of Blyth Harbour are visible. During construction: Negligible for converter station / Medium adverse for cable installation short term During the construction of the subsea cable trenching operation on the beach will be visible together with a potential contractor's compound near the car parking area at North Cambois Beach. These would be short term works. The construction works at the converter station would not be visible due to landform and vegetation. On completion: Negligible There would be no views of the cable installation following reinstatement. The completed converter station would not be in view.	Minor adverse during construction (short term during cables installation in intertidal area) Negligible on completion
P3	PRoW adjacent River Wansbeck	High	Local	Medium	Existing view: The view south from this PRoW is across the estuary of the River Wansbeck. The steep sided banks of the river are visible and the top sections of the pylons on the Lynemouth to Blyth overhead line are visible above woodland along the river.	Negligible

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
	Distance from site: approx. 1.5 km Direction of view: S				During construction: Negligible There would be no views of construction works to the converter station building or the incoming subsea underground cables. On completion: Negligible The converter station would not be in view.	
P4	PRoW near to Ashington Cemetery Distance from site: approx. 2.5 km Direction of view: SE See Photographs 5 and 6 (Figure 9.4)	High	Local	Medium	Existing view: Views southeast towards Cambois and North Blyth are screened by a hedgerow to the south of the PRoW. During construction: Negligible No construction work would be in the view. On completion: Negligible The very upper elevations of the converter station would be in a small part of the view in the distance at most with the majority filtered by landform or vegetation.	Negligible
P5	PRoW north of Cambois County First School Distance from site: approx. 1.0 km Direction of view: W See Photomontage Viewpoint 2 (Figure 9.13)	High	Local	Medium	Existing view: The view west is towards the former railway embankment to the east of the former Blyth Power Station coal stocking site. The tops of the pylons of the overhead line from the Lynemouth Power Station to Blyth are visible above the embankment and part of the roofline to the Blyth Substation is also visible. Cambois Beach is not visible due to intervening landform between the coast road and the beach. During construction: Negligible Cranes involved in the construction of the converter station may be just visible above the embankment. The trenching operation for the underground cables would not be visible. On completion: Negligible Views of the converter station would be screened by the bund and associated vegetation.	Negligible
P6	PRoW adjacent Ferguson Business Park, Cambois Distance from site: approx. 0.5 –1.0 km Direction of view: S and SE See Photographs 14 and 15 (Figure 9.6) and 18 (Figure 9.7)	High	Local	Medium	Existing view: The PRoW passes between the light industrial buildings of the Ferguson Business Park where views are framed by the buildings. An overhead power line routed west from Blyth Substation is in view. As the PRoW continues southwards it enters open land but along the boundary is a substantial line of 2.5m high railings and then by a mature hedgerow. This filters views to the southeast. There would be some direct and open views of the proposed converter station site as it passes adjacent. During construction: Range from Low to Medium During the underground cable installation along the alignment of this PRoW, it is highly likely that the PRoW would need to be temporarily closed. There would be no views from the PRoW during this period. During the construction of the converter station the construction activities of the site would be most visible from where the PRoW runs along the site boundary.	Minor with very short section Moderate during construction Minor with very short section Moderate on completion Minor with very short section Moderate as existing woodland

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
					<p>On completion: Range from Low to Medium, with very small section High at site boundary As the PRow runs southwards the converter station building would increasingly come into view. Where the PRow runs along the site boundary the converter station would become a prominent element in the view although there would be some screening and filtering by existing hedgerows and juvenile planting.</p> <p>With mitigation and following approximately 15 years establishment: Range from Low to Moderate The existing juvenile screen planting around the converter station would continue to mature and would provide screening to the lower parts of the building. Colour graded cladding to the converter station building (from a dark grey at the building's base to off-white at the roofline) will assist in minimising the visual effect of this building visible in the view.</p>	planting matures to provide further filtering.
P7	<p>PRow east of West Sleekburn Farm</p> <p>Distance from site: approx. 1.5 km</p> <p>Direction of view: SE</p>	High	Local	Medium	<p>Existing view: The hedgerow adjacent the PRow filters views southeast across arable fields. The landform in the field adjacent to the PRow rises up slightly bringing the horizon line closer to the viewpoint, with the roofline of an industrial building (aggregate industry) accessed from Brock Lane just visible in the distance.</p> <p>During construction: Negligible Due to the filtering effect of the hedgerows and slightly rising topography, the construction works would not be visible with the exception of the tops of cranes above the landform.</p> <p>On completion: Negligible Due to the filtering effect of the hedgerows and slightly rising topography the upper elevations of the converter station would be visible at most.</p>	Negligible
P8	<p>PRow west of Brock Lane</p> <p>Distance from site: approx. 1.25km</p> <p>Direction of view: SE</p> <p>See Photograph 8 and 9 (Figure 9.5)</p>	High	Local	Medium	<p>Existing views: There are views towards the Blyth Substation in the distance with 132kV and 275kV overhead lines prominent in the foreground of views. The landform in the field adjacent to the PRow rises up slightly bringing the horizon line closer to the viewpoint, with the roofline of an industrial building (aggregate industry) accessed from Brock Lane just visible in the distance.</p> <p>During construction: Low adverse The construction of the converter station with cranes would be slightly closer in view than the Blyth Substation and would appear above the storage area to the nearby industrial building. The A189 embankment would also partially obscure these views.</p> <p>On completion: Low adverse The converter station would be slightly closer in view than the Blyth Substation and appear above the storage area to the nearby industrial building. The converter station would have a similar height, scale and massing as Blyth Substation and the aggregate industry building, with the A189 embankment filtering views to the lower elevations.</p>	<p>Minor adverse during construction</p> <p>Minor adverse on completion</p> <p>Minor adverse with mitigation and after approximately 15 years although increased filtering would occur at mid elevations</p>

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
					<p>With mitigation and following approximately 15 years establishment: Low adverse Over time juvenile tree planting adjacent the embankments to the A189 would mature and gain height providing additional screening to the building, however the upper parts and roofline would remain in view.</p>	
P9	PRoW north of Sleekburn Grange Farm Distance from site: approx. 0.5km Direction of view: NE See Photograph 37 (Figure 9.11)	High	Local	Medium	<p>Existing view: Low adverse Open views across arable fields towards residential properties at East Sleekburn in a woodland setting. Part of the gable end and roofline of Blyth Substation is visible above trees along the bank of the Sleek Burn. Several overhead lines are visible in the foreground of the view as they converge at Blyth Substation.</p> <p>During construction: Low adverse The construction of the upper sections of the converter station with cranes would be visible above the mature trees around the settlement of East Sleekburn.</p> <p>On completion: Low adverse On completion the upper part of the converter station would be visible above the mature trees around the settlement of East Sleekburn.</p> <p>With mitigation and following approximately 15 years establishment: Low adverse Over time the existing mature trees around the settlement of East Sleekburn would continue to gain some height, however the upper part of the building and roofline would remain in view. Colour graded cladding to the converter station building (from a dark grey at the building's base to off-white at the roofline) will assist in minimising the visual effect of this building visible in the view.</p>	<p>Minor adverse during construction</p> <p>Minor adverse on completion</p> <p>Minor adverse with mitigation and after approximately 15 years</p>
P10	Intersection of PROWs north of Mount Pleasant Farm Distance from site: approx. 0.5km km Direction of view: NE	High	Local	Medium	<p>Existing view: Medium adverse The existing view north from the intersection of PROWs is across low lying agricultural land with one 275kV and one 400kV overhead line close in the view. Further in the distance existing trees and hedgerows are visible along the Sleek Burn and there are open views east to Blyth Substation. The existing Blyth substation is prominent in the views.</p> <p>During construction: Medium adverse There would be open views of the construction works to the converter station building, including cranes beyond the two existing overhead lines which are closer in the view. Ground level works would not be visible due to intervening trees and hedgerows to the northern bank of Sleek Burn.</p> <p>On completion: Medium adverse On completion there would be open views towards the converter station building with two existing overhead lines in the foreground of these views. Blyth substation also forms a prominent element in this view. The lower elevations would be screened by trees on the northern bank of the Sleek Burn and screen planting to the southern edge of Brock Lane.</p>	<p>Moderate adverse during construction</p> <p>Moderate adverse on completion</p> <p>Minor adverse with mitigation and after approximately 15 years</p>

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
					With mitigation and following approximately 15 years establishment: Low adverse Existing juvenile screen planting along Brock Lane would mature to provide more screening of the converter station. The upper elevations would remain in the view however recessive colour graded cladding to the converter station building would assist in minimising the visual effect of this.	
P11	PROW to the southern bank of River Blyth Distance from site: approx. 1.0 km Direction of view: NW See Photographs 30 and 31 (Figure 9.10) See Photomontage Viewpoint 6 (Figure 9.17)	High	Local	Medium	Existing view: The existing view northwest from the PROW is across the Blyth Estuary with Blyth Substation and numerous overhead lines clearly visible to the north of the estuary. There is limited filtering by existing trees along the northern banks of the River Blyth and Sleek Burn but views are predominantly open. During construction: Low adverse Construction works would be visible in views through the existing overhead lines converging at Blyth Substation. On completion: Low adverse On completion there would be views of the converter station however it would be seen in context with Blyth Substation and existing overhead lines converging at the substation which would form the more prominent elements of the view. With mitigation and following approximately 15 years establishment: Low adverse Existing screen planting along Brock Lane would mature providing screening to the lower elevations of the converter station, however the upper parts would remain in view. Recessive colour graded cladding to the converter station building would assist in minimising the visual effect of this building.	Minor adverse during construction Minor adverse on completion Minor adverse with mitigation and after approximately 15 years
P12	PROW to southern bank of River Blyth Distance from site: approx. 1.0 km Direction of view: N	High	Local	Medium	Existing view: The existing view north from the PROW is across low lying agricultural land with five overhead lines close in the view crossing in an east-west direction. Existing trees and hedgerows associated along the banks of Sleek Burn are visible beyond. Beyond the Sleek Burn a further two overhead lines are visible. To the east there are open views to Blyth Substation. During construction: Low adverse There would be views of the construction works through the overhead lines converging at Blyth Substation which would form the prominent part of the view. Ground level works would not be visible due to intervening vegetation to the northern bank of Sleek Burn. On completion: Low adverse On completion the converter station would be in view but the prominent part of the view would be the existing overhead lines running towards Blyth substation. There would be some filtering and screening of lower elevations by vegetation along the Sleek burn. With mitigation and following approximately 15 years establishment: Low adverse Juvenile screen planting along Brock Lane would mature to provide increased screening of	Minor adverse during construction Minor adverse on completion Minor adverse with mitigation and after approximately 15 years

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
					the lower elevations of the converter station, however the upper elevations would remain in view. Recessive colour graded cladding to the converter station building would further assist in minimising the visual effects	
P12a	Cyclists using National Cycle Route 1 following coastal road (from East Sleekburn to A189 near North Seaton)	High	National	High	<p>Existing view: This cycleway runs along the existing road system and views vary along its route. The view eastwards from East Sleekburn is filtered by trees and hedgerows with overhead lines passing overhead. Views open out and Blyth Substation is visible in close proximity. Continuing along Brock Lane there are views towards Blyth Harbour and the route then runs north past terraced housing. Beyond the housing views open and sand dunes are visible to the east with glimpsed views of the sea. Where the cycle route passes close to the sea there are extensive views towards Newbiggin Bay. The route then heads west inland past properties at Wembley Gardens where there are open views of parcels of agricultural land to the north and south with industrial buildings and the A189 beyond. The cycle route continues under the A189 which is elevated at this point.</p> <p>During construction: Negligible with short sections close to converter station site and cable route Medium There would be views eastwards above the roadside hedgerow on Brock Lane towards the converter station construction site. This would be visible in close proximity although from a short section of the route. The cable installation works would be visible in the short term in the intertidal area, at the cliff top and in agricultural land to the north of Wembley Gardens to the point where the cable route would cross the railway and run south through Ferguson Business Park.</p> <p>On completion: Negligible with short section close to converter station site Medium There would be direct views eastwards above the roadside hedgerow towards the converter station. It would be visible in close proximity although from a short section of the route. The cable installation works would be reinstated on completion and would not be visible.</p> <p>With mitigation and following approximately 15 years establishment: Negligible with short section close to converter station site Medium Existing juvenile planting along Brock Lane would continue to mature to filter views of the lower elevations of the converter station. New planting to the west of the converter station boundary would further filter views. The upper parts of the building would be visible above the planting. There would be more open views to the converter station building along the new access road proposed off Brock Lane. Views from the cycleway along Brock lane would however be fleeting and the converter station would only be visible from a short section of the route.</p>	<p>Effects would range from negligible for the majority of the cycle route to moderate for a short section where the route passes close to the converter station site or cable route during construction.</p> <p>Effects would range from negligible for the majority of the cycle route to moderate for a short section where the route passes close to the converter station.</p> <p>Effects would range from negligible for the majority of the cycle route to moderate for a short section where the route passes close to the converter station, although there would be increased filtering of views with vegetation.</p>
P13	The Promenade at Newbiggin-by-the-Sea	High	Local	Medium	<p>Existing view: Existing views are across Newbiggin Bay with views out across the bay with breakwaters visible in the foreground. The view extends south along the coast to Blyth Harbour, where large scale industrial buildings and warehouses and several wind turbines are visible.</p>	Negligible

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
	Distance from site: approx. 4.5 km Direction of view: SW See Photograph 1 (Figure 9.5)				During construction: Negligible The construction of the converter station and landfall of the sub-sea cable would not be visible. The cable laying vessels may be visible out to sea during the short term installation of the cable in the near-shore and intertidal area. On completion: Negligible The converter station would not be visible in this view.	
P14	Spital Point, south of Newbiggin-by-the-Sea Distance from site: approx. 3.0 km Direction of view: SW See Photograph 2 (Figure 9.5)	High	Local	Medium	Existing view: The sea and rocky coastline are prominent in the view. Views south along the coastline include Blyth Harbour, large warehouse and industrial buildings and several wind turbines. Blyth Substation and associated overhead lines are just perceptible in distant views. During construction: Negligible for Converter Station/ Low Adverse Cable Installation Construction work to the proposed converter station would not be visible with the exception of very high cranes in the distance. The cable installation works in the intertidal area would be visible in views with the cable laying vessels in the near shore area. On completion: Negligible On completion there would no views of the underground cables following reinstatement. The upper elevations of the proposed converter station would be visible but the massing of the building would sit just below the horizon line and the view would not be discernibly different to the existing	Minor adverse during construction (short term during cables installation in intertidal area) Negligible on completion Negligible with mitigation and after approximately 15 years
P15	Sandy Bay Holiday Park Distance from site: approx. 2.0km Direction of view: S See Photograph 4 (Figure 9.5)	High	Local	Medium	Existing view: The existing view south-west from the holiday park and PRoW is across the sand dunes and the Wansbeck Estuary. The landform rises on the south of the river. The tops of the pylons on the Lynemouth to Blyth overhead line are visible inland and the roofline of Blyth Substation is also in view. Further in the distance to the southeast there are views towards the industrial buildings at Blyth Harbour. During construction: Negligible for Converter Station/ Low Adverse Cable Installation During construction the cable installation works would be visible in the intertidal area and through the agricultural land to the south of the River Wansbeck in the short term. The construction works on the converter station would not be visible. On completion: Negligible On completion there would no views of the underground cables following reinstatement. The completed converter station would not be in view.	Minor adverse during construction (short term during cables installation) Negligible on completion Negligible with mitigation and after approximately 15 years
P16	Parking area adjacent Cambois Beach	High	Local	Medium	Existing view: There are views southwest towards new woodland planting adjacent the beach and the embankment to the perimeter to the former Blyth Power Station. The intervening topography limits any views further southwest. Views are also limited north	Minor adverse during construction (short term during

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
	<p>Distance from converter station site: approx. 1.0 km</p> <p>Direction of view: SW</p> <p>See Photograph 26 (Figure 9.8)</p>				<p>towards the cable installation by landform, however there are open views north from the beach and cliff top/</p> <p>During construction and operational phase: Negligible for Converter Station/ Low Adverse Cable Installation</p> <p>There would likely be an increase in use of this car park during the cable installation works which would require the closure of the northern car park. The cable installation works would be visible from the beach in the intertidal area and at the top of the cliffs in the short term. The construction of the converter station would not be visible.</p> <p>On completion: Negligible</p> <p>The construction of the converter station and the underground cables would not be visible</p>	<p>cables installation)</p> <p>Negligible on completion</p> <p>Negligible with mitigation and after approximately 15 years</p>
P17	<p>Parking area adjacent Cambois Beach and public house</p> <p>Distance from converter station site: approx. 1.0 km</p> <p>Direction of view: N and E</p> <p>See Photographs 11 and 12 (Figure 9.5)</p>	High	Local	Medium	<p>Existing view: The view eastward is towards the beach, sea and rocky coastline north towards Newbiggin-By-The-Sea and south towards Blyth. The car park and slipway are cut into the cliffs which partly obscure views out. There are more expansive views from the cliff tops and from the beach. There are open views out to the sea from the public house.</p> <p>During construction: Negligible for Converter Station/ Medium Adverse Cable Installation</p> <p>The cable trenching operation would be visible on the beach, on the slipway and on the cliff top area in front of the public house. A contractor's compound would be required at or close to the beach car park and this would also be visible in views. It is likely that the slipway, car park and a section of beach would be temporarily closed during the works which would reduce the number of people who would experience views of the works. There would be views from further along the beach, from the cliff tops and from the public house.</p> <p>The construction works to the converter station would not be in view.</p> <p>On completion: Negligible</p> <p>On completion of the cable installation the ground would be reinstated and there would be no effects on views. The converter station would not be in view.</p>	<p>Moderate adverse during construction (short term during cables installation)</p> <p>Negligible on completion</p> <p>Negligible with mitigation and after approximately 15 years</p>
P18	<p>Cemetery at Ashington</p> <p>Distance from converter station: approx. 2.5km</p> <p>Direction of view: SE</p> <p>See Photograph 6 (Figure 9.4)</p>	High	Local	Medium	<p>Existing view: Views from the cemetery in a southerly direction are largely filtered or screened by the hedgerow along the southern boundary.</p> <p>During construction: Negligible</p> <p>There would be no views towards the construction of the converter station or the underground cables due to the hedgerow along the southern boundary.</p> <p>On completion: Negligible</p> <p>Views to very upper elevations of converter station at most which would be barely perceptible in the view.</p>	Negligible

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
P19	<p>Cambois County First School</p> <p>Distance from converter station: approx. 1km</p> <p>Direction of view: W</p> <p>See Photomontage Viewpoint 2 (Fig 9.13)</p>	High	Local	Medium	<p>Existing view: Views west are towards the former railway embankment and vegetation to the east of the power station coal stocking site. This prevents views west.</p> <p>During construction: Negligible There would be no views of the converter station construction or underground cables installation.</p> <p>On completion: Negligible There would be no views towards the converter station building as illustrated on Photomontage View 2.</p>	Negligible
P20	B1334 Coast road from North Seaton to Newbiggin-By-The-Sea	Low-medium	Local	Low-medium	<p>Existing view: Local landform prevents the majority of views south from this road.</p> <p>During construction: Negligible There would be no views towards the converter station construction site or cables installation.</p> <p>On completion: Negligible There would be no views of the converter station.</p>	Negligible
P21	A189 (Blyth to Ashington)	Low-medium	Local	Low-medium	<p>Existing view: Oblique views east from the road are generally screened by landform and woodland planting on the roadside verges. The exception to this is where the road exits the roundabout at North Seaton for a short section and also where the road passes close to Ferguson Business Park.</p> <p>During construction: Low adverse There would be oblique views towards the converter station construction site from the two sections of the A189 identified above.</p> <p>On completion: There would be oblique views towards the converter station from the two sections of the A189 identified above.</p> <p>With mitigation and following approximately 15 years establishment: Low adverse Some of the lower parts of the converter station would be screened by existing juvenile planting as it matures supplemented with additional planting to the west of the converter station site. The upper elevations of the converter station buildings would remain in oblique views from the two sections of the A189 identified above, although it would be seen in context of other large scale industrial buildings and would be a fleeting view while travelling south along the A189 at speed.</p>	<p>Minor adverse during construction</p> <p>Minor adverse on completion</p> <p>Minor adverse with mitigation after approximately 15 years</p>
P22	Brock Lane	Low-medium	Local	Low-medium	Existing view: Brock Lane forms the southern boundary of the proposed converter station	Effects would range

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
	<p>See Photomontage Viewpoint 1 (Figure 9.12)</p> <p>See Photograph 19 and 20 (Figure 9.7)</p>				<p>site. When travelling east views into the proposed site are filtered by a field hedge. Blyth Substation is visible in close proximity to the south of Brock Lane and several overhead lines are visible converging at the substation, with two crossing the road. The housing at East Sleekburn (West) is not visible due to woodland and the housing at East Sleekburn (East) is also obscured by woodland to the west until directly approaching it. When travelling west the proposed converter station site is not visible until the receptor has travelled beyond the housing at East Sleekburn (East) and the woodland. The proposed converter station site is only visible from the short section of Brock Lane between the A189 and East Sleekburn (East) when travelling in both directions.</p> <p>During construction: Negligible with short sections close to converter station site and cable route Moderate There would be views north above the roadside hedgerow on Brock Lane towards the converter station construction site. The works would be visible in close proximity although from a short section of this road. The AC cable installation works would be visible between the converter station site and the proposed NGET substation.</p> <p>On completion: Negligible with short section close to converter station site Medium There would be direct views north above the roadside hedgerow towards the converter station. It would be visible in close proximity although from a short section of the route. The hedgerow would filter lower elevations with the mid to higher elevations visible. The new access road off Brock Lane would allow open views into the site. The cable installation works would be reinstated on completion and would not be visible.</p> <p>With mitigation and following approximately 15 years establishment: Negligible with short section close to converter station site Medium Existing juvenile planting along Brock Lane would continue to mature to filter views of the lower elevations of the converter station. New planting to the west of the converter station boundary would further filter views. The upper parts of the building would be visible above the planting. There would be more open views to the converter station building along the new access road proposed off Brock Lane. Views from Brock Lane would however be fleeting and the converter station would only be visible from a short section of the route.</p>	<p>from negligible for the majority of the road to moderate for a short section where the route passes close to the converter station site or cable route.</p> <p>Effects would range from negligible for the majority of the road to moderate for a short section where the route passes close to the converter station.</p> <p>Effects would range from negligible for the majority of the road to moderate for a short section where the route passes close to the converter station, although there would be increased filtering of views with vegetation.</p>
P23	<p>Coast road near Cambois County First School</p> <p>See Photomontage Viewpoint 2 (Figure 9.13)</p> <p>See Photograph 27 (Figure 9.8)</p>	Low-medium	Local	Low-medium	<p>Existing view: Views west are towards the former railway embankment and vegetation to the east of the power station coal stocking site. This prevents views west.</p> <p>During construction: Negligible There would be no views of the converter station construction or underground cables installation.</p> <p>On completion: Negligible There would be no views towards the converter station building as illustrated on Photomontage View 2.</p>	Negligible

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
P24	Road near Ferguson Business Park See Photomontage Viewpoint 3 (Figure 9.14)	Low-medium	Local	Low-medium	<p>Existing view: There are oblique views southwards towards the former Blyth Power Station coal stocking land now surrounded vegetation. Blyth Substation is visible as are several overhead lines. The industrial buildings on Ferguson Business park are also visible. Views north are over agricultural fields towards the River Wansbeck and the A189 is visible to the west on embankment.</p> <p>During construction: Negligible for converter station / Low adverse cable installation The cable installation activities would be visible in the short term in the agricultural fields to the north of this road. They would also be visible where they cross the road and railway before heading south through Ferguson Industrial Park. No ground level construction activities would be visible on the converter station site, but high level working cranes may be visible.</p> <p>On completion: Low adverse The land would be reinstated on completion of the installation and would not be visible in views. The upper elevations of the converter station would be visible above existing vegetation as indicated in Photomontage 3. The buildings would be seen in context with other industrial buildings of similar scale as indicated on Photomontage 3.</p> <p>With mitigation and following approximately 15 years establishment: Low adverse Further filtering of lower elevations would occur however the upper elevations and the roofline would remain in view. The use of recessive cladding will minimise the visibility of this.</p>	<p>Minor adverse during construction</p> <p>Minor adverse on completion</p> <p>Minor adverse with mitigation after approximately 15 years</p>
P25	Road near High Brockland Farm See Photograph 10 (Figure 9.5)	Low-medium	Local	Low-medium	<p>Existing view: There are occasional oblique views southeast towards the proposed converter station but many views are limited by mature hedgerow on the roadside.</p> <p>During construction: Negligible It is anticipated that there would be occasional oblique views between gaps in the hedgerow of high level cranes constructing the converter station. There would be no views of ground level works</p> <p>On completion: Negligible There would be occasional oblique views between gaps in the hedgerow towards the upper elevations of the converter station. This would be seen within the wider context which includes other industrial buildings of a similar scale and overhead lines.</p>	Negligible
P26	West Bridge Street, North Blyth See Photograph 28 (Figure 9.8)	Low-medium	Local	Low-medium	<p>Existing view: There are some oblique views northwest towards the proposed converter station site. The view includes the northern part of Blyth Docks, Blyth Substation and overhead power lines. This existing development is in closer to the receptor, some of which screen views of the converter station site.</p> <p>During construction: Low adverse There may be oblique views towards the cranes and emerging structure of the converter</p>	<p>Minor adverse during construction</p> <p>Minor adverse on completion</p> <p>Minor adverse with</p>

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
					<p>station.</p> <p>On completion: Low adverse There would be oblique views towards the converter station however it would be seen in the context of existing industrial and port development which is closer to the receptor.</p> <p>With mitigation and following approximately 15 years establishment: The retention of juvenile planting would provide some screening to the lower part of the converter station and the use of recessive coloured cladding would minimise effects on views.</p>	mitigation after approximately 15 years
P27	Cowley Road, Blyth See Photograph 32 (Figure 9.10)	Low-medium	Local	Low-medium	<p>Existing view: There are direct views towards the proposed converter station site framed by buildings fronting Cowley Road. A large number of existing overhead lines are in the view converging at Blyth substation which is also a feature in many views.</p> <p>During construction: Low adverse There would be framed views towards the cranes and emerging structure of the converter station.</p> <p>On completion: Low adverse There would be direct framed views towards the converter station. It would however be seen in the context of industrial development to the south of the Blyth and the substation and overhead line development to the north.</p> <p>With mitigation and following approximately 15 years establishment: Low adverse The retention of juvenile planting would provide some screening to the lower part of the converter station and the use of recessive coloured cladding would minimise effects on views.</p>	<p>Minor adverse during construction</p> <p>Minor adverse on completion</p> <p>Minor adverse with mitigation after approximately 15 years</p>
P28	A193 Bebside Road See Photograph 34 (Figure 9.10)	Low-medium	Local	Low-medium	<p>Existing view: There are limited oblique views northeast towards the proposed converter station site. There is existing built form along Bebside Road in the foreground and overhead power lines are also a feature of views.</p> <p>During construction: Negligible There would be limited oblique views towards the cranes and emerging structure of the converter station at most through breaks in development.</p> <p>On completion: Negligible There would be limited oblique views towards the upper elevations of the converter station at most through breaks in development.</p>	Negligible
P29	Bebside Furnace Road See Photograph 35	Low-medium	Local	Low-medium	<p>Existing view: Oblique views east from the road are screened in places by a mature hedgerow. In places there are gaps in the hedge with oblique views following the overhead lines towards the Blyth Substation.</p>	Minor adverse during construction

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
	(Figure 9.10)				<p>During construction: Low adverse There would be some oblique views in the gaps in the hedge towards the construction of the converter station.</p> <p>On completion: Low adverse There would be some oblique views in the gaps in the hedge towards the converter station.</p> <p>With mitigation and following approximately 15 years establishment: Low adverse There would be increased filtering of lower elevations as existing juvenile planting matures.</p>	<p>Minor adverse on completion</p> <p>Minor adverse with mitigation after approximately 15 years</p>
P30	A1147 (Bedlington to Ashington) See Photomontage Viewpoint 5 (Figure 9.16)	Low-medium	Local	Low-medium	<p>Existing view: A short section of oblique views east from the road towards the application site. Existing overhead lines are also in the view. Most views east from the road are screened by tree planting.</p> <p>During construction: Negligible There would be some oblique glimpsed views towards the construction of the converter station.</p> <p>On completion: Negligible There would be some oblique glimpsed views towards the construction of the converter station.</p>	Negligible
P31	Northumberlandia 8km to the south west	High	Regional	High	<p>Existing view: There are open views in all directions over the surrounding landscape from this elevated visitor attraction. There are views northeast towards the proposed development site and Blyth substation and other large scale development at Blyth Harbour is visible in the view.</p> <p>During construction: Negligible There would be distant views of the construction of the converter station, although it would be barely perceptible in this wider view.</p> <p>On completion: Negligible There would be distant views of the converter station, although it would be barely perceptible in this wider view and it would be consistent with other large scale development in the area.</p>	Negligible
PRIVATE VIEWS						
PR1	Houses at North View and West View Cambois Distance from converter station site: approx. 1km	High/Medium	Local	Medium	<p>Existing view: Low adverse converter station Medium adverse cable installation Views from front of properties southwards towards converter station are limited by the properties on the south side of Wembley Gardens and Wembley Terrace. It is anticipated that there would be some limited views of the existing overhead lines near Blyth Substation from the first floor of some properties. There are open views from the rear of the properties northwards towards the proposed cable route and from properties on the west side of West View across arable fields south of the River Wansbeck. There is some screening and</p>	<p>Moderate adverse during construction (short term during cables installation)</p> <p>Negligible adverse on completion</p>

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
	Direction of view: SW (converter station N Cables				<p>filtering of views from the ground floor due to the structure planting to the rear of the properties.</p> <p>During construction: Negligible It is anticipated that there would be very limited views of the converter station construction from the front of properties to the first floor. This would be limited to working at height. There would be views of the underground cable installation from the rear first floor with views from lower storey filtered by existing planting.</p> <p>On completion: Negligible On completion it is anticipated that there would be some very limited views towards the roofline of the converter station from the upper storey windows of North View. There would be no views from the rear of properties on North View and West View towards the underground cable as the open trench would have been reinstated. The use of recessive cladding would assist in minimising the visual effect of this building.</p>	Negligible adverse with mitigation and after approximately 15 years
PR2	Houses at Wembley Terrace, Cambois Distance from converter station site: approx. 1km Direction of view: SW	High/Medium	Local	Medium	<p>Existing view: There are views from the first floor rear of properties towards the Blyth Substation and the overhead lines converging at the substation. Warehouses, storage facilities and wind turbines at Blyth Harbour and industrial buildings at Ferguson Business Park are also visible. Views from the front of properties northwards towards the cable route are limited by the properties to the north.</p> <p>During construction: Low adverse The construction works on the converter station site would be visible from rear upper storey windows. Views would be limited to working at height. The cable installation works would be visible in oblique views from front upper storey windows.</p> <p>On completion: Low adverse The upper elevations of the converter station would be visible from the rear upper storey of properties above intervening planting. It would however be seen alongside Blyth Substation with a similar height, scale and massing.</p> <p>With mitigation and following approximately 15 years establishment: Low adverse The proposed mitigation would not affect views from this receptor. The use of recessive cladding would assist in minimising the visual effect of this building.</p>	<p>Minor adverse during construction</p> <p>Minor adverse on completion</p> <p>Minor adverse with mitigation and after approximately 15 years</p>
PR3	The Bucca, Cambois Distance from converter station site: approx. 1km	High/Medium	Local	Medium	<p>Existing view: Views east from this group of properties are across the grassed cliff top behind Cambois Beach to the sea beyond. Garden vegetation filters views from some properties and views from some properties are obscured by properties to the seaward side. Views west are over agricultural land through a break in development along The Bucca.</p> <p>During construction: Moderate adverse cable installation / Negligible Converter</p>	<p>Moderate adverse during construction (very short term)</p> <p>Negligible on completion</p>

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
	Direction of view: S				<p>Station The cable trenching operation would be visible on the beach, on the slipway and on the cliff top area in front on the public house. A contractor's compound would be required at or close to the beach car park and this would also be visible in views. There would also be views from some properties of the cable installation works through the arable fields to the west. The construction works to the converter station would not be in view.</p> <p>On completion: Negligible On completion of the cable installation the ground would be reinstated and there would be no effects on views. The converter station would not be in view.</p>	
PR4	Houses on Paddock Mews, Cambois Distance from converter station site: approx. 1km Direction of view: SW	High/Medium	Local	Medium	<p>Existing view: Views from properties on Paddock Views are limited by surrounding built form and landform, with the exception of the property on the corner of the main road which would have oblique views towards the parking area at Cambois Beach.</p> <p>During construction: Low adverse There would be oblique views from the corner property towards the underground cable installation works at the parking area and cliff top.</p> <p>On completion: Negligible On completion of the cable installation the ground would be reinstated and there would be no effects on views. The converter station would not be in view.</p>	<p>Minor adverse during construction</p> <p>Negligible on completion</p> <p>Negligible with mitigation and after approximately 15 years</p>
PR5	Houses on Selbourne Terrace, Cambois Distance from converter station site: approx. 1.0 km Direction of view: W	High/Medium	Local	Medium	<p>Existing view: The view west is towards the former railway embankment to the east of the former Blyth Power Station coal stocking site, The embankment is vegetated with trees and shrubs. Part of the roofline of Blyth Substation and the overhead lines are visible above the embankment and vegetation.</p> <p>During construction: Low adverse Cranes working at height on the converter station construction site would be visible at most from the rear upper storey windows.</p> <p>On completion: Low adverse It is anticipated that there would be some views of the upper elevations of the converter station above the intervening railway embankment and vegetation from rear upper storey windows.</p> <p>With mitigation and following approximately 15 years establishment: Low adverse The proposed mitigation would not affect views from this receptor. The use of recessive cladding would assist in minimising the visual effect of this building.</p>	<p>Minor adverse during construction</p> <p>Minor adverse on completion</p> <p>Minor adverse with mitigation and after approximately 15 years</p>
PR6	Ridley Terrace,	High/Medium	Local	Medium	<p>Existing view:</p>	Negligible

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
	<p>Cambois</p> <p>Distance from converter station site: approx. 1.0 km</p> <p>Direction of view: W</p>				<p>Views west from the rear of properties on Ridley Terrace are screened by the adjacent properties on Selbourne Terrace.</p> <p>During construction: Negligible Views of the construction of the converter station would be screened by the adjacent properties on Selbourne Terrace.</p> <p>On completion: Negligible Views of the converter station would remain screened by the adjacent properties on Selbourne Terrace.</p>	
PR7	<p>Houses on Northfield, Waterfield Road and Wilson Avenue East Sleekburn (East)</p> <p>Distance from converter station site: approx. 0.5 km</p> <p>Direction of view: W</p>	High/ Medium	Local	Medium	<p>Existing view: Views west are obscured or filtered by the woodland planting to the west of this residential area.</p> <p>During construction: Negligible with Low adverse from small number of properties Views west from the western edge of this residential area would be screened by the adjacent woodland. The majority of views from within the residential area are obscured by properties closer to the construction site. There would however be views of construction at height from a small number of properties to the north east of the residential area above woodland.</p> <p>On completion: Negligible with Medium adverse from small number of properties Views west from the western part of this residential area would be screened by the adjacent woodland. The majority of views from within the residential area are obscured by properties closer to the converter station site. There would however be views of the upper elevations of the converter station from a small number of properties to the north east of the residential area above woodland.</p> <p>With mitigation and following approximately 15 years establishment: Negligible with Low adverse from small number of properties The existing planting around the site will continue to mature to provide increased screening over time. The use of recessive cladding would assist in minimising the visual effect of this building.</p>	<p>Minor adverse during construction from a small number of properties</p> <p>Moderate adverse on completion from a small number of properties.</p> <p>Negligible from majority of properties</p> <p>Minor with mitigation and after 15 years from a small number of properties.</p> <p>Negligible from majority of properties</p>
PR8	<p>Houses in North Blyth</p> <p>Distance from converter station site: approx. 2km</p> <p>Direction of view: NW</p>	High/Medium	Local	Medium	<p>Existing views: The majority of views from this area of terraced housing are contained within the development with views out prevented by other housing. There are some views northwest from the rear of properties on Wordsell Street, but views of the converter station would be screened by landform and warehouses around West Bridge Street.</p> <p>During construction: Negligible There would be no views towards the construction of the converter station.</p>	Negligible

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
					On completion: Negligible There would be no views towards the converter station.	
PR10	East Sleekburn (West) Distance from converter station site: approx. 1km Direction of view: NE See Photographs 38 (Figure 9.11)				Existing view: The settlement of East Sleekburn (West) is set at a lower elevation to Brock Lane and is surrounded to the north by dense mature woodland. There are no views north During construction: Negligible Views of the converter station construction site are obscured by woodland. There may be very filtered glimpses from upper storeys at most. On completion: Negligible Views of the converter station construction site are obscured by woodland. There may be very filtered glimpses from upper storeys at most.	Negligible
PR10	Houses on Parkfield, Bedlington Distance from converter station site: approx. 1km Direction of view: NE	High/Medium	Local	Medium	Existing view: There approximately 16 properties to the eastern edge of Bedlington (on Reavley Avenue and two properties on Grange Park Avenue) with views east from upper storey rear windows towards the proposed development site. The existing overhead lines and Blyth Substation are already features in this view. Hedgerow and tree planting on the rear boundary provides some filtering to lower storey views. During construction: Low adverse There would be some filtered views of the construction of the upper elevations of the converter station with cranes. Ground level construction works would be screened by existing planting along the A189 and to the north of East Sleekburn (West). On completion: Low adverse There would be some filtered views of the upper elevations of the converter station with the lower elevations screened by existing woodland along the A189 and to the north of East Sleekburn (West). With mitigation and following approximately 15 years establishment: Low adverse Views would remain as on completion as existing mature woodland already filters views. The use of recessive cladding would assist in minimising the visual effect of this building.	Minor adverse during construction Minor adverse on completion Minor adverse with mitigation and after approximately 15 years
PR11	Stakeford/Choppington Distance from converter station site: approx. 3-4km Direction of view: SE	High/Medium	Local	Medium	Existing view: There are views east from slightly elevated ground at Stakeford and Choppington. Views east are partly obscured by woodland plantation and landform although overhead lines and industrial buildings are visible in some views. During construction: Negligible Due to the filtering effect of vegetation and landform, the construction works would not be visible with the exception of the tops of cranes above the landform. On completion: Negligible	

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
	See Photographs 7 (Figure 9.4)				Due to the filtering effect of woodland and landform the upper elevations of the converter station would be visible at most. It would be seen in the distance and in context with other large scale development.	
C1	Ferguson Business Park Distance from converter towards the 132kV overhead line from the Lynemouth Power Station to Blyth Substation. r station site: approx. 0.5km - 1km Direction of view: S	Low	Local	Low	<p>Existing view: The units in Ferguson Business Park are light industrial and have few windows to enable views outside. There are however views south along the access road and external areas towards the proposed development site.</p> <p>During construction: Low adverse There would be views from the access road and external areas of the construction works to the converter station building, including cranes. Ground level construction works would be filtered by existing planting. The cable installation works would be closer in the view along the track. There would be limited views from within the building as there are relatively few windows.</p> <p>On completion: Low adverse On completion there would be views from the access road and external areas towards the converter station building. The lower elevations would be filtered by existing planting. There would be no views of the underground cable following reinstatement.</p> <p>With mitigation and following approximately 15 years establishment: Low adverse Existing screen planting to the northern perimeter of the converter station would mature providing more screening to the building; however the upper sections would remain in view. The use of recessive cladding would assist in minimising the visual effect of this building.</p>	<p>Minor adverse during construction</p> <p>Minor adverse on completion</p> <p>Minor adverse with mitigation and after approximately 15 years</p>
C2	Public house, The Bucca, Cambois Distance from converter station site: approx. 1.5 km Direction of view: E	Medium	Local	Medium	<p>Existing view: Views from the public house are across the grassed cliff top behind Cambois Beach to the sea beyond. The beach car park and slipway are also visible.</p> <p>During construction: Moderate adverse cable installation / Negligible Converter Station The cable trenching operation would be visible on the beach, on the slipway and on the cliff top area in front of the public house. A contractor's compound would be required at or close to the beach car park and this would also be visible in views. The construction works to the converter station would not be in view.</p> <p>On completion: Negligible On completion of the cable installation the ground would be reinstated and there would be no effects on views. The converter station would not be in view.</p>	<p>Moderate adverse during construction (cable installation)</p> <p>Negligible Converter station</p> <p>Negligible on completion</p>
C3	Industrial Estate, Blyth (Cowley Road)	Low	Local	Low	<p>Existing view: The units in the industrial estate in Blyth are light industrial and have few windows to enable views outside. There are some open and filtered views along Cowley Road and</p>	Negligible

Ref	Receptor	Suscept. to Change	Importance of View	Sensitivity	Description of View and Magnitude of Effect	Significance of Effect
	<p>Distance from converter station site: approx. 1.0 km</p> <p>Direction of view: N</p>				<p>external areas northwards towards the proposed converter station site. The existing Blyth Substation and overhead lines are visible in the view.</p> <p>During construction: Negligible There are limited views from these industrial units. Other industrial units often obscure views and where there are views there would be some open and filtered views along Cowley Road and external areas in the industrial estate towards the construction works to the converter station building, including cranes but the existing overhead lines would be closer in the view.</p> <p>On completion: Negligible On completion there would be open and filtered views along Cowley Road and external areas in the industrial estate towards the converter station but the existing overhead line would be closer in the view.</p>	

Assessment of Effects during Construction

Underground Cables

- 9.95 The underground cable installation for both HVDC and HVAC cables would comprise site preparation, establishment of site compounds and temporary fencing and signage. Construction machinery would excavate the underground cable trenches and stockpile material prior to cable installation and reinstatement.
- 9.96 The installation of the underground cables would give rise to short term effects on views over a small geographical area. The effects would be reversible with the landscape reinstated to its original condition following installation. The greatest effects on views would be from receptors in the coastal area where the installation work in the intertidal and cliff top area would be visible. Work compounds would also be visible in this area.
- 9.97 Effects of **moderate** adverse significance are recorded for the car park and beach area (P17), from several private properties close to the coast (PR1 and PR3) and from the Charltons public house on the Bucca (C2).
- 9.98 Effects of **minor** adverse significance are also recorded in the coastal area for users of PRoW further north at Newbiggin, Spital Point and close to Sandy Bay (P1, P14, P2), from the beach further south (P16), from parts of National Cycleway 1 which passes close to the coast (P12a) and from Sandy Bay Holiday Park (P15).
- 9.99 Effects of **minor** adverse significance are also recorded for a very small number of receptors along the length of the cable route as it travels inland. It is visible from the several properties (PR2 and PR4), from Wembley Gardens Road (P24) and from Fergusons Business Park (C1) and the PRoW running through the business park (P6). The PRoW would require temporary closure during the works which would result in there being limited views of the cable installation.
- 9.100 Effects of **negligible** significance are recorded for all other receptors than those listed above.
- 9.101 All of the adverse effects arising from the cable installation are short term and reversible. There would be no long term effects following reinstatement.

Converter Station

- 9.102 The converter station construction would comprise site preparation works; the creation of a new access road and internal roads, and building the individual components of the converter station. The works would be typical of a large scale construction site for an industrial development. The ground level construction works would typically be seen from receptors in closer proximity, whereas cranes working at height would be visible from more distant locations.
- 9.103 Receptors using the PRoW which runs along the northern and eastern boundary of the site (P6) would experience a **moderate** adverse effect on views from a very short section of the footpath where it allows close range views. Existing hedgerows and juvenile planting provide some filtering of views. The effect from the majority of the footpath would be **minor**.
- 9.104 Effects of **moderate** significance are also recorded for the PRoW to the south of the River Sleekburn close to Mount Pleasant Farm (P10). From here the construction works would be

visible to the north of the Sleekburn however several overhead lines are present in the foreground of these views.

- 9.105 The construction works would also be visible from Brock Lane which forms the southern boundary of the site. There would be views whilst travelling along Brock Lane by car or on foot (P22) and National Cycleway Route 1 (P12a) also runs along this road. Effects of **moderate** adverse significance are recorded for these receptors for the short section which runs alongside the site with filtering of the ground level works by the existing hedgerow. This section forms a small part of a longer length of road and effects from the rest of the road and cycleway would be **negligible**.
- 9.106 Effects of **minor** adverse significance are recorded for several PRow to the west (P8) and south (P9, P11, P12) of the construction site and from several roads including the A189 (P21), Wembley Gardens (P24), West Bridge Street (P26), Cowley Road (P27) and Bebside Furnace (P29).
- 9.107 Effects of **minor** adverse significance are also recorded from several private receptors including the rear upper storeys of Wembley Terrace (PR2), Selbourne Terrace (PR5) and the eastern edge of Bedlington (PR10) where works at height would likely be visible above vegetation or landform. Views from the closest properties at East Sleekburn (West) (PR9) and East Sleekburn (East) (PR7) are largely obscured by woodland and other properties. The exception to this is several properties to the north eastern edge of East Sleekburn (East) (PR7) where views are possible towards the site over public open space and woodland.

Assessment of Effects during Operation

- 9.108 This section assesses the effects of the converter station on views at the year of completion prior to the establishment of any mitigation. The effects at 15 years from completion are considered in the section below on residual effects.

Underground Cables

- 9.109 The operation of the underground cables would not give rise to effects on views. Following the reinstatement of the cable swathe the operation of the cables would give rise to an effect of **neutral** significance.
- 9.110 Any maintenance repair work on the underground cables would give rise to short term temporary ground disturbance, stockpiling and construction activity, similar to that experienced during installation but on a more local scale. The significance of this short term effect on landscape character if it occurred would be **minor adverse**.

Converter Station

- 9.111 Photomontages are presented on Figures 9.11-9.16 to show views of the proposed converter station from six photomontage viewpoint locations which are shown on Figure 9.3
- 9.112 The operation of the converter station would give rise to a permanent presence in views, but siting and design have been considered in the development of the project to reduce the significance of effect on views. The converter station would be consistent with existing industrial development in the coastal area between the River Blyth and Ashington. Large scale industrial buildings and overhead lines are already a feature in many views. Existing

woodland vegetation associated with open space, around the former coal stocking site, and along railway lines and the A189 assists in screening the Proposed Development site in many views. There is also existing juvenile woodland planting and hedgerows surrounding the proposed converter station site which filters views.

- 9.113 Receptors using the PRoW which runs along the northern and eastern boundary of the site (P6) would experience a **moderate** adverse effect on views from a very short section of the footpath where it allows close range views. Existing hedgerows and juvenile planting provide some filtering of views. The effect from the majority of the footpath would be **minor** where there is greater filtering of views by vegetation, built form and landform.
- 9.114 Effects of **moderate** significance are also recorded for the PRoW to the south of the River Sleekburn close to Mount Pleasant Farm (P10). From here the majority of the converter station would be visible to the north of the River Sleekburn over hedgerows however several overhead lines are present in the foreground of these views. It would also be seen in context with the existing large Blyth Substation.
- 9.115 The converter station would also be visible from Brock Lane which runs along the southern boundary of the site. There would be views whilst travelling along Brock Lane by car or on foot (P22) and National Cycleway Route 1 (P12a) also runs along this road. Effects of **moderate** adverse significance are recorded for these receptors for the short section which runs alongside the Proposed Development. The existing hedgerow would provide some filtering of views of the lower elevations however there would be views into the site from land adjacent to the access road off Brock Lane. This section forms a small part of a longer length of road and effects from the rest of the road and cycleway would be **negligible**.
- 9.116 Effects of **minor** adverse significance are recorded for several PRoW to the west (P8) and south (P9, P11, P12) of the proposed converter station and from several roads including the A189 (P21), Wembley Gardens (P24), West Bridge Street (P26), Cowley Road (P27) and Bebside Furnace (P29). From these receptors the upper elevations would be visible, with the lower elevations obscured by vegetation, built form or landform. The converter station would be seen in the majority of views in context with existing large scale industrial development.
- 9.117 Effects of **minor** adverse significance are also recorded from several private receptors including the rear upper storeys of Wembley Terrace (PR2), Selbourne Terrace (PR5) and the eastern edge of Bedlington (PR10) where the upper elevations of the converter station would likely be visible above vegetation or landform. Views from the closest properties at East Sleekburn (West) (PR9) and East Sleekburn (East) (PR7) are largely obscured by woodland and other properties. The exception to this is from several properties to the north eastern edge of East Sleekburn (East) (PR7) where views are possible to the upper elevations of the development over public open space and above woodland.

Mitigation

- 9.118 Embedded mitigation has been built into the project development, siting and design to minimise effects on the environment including landscape and views. There is a band of juvenile planting around the periphery of the East Sleekburn site which is beginning to establish and would increasingly filter views into the site. The retention of a sufficient depth of

existing juvenile tree and shrub planting to the periphery of the site has been built into the siting and design to maximise the benefit of this existing screen planting.

- 9.119 The use of colour graded cladding to the converter station buildings, ranging from a dark grey at the base of the building to off-white at the roofline would assist in breaking up the form and minimising its visibility in the wider landscape.
- 9.120 New tree and shrub planting to the western boundary of the converter station site would filter views of the converter station from the west and northwest and reduce its influence on adjacent development site.

Residual Effects

- 9.121 The residual effects of the Proposed Development are those effects still remaining after approximately 15 years when tree and shrub planting would have reached a level of maturity.

Cable Route

- 9.122 The residual significance of effect on views resulting from the underground cables would remain **neutral** on completion and after establishment of the reinstatement.

Converter Station

- 9.123 The residual effects of the converter station on views would be similar to those arising at the year of operation. The majority of the mitigation is embedded into the siting and design of the converter station to minimise effects on views.
- 9.124 The converter station is visible from relatively few receptors albeit a large scale development. Screening by existing planting and landform is already effective in screening many views and the existing juvenile planting around the East Sleekburn site will provide increased filtering of views as it matures.
- 9.125 Receptors using the PRoW (P6) which runs along the northern and eastern boundary of the site would continue to have a close range view of the converter station from a short section of the footpath however this would reduce to **moderate** as vegetation matures. The effect from the majority of the footpath would be **minor or negligible** where there is greater filtering of views by vegetation, built form and landform.
- 9.126 Receptors using the PRoW to the south of the River Sleekburn close to Mount Pleasant Farm (P10) would continue to have views of the converter station however the juvenile planting along Brock Lane would continue to mature and would provide increased filtering of these views reducing to a **minor** adverse effect. The converter station would be seen in context with the existing Blyth Substation and overhead lines.
- 9.127 The converter station would continue to be visible from Brock Lane which runs along the southern boundary of the site. There would be views whilst travelling along Brock Lane by car or on foot (P22) or by bike on National Cycleway Route 1 (P12a). The existing hedgerow and juvenile planting would provide filtering of views of the lower and mid elevations, however there would be views into the site from adjacent the access road off Brock Lane where effects of **moderate** adverse significance would continue. This section forms a small

part of a longer length of road and effects from the rest of the road and cycleway would be **negligible**.

- 9.128 Effects of **minor** adverse significance would remain for several PRoW to the west (P8) and south (P9, P11, P12) of the proposed converter station and from several roads including the A189 (P21), Wembley Gardens (P24), West Bridge Street (P26), Cowley Road (P27) and Bebside Furnace (P29). From these receptors the upper elevations would continue to be visible with increasing filtering to lower and mid elevations as planting matures. The converter station would be seen in the majority of views in context with existing large scale industrial development.
- 9.129 Effects of **minor** adverse significance would continue from several private receptors including the rear upper storeys of Wembley Terrace (PR2), Selbourne Terrace (PR5) and the eastern edge of Bedlington (PR10) where the upper elevations of the converter station would continue to be visible above vegetation or landform. Views from the closest properties at East Sleekburn (West) (PR9) and East Sleekburn (East) (PR7) would continue to be obscured by woodland and other properties. Increased filtering of views from several properties to the north eastern edge of East Sleekburn (East) (PR7) would occur as the juvenile planting to the eastern boundary matures.

Assessment of Effects during Decommissioning

- 9.130 The anticipated operational life of the converter station and cables is approximately 40 years. This could however be extended dependent on the operation of the component parts and would be assessed during the operation of the link.
- 9.131 The decommissioning of the converter station would involve similar activities to those described previously for construction. The main components would be dismantled and removed for recycling wherever possible or for disposal in accordance with the relevant waste disposal regulations at the time of decommissioning. It is likely that the land would be returned to a grassed surface for future use for employment or industry. In the short term there would be a beneficial effect on views as the upper elevations of the building would no longer be present in views.
- 9.132 The underground cables may be cut and left in the ground at the end of their operational lives or could be removed. Removal would involve similar activities to installation.

Cumulative Effects

- 9.133 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. When individual effects are considered in combination, the resulting cumulative effect may be significant.
- 9.134 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:
- Port of Blyth Biomass Power Station;
 - Proposed NGET 400kV GIS Substation;

- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site;
- Residential development – 48 dwellings.

9.135 The following paragraphs consider the cumulative effect of the proposed converter station and underground cables on completion (with mitigation and after establishment), in combination with the development proposals outlined below.

Port of Blyth Biomass Power Station

- 9.136 The Port of Blyth Biomass Power Station will be located at Blyth Harbour approximately 1.5km to the south east of the proposed converter station site. The proposed site is that of the existing Blyth Battleship Wharf accessed from West Bridge Street. The development would comprise a boiler house (up to 65m in height); a steam turbine building; a chimney stack (proposed to be up to 105m in height); a water treatment plant; a control building; a cooling water intake and outfall; a grid connection by underground cable; biomass fuel storage buildings, a biomass fuel preparation area and conveyors. The majority of the development would be up to 20m in height except where specified to be higher above.
- 9.137 The Port of Blyth Biomass Power Station, if constructed, would change the visual baseline of several receptors affected by the Proposed Development. The Environmental Statement (ES) for the power station development reports that some receptors along the coast from North Blyth to Sandy Bay Holiday Park would have effects of major adverse significance on views.
- 9.138 There are relatively few receptors where views of both developments would be seen in combination. There would be points between Newbiggin-By-The-Sea and the mouth of the River Wansbeck and from North Blyth where both developments would be visible. Effects of major adverse significance on views have been recorded from some receptors for the Biomass Power Station, however effects of the proposed converter station from this distance are recorded as negligible. There would be **negligible** cumulative effects on views from this coastal area, with the main effect arising from the Biomass Power Station.
- 9.139 There would also be views of both developments from the rear of properties at Wembley Terrace. The ES for the Biomass Power Station reports a minor adverse significance of effect on this receptor. The proposed converter station development would give rise to effects of minor significance on views from this receptor. There would be **minor** cumulative effects from this receptor.
- 9.140 Some receptors would gain views of both developments in succession. These would include the PRoW on the south of the River Blyth and the network of PRoW between Sleekburn Grange Farm and Mount Pleasant Farm. The ES for the Biomass Power Station reports a major adverse significance of effect for the PRoW on the south of the River Blyth and a range of effects from major and moderate adverse for the PRoW network north of Mount Pleasant Farm. Users of these PRoWs would only see both developments by travelling along the PRoW or with a turn in direction as views to the Biomass Power Station are due west and views are due north for the converter station. The existing Blyth Substation and overhead lines and the proposed Blyth Power Station would form larger elements in these

views. It is anticipated that the converter station would cause a **minor** additional significance of effect.

NGET 400kV GIS Substation

- 9.141 The proposed 400kV GIS Substation will be located approximately 400m to the south-east of the proposed converter station site, adjacent to the existing Blyth Substation. The 400kV GIS substation is located within Section 7 of the Proposed Development area.
- 9.142 The proposed substation would likely be a GIS substation requiring a metal clad building of approximately 200m x 240m x 15m high. The proposals would also likely require minor modifications to the location of pylon(s) on the existing 400kV overhead line northwest corner of Blyth Substation.
- 9.143 The substation development would be immediately adjacent the existing metal clad NGET substation in an area where there are several overhead lines converging at the substation. The GIS substation would have a similar visual appearance to the existing substation and proposed converter station, although it would be of a smaller scale. On completion there would be some intervisibility of the development and the converter station. Both developments would be visible from the network of PRoWs between Sleekburn Grange Farm and Mount Pleasant Farm, from the PRoW along the south bank of the River Blyth and from Brock Lane driving in both directions near the proposed converter station. There would be views of the proposed NGET substation from properties at the eastern edge of East Sleekburn (West) and from the south western edge of East Sleekburn (East) however the proposed converter station would not be visible from these properties. This will be considered as part of the application of the GIS Substation by NGET.
- 9.144 There would be cumulative effects on views from the PRoW to the south and from Brock Lane. The existing Blyth Substation and the proposed converter station would form larger elements in the view from these receptors than the smaller NGET GIS substation development. The cumulative effect of the GIS Substation would be no greater than **minor** adverse.

Narec Offshore Wind Demonstration Site

- 9.145 The Narec Offshore Wind Demonstration Site is located 8km to 17km off the Blyth coast. The facility would comprise 15 turbines in 3 arrays (Array 2, Array 3 and Array 4) offshore ranging from 5.7km to 17km from Blyth Harbour. Turbines are 1km apart with over 5km between arrays. Turbine hubs would be up to a maximum height of 100m, with a 195m tip height above ordnance datum.
- 9.146 The Narec Offshore Wind Demonstration Site would change the visual baseline potentially affected by the Proposed Development in the vicinity of the coast and the immediate hinterland. The wind turbines would form prominent elements in views of the open North Sea, however wind turbines are already a feature in coastal views in this area. Beyond the immediate coastal edge the vegetated nature of the landscape, the local terrain and existing built form limit the influence of the Demonstration project on views.

9.147 On completion there would be some cumulative effects at the coast although these would be cumulative effects in succession where the receptor would need to turn to see both developments rather than seeing them in the same view. Such views would be limited to viewpoints along the coast between Newbiggin-By-The-Sea, the mouth of the River Wansbeck and some glimpsed views from the coast road near Cambois. Users of these viewpoints would need to look east and southeast to view the offshore wind site and then turn to the southwest to see very limited views towards the converter station. From here the converter station would be barely visible and cumulative effects would be **negligible**.

Ferguson Business Park Single Turbine

9.148 The Ferguson Business Park Single Turbine will be located approximately 390m west of the cable route and approximately 550m to the north west of the proposed converter station.

9.149 The single turbine (53.5m to turbine tip) would be close to an existing industrial area and would be a vertical structure of similar heights to existing 275kV overhead line infrastructure immediately to the east of the business park. The wind turbine and the proposed converter station would be visible from several visual receptors in the local area around Ferguson Business Park and Wembley Gardens, however visibility would diminish with distance. The cumulative effects of both developments would be of **minor** adverse significance at most.

Earth Balance Single Turbine

9.150 The Earth Balance Single Turbine will be located approximately 2km to the west.northwest of the proposed converter station site. The proposed single turbine (43.5m to turbine tip) would be installed at the Earth Balance site off the A1147 near Bomarsund. The single turbine structure would have a similar vertical emphasis as the 275kV overhead line which runs over the A1147 south of Bomarsund.

9.151 There would be limited cumulative effects on views due to intervening landform, woodland, built form and road embankment. Cumulative effects are considered to be **negligible**.

Residential Development - 48 dwellings

9.152 A planning application for 48 dwellings and public open space on a green field site to the north of the settlement of East Sleekburn has been submitted to NCC.

9.153 The Proposed Development would be visually contained as it is screened to the north, east and west by woodland planting. There would be no intervisibility between the two developments due to the woodland and **no cumulative effects** on views would arise.

Summary

9.154 The significance of residual cumulative effects on views of the proposed converter station and underground cable in combination with all of the development proposals outlined above is considered to give rise to a slightly greater adverse effect than reported for the proposed converter station and underground cable in isolation, but no greater than **minor adverse** overall. If all of the development proposals were implemented it would increase the amount of development visible in the area, however the nature and scale of these developments is consistent with existing development in the area which already includes large scale industrial buildings; energy development including wind turbines, overhead lines and substations; and small areas of residential development.

Conclusions

Underground Cables

- 9.155 The cable installation would give rise to short term effects on views over a small geographical area during construction. The effects would be reversible with the landscape reinstated to its original condition following installation. The greatest effects on views would be from receptors in the coastal area where the installation work in the intertidal and cliff top area would be visible. Effects of **moderate** adverse significance in the short term are recorded for the car park and beach area (P17), from several private properties close to the coast (PR1 and PR3) and from Charltons public house on the Bucca (C2). **Minor** effects are also recorded for more distant receptors along the coastal area and from receptors affected by the cable installation inland.
- 9.156 The residual effects of the underground cables following reinstatement would be **negligible**.

Converter Station

- 9.157 The converter station would be consistent with existing industrial development in the area. The converter station would be a large structure, but siting and design have been considered in the development of the project to reduce the significance of effect on views. The use of colour graded cladding to the converter station buildings, ranging from a dark grey at the base of the building to off-white at the roofline would assist in breaking up the form and minimising its visibility and existing vegetation would be retained to obscure and filter views of the development. The juvenile planting around the East Sleekburn site would be retained which would further filter views as it matures.
- 9.158 The residual effects of the converter station on views would be similar to those arising at the year of operation with effects mitigated through embedded measures such as the siting and design of the converter station.
- 9.159 The greatest effect on views would be from a very short section of the PRoW which runs immediately adjacent to the converter station site (F6) and from Brock Lane (P22 and P12a) in the vicinity of the new access road where there would be **moderate** adverse effects on views. Effects from the rest of the footpath and Brock Lane would be **minor or negligible**.
- 9.160 **Minor** adverse effects would also remain from the PRoW to the south of the River Sleekburn close to Mount Pleasant Farm (P10), a PRoW to the west (P8) and several PRoW to the south (P9, P11, P12) of the proposed converter station and from several roads including the A189 (P21), Wembley Gardens (P24), West Bridge Street (P26), Cowley Road (P27) and Bebside Furnace (P29). From these receptors the upper elevations would be visible with filtering to lower and mid elevations with woodland planting.
- 9.161 There would be effects of **minor** adverse significance from private receptors including the rear upper storeys of Wembley Terrace (PR2), Selbourne Terrace (PR5) and the eastern edge of Bedlington (PR10) where the upper elevations of the converter station would continue to be visible above vegetation or landform. Views from the closest properties at East Sleekburn (West) (PR9) and East Sleekburn (East) (PR7) would largely be obscured by woodland and other properties however there would be views from several properties to the

north eastern edge of East Sleekburn (East) (PR7) to the upper elevations of the converter station.

9.162 The converter station is visible from relatively few receptors albeit a large scale development. Screening by existing planting and landform is already effective in screening many views and the existing juvenile planting around the East Sleekburn site would provide further filtering of views as it matures. Where the converter station would be visible it would be partially filtered by vegetation and would be seen in context with existing industrial development.

10 HISTORIC ENVIRONMENT

Introduction

- 10.1 This chapter examines the effects associated with the proposed onshore components of NSN Link (“the Proposed Development”) on the historic environment.
- 10.2 For details of the project description, reference should be made to Chapter 4 of the Environmental Statement (ES). The application boundary of the Proposed Development has been split into seven sections as presented in Figure 4.5 of this ES.
- 10.3 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance. The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (“NSN Link Ltd”) and their contractors, in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the scheme design to reduce identified impacts.
- 10.4 This chapter describes the likely effects of the Proposed Development how those effects have been assessed, and measures to mitigate any predicted significant adverse effects. The predicted residual effects after mitigation methods have been implemented are also described.
- 10.5 The historic environment includes all physical remains of past human activity (whether visible, buried or submerged, landscaped or planted or managed flora). Those aspects of the historic environment that hold value to this and future generations because of their historic, archaeological, architectural or artistic interest are called ‘heritage assets’. Some heritage assets are designated; these comprise:
- World Heritage Sites;
 - Scheduled Monuments;
 - Protect Wreck Sites;
 - Protected Military Remains;
 - Listed Buildings;
 - Registered Parks and Gardens;
 - Registered Battlefields; and
 - Conservation Areas.
- 10.6 Effects assessed in this chapter include direct effects, and any indirect and cumulative effects. These effects could be permanent or temporary (short, medium or long-term); positive or negative, and the assessment of effects identifies which is the case. Construction, operational and decommissioning phase affects are all assessed.

Legislation and Policy Context

- 10.7 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on the historic environment associated with the Proposed Development. This section should be read in conjunction with Chapter 5 which provides a more detailed

overview of the policy context however the key policies relevant to this chapter are discussed below.

National Legislation

10.8 The statutory legislation most relevant to this chapter comprises;

- AMAA Act¹: Making it a criminal offence to carry out any works on or adjacent to a Scheduled Monument without Scheduled Monument Consent. This Act makes no reference to the setting of Scheduled Monuments.
- Planning (Listed Buildings and Conservation Areas) Act,²: In considering whether to grant planning permission for development which affects a listed building or its setting, the decision maker shall have special regard to the desirability of preserving the building or its setting (Section 66). Special attention shall be paid to the desirability of preserving or enhancing the character or appearance of a conservation area (Section 72).
- 'The Hedgerow Regulations'³: A local planning authority can issue a 'hedgerow retention notice' in the case of an 'important hedgerow'. Schedule 1, Part II, of the Hedgerow Regulations provides a set of criteria for determining 'important hedgerows' in relation to archaeology and history.

National Planning Policy Framework (NPPF)

- 10.9 One of the core planning principles of the NPPF is to “*conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life to this and future generations*”. Chapter 12 of the NPPF provides policy provisions for conserving and enhancing the historic environment.
- 10.10 Paragraph 128 of the NPPF directs that local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance.
- 10.11 Paragraph 132 of the NPPF notes that the significance of a heritage asset can be harmed or lost through alteration or destruction of the heritage asset, or development within its setting.
- 10.12 Paragraph 133 of the NPPF describes how applications that would lead to substantial harm to or total loss of significance of a designated heritage asset should be refused unless it can be demonstrated that the harm is necessary to achieve substantial public benefit. Paragraph 134 of the NPPF directs that less than substantial harm should also be weighed against the public benefits of the proposal.
- 10.13 The glossary to the NPPF describes a heritage asset as “*A building monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage asset includes designated heritage assets (a world heritage site, scheduled monument, listed building, protected wreck*

¹ Ancient Monuments and Archaeological Areas Act (AMAA) 1979. Available at: <http://www.legislation.gov.uk/ukpga/1979/46>

² The Stationery Office (1990) Planning (Listed Buildings and Conservation Areas) Act 1990 (as amended) Available at: http://www.legislation.gov.uk/ukpga/1990/9/pdfs/ukpga_19900009_en.pdf

³ Hedgerow Regulations (Schedule 1, Part 2) 1997 *AGuide to the Law and Good Practice* Available at: http://www.planningportal.gov.uk/uploads/pins/hedgerow_guide_part_2.pdf

site, registered park and garden, registered battlefield, or conservation area) *and assets identified by the local planning authority (including local listing)*”.

- 10.14 The glossary describes significance in relation to heritage policy as “*The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset’s physical presence, but also from its setting*”.
- 10.15 The glossary describes the setting of a heritage asset as “*the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of the asset, may affect the ability to appreciate that significance or may be neutral*”.

Regional Policy

- 10.16 In April 2009 seven Local Planning Authorities merged to form Northumberland County Council. The plans and policies produced individually have been brought together to form the ‘Northumberland Consolidated Planning Policy Framework’.
- 10.17 The consolidated Planning Policy Framework forms the statutory Development Plan for Northumberland, and comprises ‘saved’ policies The Development Plan is amended by Local Development Framework documents as they are adopted.
- 10.18 The Proposed Development falls within the former District of Wansbeck. The Wansbeck District Local Plan was adopted in July 2007 and currently forms part of the Consolidated Planning Policy Framework for NCC.
- 10.19 For further information on the Northumberland Consolidated Planning Policy Framework see Chapter 5.

Local Planning Policy

- 10.20 The Wansbeck District Local Plan (July 2007) provides the following specific references to the historic environment, relevant policies include.
- Policy GP21 “Archaeology” - Where evidence suggests that a proposed development could disturb archaeological remains, the developers will be required, before their planning application is determined, to provide information on the character and extent of the remains and any measures they propose to mitigate the impact of development. A field evaluation will be required if judged necessary.
 - Policy 50 “Natural and Historic Environment” - Development proposals should seek to conserve, protect and enhance Northumberland’s distinctive and valued natural and historic environment.
 - Policy 53 “Historic Environment and Heritage Assets” - Development proposals should seek to conserve, enhance and promote the quality and integrity of Northumberland’s distinctive and valued historic environment and heritage assets. Proposals that would result in significant harm will only be permitted where the harm cannot be avoided, adequately mitigated against or, as a last resort, compensated.

Guidance and Best Practice

10.21 Best practice guidance notes and standards relevant to the historic environment, and consulted in the production of this chapter comprise:

- Code of Conduct⁴ and Standard and Guidance documents⁵
- Conservation Principles; Policy and Guidance for the Sustainable Management of the Historic Environment⁶,
- The Setting of Heritage Assets, English Heritage Guidance⁷,
- PPS5 Historic Environment Practice Guide (2010)⁸,
- National Planning Practice Guidance (2014)⁹

10.22 Conservation Principles⁶ sets out English Heritage's approach to understanding heritage significance, and describes four groups of heritage 'values':

- Evidential value: the potential of a place to yield evidence about past human activity.
- Historical value: the ways in which past people, events and aspects of life can be connected through a place to the present – it tends to be illustrative or associative.
- Aesthetic value: the ways in which people draw sensory and intellectual stimulation from a place.
- Communal value: the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory

Methodology

Study Area

10.23 The assessment was undertaken for the Proposed Development and up to 2km from the application redline boundary. The key justification for this 2km buffer is to ensure the identification of any assets where the Proposed Development may be capable of affecting the contribution made by the asset's setting to its significance.

Assessment Methodology

10.24 The methodology outlined below is considered to be applicable for the construction, operational and decommissioning phases.

10.25 For the purposes of this chapter and in relation to the historic environment, the activities associated with decommissioning are considered to be similar in nature to those of construction. The cables might require repair during the operational phase in which case there may be a need to excavate down to them. In terms of decommissioning it is understood that the redundant cables would either be left in situ or removed.

⁴ Institute for Archaeologists (IfA), 2012, Code of Conduct.

⁵ Institute for Archaeologists (IfA), 2012, Standard and Guidance for Historic Environment Desk-Based Assessment. 5th edition.

⁶ English Heritage (EH), 2008, Conservation Principles; Policy and Guidance for the Sustainable Management of the Historic Environment.

⁷ English Heritage (EH), 2011, The Setting of Heritage Assets.

⁸ Department for Communities and Local Government (DCLG), 2010, PPS5 Planning for the Historic Environment: Historic Environment Planning Practice Guide.

⁹ Department for Communities and Local Government (DCLG), 2014, Planning Portal, Planning Practice Guidance.

- 10.26 Baseline data has been collated for the historic environment for an area of search that included potential landfall and cable routes and the converter station location. This area of search was fully inclusive of the Proposed Development boundary and provided a buffer that allowed for assets with archaeological interest to be placed in context, and for the identification of trends that may help to predict archaeological potential within the development area. Data for designated heritage assets was obtained for a 2km area of search to ensure the identification of any assets where the Proposed Development may be capable of affecting the contribution made by the asset's setting to its significance.
- 10.27 In summary the scope of this assessment comprised the following:
- A review of whether any protected features and archaeological interests were likely to be impacted by the Proposed Development;
 - A review designated heritage assets;
 - A site walkover of cable route and converter station by TEP;
 - Consultation with NCC; and
 - An assessment of the potential impacts and any mitigation measures that might be required.
- 10.28 A review of published information on the historic environment relating to the Proposed Development was undertaken with information obtained from the following sources:
- National Heritage List for up to date information regarding nationally designated heritage assets;
 - National Monuments Record held by English Heritage;
 - Historic Environment Record held by Northumberland County Council, including historic landscape characterisation;
 - Worley Parsons (March 2014), Factual and Interpretative Site Investigation Reports;
 - Ordnance Survey historic mapping sequence, supplied by Landmark Group;
 - Ordnance Survey (1:10,560), 1865,1898,1924,1949-1951, 1966-67,
 - Ordnance Survey (1:2,500), 1895,
 - Ordnance Survey (1:10,000) 1977-78, 1993 1:10,000
 - Tithe maps:
 - Camboise (township in the parish of Bedlington), 1846
 - East Sleekburn (township in the parish of Bedlington), 1839
 - Modern vertical aerial photographs viewed on "*google earth*" and "*Bing*" and aerial photographs held by the HER;
 - Tithe mapping and apportionments held by the Northumberland County Archive service;
 - Defence of Britain archive held by Archaeological Data Services; and
 - Northumberland County Council (<http://inormaps.northumberland.gov.uk/map.asp>) for conservation areas and any other relevant local heritage designations;
 - Entec (2009) Blythe Substation Extension Written Scheme of Investigation for Archaeological Monitoring

Consultation

- 10.29 Consultation with Northumberland County Council (NCC) has been undertaken as part of the Scoping stage and as the assessment progressed.

Site Walkover

- 10.30 In addition, a walkover survey was undertaken for the landfall, cable route corridor, converter station site, and substation connection. Field notes were taken to record the land use, condition of known heritage assets, surface evidence for any previously unrecorded heritage assets, the topography and landscape character as an indicator of potential for buried archaeology, and any health and safety or methodological constraints to further site surveys.
- 10.31 A vantage point survey was also undertaken to determine the contribution to significance made by the setting of designated heritage assets within the vicinity of the Proposed Development. This survey considered an extended study area of 2km from the converter station. The development of the converter station could affect the significance of a heritage asset, if it affects part of the setting of a heritage asset that contributes towards its significance. This has been assessed in accordance with the steps outlined in the English Heritage guidance on the setting of heritage assets (EH, 2011).

Site Investigation Information

- 10.32 An intrusive investigation was completed by Worley Parsons Ltd (Worley Parsons) in 2013 and 2014 obtaining information on contamination and geotechnics for the cable route (section 1-5) and the converter station (section 6). Ground investigation in section 7 has not been undertaken. The investigation was based on the findings of desk based assessment undertaken previously by Worley Parsons.
- 10.33 A summary of the site works is provided in chapter 12 Geology and Ground Condition :

Assessment of Significance

- 10.34 A staged assessment has been undertaken to determine the likely significance of effects of the development on the historic environment. This involved establishing the historic environment baseline to determine the importance of the known assets that may be affected. In this chapter, importance has the same meaning as “heritage significance”. Once the baseline is established, the extent of the effect of the Proposed Development (the “magnitude of effect”) on the heritage significance, or importance, of the identified assets is assessed. By comparing the importance of the asset and the magnitude of change the overall significance of the effect has been determined.
- 10.35 A heritage asset can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. The former relates to any direct physical harm, including total or partial loss of the asset. Where the development only affects the setting of the asset, there is no direct physical harm but loss of or change to the asset’s setting can (where setting contributes to the significance of the asset) result in a reduced ability to experience and understand the asset’s heritage significance.
- 10.36 Understanding the importance of the heritage assets within the historic environment baseline data includes an assessment of the heritage values of the asset, and the contribution made by setting to those values. The importance of a heritage asset is described in terms of the value of the heritage asset because of its heritage interest (architectural, archaeological,

artistic or historic) and is also described in relation to the asset's heritage values (evidential, historical, communal, and aesthetic⁶).

- 10.37 For designated assets (Listed Buildings, Scheduled Monuments (SM), Registered Parks and Gardens and Conservation Areas), the importance is recorded as 'high' or 'very high' as these assets meet the national criteria for designation under the relevant legislation. Listed Buildings and Registered Parks and Gardens are graded (I, II* and II) according to relative significance. This is reflected in Table 10.1 below.
- 10.38 The relative importance of each non-designated heritage asset within the historic environment baseline has also been determined to provide a framework for comparison. These categories do not reflect a definitive level of significance or value of a heritage asset, but a provisional one based on the asset's heritage values to provide an analytical tool that can inform later stages of assessment and the development of appropriate mitigation, where needed. Some non-designated assets can be of equivalent importance to designated heritage assets. Their relative importance means that they are treated as if they are designated assets.
- 10.39 The degree of survival is also taken into account in determining receptor importance. Assets where there is likely to be very limited physical evidence (including below ground archaeological evidence) because they have been destroyed or extensively damaged are of low or negligible heritage significance. The grading of importance of heritage assets is based on the criteria listed in Table 10.1.

Table 10.1: Criteria Determining Relative Receptor Importance

Receptor Importance	Description
Very High (International)	Internationally and nationally important resources: All Grade I and some II* listed buildings. Grade I Registered Parks and Gardens. Some Scheduled Monuments, especially those associated with a World Heritage Site.
High (National)	Nationally important resources: Grade II Listed Buildings, Conservation Areas, Scheduled Monuments, Registered Parks and Gardens, Registered Battlefield.
Medium (Regional)	Regionally important resources: Non-designated heritage assets and landscape features with high or moderate evidential, historical, aesthetic and/or communal values
Low (local)	Locally important resources: Non-designated heritage assets and landscape features with low evidential, historical, aesthetic and/or communal values.
Negligible (minor)	Assets with very low or no evidential, historical, aesthetic and/ or communal values, or where remains are known to have been significantly altered or destroyed.
Unknown	Assets and structures of uncertain character, extent and/or date where the importance cannot be readily predicted.

- 10.40 Assessing the effect of the Proposed Development in relation to the historic environment baseline is considered in relation to the following criteria. This includes "Step 3" of the assessment of effects on the setting of heritage assets¹⁰ to determine whether, and to what degree, the heritage significance of an asset may be harmed or lost where the Proposed Development affects its setting. English Heritage states that setting is not a heritage asset,

¹⁰ The setting of heritage assets, English Heritage Guidance Note, English Heritage 2011

nor a heritage designation - its importance lies in what it contributes to the significance of a heritage asset. Significance can therefore only be harmed or lost if the significance of the asset is in some way derived from that part of the setting affected by the Proposed Development.

10.41 The descriptions of magnitude of effect, provided in the following table, relate to harm to or loss of significance of the asset (and not, where development only affects its setting, the degree of change within that setting).

Table 10.2: Magnitude of Effect

Magnitude	Definition
High	Total loss or substantial harm to important elements, or features or characteristics of the baseline (pre-development) conditions such that post development character or composition or attributes of baseline will be fundamentally changed.
Moderate	Partial loss or harm to one or more important elements or features or characteristics of the baseline (pre-development) conditions such that post development character or composition or attributes of baseline will be partially changed.
Low	Minor loss. Change arising from the loss or alteration will be discernible but underlying character or composition or attributes of the baseline condition will be similar to pre-development circumstances or patterns.
Negligible	No loss or alteration. Change not distinguishable.
Unknown	The exact location, extent or nature of the baseline receptor is not known and therefore the magnitude of change cannot be discerned.

10.42 Determining the overall significance of effect is then a professional judgement that compares the magnitude of effect against the relative sensitivity of the heritage assets affected. Where either the importance of the receptor, or magnitude of effect, is unknown, the significance of effects is also unknown.

Table 10.3: Significance of Effect

Magnitude	Importance of Receptor				
	Very High	High	Medium	Low	Negligible
High	High	High	Moderate	Low	Negligible
Moderate	High	Moderate	Low	Low/ Negligible	Negligible
Low	Moderate	Low	Negligible	Negligible	None
Negligible	Low/ Negligible	Negligible	Negligible	None	None

10.43 Heritage policy makes a distinction between substantial and less than substantial harm (NPPF, paragraphs 132 - 134). For the purpose of this assessment, high adverse effects are equivalent to substantial harm. Moderate and low effects are equivalent to less than substantial harm. Effects that are negligible are less than substantial and are also not significant.

10.44 The nature of an effect can be classified as adverse, negligible (or no effect), or beneficial:

- Adverse: Classifications of significance indicate disadvantageous or negative effects to an environmental receptor, which may be of **Low, Moderate, or High significance**;
- Negligible/None: Classifications of significance indicate imperceptible effects to an environmental receptor;
- Beneficial: Classifications of significance indicate advantageous or positive effects to an environmental receptor, which may be of **Low, Moderate or High significance**.

10.45 Timescales associated with effects are categorised as follows:

- **Short to Medium Term:** Timescales where the effect is temporary and last for the period of the construction works or less; and
- **Long Term:** Timescales where the effect remains for a substantial time, perhaps permanently, after construction even though the activity that created it may have ceased, or the recorded effect may be reversible on decommissioning.

Assessment of Cumulative Effects

10.46 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. However, when individual effects are considered in combination, the resulting cumulative effect may be significant.

10.47 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:

- Port of Blyth Biomass Power Station;
- Proposed National Grid Electricity Transmission Plc. (NGET) 400kV GIS Substation;
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site;
- Residential development – 48 dwellings.

Limitations of Assessment

10.48 Monument data from HER and the NMR consists of secondary information derived from varied sources. This data, as well as that derived from other secondary sources, is generally accurate. There are however several limitations to the data set, generic to any desk-based assessment. For example, where the known archaeological data relates to chance finds, or cropmark evidence, the full extent, date and nature of the sites is often uncertain. Also, a number of site records, especially older records such as antiquarian finds, excavations or observations often fail to accurately locate sites. Due to these limitations, it is possible that previously unrecorded archaeological sites could survive within the proposed development area.

10.49 Additionally, due to the buried and invisible nature of archaeological sites, there is often an element of uncertainty regarding the survival, condition, nature and extent of any such sites, which a walkover survey cannot always clarify.

Existing Environment

Archaeological Background and Potential

- 10.50 As reported in the Worley Parsons reports for the cable route^{11,12} and converter station^{13,14} made ground has been noted within all of the sections of the proposed DC and AC cables and converter station. Within section 6 (the converter station) a thin layer of made ground has been identified, the recorded depth to the base of the made ground is reported to be between 0.20 and 0.45m below ground level; underlain by the drift geology of glacial till.
- 10.51 During the site visit it was observed that the topography was generally flat within the converter station site, with the impression of the site having been levelled. The lack of a significant depth of made ground suggests that this site may have been truncated or levelled and this may have an impact on the degree to which any present heritage assets with archaeological interest survive within this area.
- 10.52 The archaeological potential for the study area is, however, discussed by historical period below. Relative sea level change and the potential of the landfall/ intertidal zone for paleo-environmental and archaeological evidence is discussed in detail in the technical report on the offshore historic environment¹⁵.
- 10.53 Periods referred to in this chapter relate to the following dates:

Table 10.4: Time Periods

Period	Date
Palaeolithic	500,000 BP – 10,000 BP
Mesolithic	10,000 BP – 4,000 BP
Neolithic	4,000 BP – 2,000 BP
Bronze Age	2,000 BP – 600 BP
Iron Age	600 BP – AD 43
Roman	AD 43 – 410
Early Medieval	410 – 1066
Medieval	1066 – 1530
Post Medieval	1530 - 1900
Modern	1900- present

- 10.54 The earliest evidence for human activity in Britain dates from the Palaeolithic period (500,000 – 10,000 years before present (BP)). However, there are no known finds from this period within the study area, or elsewhere in the vicinity. Evidence for Palaeolithic activity in the region is sparse, with the only hand-axe finds likely to be re-deposited artefacts from ballast dumping on the coast¹⁶. Evidence is emerging from sites such as Howick, discussed below, for Palaeolithic activity in the region but the potential for the discovery of

¹¹ Worley Parsons, March 2014. NGPH & NGIL, Norway-UK HVDC Interconnector (NSN Link) Land Parcel 1 (Cable Landfall and Route) – Factual Geo-Environmental Site Investigation Report (ref: 305002-00006/51614-02)
¹² Worley Parsons, March 2014. NGPH & NGIL, Norway-UK HVDC Interconnector (NSN Link) Land Parcel 1 (Cable Landfall and Route) - Environmental Assessment, Interpretative Site Investigation Report (ref: 305002-00006/51614-02)
¹³ Worley Parsons, March 2014. NGPH & NGIL, Norway-UK HVDC Interconnector (NSN Link) Land Parcel 2 (Converter Station) - Factual Geo-Environmental Site Investigation Report (ref: 305002-00006/51614-02)
¹⁴ Worley Parsons, March 2014. NGPH & NGIL Norway-UK HVDC Interconnector (NSN Link) Land Parcel 2 (Converter Station) – Environmental Assessment, Interpretative Site Investigation Report (ref: 305002-00006/51614-02)
¹⁵ Headland Archaeology, 2012, North Sea Network Cable Desk Based Assessment
¹⁶ Durham County Council, 2006, Shared Visions: The North-East Regional Research Framework for the Historic Environment, David Petts and Christopher Gerrard,

archaeological evidence from this period within the development area is low. However, it is noted that any evidence that assists with understanding the coastal environmental change and pattern of human settlement for this period would be a key research priority for the region.

- 10.55 With the end of glaciation, the Palaeolithic period gave way to the Mesolithic (10,000 – 4,000 BP), and hunter gatherer societies appear in the archaeological record to become more settled. Unlike the sparse evidence for the Palaeolithic period, the Mesolithic is well represented in the archaeology of the region. A flint scatter at Newbiggin Point (asset ID 4) is recorded within the study area. At Howick (approximately 45km to the north of Cambois) a substantial Mesolithic settlement was excavated on a similar topography to the study area, illustrating the use of such locations for what, at Howick, was interpreted as a permanent or semi-permanent occupation site. Survey at Bolam and Shaftoe, an area between the Wansbeck and Blythe Rivers (approximately 30km to the west of the study area) has identified a range of sites identified from lithic scatters, and rock shelters. Although topographically different to the study area, this research further indicates widespread Mesolithic occupation of the region and there is a moderate potential for the discovery of further archaeological evidence from this period within the development area.
- 10.56 Evidence for permanent settlements and farming practice emerges more commonly during the Neolithic period (4,000 – 2,000 BP). There are no known sites from this period within the study area, but as with the Mesolithic period, the Neolithic period is well represented in the archaeological record of the region. An archaeological evaluation of land at Blyth (approximately 2km to the south of the study area) revealed early Neolithic features comprising a curvilinear ditch and probable related pits, ditches/gullies and post hole. There is a moderate potential for the discovery of archaeological evidence from this period within the development area.
- 10.57 The beginning of the Beaker Period (late Neolithic – Bronze Age 2,000 – 600 BP) in Britain is marked by the arrival of new pottery types from the continent and a new burial rite involving the single inhumation of individuals in a crouched position under barrows and in cists. A Bronze Age cist containing pottery was found to the south of Newbiggin, and a cist cemetery was also found at the Howick Mesolithic site. Further cist burials were found at Bedlington (5km to the west of the study area) and a Bronze Age cemetery has also been excavated at Low Hauxley, approximately 30km to the north of Cambois, (a multi-period settlement site with evidence for Mesolithic, Iron Age and Roman activity as well as Neolithic footprints). Although there are no known assets from this period within the study area, there is moderate potential for the discovery of archaeological evidence from this period.
- 10.58 The Iron Age (600 BP – AD43) saw further organisation of societies into tribal units, with the *Votadini* being the dominant tribe in what is now east Northumberland. Lowland Iron Age settlement is evident in the region, often in the form of cropmark sites. There is a moderate potential for the discovery of further archaeological evidence from this period within the development area.
- 10.59 The Roman invasion of England in AD43 was followed by the establishment of a military infrastructure. The study area lies between the Antonine Wall and Hadrian's Wall. These structures, built in the AD140s and 120s respectively, marked the northern extent of the Roman Empire and both are part of the Roman Frontiers World Heritage Site. Roman

occupation is attested to throughout the region, with military, civilian and native sites among the archaeological record. No assets from this period are known within the study area but the potential for the discovery of archaeological evidence from this period within the development area is moderate, given the background for occupation from this period within the wider area.

- 10.60 The Roman military withdrawal from Britain in the 5th century marked the beginning of the early medieval period. Anglian invaders settled in the north east of England and the area between the Humber and the Forth became known as the kingdom of Northumbria. The region was subject to Viking raids and grave goods reportedly found within the Study Area have been interpreted as Viking (asset ID 12). This interpretation is inconclusive, and the finds could be Roman or Anglo-Saxon.
- 10.61 However, the presence of finds from this period in the study area indicates that the region was occupied and this is supported by documentary evidence. Cambois “*Cammes*” is first documented in c. 1050¹⁷. It is interpreted as a Celtic name, derived from *camm* – crooked – referring to the bay. Sleekburn (East and West) is a place-name derived from Old English *Sliceburne* and is again first referenced c. 1050. The potential for the discovery of archaeological evidence from this period within the development area is moderate, given the background for occupation from this period within the wider area.
- 10.62 The settlements of Cambois (asset ID 17) and East Sleekburn appear to have their origins in the early medieval period, and continue as small settlements through the medieval period. There is evidence in the study area for this; documentary references from the medieval period to a chapel at Cambois (asset ID 18) and to salt pans on the shore at Cambois (asset ID 55), and evidence from aerial photographs for ridge and furrow indicative of medieval farming practice (asset ID 59, 61 and 69). The potential for the discovery of archaeological evidence from this period within the development area is high, given the background for occupation from this period within the immediate area. An unverified source reports that “an ancient burial ground” was found on the links at Cambois in the early 20th century¹⁸, which could indicate the presence of the chapel referred to in documentary sources.
- 10.63 There appears to be little change within the study area throughout the later medieval and early post medieval periods, with the exception of the enclosure of fields in the 17th and 18th centuries. The Tithe Maps record the settlements of East Sleekburn and Cambois in the mid-19th century and show small settlements that relate to the historic village cores, with the land between used for agriculture and mostly recorded as arable.
- 10.64 Later, cartographic sources record the establishment of the West Sleekburn and Cambois collieries within the study area, both of which resulted in the development of workers housing, roads and railways as well as the colliery sites themselves. These develop over the 19th century and lead to the establishment of the settlements as they appear today. A number of heritage assets from this period are recorded within the study area. These comprise wells, houses, inns, evidence relating to the coal industry (including the grade II listed Coal Staithes at Blyth Power Station, asset ID 2), as well as a lifeboat house (asset ID 58), and fords and a ferry crossing the Blyth and Wansbeck Rivers. The potential for the

¹⁷ A D Mills, 2003, Oxford Dictionary of British Place-names, Oxford University Press

¹⁸ <http://www.sixtownships.org.uk/memories-of-cambois--beyond.html>

discovery of archaeological evidence from this period within the development area is high, given the background for occupation from this period within the immediate area.

- 10.65 The coastline of north-east England, as elsewhere, was defended throughout the historic period. This is, however, particularly evident in the study area for defences associated with World War II. The majority of these assets no longer survive, although the potential for the discovery of associated archaeological evidence is high, given the large number of assets from this period within the study area. Assets from this period include pill boxes, anti-glider and aircraft batteries, military buildings, artillery firing ranges and other trenches and obstructions on the foreshore. These assets formed part of the “coastal crust”, a series of defences focused on the coastline, built in 1940, in response to the threat of invasion from Europe.
- 10.66 The historic landscape character of the study area is predominantly “industry abandoned”, referring to the former extent of the Blyth Power Station. Two areas of “17th – 18th century enclosure” survive in the north-west and south-west of the study area. The landfall is “coastal dunes” and the remainder 20th century settlement and industry. The walkover survey, review of historic mapping and review of modern aerial photographs confirm this.
- 10.67 Previous archaeological field surveys undertaken within the study area include a geophysical survey (GeoQuest, 2004) within an area of proposed landscape planting and undertaken on behalf of Northumberland County Council (EV1). This identified ridge and furrow, field boundaries and drains but did not identify the enclosure interpreted from cropmark evidence (asset ID 63).

Baseline Data

- 10.68 As shown in Figure 10.1 there are two designated heritage assets within the 2km study area:
- Cambois War Memorial (Grade II listed building). The setting of this asset includes the intimate surroundings of St Andrews church, and the adjacent housing and community of Cambois. The memorial holds high communal and historical heritage value and is designated for this, and the architect heritage interest of the asset. The wider setting does not contribute to the significance of the asset.
 - Coal staithes at Blyth Power station (Grade II listed building). The setting of this asset includes the industrial surroundings of the docks at Blyth, as well as the associated Cambois colliery, to which it is linked evidentially but not visually. It holds high evidential and historical heritage value and is designated for this, and the architectural and historic heritage interest of the asset. The wider setting does not contribute to the significance of the asset.
- 10.69 Also shown in Figure 10.1 there are four further designated heritage assets to the south of the Blyth Estuary, these are:
- Grade II listed pair of chapels in Cowpen Cemetery
 - Grade II listed Fynes Memorial in Cowpen Cemetery
 - Grade II listed gates and screen wall at entrance to Cowpen Cemetery
 - Grade II listed war memorial at the junction of Cowpen Road and Briardale Road
- 10.70 The setting of these assets includes the cemetery, in the case of the first three, and the community in which they are situated and with which they are associated, in the case of all

four. They have high communal and historical heritage value and are designated for this, and the architectural heritage interest of the assets. The wider setting does not contribute to the significance of the assets and the proposed development is not within the setting of these assets.

10.71 There are 69 non-designated heritage assets within the study area. None are of equivalent significance to a designated asset, based on currently available information, although a standing stone (asset ID 3) and area of Mesolithic flint finds (asset ID 4) could prove to be; the former is currently recorded as being of unknown importance and the latter of medium importance. 61 assets are recorded as being of low importance. These include a number of World War II defences that are recorded as no longer extant and the heritage significance attributed to these sites relates to the potential for associated archaeological evidence. Five assets are of unknown importance. Two assets, a footpath and former road, recorded on historic mapping (asset ID 70 and 71) are of negligible importance.

- One asset is of prehistoric date, the Mesolithic flint scatter (asset ID 4). The standing stone (asset ID 3) could also be prehistoric, as could an enclosure (asset ID 63).
- One asset is of early medieval date (asset ID 12), artefacts interpreted as Viking grave goods.
- Six assets are dated to the medieval period and relate to medieval Cambois and associated ridge and furrow.
- 25 assets are dated to the post medieval period and relate to development of the settlements at Cambois and to the industrial expansion of East Sleekburn and Cambois in the 19th century.
- 30 assets are dated to the modern period, predominantly relating to World War II defences
- Five assets cannot be dated on the basis of currently available data, but of these two could be prehistoric and three entries relate to wrecks and are discussed in more detail in the North Sea Network Cable Desk-Based Assessment (Headland, 2012).

10.72 There are 10 hedgerows within the study area that form part of a field system shown on Ordnance Survey mapping of 1865 and are included in the Northumberland County Historic Landscape Characterisation project as remnants of 17th–18th century field systems.

10.73 Those parts of the Study Area not impacted by 20th century industry and settlement have a moderate potential for the survival of archaeological remains dating from the prehistoric, Roman and early medieval periods and a high potential for the survival of medieval (agricultural) archaeological evidence, post medieval archaeological evidence and for archaeological evidence associated with modern industry and World War II defences.

Proposed Development

10.74 A full description of the Proposed Development during the construction and operational phases is given in Chapter 4. Those features and assumptions relevant to this chapter which could potentially affect heritage assets are summarised as follows, including best practice methods.

- Ground disturbance necessary for the construction of the converter station and the installation of DC cables and AC cables has the potential to negatively affect buried archaeology within any areas of known or potential archaeology or where the ground

conditions are such that buried archaeology could survive. These effects would be direct and permanent. The onshore underground DC cables working area is approximately 2km in length and 16m wide.

- The construction of the converter station and installation of DC cables and AC cables could have a negative effect on the significance of heritage assets as a result of development within their setting. Any such effects would be indirect and temporary (short-term) being limited to the period of construction activities. The converter station, including car parking and landscaping areas, covers an area of approximately 5 hectares and includes buildings with a height of up to 25m.
- The operation of the converter station could have a negative effect on the significance of heritage assets as a result of development within their setting. Any such effects would be indirect and permanent during the life-time of the Proposed Development but would be reversible on decommissioning.
- The installation of the DC cables and AC cables could have a negative effect on the historic landscape character, through removal of historic hedgerows. Any such effects would be direct but temporary (medium-term), limited to the period of construction and reinstatement activities.
- The construction and operation of the converter station could have a negative effect on the historic landscape character through the permanent removal of historic hedgerows. These effects would be direct and permanent. The underground HVAC cables working area is approximately 500m in length and 20m wide.

Assessment of Effects during the Construction Phase

Section 1: Landfall

- 10.75 The cables could have a negative direct effect on buried archaeology associated with adjacent World War II defensive structures (asset ID 23, 25 and 26), all are of low importance. The effect would be of moderate magnitude, the overall significance of effect is low. This effect would be permanent, although measures to mitigate this effect are proposed below.
- 10.76 The cables could also have a negative direct effect on buried archaeology associated with the medieval settlement of Cambois, the location of a well, and possible chapel location (asset ID 17, 18 and 22), all are of low importance. The effect could be of moderate magnitude, the overall significance of effect is low. This effect would be permanent, although measures to mitigate this effect are proposed below.

Section 2: Agricultural Land, North of Wembley Gardens

- 10.77 The cables could have a negative direct effect on buried archaeology associated with an adjacent World War II heavy anti-aircraft battery (asset ID 9). This asset is of low importance. The effect could be of moderate magnitude, the overall significance of effect is low. This effect would be permanent, although measures to mitigate this effect are proposed below.
- 10.78 The cables would have a negative direct effect on buried archaeology associated with a former tramway (asset ID 67), this asset is of low importance. The effect would be of low magnitude, the overall significance of effect is negligible. This effect would be permanent, although measures to mitigate this effect are proposed below.

10.79 The cables would breach two hedgerows that appear on first edition ordnance survey mapping but do not appear on earlier Tithe Maps and are not important in terms of the historical criteria of the Hedgerow Regulations. The effect would be direct, temporary (medium term) and could be reversed by reinstating hedgerow breaches on completion of the construction. The field pattern would remain discernible throughout and the effect on these receptors would be imperceptible. The significance of effect is none.

Section 3: Railway Line

10.80 The effect of this part of the cable route on the historic environment is neutral. No known heritage assets are recorded at this location and the potential for previously unknown archaeology is negligible given the previous disturbance that would have occurred at this location during the construction and maintenance of the railway crossing and highway.

Section 4: Ferguson's Business Park

10.81 The cables follow a footpath shown on historic ordnance survey mapping and therefore pre-dating the construction of the adjacent industrial park (asset ID 70). The effect would be direct, negative and of moderate magnitude but as the footpath is of negligible importance as a historic environment receptor, and the overall significance of effect is therefore also negligible.

Section 5: Scramble Track/ Agricultural Land

10.82 The cables could affect archaeology associated with the adjacent World War II aircraft obstructions (asset ID 6). This asset is of low importance. The effect would be of low magnitude, the overall significance of effect is negligible. This effect would be permanent, although measures to mitigate this effect are proposed below.

Section 6: Converter Station Site

10.83 The construction of the converter station would have a direct, negative effect on buried archaeology associated with a former pond (asset ID 68) and evidence for ridge and furrow (asset ID 69). Both assets are of low importance. The predicted magnitude of effect on these assets is high and the overall significance of effect would therefore be low. This effect would be permanent, although measures to mitigate this effect are proposed below.

10.84 The construction of the converter station would remove one hedgerow that is shown on first edition ordnance survey mapping but does not appear on earlier Tithe Maps and is not important in terms of the historical criteria of the Hedgerow Regulations. The effect would be negative, direct and permanent. The hedgerow is part of a now depleted historic field pattern. The hedgerow is of low importance, the magnitude of effect, in terms of the discernibility of the field pattern as it is now, is low (negative). The significance of effect is therefore negligible.

Section 7: HVAC Underground Cables from Converter Station Site to NGET substation

10.85 The AC cables would have a negative direct effect on buried archaeology associated with a World War II military building (asset ID 5), this asset is of low importance. The effect could be of moderate magnitude, the overall significance of effect is low. This effect would be permanent, although measures to mitigate this effect are proposed below. The AC cables also cross a former road (continuing from East Sleekburn) shown on the Tithe Map (asset ID 71). This asset is of negligible importance, the magnitude of effect is low and the overall significance of effect is therefore none.

Assessment of Effects during the Operational Phase

- 10.86 The operational phase of the DC cables, converter station and AC cables would have no effects on the historic environment. Any maintenance will only affect areas already disturbed and fully mitigated during the construction programme so there will be no direct physical impacts on heritage assets during operation. Following reinstatement there are no significant above ground structures associated with the DC or AC cables that could be harmful to the settings of any heritage assets.
- 10.87 The operational phase of the converter station is not within the setting of any designated heritage asset. There is an evidential, historical and communal association between the War Memorial at Cambois (grade II listed) and the surroundings in which it is experienced, and in this respect the setting of this asset makes a positive contribution to the significance of the asset. However, the proposed converter station would not be experienced from the asset, or in views that include the asset and the magnitude of effect is none. The overall significance of effect is therefore also none.
- 10.88 Similarly there is an evidential, historical and communal association between the Coal Staithes (grade II listed) at Blyth and the Cambois and West Sleekburn collieries. The proposed converter station would not affect the relationship between these assets, which is associative (there is no inter-visibility between these assets) and therefore the ability to understand and appreciate the significance of the staithes would not be altered by the proposed development. The magnitude of effect is none and the overall significance of effect is therefore also none.

Assessment of Effects during the Decommissioning Phase

- 10.89 The anticipated operational life of the converter station and cables is approximately 40 years. This could however be extended dependent on the operation of the component parts and will be assessed during the operation of the link.
- 10.90 The decommissioning of the converter station would involve similar activities to those described previously for construction. The main components would be dismantled and removed for recycling wherever possible or for disposal in accordance with the relevant waste disposal regulations at the time of decommissioning. The land would be returned to a grassed surface or for future use for employment or industry as indicated in the Local Development Order.
- 10.91 The underground cables may be cut and left in the ground at the end of their operational lives or could be removed. If they are left in situ there would be no effects on the historic environment and removal would involve similar activities to installation and would give rise to temporary effects.
- 10.92 The decommissioning phase of the DC cables, converter station and AC cables would have no effects on the historic environment because any ground works will only affect areas already disturbed and fully mitigated during the construction programme so there will be no direct physical impacts on heritage assets during decommissioning.

Mitigation

Mitigation of Effects on Buried Archaeology

- 10.93 In relation to predicted adverse effects arising from the construction of the DC and AC cables, it is proposed that archaeological monitoring of topsoil stripping is undertaken:
- within the two fields to the north of Cambois village (Section 2 location of asset IDs 17, 18, 19 and 67);
 - within Section 5 for any topsoil stripping adjacent to asset ID 6; and
 - within the land to the north of the existing 275kV substation (Section 7, the location of asset ID 5).
- 10.94 Archaeological monitoring refers to a programme of work limited to the extent of the area of construction where topsoil is removed under archaeological supervision, to allow for the identification, excavation and proper recording of any affected archaeological deposits.
- 10.95 In relation to the landfall (Section 1) it is proposed that provision is made for specialist recording in the event that peat deposits are encountered. This would involve the attendance on site of an environmental archaeologist to advise on the requirement for peat sampling.
- 10.96 Although no known heritage assets are recorded within the area of the converter station, there is a low potential for the survival of as yet unknown heritage assets with archaeological interest in that area. To ensure that a record is made of any such assets, it is proposed that pre-construction investigation is undertaken. This would involve a programme of archaeological trial trenching. The objective would be to firstly identify whether archaeological survival could be anticipated or whether site truncation is such that archaeological horizons do not survive. If archaeological survival is possible, further investigation will aim to identify the presence, character and extent of any surviving archaeology so that mitigation can be secured by providing a record of that archaeology prior to construction activities commencing within the area of archaeological interest.
- 10.97 The work proposed above would be subject to a written scheme of investigation (WSI) that has been submitted to and approved by the historic environment advisory team at NCC. The WSI would include provisions for post excavation assessment, analysis and reporting; with cross reference to research priorities outlined in the Regional Research Strategy, and would also identify any opportunities for public benefits arising from the archaeological research proposed.

Residual Effects

- 10.98 The archaeological mitigation outlined would provide a record of the heritage assets affected during the construction phase of the Proposed Development. Although a record is not as valuable as retaining an asset, in this case the assets are not well preserved, and have very limited archaeological information. Recording the archaeological interest of these assets would therefore advance understanding of their significance and negates the predicted adverse effects on known and potential buried archaeology. Consequently, the residual significance of effect for these heritage assets is **neutral**.

- 10.99 A **negligible significance** effect that cannot be mitigated is predicted in relation to a historic hedgerow within the area of the converter station. However, this is not a significant effect, as although the hedgerow is integral to the historic field pattern, the wider field pattern would still be discernible if the hedgerow was removed.
- 10.100 There are **no predicted significant residual effects**, from any aspect of the Proposed Development, in relation to the historic environment.

Cumulative Effects

- 10.101 Project related cumulative impacts are the combined impacts that may occur between the UK onshore elements of the project.
- 10.102 Cumulative effects on historic environment receptors can occur where areas of archaeology or contiguous/ contemporary archaeology assets are affected by more than one development footprint. For such effects to occur development footprints need to overlap or be adjacent. Different development projects can also have a cumulative effect on the settings of a heritage asset when setting is affected by more than one development; and where the part of the settings that are affected by both proposals makes a positive contribution to the heritage significance of the asset.
- 10.103 The following major development proposals have been considered as part of the assessment of potential cumulative effects:
- Port of Blyth Biomass Power Station;
 - Proposed NGET 400kV GIS Substation;
 - Ferguson Business Park Single Turbine;
 - Earth Balance Single Turbine;
 - Narec Offshore Wind Demonstration Site; and
 - Residential development – 48 dwellings.

Port of Blyth Biomass Power Station

- 10.104 The Port of Blyth Biomass Power Station will be located at Blyth Harbour approximately 1.5km to the south-east of the proposed converter station site.
- 10.105 No cumulative effects are predicted during the construction, operation or decommissioning phases of the Port of Blyth Biomass Plant, in combination with the Proposed Development, because the effects of each project on buried archaeology are discrete and can be mitigated. The effects of the proposed DC and AC cables and converter station on the settings of heritage assets is neutral and will therefore have no cumulative effects on any heritage assets when considered in combination with the Port of Blyth Biomass Plant proposal.

Proposed NGET 400kV GIS Substation

- 10.106 The proposed 400kV GIS Substation will be located approximately 400m to the south-east of the proposed converter station site, adjacent to the existing Blyth 275kV Substation. Importantly, it is located within Section 7 of the Proposed Development area.
- 10.107 The substation and the cable routes for the Proposed Development are being designed sympathetically in order that there are no clashes in the layout and engineering design. The Proposed Development components to be installed within that area comprise the HVAC

cable route only. There is unlikely to be any significant overlap between the two projects, besides surface structures such as roads which may need to cross the cable route.

10.108 No cumulative effects are predicted during the construction, operation or decommissioning phases of the proposed NGET substation, in combination with the Proposed Development, on the grounds that the effects of each project on buried archaeology are discrete and can be mitigated. The effects of the proposed DC and AC cables and converter station on the settings of heritage assets is neutral and will therefore have no cumulative effects on any heritage assets when considered in combination with the proposed NGET substation.

Ferguson Business Park Single Turbine:

10.109 The Ferguson Business Park Turbine will be located approximately 390m west of the cable route and approximately 550m to the northwest of the proposed converter station site.

10.110 No cumulative effects are predicted during the construction, operation or decommissioning phases of the single turbine development, in combination with the Proposed Development because the effects of each project on buried archaeology are discrete and can be mitigated. The effects of the proposed DC and AC cables and converter station on the settings of heritage assets is neutral and will therefore have no cumulative effects on any heritage assets when considered in combination with the proposed wind turbine.

Earth Balance Single Turbine:

10.111 The Earth Balance Single Turbine will be located approximately 2km to the west/northwest of the proposed converter station site.

10.112 Due to the distance between the two sites, there are unlikely to be any significant cumulative interaction between the two projects with regards to the historic environment. The effects of the proposed DC and AC cables and converter station on the settings of heritage assets is neutral and will therefore have no cumulative effects on any heritage assets when considered in combination with the proposed wind turbine.

Narec Offshore Wind Demonstration Site:

10.113 The Narec Offshore Wind Demonstration Site is located 8km to 17km off the Blyth coast. Due to the distance between the two sites, there are unlikely to be any significant cumulative interaction between the two projects with regards to the historic environment.

Residential Development – 48 Dwellings

10.114 This project is for a housing development, located to the south of Brock Lane at East Sleekburn, approximately 500m from the closest point of the Proposed Development (converter station site).

10.115 No cumulative effects are predicted during the construction, operation or decommissioning phases of the residential development, in combination with the Proposed Development because the effects of each project on buried archaeology are discrete and can be mitigated. The effects of the proposed DC and AC cables and converter station on the settings of heritage assets is neutral and will therefore have no cumulative effects on any heritage assets when considered in combination with the proposed residential development.

Summary

10.116 In summary, no significant cumulative impacts are expected between the Proposed Development and nearby proposed developments. In addition an assessment has been undertaken assuming that NSN Link and that the planned development all come forward at the same time. The assessment has concluded there to be no likely significant in-combination effects.

Conclusion

10.117 Baseline conditions for the historic environment comprise two designated (both Grade II listed buildings) and 69 non-designated heritage assets within the AC and DC cables and converter station study area. Within the extended study area a further four grade II listed buildings were identified.

10.118 The construction and operation of the Proposed Development would have no medium term, long term or permanent negative effects on the settings of any heritage assets. The construction and operation of the Proposed Development would have an adverse effect on historic landscape character as a result of two historic hedgerow breaches and one historic hedgerow removal. The hedgerow breaches would be reinstated reducing the significance of these effects to none. The hedgerow removal would result in a negligible adverse, permanent effect. This effect is not significant.

10.119 The assessment of effects predicts that the Proposed Development would have a direct negative effect on 10 areas of known buried archaeology. These effects would occur during the construction phase of the project, are direct, permanent and adverse. All predicted effects are of low significance and can be fully negated by implementing an appropriate programme of archaeological recording.

10.120 After mitigation the residual significance of effect would be neutral for all known and any previously unknown buried archaeology identified within the working area prior to or during construction.

10.121 No significant cumulative impacts are expected between the Proposed Development and nearby proposed developments.

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11 LAND USE

Introduction

- 11.1 This chapter examines the effects associated with the proposed onshore components of the NSN Link (the “Proposed Development”) on land use.
- 11.2 For details of the project description, reference should be made to Chapter 4 of the Environmental Statement (ES). The application boundary of the Proposed Development has been split into seven sections as presented in Figure 4.5 of the ES.
- 11.3 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance. The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (NSN Link Ltd) and their contractors, in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the scheme design to reduce identified impacts.
- 11.4 Potential effects on land use are interrelated with the following chapters within this ES:
- Landscape (Chapter 8);
 - Views (Chapter 9);
 - Historic Environment (Chapter 10);
 - Traffic and Transport (Chapter 14);
 - Noise and Vibration (Chapter 15); and
 - Air Quality (Chapter 16).

Legislation and Policy Context

- 11.5 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on land use associated with the Proposed Development. This section should be read in conjunction with Chapter 5 which provides a more detailed overview of the policy context however the key policies relevant to this chapter are discussed below.

National Legislation and Planning Policy

- 11.6 The Government published the National Planning Policy Framework (NPPF) in March 2012. The NPPF sets out the Government’s planning policies for England and is a material consideration in planning decisions and guides the development of local plans.
- 11.7 The NPPF emphasises the importance of delivering and planning for sustainable development and in terms of land use planning:
- Positively seeks opportunities to meet the development needs of the local area; and
 - Meeting objectively assessed needs with sufficient flexibility to adapt to rapid change, unless:
 - Any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the wider policies contained within the NPPF; or

- Specific policies in the NPPF indicate development should be restricted.

11.8 Paragraph 112 of the NPPF is of particular relevant to this chapter and consistent with the provisions set out in Natural England Technical Information Note TIN049¹, and the Defra Code of Practice for the sustainable use of soils on construction sites²:

'local planning authorities should take into account the economic and other benefits of the best and most versatile agricultural land. Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality'.

Regional Policy

11.9 The following regional policy is of relevance to this chapter:

- Northumberland Consolidated Planning Policy Framework (2009);
- Northumberland Local Development Plan (not yet adopted)
- Wansbeck District Local Plan (July 2007)

Local Planning Policy

11.10 There are a number of planning policies (both current and emerging) relating to environmental, social and economic issues that have influenced the Proposed Development. The policies relevant to land use are summarised in Table 11.1.

Table 11.1: Relevant Local Planning Policy

Planning Policy	Policy Summary
Wansbeck District Local Plan (2007)	
Policy GP7 Best and Most Versatile Agricultural Land (BMV)	Development which would have an adverse and irreversible effect on the best and most versatile agricultural land will only be permitted if it can be demonstrated that the development cannot be accommodated on poorer quality land that is not subject to sustainability constraints.
Policy GP8 The Coastal Zone	The Coastal Zone, as defined on the Proposals Map, will be protected and, where possible, improved. Development in or affecting the Coastal Zone will only be permitted if: a) a coastal location is essential and no suitable alternative site exists; and b) development would not cause harm to coastal systems and habitats.
Policy GP36 Comprehensive Development	Policy GP36 is concerned with making full use of land which is suitable for development, and does not permit development which would prejudice the future comprehensive development of other land which is either allocated for development in the plan or which has reasonable prospects in terms of plan policies of coming forward for development.

¹ Natural England (2012) Second Edition. *Technical Information Note TIN049 – Agricultural Land Classification - protecting the best and most versatile agricultural land*, Available online: www.naturalengland.ork.uk

² Department for Environment Food and Rural Affairs (March 2011) *Construction Code of Practice for the sustainable use of soils on construction sites*, Available online: www.defra.gov.uk

Planning Policy	Policy Summary
Policy EMP3 Cambois Zone of Economic Activity	Defined on the Proposals Map, the Cambois Zone of Economic Activity provides an opportunity for developments requiring large sites in non-estate locations. Development for Use Classes B1, B2 and B8 are permitted provided; <ul style="list-style-type: none"> • Development cannot be accommodated in a designated employment area • If development is proposed on greenfield land, there are not suitable brownfield sites Proposals must include large amounts of tree planting and other forms of landscaping.
Northumberland Local Plan Preferred Options	
Policy 2 Spatial Distribution	The Core Strategy will focus the majority of new development in Northumberland's main towns and service centres. Additional large-scale development and growth will be focused on key locations in: Blyth, Cramlington, Ashington and Morpeth.
Policy 6 South East Northumberland Delivery Area.	The County has been divided up into separate delivery areas. The South East Delivery Area includes the main settlements of Ashington, Bedlington, Blyth, Cramlington and Amble. Policy 6 aims to tailor the delivery approach to meet the specific development needs of the area. These include: <ul style="list-style-type: none"> • Focusing large-scale development and growth on key locations in Blyth, Cramlington, and Ashington; and • Prioritising the Blyth Estuary Renewable Energy Zone strategic employment area for economic development within the low carbon and environmental goods and services sector and for renewable and low carbon energy generation;
Policy 13 Blyth Estuary Renewable Energy Zone (BEREZ)	The BEREZ strategic employment area is prioritised for economic development within the low carbon and environmental goods and services sector, and for renewable and low carbon energy generation.

11.11 The local planning policies highlight that new development should aim to:

- Protect Best and Most Versatile Agricultural Land (BMV) from development;
- Preserve the coastal zone for development that requires a coastal location and which does not cause harm to coastal systems and habitats; and
- Preserve the development of allocated sites for large industry to help encourage economic prosperity and the development of skills within the local area.

Methodology

Study Area

11.12 The study area for the assessment of land use is limited to the Proposed Development as described in Chapter 4 of the ES and as shown in Figure 4.5.

Assessment Methodology

11.13 The methodology outlined below is considered to be applicable for the construction, operational and decommissioning phases.

11.14 For the purposes of this chapter and in relation to land use the activities associated with decommissioning are considered to be similar in nature to those of construction. The cables might require repair during the operational phase in which case there may be a need to

excavate down to them. In terms of decommissioning it is understood that the redundant cables would either be left in situ or removed.

11.15 The scope of this assessment comprised the following:

- Review of Ordnance Survey Mapping and aerial photography to establish existing land use within and adjacent to the Proposed Development;
- Review of land use planning policy to identify future development and planning allocations in or adjacent to the Proposed Development;
- Identification of Public Rights of Way (PRoW) and core pathways within and adjacent to the Proposed Development;
- Identification of sensitive receptors;
- A site walkover of cable route and converter station by TEP;
- Consultation with NCC; and
- Assessment of the potential impacts and any mitigation measures that might be required.

Desk Study Information

11.16 A review of published information on existing land use and environmental conditions relating to the Proposed Development was undertaken. Information was obtained from the following sources:

- Ordnance Survey (OS) Maps;
- Aerial Photography; and
- Local Policy and local plans.

11.17 The review of available information has not included verification of desk based sources.

Consultation

11.18 Consultation with owners of land which have the potential to be affected by the Proposed Development has been undertaken by NSN Link Ltd.

11.19 Consultation with NCC was undertaken as part of the Scoping exercise and as the assessment progressed.

Site Walkover

11.20 A site visit was undertaken by TEP in November 2013. The objective of the walkover was to confirm the existing land use and included a walkover of the cable routes and the converter station locations. The walkover was limited by restricted access to certain parts of land and therefore some areas were not visited, in particular the Blyth substation land (to the south of Brock Lane). Areas off the public footpath through sections 3 to 6 of the Cable Route could also not be accessed, though they could be observed from the path.

Assessment Criteria

11.21 There are no formal guidance documents defining a framework for the specific assessment of impacts with regard to land use therefore, the impact assessment and conclusions have been drawn on the significance of each impact through reference to relevant legislation, professional judgement and evaluation.

11.22 A qualitative approach to the assessment has been adopted and considers the potential of the Proposed Development to affect existing land use and the ability to deliver specific land use changes identified in the local plan. This has included consideration of issues such as:

- Access;
- Loss of land; and
- Reduction of land availability for development as identified in the local plan.

11.23 The methodology for assessing the impact on land use is as follows:

- Establishment of the baseline condition; and
- Assessment of the proposed constraints and effects on and from the Proposed Development.

Assessing the Significance of Land Use Effects

11.24 In determining whether an impact is significant or not, the sensitivity of the receptor and the magnitude of the impact are combined. Potential effects on land use resulting from the installation, operation and decommissioning of the onshore underground cables and converter station broadly fall into two categories:

- Land-take: Temporary or permanent requirement for land currently used for other purposes; and
- Disturbance: Disturbance to existing or future land uses or activities including reduced access.

Cumulative Effects

11.25 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. When individual effects are considered in combination, the resulting cumulative effect may be significant.

11.26 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:

- Port of Blyth Biomass Power Station;
- Proposed National Grid Electricity Transmission Plc (NGET) 400kV GIS Substation;
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site; and
- Residential development – 48 dwellings.

Existing Environment

11.27 As shown in Figure 1.2 the Proposed Development encompasses land between the land landfall point at Cambois slipway and the existing Blyth substation at East Sleekburn.

11.28 The Project Development is bordered by:

- The estuary of the River Wansbeck to the north;
- A former coal storage yard and railway siding to the south and east;
- The Sleek Burn and River Blyth Estuary to the south; and
- The A189 trunk road to the west.

Existing Site Description and Layout

11.29 The current land use at the Proposed Development comprises the following land uses:

- Cambois Beach and associated slipway;
- Open grassland (Cambois Links);
- Agricultural fields;
- Roads and railway line;
- A public footpath;
- Light industrial park (Ferguson's Business Park and Sleekburn Business Centre);
- Former industrial land (now disused);
- A motorbike scramble track;
- Watercourses; and
- Areas of juvenile plantation woodland.

11.30 As described in Chapter 4 of the ES and shown in Figure 4.5 the Proposed Development has been split into seven sections. Those points pertinent to this chapter are discussed below.

Section 1: Landfall

11.31 From low water mark the subsea cables will be trenched across the beach and routed up the slipway. The route of the cables will then head northwards through open grassland known locally as Cambois Links, parallel with The Bucca to where the Transition Joint Pit (TJP) is proposed. The TJP is the point at which the marine cables are jointed to the HVDC onshore underground cables.

Section 2: Agricultural Land to North of Wembley Gardens

11.32 From the TJP the cables head westwards across agricultural land, to the north of Wembley Gardens bounded by an area of screen planting which backs onto residential properties. The cable route will cross a number of existing hedgerows. At each crossing a section of hedgerow between 10m-16m will be removed during installation.

11.33 The cable route continues in a south westerly direction towards Northumbria Water Treatment Works.

Section 3: Railway Line

11.34 The cables will cross the railway line and road using a trenchless technique to avoid surface disturbance. The trenchless technique will require the construction of a launch pit and temporary roadways to provide access for plant and equipment.

Section 4: Ferguson's Business Park

11.35 Once across the road and railway line, the cables continue southwards along the access track/PRoW running between Ferguson's Business Park (to the west) and Sleekburn Business Centre (to the east).

11.36 Businesses operating from Ferguson's Business Park and Sleekburn Business Centre occupy warehouse units. The functions of the businesses include warehousing, storage and logistics.

Section 5: Scramble Track / Agricultural

11.37 To the south of Ferguson's Business Park and approximately 750m north west of the proposed converter station site is an area of bare ground used as a motorbike scramble track.

11.38 Continuing southwards from Ferguson's Business Park and Sleekburn Business Centre the cables would run either through agricultural land or along the edge of the motorbike scramble track towards a small water course called Cow Gut. The cable route will be determined by the crossing point of Cow Gut.

Section 6: Converter Station Site

11.39 The converter station site is located on land immediately to the east of the A189 spine road, approximately 1.5km north east of Blyth, to the north of the Blyth estuary, 1km inland from the Northumberland coastline.

11.40 Land use on the site itself is agricultural, comprising arable fields bounded by hedgerows and areas of juvenile native plantation woodland.

11.41 Land use directly adjacent to the converter station is as follows:

- To the north is agricultural land beyond which is Ferguson's Business Park and Sleekburn Business Centre;
- To the east is a residential development and to the north east the former Blyth Power station site;
- To the south is Brock Lane beyond which is an area of agricultural land use, to the south east is the existing substation facility; and
- To the west is an area of agricultural land use, to the south west is a residential development.

11.42 Access to the converter station site is from Brock Lane.

11.43 There is a PRoW to the north/east of the converter station site, which facilitates access between Sandfield Road and Wembley Gardens road to the north. At its closest point the PRoW is approximately 40m to the converter station.

11.44 The nearest residential dwellings to the converter station site are situated to the east and south-west of the proposed converter station site, located on Sandfield Road (~170m) and Havelock Mews (~300m) respectively.

Section 7: HVAC Undergrounds cables from Converter Station Site to the proposed NGET Substation

11.45 From the converter station, HVAC underground cables run south eastwards beneath Brock Lane towards the existing Blyth substation. Blyth substation comprises a 275kV indoor substation owned and operated by NGET. The substation is located approximately 750m south east of the converter station site and housed within a large metal clad building. The metal cladding is light grey in colour.

- 11.46 On the approach to Blyth substation are several overhead lines crossing the agricultural land.
- 11.47 Land use south east of Brock Lane is undeveloped arable land bounded by hedgerows.
- 11.48 To the north of the existing substation is the former Blyth Power Station site. The Blyth Power Station site comprises areas of concrete hardstanding and is surrounded by security fencing.

Land Use Allocations

- 11.49 Those land allocations and area specific policies identified on the Wansbeck District Local Plan Proposals Map pertinent to the Proposed Development are detailed in Table 11.2.

Table 11.2 – Relevant policies to the Proposed Development

Section	Description	Policy				
		GP7 – Best and Most versatile Agricultural Land (BMV)	GP10 – Sites of Special Scientific Interest (SSSI)	GP22 – Flood Risk and Erosion	EMP3 – Cambois Zone of Economic Opportunity	REC1 – Safeguarding Existing Parks and Open Spaces
1	Landfall		✓	✓		✓
2	Agricultural Land to the North of Wembley Gardens	✓				
3	Railway Line				✓	
4	Fergusons Business Park				✓	
5	Scramble Track/Agricultural Land	✓			✓	
6	Converter Station Site	✓			✓	
7	NGET substation					

Policy GP7 Best and Most versatile Agricultural Land (BMV)

- 11.50 Policy GP7 seeks to prevent development which would have an adverse and irreversible effect on the Best Most Versatile (BMV) agricultural land, unless it can be demonstrated that the development cannot be accommodated on poorer quality land. Policy GP7 applies to land uses in Sections 2, 5 and 6.
- 11.51 Agricultural land is classified into five grades with Grade 1 being the best quality and Grade 5 being the poorest. A number of criteria are used for the assessment including but not limited to climate, site characteristics and soil depth, particle size and wetness.
- 11.52 The land classification in Sections 2, 5 and 6 are a combination of urban and Grade 3 agricultural land. Grade 3 agricultural land is defined as of “moderate to good” quality.

Policies relevant to Section 1: Landfall

- 11.53 Policy GP10 relates to the Northumberland Shore SSSI allocated for its importance to birdlife and covering the shoreline from Wansbeck Estuary to the north to the Port and Blyth Estuary in the south. The policy prevents development likely to have an adverse effect on designated sites unless reasons for the development clearly outweigh any harm or where there is no reasonable alternative.
- 11.54 Policy GP22 – Flood risk and erosion also covers this area, and requires developments to take into consideration risk from flooding and erosion both in terms of the development itself as well as any effects created elsewhere.
- 11.55 In areas at risk from flooding a Flood Risk Assessment (FRA) must be undertaken and in coastal locations, works should not prejudice the ability of coastal features and processes to form natural sea defences.
- 11.56 The Cambois foreshore including the area known as Cambois Links is allocated as a strategically important amenity green space under Policy REC1. This policy only permits development where the open character of the designated site can be maintained and where the development proposed is incidental and beneficial to the recreational use.

Policies Relevant to the Remainder of the Route

- 11.57 The proposed converter station site and part of the HVDC cable route corridor, south of Ferguson's Business Park are located on land which forms one of the BEREZ strategic sites; the East Sleekburn Strategic Site, which is identified for use as a blade or nacelle manufacturing plant or other major manufacturing operations associated with the Port and offshore renewables. It is also subject to a Local Development Order (LDO), which offers a potential fast-track planning approval for developments specified within the order.
- 11.58 The majority of the remaining sections of the Proposed Development (from Sections 3 to 6 of the cable route corridor and converter station site) are located within the Cambois Zone of Economic Opportunity (Policy EMP3). Land is allocated for the development of businesses requiring a large site in a non-estate location which fall within Use Classes B1 Business, B2 General Industry or B8 Storage or Distribution.
- 11.59 In addition part of the zone has been given Enterprise Zone status and a Local Development Order (LDO) has been approved for this part of the zone, granting planning permission for development which meets the prescribed criteria of the order. This LDO covers the areas earmarked for the converter station site.
- 11.60 Whilst the Proposed Development does not meet the conditions of the LDO it is not considered to exclude other development.
- 11.61 A full description of the Proposed Development during the construction and operational phases is given in Chapter 4. Those features and assumptions relevant to this chapter are summarised as follows, including best practice methods.
- 11.62 The following key points which bear relevance to the land use chapter are as follows:
- The landfall TJP will be located approximately 500m west of the low tide mark. The TJP will be approximately 12m long, 5m wide and 3m deep and on completion will be backfilled to original ground level;

- Cut and fill works will be required to create a level site for the converter station;
- The converter station will include a temporary construction compound (approximately 100m x 100m) and this will be located to the west of the converter station site. Further small construction compounds for localised storage of materials and plant are likely to be required at intervals along the cable routes but these have not yet been sited;
- Standard open trenching techniques will be used for excavation, except where at the railway/road crossings where a trenchless technology will be considered;
- The HVDC cables (2 no.) will be installed in a single trench, whilst the HVAC cables (6 no.) will be installed in threes in two trenches and additional working width;
- The trench cross section will be approximately 1.5m in width at the surface tapering to 1m width at the base, and may be up to 3m deep. A working width will be required for cable installation of between 5m and 10m;
- Site won material will be re-used on site wherever possible, subject to testing. Where waste material is to be disposed of off-site this will be to a licensed waste facility in accordance with Site Waste Management Plan (SWMP);
- The cable working width of 16m allows for a single drainage channel for surface water runoff during construction. This is located between the trench/s and the haul road;
- Watercourse crossings shall be achieved either by open cut methods whereby the watercourse is temporarily dammed and over pumped, by trenching over an existing culvert or by construction of a cable bridge;
- Prior to construction, a Construction Environmental Management Plan (CEMP) will be produced which will set out a variety of control measures including as a minimum the mitigation measures identified within this ES;
- Where open space and land which is currently available for recreation and walking is disturbed, alternative routes will be provided and appropriately signposted. Where alternatives are not available, this will create a short term inconvenience to users and reversed after the reinstatement of land;
- An increase in traffic from workers and materials arriving on site will result in some disruption to road users;

Assessment of Potential Effect – Construction Phase

11.63 Activities that are likely to be occurring in the Proposed Development site during the construction stage which could affect land use are as follows:

- Soil stripping and excavation/exposure of underlying materials for the installation of the cables; once installed trenches will be backfilled and reinstated;
- Temporary loss of land during compound establishment however this will be reinstated,
- Movement of plant and machinery to the main construction compound and satellite compound/s;
- Excavations for cable trenches, foundations (potentially including piling at the converter station), drainage works or services;

- Dewatering of excavations;
- Storage of materials and stockpiling of excavated soils within the application area;
- Trenchless technologies such as HDD, thrust boring and pipe jacking;
- Working within the intertidal and supratidal zone;
- Processing of material to render it suitable for particular uses; and
- Re-use of excavated material onsite or imported materials for re-profiling.

- 11.64 As concluded in the traffic and transportation assessment included in this ES as chapter 14 the local road network is well suited to accommodate deliveries and vehicle movements associated with permanent and visiting workforce.
- 11.65 There is a loss of land associated with the installation of the cables and establishment of compounds however this is temporary and land will be reinstated to existing.
- 11.66 The siting and installation of the cables does not result in a reduction of future development.
- 11.67 Construction phase effects are temporary and localised in nature and assessed as of **minor adverse** significance.

Assessment of Potential Effect –Operation Phase

Converter Station

- 11.68 The local road network is well suited to accommodate deliveries, permanent and visiting workforce during the operational phase.
- 11.69 The location of the converter station will result in the permanent loss of approximately 5 hectares of land classified as Grade 3 agricultural land however land within Section 6 is allocated in the Wansbeck District Local Plan and the emerging Northumberland Local Plan as part of the Cambois Zone of Economic Opportunity. On this basis it would be reasonable to assume that the aspirations of planning policy take precedence to agricultural land classification.
- 11.70 There is an adopted Local Development Order (LDO) associated with the Cambois Zone of Economic Opportunity and the proposed converter station is located on land allocated for large scale, non-estate industrial development is therefore broadly in line with the aspirations of the LDO.
- 11.71 Whilst there will be a permanent loss of 5 hectares of land associated with the converter station this land has been allocated for development. The operational effects have been assessed as **minor adverse** and overall not considered to be significant.

Cables

- 11.72 Cables have been routed to avoid sensitive receptors and with consideration of future development.
- 11.73 There will be no loss of land associated with the cables during the operational phase. On completion of the cable installation land use will be reinstated to existing. This approach is consistent with the requirements of planning policy GP7.
- 11.74 There may be localised temporary effects on land use associated with any onshore cable repairs and maintenance that may be required. A permanent 5m cable easement is required

although this is not considered to affect current land use, as the onshore underground cables have been routed to enable reinstatement of the existing land use or to prevent future development.

- 11.75 Replanting and reinstatement of hedgerows will be undertaken with mixes which exclude tree stock to minimise the impact of tree roots.
- 11.76 No significant adverse effects on land use on and around the cable route have been identified. The overall effect on land use during operation is therefore considered to be **negligible**.

Assessment of Potential Effect – Decommissioning Phase

- 11.77 The anticipated operational life for the Proposed Development is 40 years but may be extended dependent on the lifespan of the components. On decommissioning the cables may be disconnected and removed or disconnected and left in situ depending on a number of factors including environmental considerations and the condition of the cables at that time.
- 11.78 There will be no potential impacts on land use from leaving the redundant cables in situ.
- 11.79 The removal of redundant cables would result in similar effects as those identified during installation and would be temporary in nature. A **minor significant** adverse effect on land use would be experienced on and around the cable route during decommissioning.

Converter Station

- 11.80 The programme and activities associated with decommissioning of the converter station are expected to be similar to the construction phase. The detailed activities and methodology will be determined later and subject to a separate consenting process however are expected to include the following activities:
- Dismantling and removal of electrical equipment;
 - Removal of cabling from the site;
 - Removal of any building services equipment;
 - Demolition of the buildings and removal of fence;
 - Landscaping and reinstatement of the site; and
 - Removal of hardstanding.
- 11.81 The impacts are considered to be similar to the construction phase with a **minor significant** adverse effect experienced during decommissioning.

Mitigation

- 11.82 The absence of potentially significant effects indicates that no specific mitigation is required, although some mitigation measures have been embedded within the design of the Proposed Development and have therefore been assumed to be implemented for assessment purposes.
- 11.83 Whilst no specific mitigation is required the predicted effects can be further managed or reduced with the implementation of standard mitigation measures as part of the development of a Construction Environmental Management Plan (CEMP). The development of a Soils Management Plan is anticipated as being the mechanism for capturing standard mitigation

measures typical of best practice including methods to ensure sustainable re use of site won material and effective stockpile management.

Residual Effects

11.84 Following the implementation of mitigation measures, residual effects associated with the construction of the development have been assessed as minor adverse and once in operation the Proposed Development the effects on existing and future land uses have been assessed as negligible/none.

Cumulative Effects

11.85 The following major development proposals have been considered as part of the assessment of potential cumulative effects:

- Port of Blyth Biomass Power Station;
- Proposed NGET 400kV GIS Substation;
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site; and
- Residential development – 48 dwellings.

Port of Blyth Biomass Power Station

11.86 The Port of Blyth Biomass Power Station will be located at Blyth Harbour approximately 1.5km to the south-east of the proposed converter station site.

11.87 In terms of overall long term impact on land use, the cumulative impact of the UK onshore elements of the NSN Link and the Port of Blyth Biomass Power Station is expected to be negligible. During the construction of the Biomass Power Station there is the potential for additional vehicle movements at the port however as reported in the Chapter 14 the net impact is expected to be negligible and easily accommodated on the surrounding road network. On this basis there are not considered to be any cumulative effects between the two projects.

Proposed NGET 400kV GIS Substation

11.88 The proposed 400kV GIS Substation will be located approximately 400m to the south-east of the proposed converter station site, adjacent to the existing Blyth 275kV Substation. Importantly, it is located within Section 7 of the Proposed Development.

11.89 The proposed substation and the cable routes for the NSN Link project are being designed sympathetically in order that there are no clashes in the layout and engineering design. The NSN Link components to be installed within the substation comprise the HVAC cable route only.

11.90 An EIA for the substation scheme is not available at this time but the proposals are likely to include::

- Removal of pylons to the northwest corner of Blyth substation, and replacement with the installation of a terminal pylon and substation infrastructure;
- Construction of an additional access road and realignment of the roundabout on Brock Lane; and
- Review of the existing drainage provision.

11.91 The potential cumulative impacts between NSN Link and the proposed NGET substation are considered under the following subheadings:

- Construction lay down areas; and
- Construction traffic.

11.92 Residual cumulative effects on land use would only occur should the construction of the GIS substation and converter station overlap. This would have impacts in terms of the amount of temporary land take required for lay down areas and construction traffic would increase and may cause delays on the local road network. However, as reporting in the cumulative assessment in Chapter 14 the net impact is expected to be negligible and easily accommodated within the surrounding road network and on this basis there are not considered to be any cumulative effects between the two projects.

Ferguson Business Park Single Turbine

11.93 The Ferguson Business Park is located approximately 390m west of the cable route and approximately 550m to the north west of the proposed converter station site.

11.94 In terms of overall long term impact on land use, the cumulative impact of the UK onshore elements of NSN Link and the Ferguson Business Park Single Turbine is expected to be negligible.

Earth Balance Single Turbine

11.95 The Earth Balance Single Turbine will be located approximately 2km to the west/northwest of the Proposed Development site.

11.96 The proposed use and change of use of land is not considered to result in any significant cumulative effects in terms of overall land use and on this basis there are not considered to be any cumulative effects between the two projects.

Narec Offshore Wind Demonstration Site

11.97 The Narec Offshore Wind Demonstration Site is located 8km to 17km off the Blyth coast. This project will comprise a maximum of 15 pre-commercial prototype turbines to be constructed across three arrays, with a maximum number of 5 turbines in each array with turbines positioned in water depths from 35m to 58m and distances from the coast between 5.7km and 13.8km. It is anticipated that the Blyth Offshore Wind Demonstration Project, will be constructed on an array-by-array basis in a maximum of three construction phases.

11.98 The proposed use and change of use of land is not considered to result in any significant cumulative effects in terms of overall land use and on this basis there are not considered to be any cumulative effects between the two projects.

Residential development – 48 dwellings

- 11.99 The proposals for 48 dwellings located on land to the south of Brock Lane, adjacent to the East Sleekburn A189/Brock Lane interchange approximately 500m from the closest point of the Proposed Development (converter station site).
- 11.100 In the event that the construction of the residential development and converter station overlap there could be an increase in construction traffic and possible delays on the local road network. As reported in the cumulative assessment in Chapter 14 the net impact is expected to be negligible and easily accommodated within the surrounding road network and on this basis there are not considered to be any cumulative effects between the two projects.

Summary

- 11.101 In summary, no significant cumulative impacts are expected between the Proposed Development and nearby proposed developments.
- 11.102 In addition an assessment has been undertaken assuming that NSN Link and the planned development all come forward at the same time. The assessment has concluded there to be no likely significant in-combination effects.

Conclusions

- 11.103 This chapter has assessed the potential impacts of the Proposed Development, including the converter station site, HVDC cable routes and HVAC cable routes on land use.
- 11.104 The assessment has considered the potential of the Proposed Development to affect existing land use and the ability to deliver specific land use changes identified in the local plan.
- 11.105 The assessment has concluded that the land use effects from NSN Link generally relate to the construction phase of the Proposed Development although there will be a minor adverse effect from the overall land take required for the converter station site.
- 11.106 Construction effects on land use will be localised, temporary and of minor significance. During the construction phase restrictions to open space and recreation routes, part closure of the foreshore and public car park have been identified however these are temporary and where possible will be mitigated.
- 11.107 Following installation of the cable trenches will be reinstated to existing and as such there will be no loss of land. There will be some restrictions to the planting design to exclude tree stock in proximity to the cables.
- 11.108 Increases in construction traffic movements can be accommodated within the existing road network.
- 11.109 The assessment concludes that the overall effect on land use during the construction phase will be negligible.
- 11.110 Operational effects on land use are considered to be negligible and limited to the converter station site as the onshore underground cables have been routed with consideration to access, future maintenance and so as not to constrain future development.

- 11.111 The location of the converter station site will result in a permanent loss of 5 hectares of Grade 3 agricultural land however the aspirations policy set out in LDO Policy EMP3 take precedence. Whilst NSN Link does not qualify under strict criteria it is similar in nature and furthermore does not preclude future development under the Cambois Zone of Economic Opportunity.
- 11.112 The absence of potentially significant effects indicates that no specific mitigation is required, although some mitigation measures have been embedded within the design of the Proposed Development and have therefore been assumed to be implemented for assessment purposes.
- 11.113 Whilst no specific mitigation is required predicted effects can be further reduced or removed through the implementation through a series of appropriate mitigation measures as part of the development of a Construction Environmental Management Plan.
- 11.114 Following the implementation of mitigation measures, residual effects associated with the construction phase have been assessed as minor adverse and once NSN Link is operational the predicted effects have been assessed as negligible.

12 GEOLOGY AND GROUND CONDITIONS

Introduction

- 12.1 This chapter examines the effects associated with the proposed onshore components of NSN Link (“the Proposed Development”) on and from geology and ground conditions.
- 12.2 For details of the project description, reference should be made to Chapter 4 of the Environmental Statement (ES). The application boundary of the Proposed Development has been split into seven sections as presented in Figure 4.5 of this ES.
- 12.3 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance including Pollution Prevention Guidelines. Where options have been identified these have been considered in the context of typical engineering construction techniques and are considered to represent reasonable worst case conditions.
- 12.4 The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (“NSN Link Ltd”) and their contractors, in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the scheme design to reduce identified impacts.
- 12.5 As part of the consideration of ground conditions the assessment considers designated geological sites, hydrogeology, contaminated land, geohazards and geotechnical issues associated with the Proposed Development.
- 12.6 Sites can be designated for their importance in terms of geology, for example, exposures of the rock represent a good example of a particular rock type or contain a specific geological feature.
- 12.7 Hydrogeology relates to the groundwater present in the soils and rocks beneath the Proposed Development area. Groundwater is an important resource and is vulnerable to various impacts, particularly those associated with construction. With regard to groundwater it should be noted that whilst this chapter considers groundwater quality and hydrogeology the issue of groundwater flooding and potential influences on surface water are addressed in Hydrology, Chapter 13.
- 12.8 The presence of contaminated land has the potential to affect both the Proposed Development and the surrounding environment as a result of development activity. Although the assessment of contaminated land is not a formal requirement under the EIA Regulations or specific legislation (Part 2A of the Environmental Protection Act), it is covered by planning guidance and an assessment of contamination has been undertaken to confirm whether any impacts could arise.
- 12.9 The assessment of geohazards and geotechnical issues is similarly not a formal requirement of the EIA regulations. Geohazards is a term covering a broad range of geological and ground related hazards such as landslips, underground mining and compressible soils. Geotechnical issues dictate the foundation design for the scheme and any associated environmental impacts.

- 12.10 The issue of mining was raised during consultation with Northumberland County Council (NCC) as part of the Scoping process. An assessment of historical mining activity has been included to confirm whether any impacts could arise.
- 12.11 This chapter is aimed at assessing the potential impacts and the significance of each impact. The assessment has also been used to assess constraints on the development from geology and ground conditions, including areas where development should be avoided and where mitigation measures might be needed. The assessment has considered the effects that may be generated during the construction and operational phases of the Proposed Development.
- 12.12 This chapter does not assess in detail the geotechnical aspects of the landfall for the cable route below the high water mark. This area depends on specialist factors which are assessed in full within the ES for the marine cable route, referred to here after as the “UK Marine ES” within this chapter.

Legislation and Policy Context

- 12.13 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on and from geology and ground conditions associated with the Proposed Development.

Protected Geological Features

- 12.14 Geological features can have protected status nationally and locally. Sites are considered on the following basis:
- Nationally Protected Sites designated as Sites of Special Scientific Interest (SSSI) and/or as part of National Nature Reserves (NNR); and
 - Local and Regional Sites that are not legally protected but are taken into account by planning authorities, these sites are known as Regionally Important Geological Sites (RIGS) and have a similar status to Sites of Importance to Nature Conservation (SINCs or SNCIs).
- 12.15 National legislation relating to geological sites is limited but it is covered by:
- Countryside Act 1968;
 - Wildlife and Countryside Act 1981 (as amended); and
 - Environment Act 1995.
- 12.16 The National Planning Policy Framework (NPPF) devolves the responsibility for setting criteria against which the potential impact of development proposals on geodiversity sites can be assessed, to local planning authorities.
- 12.17 The Wansbeck District Local Plan (July 2007) provides the following specific references to protected sites, including sites designated for either their ecological or geological interest:
- Policy GP10 affords appropriate protection to nature conservation sites which are rated amongst the best in the country. All such sites are designated by English Nature as Sites of Special Scientific Interest (SSSIs) and are considered to be national importance because of their fauna, flora or features of geological or physiographical interest; and

- Policy GP11 seeks to minimise the effects of potentially damaging development on sites in the following categories:
 - Sites of Nature Conservation Importance (SNCIs) designated by NCC
 - Local nature reserves, either statutory or non-statutory; and
 - Regionally important geological or geomorphological sites.

Hydrogeology

12.18 With regard to groundwater the following legislation is relevant:

- EC Groundwater Directive (2006/118/EEC) on the protection of groundwater against pollution caused by certain dangerous substances;
- EC Directive (80/68/EEC) on the protection of groundwater against pollution and deterioration;
- European Union (EU) Water Framework Directive (2000/60/EC); and
- Environmental Permitting Regulations (EPR) (2010).

12.19 Under the Water Framework Directive (WFD), the EA has divided the UK into a series of River Basin Districts and has prepared River Basin Management Plans (RBMPs) for each. These documents set out the current situation within each District, with respect to the key objectives, and discuss how they can be met in order to comply with the WFD, and if not, why not. As well as surface water features, groundwater is also included under the RBMPs.

12.20 The following policies in the Local Plan make specific reference to the protection of water resources:

- Policy G23 relates to controlling and minimising pollution or nuisance in so far as it relates to land use planning interests. The policy requires that developments with the potential to cause pollution are properly controlled. Pollution is considered to be the release into air, water or land of substances which could have harmful effects on the environment.

Contaminated Land

12.21 The following legislation and policies are considered to be relevant to contaminated land issues:

- Part 2A of the Environmental Protection Act (EPA), 1990;
- Contaminated Land (England) Regulations 2006 (and amendment);
- Department for Environment, Food and Rural Affairs (DEFRA), April 2012. Contaminated Land Statutory Guidance;
- National Planning Policy Framework, March 2012; and
- Wansbeck District Local Plan, July 2007

12.22 UK legislation on contaminated land is principally contained within Part 2A of the Environmental Protection Act 1990 which establishes a legal framework based on the principle of a 'suitable for use' approach taking into account the land use and environmental setting, with remedial action only required where there are unacceptable risks to human health and/or the environment.

- 12.23 Part 2A of the Environmental Protection Act 1990 was implemented by The Contaminated Land (England) Regulations 2006 and accompanying statutory guidance (DEFRA, 2012). Part 2A takes a risk-based approach to defining contaminated land, in the statutory guidance “risk” means the combination of:
- The likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land; and
 - The scale and seriousness of such harm or pollution if it did occur.
- 12.24 For a risk to exist there needs to be one or more contaminant source-pathway-receptor linkages by which a relevant receptor might be affected by a contaminant/s. For land to be determined as ‘contaminated’ under the legislation and, therefore, require remedial action, all three elements of a contaminant linkage must be present. There is a test of the significance on the receptor which requires that there is evidence that:
- Significant harm is being caused;
 - There is a possibility of significant harm being caused; and/or
 - Pollution of controlled waters is being, or is likely to be, caused.
- 12.25 The statutory guidance indicates that normal background levels of contaminants in soil should not be considered to cause land to qualify as contaminated land, unless there is a particular reason to consider otherwise.
- 12.26 Part 2A requires local authorities to inspect their areas with a view to identifying contaminated land, and to do this in accordance with the statutory guidance. Under Part 2A, risks should be considered only in relation to the current use of the land. When considering risks in relation to any future use or development, the local authority should assume this would be carried out under the planning regime.
- 12.27 The NPPF provides a number of policies relating to contaminated land. It indicates that the planning system should contribute to and enhance the natural and local environment by:
- Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and
 - Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.
- 12.28 To prevent unacceptable risks from pollution and land instability, the NPPF also considers that planning policies and decisions should ensure that new development is appropriate for its location. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.
- 12.29 The NPPF states that planning policies and decisions should also ensure that:
- The site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation; and
 - After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.

12.30 The following policies in the Wansbeck District Local Plan make specific reference to contamination:

- Policy GP29 establishes that the authority will take into account risks arising from contamination. It is important that the authority has sufficient knowledge of the nature and extent of contamination to be able to make a judgement. The minimum requirement of an applicant is a desk study to establish the possible presence of contamination. The study, which should incorporate a site reconnaissance or walk over, will assist in determining the need for and scope of further investigation and the problems that may require remediation. Further detailed site investigation and risk assessment will be required to be undertaken unless the initial assessment clearly and reliably demonstrates that any risks that may be posed by contamination can be reduced to an acceptable level.

Geohazards

12.31 The concept of “geohazards” covers a wide range of potential ground conditions that could affect a development, or be affected by development. There is not a defined list of what constitute geohazards in any legislation or guidance, however, for the purposes of this assessment, the following have been considered:

- Brine Compensation Areas;
- Coal Mining Affected Areas;
- Mining Instability;
- Geology;
- Potential for Collapsible Ground Stability Hazards;
- Potential for Compressible Ground Stability Hazards;
- Potential for Ground Dissolution Stability Hazards;
- Potential for Landslide Ground Stability Hazards;
- Potential for Running Sand Ground Stability Hazards;
- Potential for Shrinking or Swelling Clay Ground Stability Hazards;
- Unexploded Ordnance;
- Radon Affected Areas; and
- Shallow Mining Hazards which includes mine gas (such as stythe gas or blackdamp).

Geotechnical Issues

12.32 Ground conditions influence geotechnical design, in particular the design of foundations, for example, in areas of soft ground. This area is covered by British Standards and Eurocodes.

Coastal Erosion

12.33 Coastal erosion policy is guided by the Northumberland and North Tyneside Shoreline Management Plan 2 (referred to herein as the ‘Shoreline Management Plan’), produced by Royal Haskoning in 2010¹. This is a non-statutory policy document that presents a large scale assessment of the risks associated with coastal erosion for the area and presents a framework for policy covering the next 20, 50 and 100 years.

¹ Royal Haskoning (2010) *Northumberland and North Tyneside Shoreline Management Plan 2: Scottish Border to the River Tyne* [online] Available: <http://www.northumberland-smp2.org.uk/download.htm> [date accessed: 24/02/2014]

12.34 The application area is located within Policy Development Zone (PDZ) 5 of the Shoreline Management Plan.

Methodology

Study Area

12.35 The assessment was undertaken for the Proposed Development and up to 500m from the application redline boundary. The key justification for this 500m buffer is to identify any potential historic land uses which may have contributed to contamination issues within the Proposed Development area and potentially sensitive land uses in the surrounding area that could be impacted if contaminants were mobilised. It is considered that other geological and ground condition issues are also covered by such a buffer.

12.36 The coastal and marine environment up to the high water springs mark is described in full in the UK Marine ES, specifically within Chapters 7: Physical Environment and within Chapter 8: Water and Sediment Quality. These chapters were produced by Intertek in 2014 and include a detailed assessment of sediment processes, waves, tidal currents and the anticipated impacts of the cable trenching for the marine element of the Proposed Development up to the landfall location. The UK Onshore ES looks at impacts extending to the low water spring mark, whilst the environment below the high water mark is assessed through reference to the UK Marine ES chapters as detailed above.

Assessment Methodology

12.37 The methodology outlined below is considered to be applicable for the construction, operational and decommissioning phases.

12.38 For the purposes of this chapter and in relation to geology and ground conditions, the activities associated with decommissioning are considered to be similar in nature to those of construction. The cables might require repair during the operational phase in which case there may be a need to excavate down to them. In terms of decommissioning it is understood that the redundant cables would either be left in situ or removed.

12.39 The scope of this assessment comprised the following:

- A review of whether any protected geological features were likely to be impacted by the Proposed Development;
- A review of historical land use and potentially contaminative land uses;
- A review of the geological and hydrogeological setting;
- A review of the mining history of the Proposed Development and implications on development;
- A review of geotechnical issues and the associated engineering requirements;
- A review of ground gas and radon;
- A review of environmental regulatory information relating to issues such as water abstractions and discharges;
- A site walkover of cable route and converter station by Ramboll;
- Consultation with NCC; and

- An assessment of the potential impacts and any mitigation measures that might be required.

Desk Study Information

12.40 A review of published information on historical site uses and environmental conditions relating to the Proposed Development was undertaken. Information was obtained from the following sources:

- Natural England;
- Historical Ordnance Survey (OS) Maps;
- Landmark Envirocheck® Environmental Database Information (referred to as the “Envirocheck Report” in this chapter);
- British Geological Survey (BGS) maps;
- Environment Agency Groundwater Vulnerability Map and Source Protection Zones (www.environment-agency.gov.uk);
- Zetica Bomb Risk Map for Tyne and Wear (www.zetica.co.uk);
- Coal Authority Mining Reports;
- Arup, November 2013. UK – Norway Electricity Interconnector NSN Link Coal Mining Risk Assessment. Prepared for National Grid International Ltd;
- Worley Parsons, March 2014. Factual and Interpretative Site Investigation Reports – Land Parcel 1 (Cable Landfall and Route). Prepared for National Grid International Ltd and National Grid Property Holdings Ltd; and
- Worley Parsons, March 2014. Factual and Interpretative Site Investigation Reports – Land Parcel 2 (Converter Station). Prepared for National Grid International Ltd and National Grid Property Holdings Ltd.

12.41 Ground investigation reports have been prepared by Worleys Parsons for the cable route^{2,3} and converter station^{4,5}, which were referred to as Land Parcel 1 and Land Parcel 2 respectively. A summary of these documents is provided in this chapter with the reports available under separate cover.

12.42 The boundaries used in these searches relate to the initial project proposals and therefore differ slightly from those of the Proposed Development. All distances have been re-confirmed based on the Proposed Development area and for this reason the distances quoted in this chapter may vary from those given in the database information. However, notwithstanding this the information is still considered to be valid for the purposes of this assessment.

12.43 The above information was used to establish whether there were likely to be any of the following on or close to the Proposed Development:

- Geological Protected Sites;

² Worley Parsons, March 2014. NGPH & NGIL, Norway-UK HVDC Interconnector (NSN Link) Land Parcel 1 (Cable Landfall and Route) – Factual Geo-Environmental Site Investigation Report (ref: 305002-00006/51614-02)

³ Worley Parsons, March 2014. NGPH & NGIL, Norway-UK HVDC Interconnector (NSN Link) Land Parcel 1 (Cable Landfall and Route) - Environmental Assessment, Interpretative Site Investigation Report (ref: 305002-00006/51614-02)

⁴ Worley Parsons, March 2014. NGPH & NGIL, Norway-UK HVDC Interconnector (NSN Link) Land Parcel 2 (Converter Station) - Factual Geo-Environmental Site Investigation Report (ref: 305002-00006/51614-02)

⁵ Worley Parsons, March 2014. NGPH & NGIL, Norway-UK HVDC Interconnector (NSN Link) Land Parcel 2 (Converter Station) – Environmental Assessment, Interpretative Site Investigation Report (ref: 305002-00006/51614-02)

- The status of aquifer units at the Proposed Development and the presence or otherwise of Source Protection Zones;
- Whether contamination was likely to be present at the Proposed Development or in the vicinity; and
- Likelihood of geohazards to be present at the Proposed Development or in the vicinity.

Consultations

- 12.44 A consultation response was received from the Contaminated Land Officer at NCC on 22nd November 2013 in response to an enquiry to determine whether there were any known issues relating to contamination in the Proposed Development area. There are no areas within or adjacent to the application site that are classified as 'Contaminated Land' under Part 2a of the Environmental Protection Act 1990. The consultation response is included as Appendix 12.1.
- 12.45 Within the application area several locations have been identified by NCC for investigation under Part 2a as Contaminated Land, in particular:
- A small area at Cambois Links at the intersection of Sections 1 and 2;
 - Former mineral tramway in Section 2;
 - Railway tracks in Section 2 and 3;
 - Ferguson's Business Park and depot/works inside which Section 4 is located entirely;
 - Former coal stockyard, located adjacent to Sections 3 to 6, and partially within Sections 5 and 6; and
 - The former Blyth Power Station and substation site which forms approximately half of Section 7.
- 12.46 The above areas are shown within the full consultation response which is included within Worley Parsons Factual Report for Land Parcel 2. It understood that the areas identified by NCC are based on initial work by them to identify potential areas where Part 2a might apply. NCC have not at this stage done any detailed investigations to confirm whether these areas of land would classify as Contaminated Land under Part 2a, therefore, they are only suspected areas of land based on high level site history information.
- 12.47 With regard to the area west of the former Blyth Power Station (part of which is in Section 7), historical maps show some earthworks features (possible stockpiling) west and south of the existing substation, along with pylons, access roads and a number of other small structures. It appears that the boundary shown on the NCC plan matches the former power station ownership boundary rather than site features from historical maps.
- 12.48 No consultation has been held with the Environment Agency. The key guidance from the Environment Agency with regard to construction in areas of contamination is provided in their document Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention (2001). This outlines measures to reduce the potential for introducing preferential pathways for contaminant migration and has been taken into account in the impact assessment.

Site Walkover

12.49 A site visit was undertaken by Ramboll on 13th July 2013. The objective of the walkover was to confirm the existing land use and included a walkover of the cable routes and the watercourse crossings. The walkover was limited by restricted access to certain parts of land and therefore some areas were not visited, in particular the Blyth substation land (to the south of Brock Lane). Areas off the public footpath through sections 3 to 6 of the Cable Route could also not be accessed, though they could be observed from the path.

Site Investigation Information

12.50 An intrusive investigation was completed by Worley Parsons Ltd (Worley Parsons) in 2013 and 2014 obtaining information on contamination and geotechnics for the cable route (section 1-5) and the converter station (section 6). Ground investigation in section 7 has not been undertaken. The investigation was based on the findings of desk based assessment undertaken previously by Worley Parsons.

12.51 A summary of the site works is provided below:

Site Investigation - Cable Route

12.52 This investigation was undertaken in Sections 1 to 5. It comprised 8 no. boreholes advanced to depths of between 4.0m and 15.45m below ground level (bgl) along with 17 no. machine excavated trial pits up to 4.4m bgl.

12.53 Combined gas and groundwater monitoring wells were installed into four of the boreholes with a dual monitoring installation in one of the boreholes (RW-BH3).

12.54 38 no. soil samples were taken during the site works and 13 no. groundwater samples were subsequently recovered over two monitoring rounds (including four trip blanks). These were tested for a range of potential contaminants from the following locations:

Table 12.1: Summary of Samples Recovered

Relevant Section	Samples	
	Soil	Groundwater
Cambois beach and Links (section 1)	10	4
Cable route (section 2, 4 and 5)	16	0
Railway crossing (section 3)	12	9

12.55 In addition, 4 no. rounds of groundwater level and gas monitoring were undertaken between 3rd December 2013 and 14th January 2014.

Site Investigation - Converter Station

12.56 Ground investigation was undertaken in Section 6. It comprised 8 no. boreholes advanced to depths of between 2.0m and 38.5m bgl along with 20 no. machine excavated trial pits up to 4.6m bgl.

12.57 Combined gas and groundwater monitoring wells were installed into each of the boreholes.

12.58 54 no. soil samples were taken during the site works and 13 no. groundwater samples were subsequently recovered over two monitoring rounds (including two trip blanks).

12.59 In addition, 12 no. soil samples were scheduled for leachate analysis and 4 no. rounds of groundwater level and gas monitoring were undertaken on between 3rd December 2013 and 18th January 2014.

Worley Parsons Reporting

12.60 Separate factual and interpretative reports were prepared by Worley Parsons for the cable route^{6,7} and converter station^{8,9}, which were referred to as Land Parcel 1 and Land Parcel 2 respectively.

12.61 The factual report for the cable route (Land Parcel 1)⁶ includes an Ordnance Threat Assessment prepared by BACTEC.

Assessment Criteria

12.62 There are no formal guidance documents defining a framework for the specific assessment of impacts with regard to geology and ground conditions. Some aspects of this assessment, for example, contaminated land, do have a structured approach based on risk assessment and where appropriate this has been taken into account in making the assessment. Therefore, conclusions have been drawn on the significance of each impact through reference to relevant legislation, professional judgement and evaluation.

12.63 In determining whether an impact is significant or not, the sensitivity of the receptor and the magnitude of the impact are combined. Sensitivity, magnitude and significance criteria were developed for the geology and ground conditions baseline at the Proposed Development. These are detailed in Table 12.2, 12.3 and 12.4.

⁶ Worley Parsons, March 2014. NGPH & NGIL, Norway-UK HVDC Interconnector (NSN Link) Land Parcel 1 (Cable Landfall and Route) – Factual Geo-Environmental Site Investigation Report (ref: 305002-00006/51614-02)

⁷ Worley Parsons, March 2014. NGPH & NGIL, Norway-UK HVDC Interconnector (NSN Link) Land Parcel 1 (Cable Landfall and Route) - Environmental Assessment, Interpretative Site Investigation Report (ref: 305002-00006/51614-02)

⁸ Worley Parsons, March 2014. NGPH & NGIL, Norway-UK HVDC Interconnector (NSN Link) Land Parcel 2 (Converter Station) - Factual Geo-Environmental Site Investigation Report (ref: 305002-00006/51614-02)

⁹ Worley Parsons, March 2014. NGPH & NGIL Norway-UK HVDC Interconnector (NSN Link) Land Parcel 2 (Converter Station) – Environmental Assessment, Interpretative Site Investigation Report (ref: 305002-00006/51614-02)

Table 12.2: Sensitivity Criteria

Sensitivity	Criteria
Low	<ul style="list-style-type: none"> • Receptor is not a designated geological site. • Receptor is unproductive strata in hydrogeological terms or a Secondary B aquifer • No contamination present • Low sensitivity land use in terms of contamination • No evidence of geohazard/s on site, within 100m depth beneath the site or in the wider vicinity • Development not sensitive to low levels of ground movement
Medium	<ul style="list-style-type: none"> • Receptor is locally designated for its geological importance via RIGS system • Receptor is a Secondary A aquifer • Contamination present but unlikely to represent Significant Harm or SPOSH* • Moderate sensitivity land use in terms of contamination** • Geohazard/s are present in the vicinity but are unlikely to be present on the site, within 30m to 50m of the ground surface at the site or within 50m of the site boundary • Development moderately sensitive to ground movement
High	<ul style="list-style-type: none"> • Receptor designated for its geological importance on a national (SSSI/NNR) or international basis • Receptor is a Principal aquifer • Contamination present and is likely to represent Significant Harm or SPOSH • High sensitivity land use in term of contamination** • Geohazard/s present on site, or at depths of less than 30m beneath the site or within 50m of the site boundary • Development highly sensitive to ground movement

* Significant Possibility of Significant Harm (SPOSH) is a term defined in the statutory guidance for contaminated land and defines the intervention level where a remediation notice can be served.

** If either of these situations exists then a Contaminated Land Qualitative Risk Assessment is needed to assess whether significant harm or a significant possibility of significant harm (SPOSH) exists.

Geologically Protected Areas

12.64 This heading considers the sensitivity and potential impacts on sites protected because of their geological importance. Impacts could arise from direct damage to such features though it also possible that construction works can be beneficial, for example, forming new rock exposures in cuttings.

Hydrogeology

12.65 This heading considers the sensitivity and potential impacts on groundwater resources. These could arise from alterations in site conditions or from contamination or changes in hydrology but could also be direct impacts from construction, for example, loss of fuels or oils into an important aquifer. In this respect there are links between hydrogeology,

contaminated land and hydrology. Therefore, whilst this heading considers groundwater quality and hydrogeology the issue of groundwater flooding and potential influences on surface water are addressed in Hydrology, Chapter 13.

Contaminated Land

- 12.66 This heading addresses the risks specifically associated with historic contamination that may be present in the Proposed Development area including potential impacts on human health, ecology and other sensitive receptors.
- 12.67 The sensitivity criteria consider two aspects of contamination, firstly whether significant harm or a significant possibility of significant harm (SPOSH) is likely to be present or not. This links to Part 2A of the Environmental Protection Act that covers the concept of statutory contaminated land and cases where remediation may be needed regardless of whether the site is developed or not. The second aspect is the sensitivity of the site in terms of the end use. Low sensitivity end uses would be ones not used extensively by humans or ones where the proposed development is unlikely to give rise to exposure to contamination. Moderate sensitivity land uses are considered to be commercial / industrial land uses (as discussed in current guidance) whilst high sensitivity end uses would be residential land uses.
- 12.68 Under current guidance and best practice the assessment of the effects of contamination is based on risk assessment. If contamination is present then a qualitative risk assessment will be required in addition to any impact assessment, for the purposes of the EIA it has been assumed that this will be necessary for all sites with a moderate or high sensitivity end use.
- 12.69 Contaminated land links to geotechnics since some geotechnical engineering activities (particularly piling) have the capability to alter risks/impacts.
- 12.70 This chapter utilises desk study information and information from the Worley Parsons site investigation in order to assess the potential impacts from contaminated land.

Geohazards

- 12.71 This heading represents a range of potential ground related hazards (as noted in 12.30 above) including mine workings, ground dissolution, slope stability and collapsible / compressible soils (including peat). Such features can represent a risk to human life, for example, where construction works cause slope failures, or may affect the construction work needed to carry out a project. Mine workings represent a particular issue as they can effect construction requirements, they can also cause environmental impacts if they are affected by construction work. The latter can involve releases of contaminated mine water and/or the release of mine gases.
- 12.72 Desk study information and information from the site investigation have been used to inform the assessment of geohazards.

Geotechnical Issues

- 12.73 Ground conditions influence foundation design. These have not been explicitly covered in the assessment, however, the ground conditions define the geotechnical requirements of the Proposed Development such as works needed for foundation construction and these activities can give rise to environmental impacts. The foundation options that might be used for the Proposed Development have formed the basis for the assessment of various issues including contaminated land and geo-hazards.

Assessment of Cumulative Effects

- 12.74 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. However, when individual effects are considered in combination, the resulting cumulative effect may be significant.
- 12.75 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:
- Port of Blyth Biomass Power Station;
 - Proposed National Grid Electricity Plc (NGET) 400kV GIS Substation;
 - Ferguson Business Park Single Turbine;
 - Earth Balance Single Turbine;
 - Narec Offshore Wind Demonstration Site; and
 - Residential development – 48 dwellings.

Magnitude Criteria

- 12.76 The criteria used to determine the magnitude of a potential impact are defined in Table 12.3. Assessment of magnitude includes consideration of the amount and intensity of disturbance and duration, such as whether it is temporary or permanent.

Table 12.3: Magnitude Criteria

Magnitude	Geologically Protected Area / Hydrogeology
Negligible	<ul style="list-style-type: none"> • Little or no change from baseline conditions.
Minor	<ul style="list-style-type: none"> • Detectable change to protected geological site or hydrogeological conditions. • Development changes site conditions and resulting exposure to contamination represents a low risk to receptors* • Development unlikely to be affected by geohazard/s and unlikely to alter any geohazard/s on or near the site
Moderate	<ul style="list-style-type: none"> • Evident change to protected geological site or hydrogeological conditions resulting in temporary or consequential changes to baseline. • Development changes site conditions and resulting exposure to contamination represents a moderate risk to receptors* • Development may be affected by geohazard/s or could alter a geohazard/s on or near the site
Major	<ul style="list-style-type: none"> • Large scale change to protected site or hydrogeological receptor. Change likely to be permanent/long term. • Development changes site conditions and resulting exposure to contamination represents a high or very high risk to receptors* • Development represents a near or certain probability of encountering geohazard/s and/or altering geohazard/s over a wider area

* Based on the risk definitions in CIRIA C552 Contaminated Land Risk Assessment - A Guide to Good Practice (2001) (CIRIA C552) using a qualitative risk assessment.

Impacts

12.77 The combination of magnitude and sensitivity can be combined to provide a matrix categorisation of impacts. Impacts considered to be significant are shown in grey and are classed as ‘high’. These are shown in Table 12.4.

Table 12.4: Impacts Matrix

		Sensitivity		
		Low	Medium	High
Magnitude	Negligible	Negligible	Low	Low
	Minor	Low	Low	Moderate
	Moderate	Low	Moderate*	High
	Major	Moderate	High	High

Assessment for Contaminated Land

12.78 Current guidance and best practice for the assessment of contaminated land is based on risk assessment. Under current guidance risk assessment is based on the following model:

Source - Pathway - Receptor

12.79 This risk assessment can be either qualitative or quantitative.

12.80 For a risk to be considered plausible a pollutant linkage must be “present and operating”, i.e. all three components of the model need to be present. The aim of the risk assessment is to identify, on a qualitative basis, the extent to which linkages may be present and the risks associated with them. The assessment of whether Source – Pathway – Receptor linkages are present is based on a Conceptual Site Model (CSM) developed specifically for the Proposed Development. A Conceptual Site Model has been developed for the proposed development to confirm the extent to which any linkages may be present.

12.81 If no contamination sources are considered to be present then the risk assessment has not been developed any further than the Conceptual Site Model. Scenarios have been assessed for the Construction and Operational Stages.

12.82 This approach is considered to be consistent with current guidance and best practice and results in a proportionate approach to assessing contamination and to addressing sites where contamination is very unlikely to be present.

Identification and Assessment of Effects

12.83 The following information has been considered as part of the effect assessment.

- i. Status of the effect (beneficial or adverse);

-
- ii. Duration of the effect (short/medium/long term);
 - iii. Permanent or Temporary;
 - iv. Direct or Indirect; and
 - v. Significance (significant or not significant)

12.84 There are no formal guidance documents detailing specific assessment criteria of effects with regard to geology and ground conditions. However, conclusions can be drawn on the significance of each effect through reference to relevant EIA legislation and guidance, professional judgment, evaluation against the effect assessment criteria detailed below and the outcome of the contaminated land risk assessment.

Status of the Effect

12.85 The status of the effects were assessed by considering whether the Proposed Development would have a beneficial or adverse effect on the receptor, and whether the Proposed Development would lead to a change in exposure.

Timescales

12.86 In assessing the effect, the likely length of the effect has been considered. These have been summarised under the following timescales:

- Short Term – construction phase comprising the ground works for cable installation (which would typically be 12 months) and construction of the converter station (which would take between one and five years); and
- Long Term – operational phase and beyond.

Permanent or Temporary

12.87 In assessing whether an effect is permanent, the effect will be regarded as one which is not reversible and will last for the lifespan of the Proposed Development and beyond.

12.88 A temporary effect was considered to be one that is reversible or where it ceases to be an issue at some point during the Proposed Development

Direct or Indirect

12.89 Direct effects are considered to arise from the Proposed Development. For the purposes of this particular assessment an indirect effect is one which is not considered to arise directly from the Proposed Development or one which is already present and may continue after the Proposed Development has been constructed

Significance of Effect

12.90 Significance has been assessed using the matrix in Table 12.4. Consideration has been given to the need for mitigation measures for moderate and high impact.

Existing Environment

Site Description

12.91 The Proposed Development encompasses an area between the landfall point at Cambois and the existing Blyth Substation at East Sleekburn. The area within the application boundary has been split into seven sections as shown in Figure 4.5, and an overview of each section is contained within the Project Description of the ES (Chapter 4).

12.92 The application area is relatively flat with limited topographical features, however, there are in places small banks and earthworks associated with former development.

12.93 The converter station site is located to the north of Brock Lane, at East Sleekburn. The site is bounded by agricultural fields, areas of juvenile plantation woodland and Brock Lane. There are residential properties situated to the east and south-west of the proposed converter station site on Sandfield Road (~170m) and Havelock Mews (~300m). There is a public right of way to the north/east of the converter station site, which links Sandfield Road to Wembley Gardens road to the north (~40m at closest point to converter station buildings).

Geology and Protected Geological Sites

12.94 The geological information provided by the BGS online map viewer shows shallow beach deposits close to the coast at Cambois which are likely to comprise sand and gravel, with blown sand immediately west of the dunes. Although not shown, it is likely these deposits overlie glacial till as this is shown near the surface in the rest of the Proposed Development area. Bedrock comprises Mudstone, Siltstone, Sandstone and coal seams associated with Pennine Middle Coal Measures Formation. There is a dyke shown orientated east-west that crosses the cable route beneath the Business Park in Section 4, formed from an igneous intrusion of microgabbro. The geological map notes that this dyke is part of the Mull Dyke Swarm. The underlying geology is summarised in Table 12.5 below.

Table 12.5: Summary of Geology by Proposed Development Section

Section	Bedrock	Superficial
1	Pennine middle coal measures formation – Interbedded mudstone, siltstone, sandstone with coal seams	Blown sand/beach deposits, possibly underlain by glacial till
2 to 7 and Converter Station	Pennine middle coal measures formation – Interbedded mudstone, siltstone, sandstone with coal seams. Igneous dyke (Section 4 only)	Glacial till

12.95 Although not shown, it is likely that made ground will be present in parts of the application area associated with previous development areas and infilling.

12.96 The Envirocheck Report has records of potential made ground on or adjacent to the application area at the following locations:

- Between the industrial park/works area and the A189 (on site in Section 4);
- To the south of Maw Burn/east of the former depot (on site Section 4 and also east of Section 5 and 6) in the area of a former coal stock yard (off site); and
- Immediately south of Brock Lane adjacent to the roundabout (on site in Section 7).

12.97 There is also the potential for encountering buried obstructions, for example, foundations associated with previously developed areas such as the former Blyth Power Station and associated coal stockyard, parts of which lie in the application area. However, obstructions could also be present in other parts of the application area where development has

previously taken place. There is the potential for encountering large glacial erratic boulders within the glacial till that may present a minor localised constraint to cable trenching.

- 12.98 A geological SSSI is located at Cresswell and Newbiggin Shore SSSI, 230m north of Section 1 (landfall). This SSSI is designated for the geological interest of the cliffs and foreshore exposures, in particular as an important site for the study of glacial till. The Envirocheck report shows this SSSI as being approximately 30m north of Section 1. However, it should be noted that the Envirocheck report is based on a search boundary which extends further north than the application boundary for the Proposed Development.
- 12.99 No information has been received from NCC on Regionally Important Geological Sites (RIGS) within the region.

Historical Borehole Records

- 12.100 A limited amount of historical information has been obtained relating to ground conditions on or adjacent to the Proposed Development area. A summary of the ground conditions from BGS historical borehole logs has been provided in Table 12.6.

Table 12.6: Review of Historical Borehole Records

Borehole Reference, Date, Depth	Relevant Cable Route Section and Direction from Application Area	Strata
NZ38NW117, [date not given], 193.06m	Section 1, to north	Sand to approximately 1.8m, over glacial till to 25m, underlain by bedrock which includes coal seams.
NZ28SE12, 1953, 91.49m	Section 2, to south	Glacial till recorded to 31.8m. No sand recorded in glacial till. Fragmented mudstone and plant debris noted at base of glacial till. Sandstone and mudstone bedrock with coal seams and fossil beds.
NZ28SE5, 1953, 161.08m	Section 2, on site	Glacial till, with layers of sand and sandy clay to a depth of 51m bgl. Loose boulders noted at 13m. Interbedded layers of shales, sandstone and coal recorded below this. Old workings recorded at 159m bgl.
NZ28SE6, 1953, 36.06m	Section 2, on site	Glacial till reported to 33m bgl, with sandstone and shales below this.
NZ28SE204/104, 1969, 4.55m	Section 3, on site	Top soil recorded to 0.30m, underlain by glacial till (clay).
NZ28SE14, [date not given], 148.38m	Section 4, on site	Strata not recorded above 66m bgl. Interbedded layers of sandstone, shales (mudstone) and coal recorded below this. Evidence of 'old workings' recorded at 143m bgl.
NZ28SE65/1, 1953, 19.81m	Section 5, to east	Made ground comprising brick and ashes to 0.6m bgl, underlain by glacial till with layers of sand.
NZ28SE28, [date not given] 50.31m	Section 6, to west	Borehole put down from within existing mine workings 'Plessey Seam', starting at 180m bgl.
NZ28SE160, date not given], 18.28m	Section 7, on site	Borehole put down from within existing mine workings 'Plessey Seam', starting at 180m bgl.

- 12.101 The borehole records outlined in the table above show evidence of historical mine workings on or adjacent to the Proposed Development at four borehole locations from depths of 180m bgl in Sections 6 and 7, and from 140 to 160m bgl in Section 2.

Site Investigation – Ground Conditions

12.102 The investigation undertaken by Worley Parsons in 2013 and 2014 identified the following ground conditions, tabulated in Table 12.7 below.

Table 12.7: Ground Conditions Summary from the Worley Parsons Site Investigation

Relevant Cable Route Section	Strata – Summary	Depth to Base (m bgl)
Section 1 - Beach	Beach deposits Glacial Till	2.00 to 4.45 (base not proved) 4.30 (base not proved)
Section 1 – Cambois Links	Made ground Beach Deposits Glacial Till	1.20 3.70 5.65 (base not proved)
Section 2, 4 & 5	Made ground Glacial Till	0.10 to 1.10 2.3 (base not proved)
Section 3	Made ground Glacial Till	0.40 to 1.20 3.50 to 14.45m (base not proved)
Section 6	Made ground Glacial Till Bedrock	0.20 to 0.45m 23.95 to 28.25 30.00 to 38.50 (base not proved)

12.103 A detailed description of the ground conditions has been provided by Worley Parsons in their reports and also shown on the exploratory hole logs which have been included in Worley Parsons Factual Report for Land Parcel 1 and Worley Parsons Factual Report for Land Parcel 2. A summary of the ground conditions has been provided in the following sections.

Made Ground

12.104 Made ground was reported within all exploratory holes from Section 1 to Section 6.

12.105 Made ground in Section 1 was reported in both exploratory holes at Cambois Links (OT-BH1 and SP01). The made ground was typically described as slightly or very gravelly clay with inclusions of brick, sandstone and coal. In SP01 the made ground was overlain by topsoil with inclusions of sandstone, concrete, wood and coal¹⁰.

12.106 Made ground was noted in all of the exploratory holes in Sections 2, 4 and 5, it comprised:

- Very soft to stiff clay with varying proportions of sand and gravel; and
- Loose gravel with varying proportions of sand and clay (SP02 in Section 2 and SP07 and SP08 in Section 5).

12.107 In Section 2, 4 and 5 coal, limestone, ceramics, brick and sandstone with less frequent plastic and wood were noted in the made ground.

12.108 The made ground in Section 3 comprised clay with silt, sand and gravel including brick, ceramic, tarmac, glass, coal and sandstone.

¹⁰ Although the material was topsoil the presence of concrete, wood and coal means that it has also been described as made ground on the exploratory hole log.

12.109 In Section 6 material described by Worley Parsons as 'made ground' typically comprised topsoil and/or re-worked natural materials. It is also likely that at least some of the made ground noted in other Sections also relates to topsoil or re-worked natural materials.

Beach Deposits

12.110 Beach deposits were reported in all of the exploratory holes carried out by Worley Parsons within Section 1. They were typically described as a loose to dense very gravelly sand or very sandy gravel where the gravels comprised coal and sandstone. Sandstone cobbles were also encountered.

Glacial Till

12.111 Glacial till was reported in all of the Sections investigated by Worley Parsons, this material was described as a soft to stiff clay with varying proportions of sand and gravel with occasional cobbles and boulders.

12.112 Gravelly sand and sandy gravel lenses were reported in a number of exploratory holes comprising RW-BH01, RW-BH02 and RW-BH03 in Section 3 and at BH-02 and BH-04 in Section 6. However, these lenses do not appear to be continuous and were not present in all of the boreholes.

Bedrock

12.113 Bedrock was proved in all five of the deeper boreholes from Section 6. The bedrock was described as interbedded mudstone, sandstone and siltstone of the Pennine Middle Coal Measures. Thin coal seams of between 0.05m and 0.2m thickness were reported in the bedrock from BH-04 and BH-05.

Hydrogeology

12.114 The EA website classifies the bedrock and windblown sand and beach deposits beneath Section 1 and 2 of the Proposed Development area as a Secondary A aquifer. Secondary A aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

12.115 The glacial till beneath the remainder of the application area is classified as unproductive strata by the EA; these are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

12.116 The EA website shows that the bedrock beneath the Proposed Developed area is also a Secondary A aquifer although the igneous dykes of the Mull Dyke Swarm are described as a Secondary B aquifer. Given the depth of glacial till at the site the bedrock aquifer is unlikely to contribute to river base flow.

12.117 The application area is located within the area covered by the Northumbria River Basin Management Plan. The bedrock is within the Northumberland Carboniferous Limestone and Coal Measures waterbody where the current chemical status of groundwater is listed as poor and the quantitative status is good. The chemical status objective for this waterbody is good by 2027 with good quantitative status by 2015.

12.118 The Environment Agency website does not show any groundwater abstraction Source Protection Zones (SPZs) within 1km of the application area.

12.119 The Envirocheck Report does not have any records of current abstraction licenses within the application area or within 500m of it.

12.120 Although outside of the search area, the Envirocheck Report indicates the Coal Authority is operating a groundwater pump and treat system from Bates No. 3 Mineshaft approximately 1.6km south of Section 6. Additional information provided by Worley Parsons indicates this is to prevent surface break-out of rising mine waters across the Blyth locality.

12.121 The following evidence of water strikes were recorded by Worley Parsons during the site investigation.

Table 12.8: Groundwater strikes encountered during the Worley Parsons Site Investigation

Relevant Cable Route Section	Strata – summary	Depth (m bgl)
1	Beach deposits	GL – 3.6
3	Glacial Till	2.0 – 4.4
5	Glacial Till	1.2 – 2.5
6	Glacial Till	3.0 – 14.8

12.122 Topsoil was noted as being ‘damp’ in a number of exploratory holes from Sections 3 and 6 between ground level and up to 0.7m bgl.

12.123 Subsequent groundwater monitoring by Worley Parsons showed the following standing water levels.

Table 12.9: Groundwater Elevations

Relevant Cable Route Section	Monitored Strata	Groundwater Elevation (m bgl)
3	Glacial Till	8.93 – 11.92
6	Glacial Till Bedrock	3.4 – 10.4 2.8 3.25

Historical Land Uses

12.124 A summary of the historical land uses has been provided below based on a review of the Ordnance Survey (OS) maps in the Envirocheck Report.

12.125 Section 1 of the Proposed Development area is shown as Cambois Farm on historical maps until the 1989 OS map. Two wells are shown within this area on the 1865 OS map.

12.126 The land within Section 2 comprises predominantly agricultural fields throughout its history. A ‘camp’ is shown in or immediately to the north of Section 2 which comprises a series of small buildings. This camp is first shown on the 1961-62 OS map and is marked as disused by 1974 but the camp is still shown on the 1983 map. The BACTEC report¹¹ (included in Worley Parsons Factual Report for Land Parcel 1) shows this was a heavy anti-aircraft

¹¹ BACTEC, June 2013. Explosive Ordnance Threat Assessment in respect of Cambois, Northumberland (ref: 4263TA). Prepared for National Grid International Ltd

battery but note the exact location was not mapped previously due to censoring for national security reasons. Historically, a mineral tramway crossed Section 2 from north to south, crossing Wembley Gardens between the existing terraced houses and the railway crossing.

12.127 Section 3 of the Proposed Development area comprises the crossing point of an existing mineral railway and road. This mineral railway has been present since the 1898 OS map, prior to which it was agricultural land.

12.128 Section 4 passes between an existing works/business park area which has been shown on OS maps since 1987, and a 'depot', which is understood to have been most recently in use as the Robinsons Brothers chemical works. The depot has been shown on OS mapping since the 1951 maps and site photos show that there to be a series of Nissen-type huts at the depot site.

12.129 Section 5 comprises an existing motorcycle scramble track and agricultural land. The agricultural land areas have been present since the earliest OS maps, it is not known when the motorcycle scramble track was created although it is likely to be relatively recent.

12.130 The historical OS maps show no evidence of previous development within the majority of Section 6, and this area is shown as agricultural fields from the earliest available maps (1865). However, the easternmost part of Section 6 includes a small part of the former coal stockyard site associated with the former Blyth Power Station.

12.131 Within Section 7, the land is shown as agricultural land with no change until the 1966 OS maps, when power lines and the Blyth power station are shown. The current layout of access tracks within the fields adjacent to the substation is shown first on the 1971 Russian military maps.

12.132 Further information on historical land uses can be found with the Envirocheck Report in Worley Parsons Factual Report for Land Parcel 1 and Worley Parsons Factual Report for Land Parcel 2.

Historical Potentially Contaminating Land Uses

12.133 The historical Ordnance Survey (OS) maps in the Envirocheck Report show the following historical potentially contaminating land uses on or within 500m of the proposed development route.

Table 12.10: Historical Land Uses

Section	Land Use	Dates Shown on Maps	Approx. Distance from Proposed Development area
1	Former foundry	1980-2006	200m south
	Former Cambois Colliery and mineral railway/sidings	1898-1966	170m south
2	Former Cambois Colliery and mineral railway/sidings	1898-1966	Adjacent to south
	Mineral tramway	1940-1967	On site
	Former foundry	1980-2006	On-site/adjacent to north
	Former anti-aircraft battery	1961-1983 (present during WWII)	200m south

Section	Land Use	Dates Shown on Maps	Approx. Distance from Proposed Development area
	Power station coal stock yard	1966-1993	Adjacent to south
	Former landfill	Opened 1993	120m south east
	Sheep wash	1961-1985	50m south
3	Mineral railway	1898-present	On site
	Power station coal stock yard	1966-1993	Adjacent to south east
4	Depot	1951-present	On site
	Works/business park	1987-present	On site
	Power station coal stock yard	1966-1993	Adjacent to east
5	Works/business park	1987-present	Adjacent to north
	Power station coal stock yard	1966-1993	Adjacent to east
6	Power station coal stock yard	1966-1993	On site
Converter Station	Power station coal stock yard	1966-1993	150m northeast
7	Blyth Power Station	1971-1993	On site
	Blyth Substation	1967-present	On site
	Power station coal stock yard	1966-1993	175m northeast

* The former coal stock yard is also located

Blyth Power Station

12.134 The former Blyth Power Station represents the most significant former industrial land use within the vicinity of the Proposed Development, occupying a large tract of land close to Sections 2 to 7 and the converter station site. The ‘About Blyth’¹² website provides a comprehensive although anecdotal history of the power station site up until its demolition in 2001. It should be noted that this source cannot be relied upon alone for the identification or otherwise of risks from contaminated land or geology, but provides useful background information to the types of infrastructure that was present at the power station which is not matched by published resources.

12.135 The former coal storage yard and depot housed a continuous coal handling facility which allowed trains to empty their cargos to hoppers while moving. A system of conveyors was in place to transport the coal between the drop off point, the storage yard and the power station. The storage yard was also used for the storage of Pulverised Fuel Ash (PFA) and Furnace Bottom Ash (FBA). This material was transported via sluiceways to settling ponds which were located in the south east of the coal stockyard area. Prior to 1992, FBA and any leftover PFA that was not sold for the construction industry was disposed of at sea via barge from the Blyth estuary. Post 1992, this material was disposed of into an on-site licensed landfill. The landfill area corresponds to the area of landfill listed on the EA website which opened in 1993, in the eastern and north eastern part of the coal stockyard.

12.136 The power station was decommissioned and demolished between 2001 and 2003. The landfill site used for ash wastes was topsoiled around this time. The About Blyth website states that prior to demolition, the buildings were extensively decommissioned, involving the removal of all potentially contaminating or hazardous materials, including fuels, chemicals and asbestos, however, this cannot be verified.

12.137 In addition to the pylons present in the area to the west of the former power station (in Section 7), historical OS maps dating from the 1960s show a number of earthworks features

¹² About Blyth (2013) *About Blyth Power Station* [online] Available: <http://www.aboutblyth.co.uk/html/aboutblythpowerstation.htm> [date accessed: 26/11/2013]

immediately to the west and south of the existing Blyth substation. The 1969 OS map onwards show a series of access roads in the land west of the former power station. The Russian Map dating from 1971 also shows a series of small structures present in this area some of which are still present on later OS maps. It is not marked on the maps what these structures were used for.

Current Potentially Contaminating Land Uses

12.138 Current potentially contaminative land uses on or within 250m of the application area have been identified using OS mapping and from the walkover survey, and can be summarised as follows:

- Sewage treatment works adjacent to Section 3 – also includes several buried pipes beneath Sections 2 and 3 with the potential for made ground;
- Mineral railway at Sections 2 and 3;
- Business park and light industrial units at former works and depot within Section 4;
- Motorcycle scramble track within Section 5;
- Blyth substation and associated infrastructure; and
- Agriculture (predominantly arable farming) - potential for pesticide and herbicide residues or burial of wastes.

12.139 With regards to agricultural areas within the Proposed Development site boundary, although the risk of contamination is unlikely to be high in comparison to industrial land uses, arable farming historically has been associated with the use of pesticides and herbicides such as organochlorides (e.g. DDT, dieldrin), which can be persistent in soils for decades. The risk of encountering animal burial pits is considered very low on arable land but there is the potential for encountering fly tipping and areas of historical unlicensed waste burial.

12.140 The sewage treatment works adjacent to Section 3 is relatively new and was built on previously undeveloped land, as such the potential for contamination associated with this development is considered to be low.

12.141 The Envirocheck Report has one record for a Control of Major Accident Hazard Sites (COMAH) and Notification of Installations Handling Hazardous Substances (NIHHS) which relates to Robinson Brothers Limited within Fergusons Business Park (Section 4). There are no details provided for these records. The Robinson Brothers site was also listed as a registered waste treatment or disposal site for 'Incineration – with heat recovery' that accepted a wide range of organic and inorganic wastes. The Robinson Brothers Ltd. chemical plant (rubber products and pharmaceuticals) at the site closed in 2000, it was in operation from at least 1977.

Site Investigation - Contamination Assessment

12.142 The Worley Parsons site investigation included sampling and analysis for soils and water for the presence of contamination. The following summary is based on the information obtained from the site investigation derived from the Worley Parsons reports on the investigation undertaken in 2013 and 2014¹³

¹³ Worley Parsons_Land Parcel 1_Cable Landfall and Route_ Factual Geo-Environmental Site Investigation Report_March 2014
Worley Parsons_Land Parcel 2_Converter station_ Factual Geo-Environmental Site Investigation Report_March 20
Worley Parsons_Land Parcel 1_Cable Landfall and Route_ Interpretive Site Investigation Report_March 2014

12.143 No visual or olfactory evidence of contamination was noted by Worley Parsons during the site investigation. A review of the exploratory hole logs shows very limited evidence of materials which could represent sources of contamination, those notes are as follows:

- SP02 (Section 2) shows clinker in made ground from 0.0m to 0.1m bgl; and
- RW-WS1 (Section 3) shows tarmac in made ground from 0.0m to 1.0m bgl

12.144 Coal fragments were noted in many of the exploratory hole locations associated with made ground, topsoil, beach deposits and glacial till.

12.145 Assessment of the chemical testing results for soils reported by Worley Parsons did not show any exceedances of the criteria used for a commercial land use.

12.146 In addition, although generic assessment criteria have not been published for construction workers, the soil testing results obtained by Worley Parsons are considered to be low and, therefore, unlikely to represent a risk to construction workers.

12.147 Soil leachate testing was undertaken by Worley Parsons on 12 no. samples of topsoil and glacial till at depths of between 0.2m and 1.70-1.90m bgl from Section 6. The results were compared mainly to the Environmental Quality Standards (EQS) for Freshwater and Drinking Water Standards where EQS are not available. Slightly elevated concentrations were reported by Worley Parsons in localised areas for ammoniacal nitrogen, cadmium, chromium and zinc.

12.148 Two rounds of groundwater sampling were undertaken by Worley Parsons in December 2013 with groundwater obtained from the following strata for chemical testing.

Table 12.11: Groundwater Sampling

Relevant section	Strata	Borehole ID
1	Beach Deposits	OT-BH1
3	Glacial Till	RW-BH1 to RW-BH3
6	Glacial Till	BH-01 to BH03 and VW-01 to VW03
	Bedrock	BH-04 and BH-05

12.149 The results of the chemical testing were compared, by Worley Parsons, to the EQS for Freshwater and Drinking Water Standards where EQS are not available.

12.150 Slightly elevated concentrations of metals (cadmium, chromium, lead and zinc) were reported by Worley Parsons during the second round of monitoring from a sand horizon within the glacial till at RW-03 in Section 3.

12.151 Localised exceedances of these assessment criteria were also reported by Worley Parsons in groundwater from the glacial till and bedrock in Section 6 although the results were not significantly elevated. The exceedances comprised phenols, ammoniacal nitrogen and

metals (cadmium, chromium, lead and copper) from the glacial till. In bedrock, exceedances comprised conductivity, phenols, sulphate, chloride, ammoniacal nitrogen and cadmium.

- 12.152 Whilst elevated conductivity, sulphate, chloride and ammoniacal nitrogen were reported from both rounds of sampling, elevated phenol and metals were only noted from the second round.
- 12.153 Worley Parsons considered that migration of groundwater upwards from the Coal Measures bedrock was likely to be affecting groundwater quality in the deeper glacial till. The presence of phenols within groundwater from the glacial till at BH-02 and BH03 (Section 6) during the second round of testing were considered, by Worley Parsons, to be associated with groundwater under sub-artesian within the bedrock migrating upwards.
- 12.154 The results for phenols were below the lower analytical detection limit during the first round of testing and no elevated results were obtained from BH-05 (in the bedrock) or the well installed into deeper glacial till (BH-01).
- 12.155 It has been noted that the groundwater elevations are indicative of a downward vertical gradient, and it is possible that water levels in the bedrock have been affected recently by the mine water pump and treat system operated by the Coal Authority which has reversed the hydraulic gradient. Whilst upwards migration may have been the mechanism by which contaminants reached the glacial till it is no longer operating.
- 12.156 Worley Parsons report that the results for ground gas are consistent with Characteristic Situation 1 in CIRIA C665 (2007) and as such no special protection measures should be required for buildings.
- 12.157 The results for carbon dioxide from OT-BH1 (Section 1), RW-BH1 and RW-BH3 (Section 3) are reported to exceed the workplace exposure limits and a risk could exist to workers in confined spaces if these are introduced.

Landfill and Waste Management

- 12.158 The EA website does not have any records of landfills within the Proposed Development area.
- 12.159 The EA website has records of a historical landfill at the northern and eastern part of the coal stockyard. This landfill is understood to have first received waste in 1993 (no end date for receiving waste is listed). The waste type is shown as "industrial" and listed as waste from a factory or industrial process.
- 12.160 The Envirocheck Report indicates this landfill accepted FBA and PFA and that it was prohibited from accepting waste liable to cause environmental hazards, poisonous, noxious, polluting wastes and special wastes. The northern end of this landfill is approximately 30m south east of the Proposed Development boundary in Section 2.

Environmentally Designated Sensitive Areas

- 12.161 There are a number of designated sites in the vicinity of the application area, the boundaries of these features are described within Chapter 7: Ecology and shown in Figure 7.2. Pertinent aspects are discussed below.

12.162 The Northumberland Shore Site of Special Scientific Interest (SSSI) extends to the high tide mark for the length of coastline between the Blyth and Wansbeck estuaries and is therefore located “on site” in this area (Section 1: landfall location).

12.163 The Northumberland Shore SSSI also occupies part of the Blyth Estuary, to the mouth of Sleek Burn. This is approximately 620m downstream of the anticipated surface water drain outfall location (Section 7).

12.164 The remainder of the Blyth Estuary upstream of the Northumberland Shore SSSI is designated as a Local Wildlife Site (LWS). The LWS is located partially within Section 7 of the cable route.

12.165 At the mouth of the Blyth Estuary, the coastal waters are designated as the Northumbria Coast Ramsar site and Special Protection Area (SPA). These sites are located approximately 3.4km downstream from the Proposed Development site.

Geohazards

12.166 The Envirocheck Report shows the application area to have the following potentials risks:

- Potential for landslide hazards – very low;
- Potential for collapsible ground hazards – very low;
- Potential for compressible ground hazards – no hazard;
- Potential for ground dissolution stability hazards – no hazard;
- Potential for running sand hazards – low within Section 1, very low within rest of the Proposed Development area; and
- Potential for shrinking/swelling clay hazards – very low

12.167 Information provided with the Envirocheck Report indicates the application area is “in an area which may be affected by coal mining.”

12.168 The Coal Authority Mining Reports obtained with the Envirocheck Report indicate the Proposed Development site is in the likely zone of influence from workings in between 7 and 9 seams of coal at 80m to 340m depth, last worked in 1967. The report notes that any ground movement from these coal workings should have ceased by now. In addition, the Proposed Development site is noted to be in an area where the Coal Authority believes there is coal at or close to the surface, however, given the depth of glacial till in the Proposed Development site area there is unlikely to be any coal within at least 20m depth bgl.

12.169 The Proposed Development site is not in the likely zone of influence of any present underground coal workings and the proposals are not in an area for which the Coal Authority has determined or is determining whether to grant a licence to remove coal using underground methods.

12.170 Parts of Section 1 of the cable route, and Sections 2, 3 and 4 fall within a Coal Authority Development High Risk Area (formerly known as a ‘Development Referral Area’). These areas are defined as places where there are records of one or more coal mining related features which have the potential to cause instability or present a degree of risk to the surface. The Coal Authority states that new development in these areas will need to demonstrate that they have taken into account the risk from former mining activities.

12.171 The Coal Authority indicates there are no known coal mine entries within, or within 20 metres of, the boundary of the Proposed Development site but that records may be incomplete. This has been confirmed through use of the Coal Authority online mapping (www.coal.decc.gov.uk), which shows the closest recorded mine entries to be located to the south of Wembley Gardens road (at the location of the former Cambois colliery).

12.172 The Coal Authority Mining Reports have been provided in Worley Parsons Factual Report for Land Parcel 1 and Worley Parsons Factual Report for Land Parcel 2.

12.173 The Coal Authority website indicates there are probable shallow underground coal mine workings in the Proposed Development site for which no recorded plan exists, but where it is likely that workable coal at shallow depths has been mined before records were kept. This refers to Sections 3 to 5 of the Proposed Development.

12.174 A detailed Coal Mining Risk Assessment was carried out by Arup in November 2013¹⁴. Although the information from the Envirocheck report and the Coal Authority suggests potential issues with coal mining in the vicinity of the proposed development site the more detailed assessment by Arup, taking account of the nature of the proposed development, indicates that the risks are in fact very low. The cable route was considered to be of much lower sensitivity to potential risks than the converter station structures.

12.175 Notwithstanding this Arup recommended a number of mitigation measures, in particular:

- As the possibility of unrecorded mine shafts affecting the Converter Station site cannot be entirely ruled out, observations should be made when the development platform formation is exposed for any feature that may reflect a former (trial) mineshaft. This is standard practice for new developments in mining areas;
- As with the Converter Station buildings, during excavation observations should be made for any feature that may reflect a former mine shaft along the cable routes;
- Arup did not consider mine gas to be an issue for the converter station, they noted that foundations could be readily designed to mitigate this by using appropriate gas protection measures, and that gas monitoring would be undertaken as part of the ground investigation; and
- Arup noted that routine gas monitoring should be undertaken in any trenches where human entry is proposed, particularly in the Coal Authority Development High Risk Areas.

12.176 A Coal Mining Risk Assessment¹⁵ has been prepared by Arup. The findings of the risk assessment are discussed in this chapter with the report available under separate cover.

Radon

12.177 The Envirocheck Report states that the Proposed Development site is in a low probability area as less than 1% of homes in this area are above the action level for radon. No radon protective measures are necessary in the construction of new dwellings or extensions.

¹⁴ Arup, November 2013. UK – Norway Electricity Interconnector NSN Link Coal Mining Risk Assessment (ref: RP001.Geo.Mining)
Prepared for National Grid International Limited

¹⁵ Arup (November 2013) *Coal Mining Risk Assessment*

Unexploded Ordnance (UXO)

- 12.178 The Zetica Bomb Risk Map for Tyne and Wear (www.zetica.co.uk) shows the application area to be in an area of low risk from unexploded ordnance (UXO). Zetica indicate that low risk regions are those that show a density of bombing hits less than 10 bombs per 1000 acres.
- 12.179 However, Blyth docks are identified on Zetica bomb risk map as a potential target during World War II, therefore, the potential for UXO cannot be ruled out, particularly for Sections 6 and 7 and the converter station location.
- 12.180 The Unexploded Ordnance Threat Assessment prepared by BACTEC for the Worley Parsons site investigation (included in Worley Parsons Interpretive Report for Land Parcel 1) indicates that during World War II the Cambois Heavy Anti-Aircraft battery was located in the northern part of Section 2. This camp is shown on historical OS maps from 1961-1962 to 1983; the 1974 OS map marks it as 'camp (disused)'.
- 12.181 BACTEC identified a 'medium-high risk' in Sections 1 and 2 from both German and British ordnance. A low-medium risk is identified by BACTEC from British ordnance and a low risk from German ordnance for the rest of the area.

Intertidal Zone and Coastal Erosion

Coastal Geology and Geomorphology

- 12.182 Chapter 7 of the UK Marine ES provides a detailed description of the geology and geomorphology of the Northumberland coast, the key elements of which are summarised as follows:
- The geology of the Cambois area (Coal Measures) has been heavily reworked during successive periods of glaciation, resulting in the deep glacial deposits found in the area and the relatively flat topography;
 - The present day coastline comprises well defined and relatively stable bays, typically backed by dunes or slowly eroding glacial deposits, held by harder headlands or exposed rocks at the foreshore;
 - At the landfall location the beach above high water comprises gravelly sand and cobble shelf approximately 5m in width. The shelf drops to the wide expanse of beach which is predominantly sandy with occasional gravel and cobbles;
 - The ground level of the beach slopes down from approximately 3.7m AOD at the foot of the cliffs to -2.1m at the low water mark, where small banks are formed by tidal runs; and
 - The sediments below the low water mark comprise sands and gravels overlaying glacial till, and in some areas mud (created by reworking of glacial deposits). Colliery waste dumped on the beaches at Cambois forms a component of the sediments.

Coastal Processes

- 12.183 Chapter 7 of the UK Marine ES details the technical aspects governing coastal processes and erosion for the region and specifically for the landfall location. The North Tyneside Shoreline Management Plan 2 states that the Northumberland coastline is dominated by wave action that controls erosion, transport and deposition of beach sediments; and inshore tidal currents are relatively weak.

12.184 Sediment transport works in a north to south direction due to the prevailing wave climate. Sediment movement is largely limited to individual bays due to the sheltering or blocking effect of headlands.

Coastal Erosion

12.185 The EA website shows that the coastline of North Cambois is under a Shoreline Management Plan for Managed Realignment during the current twenty year period. Current information shows that the policy is to 'Hold the Line' over the fifty and one hundred year periods.

12.186 Historical maps show little erosion across the majority of South Cambois during the last 150 years. This is consistent with the landforms present in this area (sand dunes) which are typically indicators of beach deposition. There is evidence from historical maps of a small amount of retreat of the coast adjacent to the former Cambois Colliery shown from 1989 onwards.

12.187 The proposed landfall site in Section 1 is located within an area which has seen both erosion and deposition since the earliest historical OS map, but it is not clear whether there is a dominant pattern of retreat or advance in this area at present.

12.188 The following predictions for retreat have been provided by the EA for the Cambois coastline:

- 20 year period: 2.3-7m;
- 50 year period: 10-20m; and
- 100 year period: 40m.

12.189 The North Tyneside Shoreline Management Plan 2: Scottish Border to River Tyne prepared by Royal Haskoning for NCC, states that due to the stabilising influence of resilient headlands such as that at Newbiggin to the north, longshore transport is limited along the low lying stretches of coast which has allowed many areas to become quite stable. The assessed erosion rate for the Cambois coastline is estimated at between 0.1 to 0.5m per year. This is broadly consistent with the EA predicted rates listed above for 20, 50 and 100 years.

12.190 The Royal Haskoning Shoreline Management Plan considers the effects of climate change and sea level rise. It is estimated by the Shoreline Management Plan that the 'rolling back effect' (i.e. coastal erosion) could account for as much as 50m of coastal retreat in the next 100 years. This is broadly consistent with the data provided by the EA above. In addition the UK Marine ES states that '...any potential impacts resulting from remedial works to protect and/or rebury the cable after a significant change in beach profile will be on a much smaller scale than the potential impacts which may arise from installation. On this basis the UK Marine ES concludes that the impacts of coastal erosion and sea level rise are likely to be of minor significance.

Conceptual Model

12.191 The baseline information has been used to prepare a conceptual site model of the application area, as follows.

Table 12.12: Baseline for Conceptual Model

Aspect	Baseline Information for Model	
Current Land Uses	Section 1	Beach, open land, slipway and road
	Section 2	Agricultural land
	Section 3	Railway lines and road
	Section 4	Works and depots
	Section 5	Motorcycle scramble track
	Section 6	Agricultural land
	Section 7	Road crossing, agricultural land and brownfield land
Historical Land Uses	Section 2	Military camp and anti-aircraft battery and tramway.
	Section 2 and 3 (still present in Section 3)	Mineral railways
	Sections 3 and 4	Chemical works, light industry and depot
	Sections 5 and 6	Edge of former coal stockyard.
	Section 7	Part of former Blyth power station and substation facilities.
Surrounding Area	Sections 1 and 2	Former foundry and former Cambois Colliery with associated railway lines/sidings to the south. Former landfill to the south.
	Sections 3 to 6	Former coal stock yard to the east, the eastern/northern side of the former coal stock yard was an industrial landfill from 1993 accepting ash.
	Section 3	Current sewage works located close to this section although this was only recently constructed
	Section 7	Former Blyth Power Station to the east
Part 2a	There are no areas within or adjacent to the Proposed Development area that are classified as 'Contaminated Land' under Part 2a of the Environmental Protection Act 1990. Areas have been identified by NCC for investigation under Part 2a including the following:	
	Sections 1 and 2	A small area at Cambois Links, at the intersection of these sections
	Section 2	Former mineral tramway
	Section 2 and 3	Railway tracks
	Section 4	Ferguson's Business Park and depot/works
	Sections 3 to 6	Former coal stockyard, located adjacent to, and partially within Section 5 and 6
	Section 7.	Former Blyth Power Station and substation site which forms approximately half of Section 7
Ground Conditions	<ul style="list-style-type: none"> • Predominantly glacial till over Pennine Middle Coal Measures Formation (interbedded mudstone, siltstone, sandstone and coal seams); • Glacial till is present in Sections 1 to 7 to depths of greater than 20m (where proved in Section 6); • Blown sand is present at Section 1, with sand and gravel beach deposits to the east of Section 1 in the landfall area; • Made ground and/or reworked ground is present near surface in parts of project area, in particular Sections 3, 4 and 7; and • A large area of made ground is likely to be located in the area of the former coal stock yard east of Sections 4 to 6. 	

Aspect	Baseline Information for Model
Designated Sites	<ul style="list-style-type: none"> • A geologically designated site (cliffs and foreshore at the Cresswell and Newbiggin Shore SSSI) is located 230m north of Section 1; • The Northumberland Shore SSSI is located within Section 1 (up to the high tide mark); and • Part of Section 7 is located within a Local Wildlife Site.
Geohazards	<p>No hazard or very low potential for encountering:</p> <ul style="list-style-type: none"> ▪ shrinking or swelling clay; ▪ ground dissolution; ▪ collapsible and compressive ground stability; and ▪ landslide ground stability. <p>The only exception is Section 1 where the risk of running sand ground stability is described as low.</p>
Coal Mining	<ul style="list-style-type: none"> • The Proposed Development is located in an area of historical coal mining which was last worked in 1967 but any movement from these workings should have stopped now; • The Coal Authority indicates there are no known coal mine entries on or within 20 metres of the boundary of the application area but that records may be incomplete; • The Coal Authority also indicates there are probable shallow underground coal mine workings for which no recorded plan exists where it is likely that workable coal at shallow depths has been mined before records were kept (beneath Section 2 to 5) – the thickness of glacial till in these areas would restrict any 'shallow' workings to at least 20m bgl; and • The Proposed Development site is located across two Coal Authority Development High Risk Areas (Sections 1, 2, 3 and 4).
Hydrogeology	<ul style="list-style-type: none"> • The Proposed Development is underlain by a Secondary (Undifferentiated) aquifer associated with the alluvial deposits but previous ground investigation indicates these deposits are likely to comprise predominately clay; • Bedrock beneath the Proposed Development is a Secondary A aquifer with the Mull Dyke Swarm shown beneath Section 4 being a Secondary B aquifer; • The blown sand and marine deposits in and east of Section 1 are Secondary A aquifers; • Bedrock is overlain by glacial till which is classed as unproductive strata; • The Proposed Development is not within a groundwater abstraction source protection zone; • No groundwater or surface water abstraction licenses have been identified within 500m of the Proposed Development site; and • Slightly elevated concentrations of contaminants have been encountered in localised areas (Section 3 and Section 6) from the Glacial Till and Bedrock.
Landfill sites	A historical landfill site, which accepted industrial waste (furnace bottom ash and pulverised fuel ash) is located east and north of the former coal stock yard, approximately 30m south east of Section 2
Aggressive Ground Conditions	The potential exists for aggressive ground conditions to be present associated with fill material along with areas where saline intrusion is present.
Radon	The Proposed Development is in an area where less than 1% of homes are above the action level of radon and protection measures should not be required.
Ground and Mine Gas	There is a potential for ground gas to be present in particular associated with made ground/fill material and bedrock, and also associated with former mining activity.
Unexploded Ordnance	BACTEC have classified Section 1 and 2 as being a medium to high risk zone for UXO, with the remainder of the Proposed Development being a low to medium risk zone for UXO.

12.192 A Qualitative Risk Assessment has been prepared based on the Conceptual Site Model outlined above and has been used to identify whether any potentially significant effects could be present. The full qualitative risk assessment is presented within Appendix 12.2.

Proposed Development

12.193 A full description of the Proposed Development during the construction and operational phases is given in Chapter 4. Those features and assumptions relevant to this chapter are summarised as follows, including best practice methods.

12.194 In localised areas cable may be buried to 3mbgl however cables will typically be buried at 1.2m depth. Cables will be buried in a 1.5m wide trench, which will be backfilled and restored to the existing ground level.

12.195 At this stage it is understood that there will be one large construction compound and this will be located east of the converter station site. However, further small construction compounds for localised storage of materials and plant are likely to be required at intervals along the cable routes but these have not yet been sited.

12.196 The following key points which bear relevance to the geology and ground conditions chapter are as follows:

- Cut and fill works will be required to create a level site for the converter station – a balance of which will be targeted in order to minimise off site material movements;
- Piled foundations may be required for the converter station site. The foundations will be designed following the results and recommendations of the intrusive ground investigation by Worley Parsons;
- Construction platforms and areas of hardstanding will be founded on compacted fill over natural ground following a topsoil strip;
- The converter station site will include areas of hard and soft landscaping with planting;
- The converter station will include a temporary construction compound, located to the west of the converter station site;
- All storage areas for fuels and oils will be appropriately bunded in line with best practice guidance;
- Wheel washing facilities will be provided during construction for plant and vehicles;
- The landfall Transition Joint Pit (TJP) will be located approximately 500m west of the low tide mark. The TJP will be approximately 12m long, 5m wide and 3m deep and on completion will be backfilled to original ground level;
- Standard open trenching techniques will be used for excavation, except where at the railway crossing where a trenchless technology will be considered, such as HDD, thrust boring or pipe jacking;
- The trench cross section will be approximately 1.5m in width at the surface tapering to 1m width at the base, and may be up to 3m deep;
- Topsoil and subsoils will be excavated during construction for which 6m within the working width has been allowed. Topsoil and subsoil will be segregated pending reuse. The trenches will be backfilled as much as possible with site won material;

- Site won material will be re-used on site wherever possible, subject to relevant geotechnical testing. Where waste material is to be disposed of off-site this will be to a licensed waste facility in accordance with Site Waste Management Plan (SWMP);
- The cables and Cement Bound Sand (CBS) surround will occupy a significant volume within the cable trenches – there will be a significant amount of site won material which will require off-site disposal or where appropriate, re-use elsewhere on the site;
- The cable working width of 16m allows for a single drainage channel for surface water runoff during construction. This is located between the trench/s and the haul road;
- The cables will be installed atop a 60cm layer of CBS;
- Watercourse crossings shall be achieved either by open cut methods whereby the watercourse is temporarily dammed and over pumped, by trenching over an existing culvert or by construction of a cable bridge;
- The HVDC cables (2 no.) will be installed in a single trench, whilst the HVAC cables (6 no.) will be installed in threes in two trenches and additional working width, but otherwise installation methods will be the same; and
- Prior to construction, a Construction Environmental Management Plan (CEMP) will be produced which will set out a variety of control measures including as a minimum the mitigation measures identified within this ES.

Site Activities - Construction Phase

12.197 Activities that are likely to be occurring in the Proposed Development site during the construction stage which could involve dealing with the ground or which could affect the ground are as follows:

- Soil stripping and excavation/exposure of underlying materials;
- Compound establishment, storage and use of fuels / chemicals including concrete in the Proposed Development area – the site establishment stage sits prior to the installation of appropriate bunds and other pollution control measures and as such represents the highest risk;
- Movement of plant and machinery within the application area and to and from the compound/s;
- Vehicles moving across soils within the Proposed Development;
- Excavations for cable trenches, foundations (potentially including piling at the converter station), drainage works or services;
- Dewatering of excavations;
- Storage of materials and stockpiling of excavated soils within the application area;
- People working within deep excavations;
- Open trenching between different forms of previous land use;
- Trenchless technologies such as HDD, thrust boring and pipe jacking;
- Working within the intertidal and supratidal zone;
- Processing of material to render it suitable for particular uses; and
- Re-use of excavated material onsite or imported materials for re-profiling

12.198 These activities have been considered during the construction stage effect assessment.

Site Activities - Operational Phase

12.199 Activities or factors during the operational stage which could affect or be affected by the ground are as follows:

- Storage and use of fuels/chemical – limited to the converter station site;
- Processing and/or storage of waste materials;
- Periodic maintenance which could involve small scale excavations;
- Site employees working on site;
- Cable routes, and their presence in the environment for the lifetime of the project and beyond – includes materials from which they are made and the geophysical aspects of the installed cable trenches;
- Areas of soft landscaping and planting;
- Restoration of former land use including agriculture; and
- Cables installed at the landfall location.

Receptors

12.200 Geology and ground conditions have the capability to affect a wide range of receptors, for the purposes of this assessment the following have been considered as potential receptors:

- Designated geological sites;
- Groundwater resources;
- Human health;
- Flora and fauna – secondary receptors include agriculture;
- Buried concrete;
- Buried services; and
- Structures, buildings or roads

12.201 Surface waters could also be considered as a receptor for ground conditions. The main assessment for impacts to surface waters is dealt with under Hydrology, in Chapter 13 of this ES, however, reference is made in this chapter where directly relevant to ground conditions.

Incorporated Mitigation

12.202 Mitigation measures to protect the general public and site workers during ground works will be detailed in the CEMP and developed to ensure full compliance with relevant and current policy, guidelines and best practice . The following list presents the assumptions that have been made for the purposes of this ES in terms of incorporated mitigation, with the proviso that the list is not exhaustive:

- For construction workers and site maintenance workers (specifically where ground excavation is required) key aspects would involve personal protective equipment whilst undertaking ground excavation on this basis they are considered medium sensitivity receptors rather than high.
- It is assumed that mitigation measures would be adopted during the construction works where material is excavated and stockpiled, for instance to prevent run-off. This might comprise plastic (e.g. tarpaulin) covers or temporary seeding with a grass mix);

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- All cable trenches will be shuttered to prevent side wall collapse during construction where necessary and based on the recommendations of the ground investigation.
 - The CEMP will be compliant with all relevant construction best practice and codes of practice;
 - Relevant pollution control measures will be observed during both construction and operation in line with current legislation and best practice;
 - The effect assessment in Table 12.10 and 12.11 below assumes these mitigation measures have been adopted.
 - Construction will be compliant with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites¹⁶, in order to protect soil quality during excavation right through to reinstatement and take account of the recommendations provided by BACTEC for UXO.

Contaminated Land Risk Assessment

12.203 A qualitative risk assessment for contaminated land has been undertaken for the construction and operational phase. The risk assessment is based on the assumption that mitigation measures have not been implemented to identify where such measures would be required. The risk assessment is included in Appendix 12.2. Where risks have been identified that may result in potentially significant environmental impacts these have been brought forward into the following impact assessment.

¹⁶ DEFRA (2009) *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites* [online] Available: <https://www.gov.uk/.../system/.../pb13298-code-of-practice-090910.pdf>. [date accessed: 24/02/2014]

Assessment of Effects – Construction Stage

12.204 The following assessment has been undertaken to determine potentially significant impacts for the construction stage.

Table 12.13- Categorisation of Impacts – Construction Stage

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Impact	Category of Impact	Significant Impact?	Commentary
Physical damage to designated geological sites	Adverse	Long Term	Permanent	Direct	High	Negligible	Low	No	Nearest designated geological site is 230m north of Section 1.
Reduced groundwater quality through dewatering during excavations	Adverse	Short Term	Temporary	Direct	Low (Medium – Section 1)	Minor	Low	No	Majority of excavations will be shallow and Proposed Development area underlain by thick clay which comprises unproductive strata. Significant impacts to groundwater therefore not anticipated
Impacts on soil from construction compound establishment activities, such as material storage, processing, stockpiling, storage and use of fuels/oils	Adverse	Short Term	Temporary	Direct	Medium	Moderate	Moderate	Yes	Once the construction compounds are established and the procedures (e.g. bunds) in place then it is considered that the risk of pollution events would be low. A greater risk is presented during the establishment phase.

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Impact	Category of Impact	Significant Impact?	Commentary
Impacts on ground and groundwater conditions from construction compound establishment activities, such as material storage, processing, stockpiling, storage and use of fuels/oils	Adverse	Short Term	Temporary	Direct	Low	Moderate	Low	No	Once the construction compounds are established and the procedures (e.g. bunds) in place then it is considered that the risk, the risk is of pollution events is would be low, but there is a residual greater risk from during the setting up establishment phase. However, the construction compound site is located within an area underlain by clay which is unproductive strata and as such there is unlikely to be a pathway between the source and groundwater. For this reason the impact has been assessed as low.
Exposure of construction workers to contaminated land during excavations	Adverse	Short Term	Temporary	Direct	Medium	Minor	Low	No	Low concentrations of contamination identified from site investigation. Potential remains for contamination within Proposed Development from historical land uses in localised areas but risk minimised by standard construction practice including personal protective equipment.

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Impact	Category of Impact	Significant Impact?	Commentary
Risk of encountering ground instability during construction	Adverse	Short Term	Permanent	Direct	Medium	Low	Low	No	Majority of the Proposed Development is underlain by glacial clay although made ground has been reported in localised areas. There are beach sands and gravels and blown sand present within Section 1, where the risk is likely to be higher. However, only works for the marine element will take place within this area up to the slipway, which will be subject to separate construction practices and health and safety procedures.
Exposure of construction workers to ground gas in confined spaces	Adverse	Short Term	Temporary	Direct	Medium	Moderate	Moderate	Yes	Made ground and mine workings have the potential to release ground gas. Locally elevated carbon dioxide was encountered from gas monitoring during the site investigation. As such monitoring of excavations and PPE could be required by workers in confined spaces and deep excavations.

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Impact	Category of Impact	Significant Impact?	Commentary
Risk to construction activities from historical coal mining	Adverse	Short Term	Temporary	Direct/Indirect	Low	Moderate	Low	No	The probability of encountering unrecorded surface mine workings is highest during construction, but does not present a significant risk as evidence is likely to be present at or near the surface.
Direct contact with UXO during excavations or during installation of deep foundations	Adverse	Short Term*	Temporary	Direct	Medium	Minor	Low	No	The impacts have been assessed assuming the mitigation measures provided by BACTEC before and during the construction works are implemented.
Compaction of soils by plant and machinery	Adverse	Short term	Temporary	Direct	Medium	Minor	Low	No	All topsoil will be stripped and stored prior to heavy plant accessing an area. Damage to soils would be reversible and temporary, and would be minimised through best practice soil management, undertaken in line with Defra ¹⁶ guidance on construction soil management.

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Impact	Category of Impact	Significant Impact?	Commentary
Cable routes - impacts on soil quality from storage – possible secondary impacts on subsequent land use (e.g. agriculture, soft landscaping)	Adverse	Short term	Temporary	Direct	Medium	Low	Low	No	Soil storage will be compliant with Defra guidance ¹⁶ . The majority of land along the cable routes is agricultural and will be returned as such after construction. Topsoil and subsoil to be segregated for storage. No maximum period has been set for duration of soil storage but it is anticipated to be less than six weeks for each section of cable installation.
Converter station site - impacts on soil quality from storage – possible secondary impacts on subsequent land use (e.g. soft landscaping)	Adverse	Short term	Temporary	Direct	Low	Moderate	Low	No	Soil storage will be compliant with Defra guidance ¹⁶ . Soil could be stockpiled for up to 3 years for the converter station site. This could severely impact soil quality. However, only small areas of soft landscaping are included for the converter station site are proposed and there is likely to be sufficient topsoil of good quality (i.e. from the top of stockpiles) available to provide for these areas.

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Impact	Category of Impact	Significant Impact?	Commentary
Migration of contaminants along open cable trenches	Adverse	Long term	Permanent	Direct	Medium	Moderate	Moderate	Yes	The cable route traverses both industrial and agricultural areas. The cable trenches, particularly when open during construction have the potential to act as linear pathways along which contaminants could migrate from contaminated areas. Whilst only low concentrations of contamination have been identified from the site investigation, mitigation could still be required if contamination were to be encountered during the construction works.
On-site movement of soils – risk of spreading contamination	Adverse	Long term	Permanent	Direct	Medium	Moderate	Moderate	Yes	The cable route traverses both industrial and agricultural areas. Soils will be excavated and stored in piles, typically adjacent to their source, however some soils may need to be moved to designated storage areas. There is a risk that when the trenches are backfilled, contaminated or low grade soils could be restored to areas of agricultural land or previously non-contaminated areas.

Assessment of Effects – Operational Stage

12.205 The following assessment has been undertaken to determine potentially significant impacts for the operational phase.

Table 12.14 - Categorisation of Impacts – Operational Phase

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Impact	Category of Impact	Significant Impact?	Commentary
Impacts on ground conditions and groundwater during operational activities	Adverse	Long Term	Temporary	Direct	Low (Medium – Section 1)	Minor	Low	No	It is assumed that standard best practice measures would be employed for activities during the operation stage and on this basis the proposed development is unlikely to have a long term impact on groundwater or ground conditions.
Exposure of ground maintenance workers to contaminated land during excavations	Adverse	Long Term	Temporary	Direct	Medium	Minor	Low	No	There is a potential for contaminants within the made ground, however, only low concentrations of contamination have been found in the site investigation. As maintenance work would not be taking place in any areas that have not been previously excavated, investigated and in the event of significant contamination, remediated prior to the construction of the project, the risk to site workers during this phase is low.

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Impact	Category of Impact	Significant Impact?	Commentary
Long term impacts from coal mining subsidence	Adverse	Long Term	Permanent	Direct	Medium	Minor	Low	No	The majority of the project is low sensitivity (cable routes) with the exception of the proposed converter station. The area is underlain by historical coal mining, but the Arup assessment concludes this should present a low risk of significant impact in the application area for the lifetime of the project.
Exposure of ground maintenance workers or workers in buildings to ground gas in confined spaces	Adverse	Long Term	Temporary	Direct	Medium	Minor	Low	No	Made ground and mine workings have the potential to release ground gas and mine gas. Site operatives would only be present at the converter station during operation. Monitoring at the converter station has not identified a risk from ground gas or mine gas to buildings and their users and the substantial concrete foundations required would provide a significant barrier.
Direct contact with UXO during excavations	Adverse	Long Term	Temporary	Direct	High	Moderate	Low	No	Potential for encountering UXO is considered low as no significant excavations anticipated during this stage.
Cable routes - damage to buried structures from aggressive ground conditions	Adverse	Long Term	Permanent	Direct	Medium	Moderate	Moderate	Yes	Aggressive ground conditions could be present within areas with previous industrial/contaminative land uses. The cable routes have been categorised as medium

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Impact	Category of Impact	Significant Impact?	Commentary
									sensitivity. Whilst the High Density Polyethylene (HDPE) DPE sheathed cables are resistant to acids/solvents, the CBS surround and concrete jointing bays could be affected.
Converter station – damage to buried structures from aggressive ground conditions	Adverse	Long Term	Permanent	Direct	Low	Minor	Negligible	No	The converter station site has no recorded potentially contaminative land uses and as such is likely to be low risk for aggressive ground conditions. The site investigation did recorded only low concentrations of contamination.
Migration of contaminants along closed and backfilled cable trenches	Adverse	Long Term	Permanent	Direct	Medium	Moderate	Low	No	The cable route traverses both industrial areas and agricultural areas. The cable trenches, particularly when open during construction have the potential to act as linear pathways along which contaminants could migrate from contaminated areas to non-contaminated areas. Only low levels of contamination have been identified from the site investigation and it is assumed that if any unacceptable contamination was encountered during the construction works then

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Impact	Category of Impact	Significant Impact?	Commentary
									mitigation would already have been implemented.
Coastal erosion	Adverse	Long term	Permanent	Direct	Low	Moderate	Low	No	Although the rate of coastal erosion in the area would be likely to expose the cables throughout the projects lifetime, the associated repair/reburial and mitigation has been assessed by Intertek as low complexity and would not be a significant factor for the project.

Assessment of Effects – Decommissioning and Legacy Impacts

Cable Routes

- 12.206 The anticipated operational life for the cable routes and converter station is 40 years but this may be extended dependent on the lifespan of the components. At decommissioning the cables may be either disconnected and removed or disconnected and left in place in the ground.
- 12.207 A decision would be made on whether to leave the redundant cables in place or remove them on decommissioning based on a number of factors including the condition of the cables at the time. The potential impacts of leaving them in place are difficult to quantify, and there is a lack of scientific studies or case studies to draw on.
- 12.208 HDPE/XLPE cables built to modern specifications have not been in use for a sufficient period to estimate their physical longevity outside the lifespan of any particular project, under which period maintenance can prolong lifespan. If the cables are left in the ground after decommissioning it is not known at what rate they would deteriorate.
- 12.209 If the cables are lead-insulated there is a risk of lead as well as copper leaching into the environment over the long term. This is likely to happen more quickly at any open cut ends of the cable or where damage has occurred.
- 12.210 HDPE/XLPE are chemically resistant materials and are not readily affected by acids or solvents. They are used in buried high voltage cables partly for this reason, and are also used in applications such as landfill liners and would be expected to have an extremely long lifespan under normal ground conditions.
- 12.211 There are likely to be a number of mitigating factors relating to the conditions in the Proposed Development area which would reduce any impacts of the long term break down of the cables in the environment and these are summarised as follows:
- The thick layer of glacial till at the site means that the cables are unlikely to come into direct contact with significant quantities of groundwater. This both reduces the potential pathway to a receptor and is likely to prolong the post-decommissioning lifespan of the cables, reducing the rate of deterioration;
 - The use of CBS surround in the installation of the cables is likely to offer significant long term protection to the cables beyond the intended lifespan; and
 - The installed depth of the cables is well below the influence of agricultural activities such as ploughing and crop roots thereby reducing the chance that any leached contaminants will reach surface receptors
- 12.212 Taking into account all of the factors above, there is unlikely to be any significant impact as a result of the long term breakdown of the cables in the environment. Any potential contaminants are unlikely to be released in acute events and there are no significant pathways linking the source to receptors.

Converter Station

- 12.213 The decommissioning of the converter station would involve similar activities to those described during construction. The main components would be dismantled and removed for recycling wherever possible or for disposal in accordance with relevant waste management regulations.

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- 12.214 If the land is to be returned to the pre-development land use (agriculture) the concrete bases would need to be broken out to a depth of 1.2m and suitable subsoil and topsoil added. This would need to be imported from off-site sources as it would not be feasible to store soils such that they would maintain fertility over a 40 year period.
- 12.215 It may be that the land is sold for development, in which case the developer may wish to keep the existing foundations. If in the case the foundations are left in situ then it is unlikely there will be any long term contamination issues.
- 12.216 Providing pollution prevention guidelines are followed throughout the operational phase, there is unlikely to be a lasting legacy of contamination at the converter station site that would affect its subsequent use after decommissioning.

Mitigation

- 12.217 A limited number of potentially significant impacts have been identified for the Proposed Development with regards to geology and ground conditions. These will require mitigation in order to reduce the potential impact.
- 12.218 A strategy will need to be prepared outlining where mitigation measures are required to address contamination prior to construction works commencing. The Contractor will develop this strategy into a detailed methodology for the site works for agreement with Regulators.
- 12.219 A protocol to address unexpected contamination should be incorporated into the CEMP should any potentially contaminated materials be encountered during excavations.
- 12.220 The development of a project specific CEMP including overarching mitigation measures will contribute towards addressing construction phase impacts. This will need to incorporate specific measures to address the significant impacts identified in Section 12.5 for the construction phase.
- 12.221 In addition, despite the low risk from coal mining subsidence assessed in the coal mining report by Arup, the report recommended a number of mitigation measures including the following:
- As the possibility of unrecorded mine shafts affecting the Converter Station site cannot be entirely ruled out, observations should be made when the development platform formation is exposed for any feature that may reflect a former (trial) mineshaft. This is standard practice for new developments in mining areas;
 - As with the Converter Station buildings observations should be made during excavation for any feature that may reflect a former mine shaft along the cable routes;
 - Arup did not consider mine gas to be an issue for the converter station, they noted that foundations could be readily designed to mitigate this by using appropriate gas protection measures, and that gas monitoring would be undertaken as part of the ground investigation; and
 - Arup noted that routine gas monitoring should be undertaken in any trenches where human entry is proposed, particularly in the Coal Authority Development High Risk Areas.

12.222 Each impact and relevant mitigation procedures are considered in turn in Table 12.15.

Table 12.15: Mitigation Measures

Potential Impact	Sensitivity of Receptor	Magnitude of Impact	Category of Impact W/O Mitigation	Commentary	Proposed Mitigation	Sensitivity of Receptor	Magnitude of Impact	Category of Impact with Mitigation
Construction Phase								
Impacts on soil from construction compound establishment activities, such as material storage, processing, stockpiling, storage and use of fuels/oils	Medium	Moderate	Moderate	Once the construction compounds are established and the procedures (e.g. bunds) in place, the risk is of pollution events is low, but there is a residual risk from the setting up phase, which will involve the initial setting up of the compound, topsoil stripping, short term plant and materials storage.	<p>Daily site audits should be carried out by the Environmental Manager during compound establishment to monitor strict compliance with the CEMP.</p> <p>Typical pollution control measures for this phase include but are not limited to the following:</p> <ul style="list-style-type: none"> • Prioritising establishment of designated areas for fuels and materials storage; • Prioritising construction of temporary site drainage and relevant pollution control measures; • Use of mobile drip trays for fuels/oil storage or the use of fully bunded mobile plant (e.g. fuel bowsers). 	Medium	Low	Low

Potential Impact	Sensitivity of Receptor	Magnitude of Impact	Category of Impact W/O Mitigation	Commentary	Proposed Mitigation	Sensitivity of Receptor	Magnitude of Impact	Category of Impact with Mitigation
Exposure of construction workers to ground gas in confined spaces	Medium	Moderate	Moderate	Made ground/fill material and mine workings have the potential to release ground gas. As such monitoring of excavations and appropriate PPE could be required by workers in confined spaces and deep excavations	The ground investigation and any subsequent gas monitoring will enable the identification of locations at risk of ground gas. Appropriate PPE and safety procedures for working in those areas can then be devised. These might include: <ul style="list-style-type: none"> • Monitoring undertaken throughout construction; • The use of breathing apparatus and fans to circulate fresh air through excavations; • All workers to wear harnesses to facilitate ease of rescue in the unlikely event of becoming overcome by gases. 	Medium	Low	Low

Potential Impact	Sensitivity of Receptor	Magnitude of Impact	Category of Impact W/O Mitigation	Commentary	Proposed Mitigation	Sensitivity of Receptor	Magnitude of Impact	Category of Impact with Mitigation
Migration of contaminants along open cable trenches	Medium	Moderate	Moderate	The cable route traverses both industrial and agricultural areas. The cable trenches, particularly when open during construction have the potential to act as linear pathways along which contaminants may travel large distances from contaminated areas to uncontaminated areas.	The ground investigation has not identified areas where unacceptable levels of soil contaminants are present. The potential exists that contamination could still be encountered and this could be addressed through further investigation and/or protocols for dealing with contamination during the construction works. Contaminated areas may or may not require remediation, depending on the level of contamination. In either situation, impermeable barriers (e.g. clay/bentonite/concrete) could be installed along the cable trenches at key intervals, such as the boundary between industrial areas/areas of known contamination and agricultural land/the sea to prevent a preferential pathway forming.	Medium	Low	Low

Potential Impact	Sensitivity of Receptor	Magnitude of Impact	Category of Impact W/O Mitigation	Commentary	Proposed Mitigation	Sensitivity of Receptor	Magnitude of Impact	Category of Impact with Mitigation
On-site movement of soils – risk of spreading contamination	Medium	Moderate	Moderate	The cable route traverses both industrial and agricultural areas. Soils will be excavated and stored in piles, typically adjacent to their source, however some soils may need to be moved to designated storage areas. There is a risk that when the trenches are backfilled, contaminated or low grade soils could be restored to areas of agricultural land or previously non-contaminated areas.	The ground investigation has not identified areas where unacceptable levels of soil contaminants are present. The potential exists that contamination could still be encountered and this could be addressed mitigated through further investigation and/or protocols for dealing with contamination during the construction works. Contaminated areas may or may not require remediation, depending on the level of contamination, and soils may or may not be suitable for re-use on site, again, depending on the level of contamination. On site soil management will need to be undertaken in accordance with Defra guidance ¹⁶ . The CEMP will need to clearly identify those areas where soils are contaminated/low quality. Soils from these areas, if suitable for use on site, should only be re-used within the same area and not transported for use, for instance, on agricultural land elsewhere on the site.	Medium	Low	Low

Potential Impact	Sensitivity of Receptor	Magnitude of Impact	Category of Impact W/O Mitigation	Commentary	Proposed Mitigation	Sensitivity of Receptor	Magnitude of Impact	Category of Impact with Mitigation
Operational Phase								
Cable routes - damage to buried structures from aggressive ground conditions	Medium	Moderate	Moderate	Aggressive ground conditions could be present within areas with previous industrial/contaminative land uses. The cable routes have been categorised as medium sensitivity. Whilst the HDPE sheathed cables are resistant to acids/solvents, the CBS surround and concrete jointing bays could be affected (e.g. by sulphates)	The ground investigation will identify areas where aggressive ground conditions are likely to be a problem. Mitigation could take one or both of two forms: <ul style="list-style-type: none"> • Remediation to remove the source of the problem; and • Inform the design (e.g. concrete specification) such that buried structures will be resistant to aggressive ground conditions. 	Medium	Low	Low

Geohazards

12.223 Although not considered significant in EIA terms because of the low sensitivity of the receptor, the principal geohazard that has been noted at the application area relates to historical coal mining. The Coal Mining Risk Assessment prepared by Arup in November 2013 considered there to be a very low risk of significant impact from historic Coal Mining on the converter station and cable routes.

12.224 A number of precautionary measures were recommended by Arup and should be incorporated into the project, in particular.

- As the possibility of unrecorded mine shafts affecting the proposed converter station site cannot be entirely ruled out, observations should be made when the development platform formation is exposed for any feature that may reflect a former (trial) mineshaft. This is standard practice for new developments in mining areas;
- As with the converter station buildings, during excavation of the cable trenches and jointing pits observations should be made for any feature that may reflect a former mine shaft along the cable routes; and
- Mine gas is not considered to be an issue for the converter station as existing monitoring results shows low levels of gas in this part of the site and foundations could be readily designed to mitigate this by using appropriate gas protection measures. Routine gas monitoring should be undertaken in any trenches where human entry is proposed. Arup note this will be particularly important in the Coal Authority Referral Areas.

12.225 If an unrecorded shaft is encountered it will be necessary to liaise with the Coal Authority. It will also be necessary to assess the integrity of the shaft and determine the requirement for mitigation such as concrete capping.

UXO

12.226 The assessment by BACTEC shows the majority of the Proposed Development area to be located in a low to medium risk area for UXO, with Section 1 and 2 being at medium to high risk. The following mitigation measures have been recommended by BACTEC for both zones:

- Explosive Ordnance Safety and Awareness Briefings to all personnel conducting intrusive works; and
- The Provision of Unexploded Ordnance Site Safety Instructions

12.227 The following has also been recommended by BACTEC for the Medium-High Risk Zone only:

- Non-Intrusive Magnetometer Survey and targeted investigation ahead of any intrusive works

12.228 In some areas, BACTEC note that a Non-Intrusive Magnetometer Survey may not be possible due to high levels of background 'noise' from made ground. In these areas they have recommended that an Explosive Ordnance Disposal (EOD) Engineer is present on site to supervise all open excavations.

12.229 Contractors for the construction phase should have a procedure for dealing with suspected UXO if it is encountered.

Residual Effects

12.230 Assuming the above mitigation measures are undertaken no significant residual effects have been identified for geology and ground conditions.

Cumulative Effects

12.231 The following major development proposals have been considered as part of the assessment of potential cumulative effects:

- Port of Blyth Biomass Power Station
- Proposed NGET 400kV GIS Substation
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site; and
- Residential development – 48 dwellings.

12.232 The scope for cumulative impacts from two schemes, even when side by side, or in the case of the proposed NGET substation, occupying the same site, are often limited with regards to impacts from geology and ground conditions but potential interactions can be summarised as follows (list not exhaustive):

- Effects of increased mobility of contaminants due to cumulative effects of buried structures (e.g. piling) – whilst the impacts of one scheme to a receptor (e.g. an aquifer) may be small, the impacts of two projects could be significant. The magnitude of this impact is dependent predominantly on the sensitivity and size of the receptor and the extent of the proposed works;
- Prolonged duration of construction phase impacts for sequential construction phases of two schemes (e.g. prolonged soil storage leading to compaction and reduced soil fertility);
- A phase shift in the fundamental baseline conditions caused by one project could alter the impacts of a second – for example, if the first project alters the underlying surface geology at or near a site, the assumptions made during the assessment of the second project could vary; and
- Combined ground loading – the combined ground loading of two projects on the underlying soils may need to be assessed with regards to the potential for inducing settlements, geohazards and mining instability

Port of Blyth Biomass Power Station

12.233 The Port of Blyth Biomass Power Station will be located at Blyth Harbour approximately 1.5km to the south-east of the proposed converter station site.

12.234 Due to the considerable separation distance between the two sites, cumulative effects with regards to geology and ground conditions are not envisaged. On this basis, cumulative effects with the Port of Blyth Biomass Power Station are considered to be not significant.

Proposed NGET 400kV GIS Substation

- 12.235 The proposed 400kV GIS Substation will be located approximately 400m to the south-east of the proposed converter station site, adjacent to the existing Blyth 275kV Substation. Importantly, it is located within Section 7 of the Proposed Development area.
- 12.236 The substation and the cable routes for the Proposed Development are being designed sympathetically in order that there are no clashes in the layout and engineering design. The Proposed Development components to be installed within that area comprise the HVAC cable route only. There is unlikely to be any significant overlap between the two projects, besides surface structures such as roads which may need to cross the cable route.
- 12.237 An EIA for the substation scheme is not available at this time but a provisional layout has been provided.
- 12.238 The potential cumulative impacts between Proposed Development and the proposed NGET substation are considered under the following subheadings.

Land Contamination

- 12.239 The proposed NGET substation is located on land under investigation by NCC under Part 2A of the Environmental Protection Act, associated with the former Blyth Power Station site. It is understood that appropriate mitigation and best practice measures will be taken in the assessment, design and construction of the substation such that any contamination is identified and dealt with accordingly. Without mitigation there is the potential that that cable routes for the Proposed Development in combination with the substation could increase the mobility of any contamination present at that site which could then move along the cable routes to off-site sources. However, the risk of this happening would be reduced by the mitigation for the Proposed Development as set out within Section 12.5 and 12.6 of this chapter. This includes the incorporation of impermeable barriers along the cable routes (particularly when moving from contaminated areas to uncontaminated areas), to prevent the lateral migration of contaminants. Where glacial clays are used as backfill this risk would be further reduced. Therefore the cumulative effects are assessed as low.

Soils

- 12.240 There is the potential due to the two schemes being located at the same site, for the same soils and subsoils to be excavated and stockpiled during two separate construction phases. This would prolong the duration to which any soils are stored, which can lead to degradation in the fertility of the soil. This effect would be diminished by a significant temporal gap (e.g. one year) between the end of one project construction period and the start of the second such that there would be no significant impacts to the soil. The significance of this effect would also be largely dependent on the sensitivity of the proposed land use – if it is to be restored to agricultural use or planted the effects could be significant, if not then less so.
- 12.241 As there are unlikely to be significant areas of overlap between the two schemes, providing that best practice soil management is undertaken in line with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites¹⁶, there are not anticipated to be any significant cumulative impacts on soils.

Geohazards

- 12.242 No significant geohazards were identified for the location or vicinity of Section 7 of the cable route and the location of the proposed NGET substation.

12.243 With regards to the risk from coal mining, there are unlikely to be any cumulative impacts from the two schemes. The NGET substation is likely to require significant foundations, for which there would need to be a separate review of the risks of coal mining subsidence but the cable routes are unlikely to influence this, given their relatively small scale and depths involved.

Groundwater

12.244 The significant depth to water bearing strata separated by approximately 24m to 28.5m of glacial clays means that impacts to groundwater in bedrock are low. There are unlikely to be any cumulative impacts, unless the NGET substation creates a preferential pathway for potential contaminants to cross the glacial till to the underlying bedrock in a location that links directly with the proposed cable routes within Section 7. This is however considered unlikely given the depths involved.

Ferguson Business Park Single Turbine:

12.245 The Ferguson Business Park Turbine will be located approximately 390m west of the cable route and approximately 550m to the northwest of the proposed converter station site.

12.246 Whilst it is possible that the turbine will need to be piled, due to the depth to groundwater and distance between the two sites, there are unlikely to be any significant cumulative interaction between the two projects with regards to geology and ground conditions.

Earth Balance Single Turbine:

12.247 The Earth Balance Single Turbine will be located approximately 2km to the west/northwest of the proposed converter station site.

12.248 Due to the significant distance between the two sites, there are unlikely to be any significant cumulative interaction between the two projects with regards to geology and ground conditions.

Narec Offshore Wind Demonstration Site:

12.249 The Narec Offshore Wind Demonstration Site is located 8km to 17km off the Blyth coast. Due to the significant distance between the two sites, there are unlikely to be any significant cumulative interaction between the two projects with regards to geology and ground conditions.

Residential Development – 48 Dwellings

12.250 This project is for a housing development, located to the south of Brock Lane at East Sleekburn, approximately 500m from the closest point of the Proposed Development (converter station site).

12.251 Due to the distance from NSN Link there are unlikely to be any significant cumulative interaction between the two projects with regards to geology and soils.

Summary

12.252 In summary, no significant cumulative impacts are expected between the Proposed Development and nearby proposed developments, with the exception of the NGET substation where there is the potential for cumulative impacts to soils. However, as these projects are being planned in tandem and are mutually dependent, provisions can be

included in the design of the NGET substation such that cumulative impacts with the Proposed Development cable route are eliminated. Assuming the use of standard construction techniques and practices commensurate with the proposed works, and full compliance with UK legislation and guidance including Pollution Prevention Guidelines, no in combination effects would arise.

Conclusions

- 12.253 This chapter has assessed the potential impacts of the Proposed Development, including the converter station site, HVDC cable routes and HVAC cable routes with regards to geology and ground conditions, including contaminated land and geohazards.
- 12.254 This chapter does not assess the geotechnical aspects of the landfall for the cable route below high tide springs. This is covered by the UK Marine ES.
- 12.255 Consultation with the Contaminated Land Officer at NCC revealed that there are no areas within or adjacent to the Proposed Development area that are classified as 'Contaminated Land' under Part 2a of the Environmental Protection Act 1990, but that several locations within the application area have been identified by NCC for investigation under Part 2a as Contaminated Land, including:
- A small area at Cambois Links at the intersection of Sections 1 and 2;
 - Former mineral tramway in Section 2;
 - Railway tracks in Section 2 and 3;
 - Ferguson's Business Park and depot/works inside which Section 4 is located entirely;
 - Former coal stockyard, located adjacent to Sections 3 to 6, and partially within Sections 5 and 6; and
 - The former Blyth Power Station and substation site which forms approximately half of Section 7.
- 12.256 The natural geology at the Proposed Development site comprises an approximately 22m to 28.5m deep layer of glacial till formed predominantly of clays, underlain by mudstones, siltstones and sandstones of the Pennine Middle Coal Measures formation. The bedrock geology contains numerous significant coal seams which have been worked extensively in the past. Superficial deposits including windblown sand and beach deposits are present within Section 1.
- 12.257 The glacial clays beneath the Proposed Development are classified as unproductive strata and are likely to provide a significant low-permeability barrier between the surface and the underlying Coal Measures bedrock, which is classified as a Secondary A Aquifer with the Mull Dyke Swarm a Secondary B Aquifer.
- 12.258 Made ground is likely to be present near surface in parts of Proposed Development and this has been confirmed by the site investigation, in particular Sections 4 and 7 and a large area of made ground is likely to be located in the area of the former coal stock yard east of Sections 4 to 6.
- 12.259 A number of potentially contaminative former and current land uses have been identified at or near the Proposed Development site, which are summarised as follows:

- Land to the south of Section 1 and 2 at the location of a former sheep wash, former foundry and former Cambois Colliery with associated railway lines/sidings;
- Former mineral tramway, former military camp and anti-aircraft battery in Section 2 and former landfill south of Section 2;
- Existing mineral railway in Sections 2/3;
- Former depot and chemical works, and existing light industry within Sections 3 and 4;
- Power station coal stockyard adjacent to Sections 3 to 6 and located partially within Sections 5 and 6; and
- Land to the east of the former Blyth power station, within Section 7.

12.260 No elevated concentrations of soil contamination were identified from the site investigation undertaken on Sections 1 to 6 in 2013 and 2014 by Worley Parsons. Slightly elevated concentrations of contaminants were identified in groundwater from localised areas associated with the glacial till and bedrock in Section 3 and 6. Whilst the source of these contaminants is not clear it is considered unlikely that the Proposed Development will change them, notwithstanding this mitigation measures will be implemented during the construction works to ensure the development does not introduce new preferential pathways for contaminant migration.

12.261 Whilst the potential exists that contamination could still be present in localised parts of the development area, this could be addressed through further investigation and/or protocols for dealing with contamination during the construction works.

12.262 The BACTEC Explosive Ordnance Threat Assessment report identified Sections 1 and 2 as being in a **medium risk zone** from UXO with the remaining areas being at low to medium risk and as such a risk could exist to workers during excavations. However, these risks can be mitigated through the recommendations outlined in the BACTEC report.

12.263 **No significant** geohazards were identified for the Proposed Development from the Envirocheck Report. The highest geohazard noted was for running sand at the landfill location.

12.264 The Arup coal mining study concluded that the impacts to the project from ground instability as a result of historic coal mining is **very low**, but recommended basic precautions in relation to the construction phase and the possibility of discovering unrecorded mine workings.

12.265 Chapter 7 of the UK Marine ES concludes that the impacts from coastal erosion and sea level rise are of **low significance**, and that any issues with coastal retreat would require relatively simple works to rebury the cables throughout the life of the project.

12.266 **No significant impacts** are anticipated from the onshore part of the Proposed Development on the Cresswell and Newbiggin Shore geological SSSI for construction or operational phases based on the significant distance from the closest part of the Proposed Development (230m).

12.267 The potential for ground gas has been identified for the Proposed Development, both from areas of made ground and from the natural geology, including from mining. Potential **moderate adverse** significant impacts from ground gas were identified for the construction phase, but these can be mitigated through the recommendations of the ground investigation,

ground gas monitoring and implementation of appropriate health and safety measures. No significant impacts from ground gas were identified for the operational phase.

- 12.268 **No significant impacts** have been identified to groundwater resources during the operational stage. However, best practice mitigation measures should be implemented regardless. It is anticipated that these will be focussed on the converter station site as there will be very little activity on the cable routes during operational phase.
- 12.269 **Moderate adverse** significant impacts on soils were identified from handling and storage during construction and from the potential for pollution during the establishment of the construction compound. These impacts can be mitigated by best practice construction methods and compliance with Defra¹⁶ guidance on construction soil management. All other potential impacts on soils were assessed as low.
- 12.270 The Worley Parsons site investigation indicates that the risk of workers coming into contact with contamination during construction or the operational phase is **low**. If contaminants were to be encountered during excavations, mitigation measures such as the use of appropriate PPE or the treatment/removal of contamination could be implemented to ensure the risk remains low.
- 12.271 **Moderate adverse** significant impacts could exist in localised areas for the construction phase associated with the cable trenches and the potential for them to act as linear pathways for the migration of contaminants between contaminated areas and uncontaminated areas. This can be mitigated through programming of the cable route construction such that there are no continuous trenches between areas of known contamination or previous industrial land use and uncontaminated areas such as agricultural land or the beach. To mitigate this impact during the operational phase permanent impermeable barriers or screens may need to be constructed at intervals along the trenches to prevent migration of contaminants.
- 12.272 **Moderate adverse** significant impacts could exist in localised areas for the construction phase relating to on-site soil management, with the risk being that contaminated soil may be spread to uncontaminated areas. The ground investigation has not identified any areas where soil is chemically unsuitable for backfilling and has to be disposed of to a licensed facility. However, there may be soils that are suitable for re-use on site, but contain low levels of contamination or are low grade and as such would not be suitable for agricultural land. Soil management will need to be undertaken in accordance with Defra¹⁶ guidance on construction soil management. The CEMP will need to clearly identify those areas where soils are contaminated/low quality. Soils from these areas, if suitable for use on site, should only be re-used within the same area and not transported for use, for instance, on agricultural land elsewhere on the site.
- 12.273 **Moderate adverse** impacts were identified relating to aggressive ground conditions in parts of the Proposed Development and the potential for damage to buried structures including the cable route infrastructure. No significant impacts were identified for the converter station site which is located on agricultural land with no former industrial land use. The ground investigation has not identified areas where aggressive ground conditions are likely to be a problem. Whilst the potential exists that contamination could still be encountered, this can be mitigated through further investigation and protocols for dealing with contamination during

the works such as source removal/treatment or the use of an appropriate specification for buried structures.

- 12.274 The majority of potential impacts have been assessed as **low** providing incorporated mitigation is undertaken in the form of compliance with all relevant construction and design standards and practices such as EA pollution control guidelines and health and safety measures. With the incorporation of additional mitigation measures for those impacts that were assessed as significant as summarised above, no significant residual impacts are anticipated for geology and ground conditions.
- 12.275 An assessment has been made of the potential for cumulative effects between the Proposed Development and those planned developments identified in Chapter 3 of this ES. .
- 12.276 The potential for cumulative effects between the Proposed Development and seven of schemes identified (including the Port of Blyth power station) with regards to geology and ground conditions has been ruled out based on the distance between the two projects.
- 12.277 One potentially significant cumulative impact of the Proposed Development and the NGET substation has been identified with regards to geology and ground conditions. This relates to the combined and potentially extended duration of the construction phases of the two projects which share the same project footprint within Section 7 of the Proposed Development. There is the potential for **significant impacts** to soils from prolonged storage and handling associated with subsequent construction phases. However, the degree to which this effect will be significant will depend on the time period between the two construction phases, and on the sensitivity of the end receptor. Ultimately, the proposed NGET substation project is being developed as a mutually dependant project of the Proposed Development, and therefore any potential cumulative impacts can be eliminated through the design and construction of that project.

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13 HYDROLOGY AND FLOOD RISK

Introduction

- 13.1 This chapter examines the effects associated with the proposed onshore components of NSN Link (“the Proposed Development”) on water quality, flood risk and surface water runoff for upstream and downstream receptors. It also considers the flood risk associated with the construction phase, and whether the Proposed Development would result in any changes to the surface water regime which would affect existing surface water flow paths.
- 13.2 For details of the project description, reference should be made to Chapter 4 of this ES. The application boundary of the Proposed Development has been split into seven sections as described in Chapter 4 and as presented in Figure 4.5 of this ES.
- 13.3 This chapter utilises the results of the Flood Risk Assessment (FRA) prepared for the Proposed Development as a requirement of and according to the National Planning Policy Framework (NPPF). The Flood Risk Assessment (2013), prepared by Ramboll is included under separate cover.
- 13.4 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance including Pollution Prevention Guidelines (PPG). The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (“NSN Link Ltd”) and their contractors, in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the scheme design to reduce identified impacts.
- 13.5 The information used to produce this chapter includes the following sources:
- The Northumberland County Council (NCC) Strategic Flood Risk Assessment (SFRA) April 2010, prepared by Scott Wilson¹;
 - British Geological Survey (BGS) maps²;
 - The Environment Agency (EA) online database of indicative floodplain and hydrogeological maps³;
 - Ordnance Survey 1:10,000 scale mapping; and
 - Northumbrian Water Site Enquiry Plans⁴.
- 13.6 This chapter does not assess impacts to groundwater quality as this is addressed within the geology and soils chapter. This chapter does however assess the risk from groundwater flooding, and includes a description of the hydrogeological environment within the baseline due its potential influence on surface water, and vice versa.

¹ Scott Wilson (2010) *Northumberland County Council Level 1 Strategic Flood Risk Assessment* [online]
Available: <http://www.northumberland.gov.uk/default.aspx?page=11924> [date accessed: 11/10/2013]

² British Geological Survey (2013) *Geology of Britain Viewer* [online]
Available: <http://www.bgs.ac.uk/data/mapViewers/home.html> [date accessed: 11/10/2013]

³ The Environment Agency Interactive Maps [online]
Available: <http://www.environment-agency.gov.uk/homeandleisure/37793.aspx> [date accessed: 11/10/2013]

⁴ Northumbrian Water (2013) *Site Enquiries for Brock Lane and Wembley Gardens*.

Legislation and Policy Context

- 13.7 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects of water quality, flood risk and surface water runoff associated with the Proposed Development.

International Legislation and Policy

Water Framework Directive

- 13.8 The European Union Water Framework Directive (WFD) (2000/60/EC) is enacted in England through River Basin Management Plans. The country is divided into river basin districts and the plan for each district is reviewed and renewed on a six year cycle, the first of which will end in 2015.
- 13.9 The River Basin Management Plans require that water quality and the pressures on water quality within main rivers, estuaries, coastal waters, reservoirs and groundwater are monitored. The plans operate on a six year cycle. At the end of each cycle each body of water is monitored for its chemical and biological quality and then the Environment Agency assess for the potential for improvements in the next cycle.
- 13.10 Watercourses that are designated as heavily modified, due to substantial changes to the hydromorphological status of the watercourse caused by human activity, have a maximum overall status target of 'good potential', whereas natural watercourses can achieve 'high' status.

Bathing Water Directive

- 13.11 The GOV.UK website defines bathing waters as '...beaches, lakes or ponds that are used by a large number of bathers and have been designated under the 1976 Bathing Water Directive' (76/160/EEC). The 1976 Directive is repealed by the 2006 Directive (2006/7/EC) which comes into effect in 2015. For 2014, monitoring data will be assessed using the standards set in the current bathing 1976 bathing water directive. From 2015, bathing water quality will be assessed using the new more onerous standards of the 2006 directive.
- 13.12 The EA is responsible for monitoring water quality at designated bathing waters in England and publishes annual results on its website. The assessment criteria are based on limits set out in the Directives for certain types of bacteria which indicate pollution from sewage or livestock effluents. For 2014, a 'Higher' quality status is provided, which corresponds to the standards set out in the revised Directive. The criteria are detailed on the EA website including the existing and new limits, and are summarised below.

- Higher Quality - the bathing water meets the stricter Directive standards;
- Minimum Quality - the bathing water meets the mandatory Directive standards;
- Fail - the bathing water failed to meet the required standards in the Directive;
- Closed - indicates that the bathing water was closed during the bathing season; and
- Not Classified - insufficient data has been collected for a classification to be given.

Shellfish Waters Directive

- 13.13 The European Community Shellfish Waters Directive (2006/113/EC) supersedes the 1979 Shellfish Waters Directive 79/923/EEC.

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- 13.14 The Shellfish Waters Directive was adopted to protect and improve the quality of waters where shellfish grow and to contribute to the high quality of edible shellfish products. It requires member states to designate those coastal and brackish waters needing protection or improvement in order to support shellfish.
- 13.15 The Directive prescribes the minimum quality criteria which must be met by shellfish waters, and guideline values which Member States must endeavour to observe.

National Legislation and Policy

National Planning Policy Framework (NPPF)

- 13.16 Section 11 of the National Planning Policy Framework (NPPF) makes reference to the water environment stating that... "the planning system should contribute to and enhance the local environment, in part by preventing both new and existing development from being put at unacceptable risk or from being adversely affected by unacceptable levels of water pollution..."
- 13.17 The NPPF requires that a FRA is carried out for new developments in order to inform the planning process, and provides technical guidance on assessing flood risk and development suitability.

Water Resources Act 1991 (Amendment) Regulations 2009

- 13.18 The Water Resources Act introduced or consolidated regulations concerning water quality, pollution and flooding.
- 13.19 The Act assigns the EA (formerly the National Rivers Authority) as the governing body for all matters concerning controlled waters and gives them legal powers to prosecute for offences.
- 13.20 Under the Water Resources Act it is an offence to knowingly permit poisonous, noxious or polluting matter or any solid waste to enter controlled waters. Controlled waters include all groundwater, watercourses, reservoirs/lakes/lochs and coastal waters to the UK offshore territorial limit (3 miles).

Local Planning Policy

- 13.21 NCC is in the process of drafting the Northumberland Core Strategy which will form the basis of planning policy within Northumberland. In the interim period the relevant Local Plans which for the still form part of the Northumberland Consolidated Planning Policy Framework.
- 13.22 Wansbeck Local Plan covers the area in which the site is located, between the Wansbeck and Blyth estuaries.

Methodology

Study Area

- 13.23 The study area for the assessment of surface waters and flood risk is limited to bodies of water within 500m of the Proposed Development. Given the hydrological context this study area is considered appropriate to encompass all receptors within the potential hydrological influence of the site.

13.24 The coastal and marine environment up to the high water springs mark is described in full in the UK Marine ES, specifically within Chapter 7: Physical Environment and Chapter 8: Water and Sediment Quality. These chapters were produced by Intertek in 2014 and include a detailed assessment of sediment processes, wave regime, tidal currents and the anticipated impacts of the cable trenching for the marine element of the Proposed Development up to the landfall location. The UK Onshore ES looks at impacts extending to the low water spring mark whilst the environment below the high water mark is described and assessed through reference to the UK Marine ES chapters as detailed above.

Consultations

13.25 Consultation has been undertaken with the following organisation and individuals:

- Environment Agency;
- Northumberland County Council; and
- Landowners.

13.26 Consultation has been held with NCC regarding surface water and flood risk, and the ownership of watercourses that the cable route crosses. NCC did not raise any issues with regards to flood risk or otherwise for watercourses within the vicinity of the application area. NCC noted that reference should be made to the maps provided within the NCC SFRA.

13.27 Consultation has been held with the EA who stated that they agree in principle to unrestricted discharge to Sleek Burn from the converter station site, on the grounds that Sleek Burn is tidal meaning that dilution rates would be very high and that there would be no increase in downstream flood risk. The EA did not raise any concerns with regards to flood risk for either the cable routes or the converter station site.

Site Visit

13.28 A site visit was undertaken by Ramboll on 13th July 2013. This included a walkover of the cable routes and the watercourse crossings. The walkover was limited by restricted access to certain parts of land and therefore some areas were not visited, in particular the Blyth substation land (to the south of Brock Lane). Areas off the public footpath through sections 3 to 6 of the Cable Route could also not be accessed, though they could be observed from the path.

Assessment Methodology

13.29 The methodology for assessing the impact on surface waters and flood risk is as follows:

- Establishment of the baseline condition including the existing flood risk, identification and description of watercourses and standing water bodies, hydrogeology, geology and topography; and
- Assessment of the proposed constraints and effects on and from the development respectively.

13.30 Three sets of impacts have been considered with regards to surface waters, water quality and flood risk, as follows:

- The impact on the Proposed Development from all sources of flooding;

- The impact from the Proposed Development on local hydrology and downstream flood risk due to an increase in surface water runoff or loss of floodplain; and
- The impact of the Proposed Development on water quality in the local water environment.

13.31 With regards to these impacts the construction, operational and decommissioning phases have been considered.

13.32 For the purposes of this chapter and in relation to hydrology and flood risk the activities associated with decommissioning are considered to be similar in nature to those of construction and as such a separate assessment has not been carried out.. The cables might require repair during the operational phase in which case there may be a need to excavate down to them. In terms of decommissioning it is understood that the redundant cables would either be left in situ or removed.

The Impact of Flood Risk to the Site

13.33 The assessment of flood risk has been determined based on the vulnerability of the Proposed Development land use to the identified flood risk, in accordance with the Technical Guidance to the NPPF, as follows:

- Low overall impact would result if the land use is in an area with a low probability of flooding (low magnitude), regardless of the vulnerability of the land use (importance);
- Neutral overall impact would result if the land use is in an area with medium or high probability of flooding but the land use is compatible with the level of flood risk. For example, land use classified as 'more vulnerable' is acceptable in an area with medium probability of flooding; and
- Significant adverse overall impact would result if the land use is in an area with medium or high probability of flooding but the land use is not compatible with the level of flood risk. For example, land use classified as 'highly vulnerable' is not acceptable in areas with either medium or high probability of flooding.

13.34 A low or neutral overall impact is acceptable in terms of flood risk for development, in accordance with the NPPF, and is therefore not considered to be significant for the purposes of the EIA.

Local Hydrology, Surface Water Runoff and Flood Risk Off Site

13.35 Should the Proposed Development result in a loss of floodplain storage then this could increase the risk of flooding downstream. The EA may object to a development which compromises the floodplain, and therefore any loss of floodplain is a **significant adverse** impact.

13.36 Should the Proposed Development result in increased peak surface water runoff (either through an increase in impermeable area, coupled with a potential increase in rainfall intensities due to climate change, or by causing a change in surface water flow paths), this could increase the risk of flooding downstream. Through planning conditions, the EA places constraints on developments which increase surface water runoff, obliging the developer to reduce surface water flows. Any increase in peak surface water runoff is a **significant adverse impact**, unless in agreement with the EA.

Water Quality

- 13.37 The potential impact on local water quality as a result of the Proposed Development has been assessed qualitatively using a source-pathway-receptor approach. Potential sources of pollution arising from the construction, operational and decommissioning phases of the Proposed Development have been identified, along with potential surface water receptors. Potential pathways for the pollution to reach the receptor were then identified..
- 13.38 The degree of impact is based on the probability of the pollution reaching the receptor, and on the severity of impacts should it occur. The severity is dependent on the degree of pollution and the sensitivity of the receptor.
- 13.39 The sensitivity of receptors has been assessed based on approximate dilution rates, existing water quality and whether the receptor is a designated site for nature conservation.
- 13.40 The assessment takes into account the objectives of the Water Framework Directive when considering impacts to bodies of water.
- 13.41 The assessment of significance ultimately relies on professional judgement, although comparing the extent of the effect with criteria and standards has guided this judgement.
- 13.42 This assessment includes mitigation measures that have been incorporated as part of an iterative design process.
- 13.43 With regard to receptors definitions for aquifer types are provided below based on the EA website:
- Principal Aquifer: “layers of rock or drift deposits that have high intergranular and/or fracture permeability – meaning they usually provide a high level of water storage. They may support water and/or river base flow on a strategic scale”;
 - Secondary A aquifer: “permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.”;
 - Secondary B aquifer: “predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.”; and
 - Secondary ‘undifferentiated’ aquifer: “it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.”
- 13.44 Consideration has been made of whether the application area is located within a groundwater Source Protection Zone (SPZ), whereby groundwater is protected as a source of potable water.
- 13.45 Source Protection Zones are defined as follows based on the EA website:
- SPZ1 Inner Protection Zone – Defined as the 50 day travel time from any point below the water table to the source (abstraction point);
 - SPZ 2 Outer Protection Zone – Defined by a 400 day travel time from a point below the water table to the source; and

- SPZ3 Source Catchment Protection Zone or “Total Catchment” – The area around a source within which all groundwater recharge is presumed to be discharged at the source.

Residual and Cumulative Effects

- 13.46 The residual impacts of the proposed development after mitigation have been considered.
- 13.47 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:
- Port of Blyth Biomass Power Station;
 - Proposed National Grid Electricity Transmission Plc (NGET) 400kV GIS Substation;
 - Ferguson Business Park Single Turbine;
 - Earth Balance Single Turbine;
 - Narec Offshore Wind Demonstration Site; and
 - Residential development – 48 dwellings.

Assessment Criteria

- 13.48 In order to assess the significance of impacts, both the magnitude of the impact and the sensitivity of the receptor are considered. The criteria developed below are for guidance only and in reality the factors of magnitude and sensitivity depend on a number of complex interacting factors which will be elaborated upon in as much detail as possible within this chapter.
- 13.49 Magnitude can be described as the level of change against the baseline conditions. Also included within the assessment of magnitude are the likelihood of whether an impact will occur and the spatial or temporal spread of such an impact. For an impact to occur in relation to water quality, a pathway must be established between the source pollutant/activity to the receptor.
- 13.50 In the case of flood risk, the assessment is risk based and therefore does not depend on assessment against a baseline as such, as the baseline conditions themselves can be considered a risk. The methods for categorising flood risk impacts are described fully in the FRA for the project.
- 13.51 The magnitude criteria developed for this chapter are outlined in Table 13.1.

Table 13.1: Magnitude Criteria

Criteria Magnitude	Description
High	<ul style="list-style-type: none"> • Either an acute and severe short term change with the potential for long term secondary effects; or a chronic but long-term/permanent change to the baseline conditions. • A direct pathway is identified with no barriers or factors limiting the pollutant from reaching the receptor. • Impacts may be detectable over a large area. • Activities that would cause a breach or fail of statutory policy or legislation.

Criteria Magnitude	Description
Medium	<ul style="list-style-type: none"> • A change to the baseline conditions that can occur over the short or long term but does not qualify as a high magnitude as described above. • A pathway can be clearly established but there are factors which limit interaction between the source and receptor. • The impact may be contrary to guidance or objectives set by statutory or non-statutory stakeholders.
Low	<ul style="list-style-type: none"> • A measurable but temporary or small scale impact to the water environment with no lasting effects. • A pathway can be demonstrated but there are barriers or limiting factors that would slow or prevent the source from reaching the receptor. • Impacts are confined to the immediate surroundings of the Proposed Development. • Although a detectable change has occurred, it is in line with the relevant policy and guidance.
Negligible	<ul style="list-style-type: none"> • No measurable change against the baseline. • No feasible pathway can be established.

13.52 The sensitivity of the receptor is dependent on a number of factors such as legislation and policy protecting that receptor; the ability of the receptor to absorb changes to the environment without significant effects on the function services or health of that receptor; the uniqueness or rarity of that receptor either on a local, regional or national/international scale; and existing pressures on the receptor from other sources and its current quality.

13.53 It is important to note that a receptor can be equally sensitive to change if its status or current quality is low and hence it may not be resilient to environmental changes; or of very good status or quality in which case it may be resilient but also of very high value as a resource.

13.54 The sensitivity criteria developed for this chapter are outlined in Table 13.2.

Table 13.2: Sensitivity Criteria

Sensitivity	Description
High	<ul style="list-style-type: none"> • The receptor is of high value. • The receptor is protected by national or international legislation and any change to the baseline conditions would be subject to stringent control. • The receptor either has limited or no ability to absorb change without its status, quality or value being affected, either through the effects of existing pressures or through its very high baseline quality. • Existing pressures on the receptor may be such that a small change in the baseline conditions could tip the balance and lead to significant environmental harm.
Medium	<ul style="list-style-type: none"> • The receptor may have some value and may be afforded protection by regional or local legislation or policy or be of some value to stakeholders. • The receptor has moderate ability to absorb change without its status, quality or value being affected. • Existing pressures on the receptor are such that small impacts will not tip the balance.
Low	<ul style="list-style-type: none"> • The feature is of limited value or rarity. • The feature is resilient and can absorb significant change to the baseline conditions without impacts to its status or value.

13.55 The significance of an impact is assessed as a factor of magnitude versus sensitivity, and assigned a category of Major, Moderate, Minor or None; where Minor and None mean that no mitigation is required (i.e. the impact is considered Not Significant in EIA terms). A matrix is provided in Table 13.3 to indicate how the significance of an impact is assessed.

Table 13.3: Impact Significance Matrix

		Sensitivity		
		High	Medium	Low
Magnitude	High	Major	Major	Moderate
	Medium	Major	Moderate	Minor
	Low	Moderate	Minor	None
	Negligible	Minor	None	None

13.56 Mitigation measures will need to be considered where an impact is Moderate or Major but may also be required for Minor impacts where appropriate (e.g. where a Minor significance is reached from a Medium magnitude versus Low sensitivity). Impacts are re-assessed post-mitigation with the aim that Major or Moderate impacts are reduced to Minor or below in order to be classified as Not Significant.

Existing Environment

Site Location

13.57 The Proposed Development encompasses the land between the landfall point at Cambois slipway and the existing Blyth Substation at East Sleekburn. The Proposed Development area has been split into seven sections as shown in Figure 4.5. An overview of each section is contained within the Project Description of the ES (Chapter 4) and a summary of historical use is provided in Chapter 10 and Chapter 12. For the purposes of this chapter the Proposed Development is situated in a largely rural setting and bordered by:

- The estuary of the River Wansbeck to the north;
- Former industrial land to the east;
- Sleek Burn and the River Blyth Estuary to the south; and
- The A189 trunk road to the west.

13.58 The topography of the Proposed Development is relatively flat, ranging from 6m and 10m AOD and with limited topographical features. The top of the beach at the landfall location is at approximately 5m AOD and equates to the high tide mark.

13.59 The converter station site is located on level agricultural land to the north of Brock Lane, at East Sleekburn. The site is bounded by agricultural fields and areas of young plantation woodland at the field boundaries.

Existing Site Description and Layout

13.60 Current land use at the Proposed Development comprises the following:

- Cambois Beach and associated slipway;
- Open grassland (Cambois Links);
- Agricultural fields;
- Roads and railway line;
- A public footpath;
- Light industrial park (Ferguson’s Business Park and Sleekburn Business Centre);
- Former industrial land (now disused);
- A motorbike scramble track;
- Watercourses; and
- Areas of juvenile plantation woodland.

Geological Setting

13.61 British Geological Survey (BGS) mapping shows the Proposed Development to be located over Pennine Middle Coal Measures formation bedrock, comprising predominantly sandstone, with mudstone and siltstone. There is a dyke shown within the bedrock geology orientated east-west that crosses the application area, formed from an igneous intrusions of microgabbro.

13.62 Superficial deposits are shown to underlie the Proposed Development. The superficial deposits comprise predominantly glacial till, with some blown sand, and marine deposits (sand and gravel) at the landfall location. Table 13.4 summarises the geological formations by site section.

13.63 Refer to Chapter 12 for further information on geology and ground conditions.

Table 13.4: Summary of Geology by Site Section

Section	Bedrock	Superficial
1	Pennine middle coal measures formation – Interbedded mudstone, siltstone, sandstone with coal seams	Blown sand/beach deposits, underlain by glacial till
2 to 7		Glacial till
Converter Station		Glacial till

Hydrogeological Setting

13.64 The Proposed Development is not located within 1km of a groundwater SPZ.

13.65 The EA website categorises the bedrock beneath the Proposed Development to be a Secondary A Aquifer although the igneous dykes of the Mull Dyke Swarm are described as a Secondary B aquifer.

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- 13.66 The windblown sand and beach deposits beneath the Proposed Development are also defined as a Secondary A aquifer.
- 13.67 The glacial till underlying the Proposed Development is classed as unproductive strata, comprising predominantly low permeability clays. Localised lenses of sand and gravel were encountered within the glacial till during the Worley Parsons site investigation in 2013 and 2014 which contain groundwater, but these do not constitute a significant aquifer. BGS historical borehole logs and the site investigation by Worley Parsons show the bedrock at the Proposed Development to be between approximately 24 and 30m (or greater) depth. Given the depth, the bedrock aquifer is unlikely to contribute to river base flow in the area.

Hydrological Setting

- 13.68 The Proposed Development is located between two estuaries and the North Sea, and is therefore surrounded by water on three sides. To the south lies Sleek Burn, a branch of the Blyth Estuary. To the north lies the Wansbeck Estuary. The North Sea coast comprises a sandy beach backed by dunes to the south and low cliffs in the north.
- 13.69 A summary of surface water features by site section is provided in Table 13.5 and shown in Figure 13.1. Maw Burn is a small watercourse located within Section 3 of the Proposed Development. Maw Burn is heavily modified and is currently culverted beneath the A189, and again in small sections for the entrance roads associated with Fergusons Business Park, beneath the former coal storage yard and the railway sidings site. Consultation with NCC has confirmed Maw Burn to be under riparian ownership.
- 13.70 A watercourse marked as Cow Gut is shown on OS mapping located in Sections 5 and 6 of the Proposed Development. Cow Gut is located south of the motorcycle scramble track and crosses the former coal storage yard and railway sidings in culvert. Consultation with NCC has confirmed that Cow Gut is an ordinary watercourse and as such is under the authority of NCC. Historical OS mapping shows the original path of the watercourse to have been west to east through what is now the southern part of the former coal storage yard and railway sidings site before turning sharply south at Cambois, towards the Blyth Estuary.
- 13.71 Worley Parsons carried out a ground investigation for the Proposed Development in 2013 and a summary is provided in Chapter 12. Worley Parsons reported that on the 14th June 2013 Cow Gut was dry, however, water has been noted at other times suggesting an influence from seasonal rainfall and run off events.
- 13.72 Historical OS maps from 1932 show a small watercourse flowing west to east between Cow Gut and Maw Burn and to the south of the industrial park, with a small pond adjacent to the existing public footpath. From the pond the watercourse then flowed west to east across the area of the former coal storage yard and discharged to the North Sea. Later OS maps no longer show the watercourse east of the footpath suggesting that it was diverted south to Cow Gut. There is a watercourse that flows parallel with the footpath in this area towards Cow Gut and although it was not possible to confirm that it joined the Gut it is considered to be the diverted watercourse. EA surface water flood maps show an elevated risk of surface water flooding in this area, suggesting poor drainage. The presence and location of this watercourse was also confirmed during site visits by Worley Parsons in 2013.

13.73 Sleek Burn, at the closest point to the site, is a tidal creek which forms part of the river Blyth Estuary. The creek is fed by a small river of the same name which is classified as a Main River.

13.74 Table 13.5 summarises the surface water features in or close to the Proposed Development by cable route section.

Table 13.5: Summary of Surface Water Features by Site Section

Section	Surface Water Feature	Distance / Direction
1	North Sea	On site
2	River Wansbeck	240m north
	Maw Burn (riparian ownership, partially culverted)	50m south
3	Maw Burn	On site
4	Maw Burn	5m north
5	Unnamed Watercourse/ditch and small pond	On site
	Cow Gut (Ordinary Watercourse, heavily modified, seasonally wet)	On site
6	Cow Gut (Ordinary Watercourse, heavily modified, seasonally dry)	Adjacent to north
	Pond at former coal store site	400m east
Converter Station	Cow Gut	<170m north
	Sleek Burn	200m south
7	Unnamed ditches	On site
	Sleek Burn (Primary River, Estuary)	On site

13.75 It is anticipated that the surface water flows from the Proposed Development will be located within the catchments of the above listed watercourses. There is likely to be direct overland and underground flow within Section 1 to the North Sea.

13.76 The unnamed ditches recorded within Section 7 are likely to be associated with former infrastructure at the Blyth Powerstation site, and are shown on OS maps. It was not possible to survey this area during the site visit due to access restrictions. No natural watercourses are shown in this area on historic maps prior to the construction of the power station. It is considered that the drains would have been installed to convey surface water runoff from the former power station to Sleek Burn. On this basis the ditches are likely to be small and considered to be of very low value. Given the seasonal variability of larger watercourses that has been reported in the area they are also likely to be dry for much of the year, except during peak runoff events.

Existing Flood Risk

Fluvial and Tidal

13.77 The EA indicative flood map for the site shows that the majority of the Proposed Development to be located within Flood Zone 1, where the flood risk is assessed as having less than a 1 in 1000 year return period, and is therefore considered to be at **low risk** of flooding from rivers and sea. The exception to this is in Sections 1 and 7 of the Proposed Development when land falls within the tidal zone (Zone 3b: Functional Floodplain) and within the sea and estuary respectively. This is discussed in more detail in the Assessment of Effects section below.

Surface Water and Sewer Drainage Risk

13.78 The Northumberland SFRA shows that parts of the Proposed Development are susceptible to surface water flooding. The EA surface water flood maps display a similar distribution of surface water flood risk across the area. The maximum surface water flood susceptibility for each section of the route is summarised in Table 13.6 below.

Table 13.6: Surface Water Flood Risk

Section	Surface Water Flood Risk	Notes
1	None	N/A
2	Less/Intermediate	Low lying land within agricultural fields and along Wembley Gardens.
3	Less/Intermediate	Low ground adjacent to railway/road crossing
4	Less/Intermediate	Localised section of road within industrial park
5	Intermediate/More	Low lying land adjacent to hedgerow along eastern edge of motorbike track.
6	Less/Intermediate	Low lying land within agricultural fields
Converter Station	Intermediate/More	Significant area of intermediate susceptibility covering land to the east of the converter station site.
7	Less	Small, localised areas of agricultural land

13.79 The Northumberland SFRA provides mapping to show areas where the drainage network (sewers) may be susceptible to being overwhelmed during periods of high intensity rainfall. These maps show that the application area is located within an area at intermediate susceptibility to sewer and storm water flooding.

Groundwater Flood Risk

13.80 The Northumberland SFRA does not provide an assessment of the risk of flooding from groundwater. Taking into account the underlying geology in the Proposed Development this is considered to be low risk.

13.81 There is unlikely to be a significant risk of groundwater flooding within the beach deposits and windblown sand geology at the landfall location (above high tide mark), given that the land is locally elevated above the surrounding area (beach) and the water table is likely to be several metres below ground level. Groundwater levels within the beach deposits are likely to be influenced by the tide.

Artificial Water Bodies

13.82 The EA’s indicative reservoir flood risk maps show that the application area is not at risk of reservoir flooding. There are no artificial water bodies such as canals or reservoirs within the vicinity of the application area, therefore the flood risk from artificial sources is considered to be low.

Flood Risk Summary

13.83 Table 13.7 presents a summary of the flood risks at the Proposed Development.

Table 13.7: Flood Risk Summary

Source	Flood Risk	Details
Tidal/fluvial	Low	Majority of site located within Flood Zone 1: less than 1 in 1000 year return period
Surface Water and Sewer	Intermediate	Whilst the majority of the cable route is located within an area where surface water flooding is not an issue, there are localised areas with an intermediate to higher susceptibility
Groundwater	Low	No groundwater within superficial deposits (glacial till)
Artificial water bodies	Low	None within vicinity of site.

13.84 Northumbrian Water Site Enquiry Plans show there to be existing combined sewers located on Brock Lane, approximately 230m east of the point at which the land within the Proposed Development crosses the road. Only road drainage and existing distribution water mains are shown on site at this location.

13.85 On the plans showing Wembley Gardens, there are three parallel pipes shown located to the north of the road within agricultural fields. These comprise the following:

- An overflow interceptor pipe which is likely to intercept and convey combined sewage overflow from Cambois to the sewage works (overflow would originally have been discharged directly to the sea); and
- Two pipes associated with the conveyance of treated sewage to an outfall pipe on the North Sea coast.

13.86 There is also a sewage pipe linking the Synpac works (located west of the A189) to an outfall at North Cambois which lies parallel to the above mentioned pipes at the crossing point with the project. There are additional combined sewers parallel with the railway and road. The cable route crosses all of these features.

- 13.87 A network of separate surface water drains and sewers are shown within Ferguson's Business Park. These discharge to a combined sewer towards the north of the sewage works.
- 13.88 It is anticipated that land drainage systems will be present in agricultural land at the site but the extent or layout of land drainage cannot be confirmed at this time.

Water Quality

- 13.89 As noted above and shown in Figure 13.1 the Proposed Development is located within the vicinity of a number of surface water bodies comprising the Wansbeck and Blyth Estuaries, Maw Burn, Cow Gut and Sleek Burn.
- 13.90 The Blyth and Wansbeck estuaries are subject to River Basin Management Plans for the Northumbria region, the most recent EA data for which is summarised in Table 13.8 below.

Table 13.8: River Basin Management Plan Data

River Name	Typology	Physicochemical Quality	Hydro Morphology	Ecological Status (Current/ Predicted)
Blyth	Estuary: Partially mixed meso	Good	Heavily modified	Good/Good
Wansbeck	Estuary: Partially mixed meso	Poor	Heavily modified	Moderate/Moderate
North Sea (Tyne and Wear)	Moderately exposed, mesotidal	Good	Not designated	Good/Good

- 13.91 The data present in Table 13.8 shows that the Blyth Estuary has demonstrated high biological quality, in contrast to the Wansbeck which has poor/moderate biological quality. There is not anticipated to be any significant change in the quality of these watercourses leading up to 2015. Both estuaries are classified as heavily modified as a result of human activity.
- 13.92 The North Sea demonstrates good physicochemical and ecological quality status.

Designated Sites for Nature Conservation

- 13.93 The Northumberland Shore Site of Special Scientific Interest (SSSI) extends to the high tide mark for the length of coastline between the Blyth and Wansbeck estuaries and is located immediately adjacent to the site at its closest point (landfall location). The Northumberland Shore SSSI also occupies part of the Blyth Estuary, to the mouth of Sleek Burn. This is approximately 620m downstream of the anticipated surface water outfall for the converter station, as detailed under Assessment of Effects below.
- 13.94 The remainder of the Blyth Estuary upstream of the Northumberland Shore SSSI including Sleek Burn is designated as a Local Wildlife Site (LWS). The LWS is located partially within Section 7 of the Proposed Development.

- 13.95 At the mouth of the Blyth Estuary, the coastal waters are designated as the Northumbria Coast Ramsar site and Special Protection Area (SPA). These sites are located approximately 3.4km downstream from the site.
- 13.96 As outlined above, the area of cable route at Cambois beach between the high water and low water marks is covered by both the UK Onshore ES and the UK Marine ES for NSN Link. The UK Marine ES provides a full account of the baseline within this area, the key information relevant to the intertidal area is as follows:
- Water quality in the North Sea is the result of the combination of a number of factors including source, transport and removal mechanisms for the individual pollutant under consideration;
 - The coast has been heavily influenced by human activity with historic and extant sources of contamination nearby including mining and metallurgic industries and sewage outfalls;
 - The majority of contaminants entering the marine environment via water (e.g. river or sewage) tend to fall out of suspension or solution within the estuary or close to shore as a result of the change in salinity/solute potential (e.g. heavy metals), or, if soluble in seawater are rapidly diluted;
 - Background turbidity levels close to the shore are anticipated to be high within the vicinity of the proposed development;
 - Bathing water quality is not measured at Cambois beach as it is not an EU designated bathing water. However, Newbiggin Beach (3.3km north) has achieved 'very good' status since 2009. In contrast, Blyth South beach (4.5km south) has not always achieved the same quality – this could be as a result of a watercourse outfall at the centre of the beach or due to its location immediately to the south and therefore 'downstream' of the Blyth Estuary;
 - There are no shellfish waters within the Cambois area;
 - Sediment along the foreshore is known to be affected by colliery waste, deposited on the beach between 1920 and 1968 and now widespread along the foreshore.

Proposed Development

- 13.97 A full description of the Proposed Development during the construction and operational phases is given in Chapter 4. Those features and assumptions relevant to hydrology are summarised as follows, including best practice methods.
- 13.98 The cables will typically be buried within trenches. As shown in Inset 4.1 included in Chapter 4 the trench section will be 1m - 3m deep and approximately 1.5m at the surface tapering to 1m at the bottom of the trench. The depth of the trench will typically be excavated to between 1m and 2m below ground level (bgl) however in localised areas excavations may be extended to 3m bgl. The trench will be excavated backfilled and restored to the existing ground level.
- 13.99 At this stage it is understood that there will be one large construction compound (approximately 100m x 100m) and this will be located east of the converter station site. Further small construction compounds for localised storage of materials and plant are likely to be required at intervals along the cable routes but these have not yet been sited.

Watercourse Crossings

13.100 Where possible watercourses will be crossed by open cut methods, this will involve the watercourse being temporarily dammed and a pump used to maintain flow across the cable trench. Once the cable is installed the watercourse will then be reinstated.

13.101 At Cow Gut the following alternatives to open cut methods are being considered:

- Pipe bridge – no interaction with surface water needed for construction; and
- Existing culvert - no interaction with surface water need for construction.

13.102 For the purposes of this assessment, the method considered to be of the highest impact (open cut method) is carried forward in order to represent a reasonable worst case. Although the information from Worley Parsons indicates that Cow Gut only flows seasonally, it has been assumed for the purposes of representing a reasonable worst case that the watercourse will be flowing throughout the construction period. In any case the duration of the construction is likely to include rainfall events and seasonal variations in flow.

13.103 Within Section 3 the railway/roads will be crossed by trenchless techniques such as HDD, thrust bore or pipe jacking, it is anticipated that Maw Burn will be crossed at the same time. There will therefore be no impact to this watercourse, providing that the trenchless techniques are carried out to a sufficient depth and that the launch/receive pits are located a minimum of 10m from the watercourse.

Landfall Location

13.104 The engineering techniques for the landfall will be confirmed during the detailed design stage however for the purposes of this assessment the open cut has been assessed as a worst case.

13.105 Alternative drilling methods could be adopted and these would involve the use of bentonite drilling muds which can pollute surface water but can be properly managed and controlled through construction best practice techniques.

13.106 Bringing the cable on shore will involve some work on the beach below the high water mark, potentially including the excavation and backfilling of trenches. This work will be similar in scale and the type of impact to the cable installation methods detailed within the UK Marine ES, which were assessed as **low significance**.

Temporary Drainage

13.107 It may be necessary during the construction period for drains to be installed along the lengths of the trenches to prevent surface water runoff from filling the excavations. These drains would typically discharge to small settlement ponds, prior to discharge to watercourses. Consultation with the EA would be required prior to any discharge to watercourses. Straw bales or other best practice silt control measures may also be used to reduce the silt load of runoff.

13.108 Temporary settling ponds would typically be located close to the discharge point, which would necessitate either a localised widening of the construction working width to accommodate both the ponds and the soil storage, or the soil storage for the locality can be moved to a designated area (e.g. construction compounds).

13.109 Temporary drainage would also need to account for any land drains that are temporarily severed for the cable installation. The temporary site drains can be used to intercept water from land drainage if required.

13.110 Where dewatering is required to remove water from excavations, it is anticipated that water will be pumped on to adjacent grassland (within the Proposed Development and with the permission of the landowner) in order to reduce silt load, and not directly to watercourses or drains.

13.111 Where contaminated land is present, additional measures may be required to treat site drainage prior to discharge to watercourses, or water may need to be transported off site by tanker for treatment.

Storage of Plant and Materials

13.112 Materials and plant will not be stored within 50m of a watercourse, or within an area deemed to be at risk of flooding, with the exception of site won topsoil and subsoil which will not be stored within 10m of a watercourse. This will be taken into account when locating small construction compounds.

13.113 Topsoil and subsoil stockpiles will be covered or temporarily seeded with grass to reduce runoff and silt.

13.114 Plant and materials – with the exception of materials excavated from the beach itself – will not be stored within the intertidal zone and will be stored within a designated area back from the beach.

13.115 Full measures for the storage of plant and materials will be detailed within a Construction Environmental Management Plan (CEMP) which would be prepared prior to construction. The CEMP will also detail measures to prevent pollution from plant that will work on the beach.

13.116 A concrete wash out area will be constructed which will require approval by the EA. This will be used to wash out concrete handling and transport vehicles after use to prevent concrete from entering controlled waters.

Completed Cable Trenches

13.117 Once the cables and associated structures and materials are installed (including ducts, cement bound sand, protection tiles and warning tape), the trench will be backfilled with site won subsoil and topsoil which will have been stockpiled either alongside the cable routes or at designated locations. Temporary drainage will be removed. The subsoil will be compacted before the topsoil is reinstated. Topsoil will not be compacted. The level will be restored to pre-construction ground levels in order not to interfere with overland flow paths.

Jointing Bays

13.118 The location of jointing bays has not yet been confirmed. Siting for jointing bays will be carried out at the detailed design stage. Jointing bays will not be located within an area at risk of tidal or fluvial flooding but can be located within areas at risk of surface water flooding if adequate drainage is provided during construction.

Converter Station

13.119 A draft drainage strategy for the converter station has been produced by Arup. This assessment utilises the principles of the strategy assuming the use of standard construction techniques and practices and full compliance with UK legislation and guidance. The drainage strategy has been produced based on the following assumptions:

- There will be an increase in impermeable area as a result of the construction of the converter station and associated infrastructure, but this is in the context of the fact that the glacial till at the site is of low permeability anyway;
- The EA have agreed in principle that providing surface water from the converter station site is discharged directly to Sleek Burn it would be appropriate to discharge at an unrestricted peak runoff rate on the grounds of flood risk, since Sleek Burn is tidal;
- Unrestricted discharge to Sleek Burn would negate the need for Sustainable Drainage Systems (SuDS) on the grounds of flooding alone (quantity of water). This is because the anticipated volumes would not increase flood risk in a tidal estuary. On this basis the Proposed Development will not result in an increase in downstream flood risk due to surface water runoff;
- However, some SuDS have been proposed for the converter station drainage in the interests of water quality. The SuDS would be installed in line with the 'treatment train' approach, whereby a number of SuDS components are installed in series. These have not been confirmed but would likely include features such as permeable paving, mini-swales, bio-retention or planters and small ponds or basins. Oil/petrol interceptors would be used in road gullies/car parks; and
- The converter station site is situated within an area at moderate to high risk of surface water flooding, which is likely to be contributed to by overland flow from the west.

13.120 There are two options being considered to convey surface water from the converter station site to a discharge point on the Sleek Burn. The first option involves a surface swale which would cross Brock Lane via a culvert. The second option involves a buried pipe to achieve the same connection. There are existing sewers and surface water drainage along Brock Lane that both options would need to cross, the levels for which are not known at this time.

13.121 The converter station site could potentially influence overland flow from land to the west towards Cow Gut watercourse. Typically, it would be appropriate to divert this flow around the development so as to maintain its original path. It is likely that this flow is contributing to the existing surface water flood risk in this area and as such it may be more appropriate to divert any surface water flow from the area surrounding the converter station site into the Proposed Developments drainage system to allow it to discharge to Sleek Burn, thereby reducing flood risk in the area. The converter station layout includes a large swale system that encompasses the perimeter of the site. This system will not only receive surface runoff from the site, but will also receive runoff from the surrounding fields, providing additional pluvial protection to the site.

- 13.122 With regards to foul drainage, foul flows from the converter station site are expected to be very low due to the minimal requirements for site staff. Combined sewers have been identified within the vicinity of the converter station site (Brock Lane) and it would therefore be feasible to discharge directly to public sewers via a short new connection. Further discussions would be required with Northumbrian Water to agree discharge from the site into the sewer. Alternatively and in the event that connection to an existing sewer is not feasible, foul drainage could be treated on site. Typically this could comprise a septic tank as the primary form of treatment, together with secondary and tertiary treatment (e.g. reed beds) if required prior to discharge, potentially to Sleek Burn.
- 13.123 There is the potential for any discharge to Sleek Burn, whether it be surface water runoff or treated foul drainage, to impact upon the LWS (on site) or on the SSSI further downstream. Providing that adequate SuDS are incorporated into the design in line with the strategy outlined above a significant impact is not anticipated. The high dilution rates associated with discharge to the estuary is likely to further decrease any potential effects on water quality within the LWS.

Assessment of Effects – Construction Phase (Flood Risk)

- 13.124 It has been assessed that the Proposed Development is at low risk of flooding from tidal and fluvial sources, and from groundwater flooding with the exception of those areas within Sections 1 and 7 which are located within the tidal zone. Below this point, the cables will be installed as for the marine element, the environmental impacts of which are assessed within the UK Marine ES.
- 13.125 The risk of surface water flooding at some parts of the Proposed Development will be most relevant during construction, when excavations and ground works will be undertaken in these areas. The incorporated mitigation measures discussed above including temporary drainage of the trenches during cable trench construction and storage of plant and materials outside of areas of known surface water flood risk will reduce the construction phase surface water flood risk to the scheme to existing low levels. Notwithstanding this in some areas a moderate risk of surface water flooding affecting the trenches will remain, however, such flooding is temporary and localised in nature and can be dealt with by responsible dewatering techniques during construction. It would also be minimised by temporary drainage which would be incorporated into the construction design. The overall impact from surface water flooding is assessed as **Minor**.

Assessment of Effects –Operational Phase (Flood Risk)

- 13.126 It has been assessed that the Proposed Development is at **low risk** of flooding from tidal and fluvial sources, and from groundwater flooding.
- 13.127 As noted above, a potential risk of surface water flooding has been identified for parts of the application area. The majority of the Proposed Development will not be at risk of flooding once operational as the cables will be buried underground. Sensitive infrastructure such as jointing bays will not be located within areas with a known risk of surface water flooding.

13.128 Given that Sleek Burn is tidal, it is considered to have sufficient volume and capacity to accept surface water drainage from the converter station site without impacts downstream. This approach has been agreed in principle through initial discussion with the EA.

13.129 The converter station site drainage strategy will be designed such that runoff generated by the increased impermeable areas will not increase flood risk to downstream receptors. In addition, the drainage measures and discharge of surface water runoff directly to Sleek Burn may help to alleviate the existing risk of surface water flooding in the vicinity of the converter station. Current proposals allow sufficient capacity to accept surface water runoff from the fields surrounding the converter station site into the proposed drainage system for discharge to Sleek Burn, which would have a beneficial effect on surface water flood risk in the area.

13.130 Based on the above, the overall impact during the operational phase from surface water flooding has been assessed as minor beneficial.

Water Quality

Identification of Receptors

13.131 Table 13.9 below details the receptors identified for the construction and operational phases of the proposed development and their assessed sensitivity.

Table 13.9: Hydrological Receptors

Receptor	Description	Sensitivity
North Sea	Tidal open sea. Assessed as low sensitivity within Chapter 8 of the UK Marine ES as a result of its strong capacity for dilution and dispersion, and high background levels of turbidity.	Low
Maw Burn watercourse	Heavily modified watercourse under riparian ownership. Not directly impacted by the Proposed Development (it is to be crossed by trenchless techniques). Of limited value or rarity. Water quality likely to be impacted by surrounding industrial land use with little scope for improvement.	Low
Unnamed Watercourse (Section 5 of Cable Route)	Likely to be under riparian ownership – it is not known to local regulators. Of limited value or rarity. Water quality likely to be impacted by surrounding industrial land use with little scope for improvement.	Low
Cow Gut watercourse	Watercourse likely to be of some value on a local scale for wildlife (upstream) but is of very low value downstream as it is culverted. Classified as an Ordinary Watercourse (regulated by NCC). Watercourse discharges ultimately to part of the Blyth Estuary designated as a European protected site. Watercourse is ephemeral.	Medium

Receptor	Description	Sensitivity
Sleek Burn (Blyth Estuary)	<p>Meso-tidal, partially mixed estuary. Dispersion and dilution rates anticipated to be very high. Sleek Burn is designated as a Local Wildlife Site (LWS) within the boundaries of the Proposed Development. Blyth Estuary designated as the Northumberland Shore SSSI approximately 620m downstream of the Proposed Development.</p> <p>Given the dispersion rates and distance to the SSSI this receptor is not considered to be of high sensitivity.</p> <p>Designation as a LWS within the boundaries of the Proposed Development means that the receptor is of significant value on a local scale.</p>	Medium
Unnamed ditches and agricultural field drains (throughout Proposed Development)	Of exceptionally low value as a water resource and wildlife.	Low

Assessment of Effects –Construction Phase (Water Quality)

Potential Sources of Pollution – Construction Phase

13.132 Typical pollutants from construction sites include suspended solids, oils and hydrocarbons, cement and concrete products, heavy metals and metalloids, bentonite, dust and solvents/paints. Sources of these pollutants can include excavations, stockpiles, plant and wheel washing, fuel storage tanks, general plant use and maintenance, and accidents and spillages.

Potential Pathways for Pollution – Construction Phase

13.133 During construction, the following potential pathways have been identified:

- Risk of pollutants from construction processes and excavations entering watercourses via site drainage – incorporated mitigation assuming compliance with Pollution Prevention Guidelines (PPG) and the temporary measures detailed above (e.g. silt traps and temporary settling ponds) and so this pathway is considered to be of **low risk**;
- Risk of pollutants entering surface water via overland flow – this pathway will be limited by the incorporated mitigation comprising appropriate storage of materials and soil as detailed above and so the risk is considered to be **low**.
- Disturbance of sediments and scour in the intertidal zone at the landfall location and within the Blyth Estuary – this pathway is direct as works are to take place directly within sea/estuary;
- Disturbance of sediments and scour in the intertidal zone at the landfall location (North Sea) and within the Blyth Estuary – this pathway is direct as works are to take place directly within sea/estuary
- Disturbance of sediments and erosion as a result of open cut watercourse crossing at Cow Gut – this pathway is direct as works are to take place within the watercourse.

Magnitude of Impact – Construction Phase

- 13.134 The magnitude of impact from pollutants entering watercourses via site drainage or overland flow is assessed as **low** given the incorporated mitigation that will prevent any pathway to the receptor.
- 13.135 The impact of disturbance of sediments and scour at the landfall location is based on the assessment within Chapter 8 of the UK Marine ES, which concludes that the impacts from sediment disturbance would be low based on a number of factors such as, dispersal extent and the localised and temporary nature of such impacts. In addition, incorporated mitigation and standard construction best practice for pollution prevention will limit the impact from the onshore construction component to **low**.
- 13.136 The impact of disturbance to sediments and the potential for scour at the surface water outfall for the construction phase is assessed as **low**. The works to construct the outfall would involve limited disturbance to the estuary but any disturbance would be temporary in nature and limited to the immediate area adjacent to the outfall.
- 13.137 Disturbance to Cow Gut will be most marked during the work in the open cut features including the damming of the watercourse and likely installation of over pumping apparatus. There are likely to be temporary impacts on turbidity in the watercourse downstream. However, the impacts to the watercourse throughout the cable installation will be limited by the incorporated mitigation and as such the magnitude of impact is assessed as **low**.

Assessment of Effects –Operational Phase (Water Quality)*Potential Sources of Pollution – Operational Phase*

- 13.138 Potential sources of pollution which could impact upon water quality during the operational phase have been identified as follows:
- Surface water runoff from the converter station site containing dust (silt) and diffuse contaminants*;
 - Mud and silt from the estuary at the outfall for the converter station drainage;
 - Oils and other chemicals, such as coolants, used within the converter station site and parking areas; and
 - Trace metals and metalloids from the converter station site.

*Large industrial developments can accumulate significant quantities of dust and organic material such as bird guano⁵ (potential source of nutrients and pathogens) on roofs and areas of hardstanding. At the existing site (agricultural land) vegetation and soil will largely prevent these materials from entering watercourses in high concentrations, but with the development of the converter station dust and guano could be washed into the drainage system, typically during periods of heavy rainfall following a prolonged dry period.

Potential Pathways – Operational Phase

- 13.139 Once the development is operational potential pathways will be largely limited to the converter station site as the cable routes will be buried underground and are unlikely to require frequent intrusive maintenance. The main pathways between the converter station site and receptors would be surface water drainage and, to a lesser extent, potential surface

⁵ Water Regulations Advisory Scheme (1999) *Reclaimed Water Systems: Information about Installing, Modifying or Maintaining Reclaimed Water Systems*. Water Regulations Advisory Scheme. Gwent.

water flooding and overland flow from the converter station site (for which substantial incorporated mitigation is proposed as detailed above).

13.140 The concept of the drainage strategy for the converter station site is to direct all surface water runoff from within the site to discharge to the Sleek Burn via a new drainage pipe or culvert. The probability of oils, coolants and other chemicals entering the drainage is low, assuming that drums, containers and fixed plant are stored appropriately and banded in line with best practice and PPG. There will be some metals and other trace contaminants entering the drainage system through surface water coming into direct contact with metal objects such as electrical equipment and roofing but levels are likely to be very low. Dust can add to the silt content of runoff and can increase turbidity and introduce nutrients and pathogens to watercourses.

Magnitude of Impact – Operational Phase

13.141 Providing the implementation of SuDS and the other drainage measures detailed within the draft converter station drainage strategy, the magnitude of impacts to Sleek Burn and Blyth Estuary from dust and trace contaminants from the converter station drainage has been assessed as **Negligible**.

13.142 The converter station drainage will most likely provide some attenuation of peak flows in the form of swales. This will help to control the rate of flow to the discharge point on Sleek Burn. However, the fall of the swale and the height of the outfall have not yet been calculated and therefore the water velocity is currently unknown. There is the potential for minor scour effects from the outfall on the mud slopes of the estuary at low tide. The magnitude of this impact has been assessed as **Medium**.

Water Quality Significance of Impacts

13.143 Table 13.10 below shows the Significance of Impacts for the construction and operational phases of the proposed development, without mitigation.

Table 13.10: Water Quality – Assessment of Impacts Before Mitigation

Receptor	Sensitivity	Source and Pathway	Magnitude	Significance	Description
Construction Phase					
North Sea	Low	Disturbance of sediments and potential for pollution in intertidal zone during cable installation	Low	None	Full assessment is made within Chapter 8 of the UK Marine ES. The construction of the onshore cable route will not add to or change this assessment due to incorporated mitigation and standard construction best practice for pollution prevention.
Maw Burn	Low	No pathway established	Negligible	None	Crossed by trenchless techniques
Unnamed Watercourse	Low	Open cut crossing – temporary disturbance. No discharge of temporary drainage proposed for this watercourse.	Low	None	Minor localised impacts limited to open cut crossing for trench installation. Watercourse to be fully re-instated following construction.
Cow Gut	Medium	Open cut crossing – temporary disturbance. Discharge of temporary site drainage to this watercourse.	Low	Minor	Disturbance during installation of the open cut crossing will be temporary in nature. Discharge of temporary site drainage to be carried out subject to temporary SuDS and under agreement with the Regulator.
Sleek Burn (LWS) and Blyth Estuary (SSSI)	Medium	Direct disturbance to estuarine sediments during construction of new surface water outfall.	Low	Minor	Effects limited in extent and temporary in nature.
Unnamed ditches within Section 7 and agricultural field drains throughout	Low	Open cut crossing – temporary disturbance. Very low susceptibility to water quality impacts	Negligible	None	Minor localised impacts limited to open cut crossing for trench installation. Land drains diverted into temporary site drains during construction.

Receptor	Sensitivity	Source and Pathway	Magnitude	Significance	Description
Operational Phase					
North Sea	Low	Cables buried throughout. No pathway.	Negligible	None	N/A
Maw Burn	Low	Cables installed. No impacts to surface features.	Negligible	None	N/A
Unnamed Watercourse	Low	Cables installed. No impacts to surface features.	Negligible	None	N/A
Cow Gut	Medium	Cables installed. No impacts to surface features.	Negligible	None	N/A
Sleek Burn (LWS) and Blyth Estuary (SSSI)	Medium	Permanent surface water outfall to Sleek Burn. Pollution from surface water drainage.	Negligible	None	Impacts to water quality from the converter station drainage are limited by incorporated mitigation including SuDS. The receptor (estuary) has substantial ability to absorb minor impacts by dilution and dispersal.
Sleek Burn (LWS) and Blyth Estuary (SSSI)	Medium	Direct disturbance to estuarine sediments by scour caused by the proposed outfall.	Medium	Moderate	The potential for scour could have secondary impacts on water quality locally within Sleek Burn. Impacts are unlikely to extend as far as the more sensitive part of the estuary (SSSI within Blyth Estuary)
Unnamed ditches within Section 7 and agricultural field drains throughout	Low	Cables installed. No impacts to surface features.	Negligible	None	N/A

Intertidal Area

13.144 Chapter 8 of the UK Marine ES concludes that the marine cable, which includes installation up to the high water spring mark, will not have any significant impacts on water quality within the North Sea as measured against the objectives of the Water Framework Directive for both the construction and operational phases. This includes the following factors:

- Sediment disturbance;
- Pollution from ships including discharge and accidental spillages; and
- Disposal of ballast waters from ships.

13.145 No additional activities will take place below the high water mark for the onshore cable route; therefore the impacts to the intertidal zone arising from the onshore construction works are assessed as None.

Flooding and Overland Flow

13.146 Flood events have the potential to release and transport contaminants which would not otherwise be exposed to water. Given the nature of the converter station site and the high voltage electrical equipment, it is essential that the converter station site does not flood and the flood risk has been confirmed as **low**, with the exception of surface water flooding. The principles outlined in the drainage strategy and site levels will ensure that the converter station site is not at an elevated risk of surface water flooding, therefore the secondary impacts to water quality are assessed as **None**.

Mitigation

Construction Phase

13.147 The flood risk to the Proposed Development from fluvial, tidal and groundwater sources has been assessed as low, and this is not likely to increase as a result of construction activities. No further mitigation is required.

13.148 A minor impact from surface water flooding has been identified for the construction period. The minor impact takes account of the incorporated mitigation comprising the adoption of best practice construction methods in accordance with a CEMP which will be produced for the project. No further mitigation is required.

13.149 Minor impacts have been identified for the proposed works for an open cut crossing at Cow Gut, and for the installation of the new drainage outfall at Sleek Burn. These impacts are already minimised by the incorporated mitigation, including pollution control measures (e.g. silt traps), and the remaining minor impacts are short term and relate to the initial disturbance (e.g. damming of Cow Gut, or initial excavation for the new outfall). In order to get the most out of the incorporated mitigation for these two aspects of the Proposed Development the methods for construction adjacent to or within all watercourses will be detailed fully within the CEMP, regardless of sensitivity. Approval of detailed method statements will be required from Regulator (NCC/EA) prior to any works to watercourses.

Operational Phase

13.150 During the operational phase, the risk of surface water flooding at the converter station site has been taken into account in the design, and as such the site levels and the drainage

design are likely to have a minor beneficial impact on surface water flooding in the area by diverting overland flow from the areas at risk into the proposed new surface water connection to Sleek Burn. No mitigation is proposed.

13.151 The HVDC and HVAC cable routes from the landfall location to Blyth substation are not located within an area at risk of flooding from rivers and sea, therefore no mitigation is proposed. Below the high water mark the cable installation will be as for the marine cable route and hence flooding is not an issue.

13.152 Given that Sleek Burn is tidal, it is considered to have sufficient volume and capacity to accept surface water drainage from the converter station site without impacts on flood risk downstream. This approach has been agreed through initial discussion with the EA. No further mitigation is proposed.

13.153 The potential for a moderate significant impact has been identified to the Blyth Estuary as a result of scour from the proposed new surface water outfall, particularly during times of peak flow. Mitigation is required in order to minimise this impact. Measures to mitigate this impact would need to be discussed with the EA, but would typically comprise installation of scour protection (for example, rock armour) below the outfall to reduce the direct effects of the outfall on the banks of the estuary. If this is not suitable or not effective as a standalone solution the velocity of the water at the outfall can be reduced by throttling or a stilling feature, which would necessitate some storage (such as swales) within the drainage design for the converter station. Full consideration of the mitigation methods for the outfall would be considered at the detailed design stage. Through implementation of one or both of the methods outlined above, or other suitable alternative methods, the significance of impact post-mitigation is assessed as Minor.

Residual Effects and Recommendations

13.154 The assessment of impacts post-mitigation is shown in Table 13.11.

Table 13.11: Water Quality - Assessment of Impacts After Mitigation

Receptor	Source and Pathway	Sensitivity before Mitigation	Magnitude before Mitigation	Significance before Mitigation	Mitigation	Sensitivity After Mitigation	Magnitude After Mitigation	Significance After Mitigation
Construction Phase								
North Sea	Disturbance of sediments in intertidal zone during cable installation	Low	Low	None	N/A	Low	Low	None
Maw Burn	No pathway established	Low	Negligible	None	N/A	Low	Negligible	None
Unnamed Watercourse	Open cut crossing – temporary disturbance. No discharge of temporary drainage proposed for this watercourse.	Low	Low	None	N/A	Low	Low	None
Cow Gut	Open cut crossing – temporary disturbance. Discharge of temporary site drainage to this watercourse.	Medium	Low	Minor	N/A	Medium	Low	Minor

Receptor	Source and Pathway	Sensitivity before Mitigation	Magnitude before Mitigation	Significance before Mitigation	Mitigation	Sensitivity After Mitigation	Magnitude After Mitigation	Significance After Mitigation
Sleek Burn (LWS) and Blyth Estuary (SSSI)	Direct disturbance to estuarine sediments during construction of new surface water outfall.	Medium	Low	Minor	N/A	Medium	Low	Minor
Unnamed ditches within Section 7 and agricultural field drains throughout	Open cut crossing – temporary disturbance. Very low susceptibility to water quality impacts	Low	Negligible	None	N/A	Low	Negligible	None
Operational Phase								
North Sea	Cables buried throughout. No pathway.	Low	Negligible	None	N/A	Low	Negligible	None
Maw Burn	Cables installed. No impacts to surface features.	Low	Negligible	None	N/A	Low	Negligible	None
Unnamed Watercourse	Cables installed. No impacts to surface features.	Low	Negligible	None	N/A	Low	Negligible	None
Cow Gut	Cables installed. No impacts to surface features.	Medium	Negligible	None	N/A	Medium	Negligible	None

Receptor	Source and Pathway	Sensitivity before Mitigation	Magnitude before Mitigation	Significance before Mitigation	Mitigation	Sensitivity After Mitigation	Magnitude After Mitigation	Significance After Mitigation
Sleek Burn (LWS) and Blyth Estuary (SSSI)	Permanent surface water outfall to Sleek Burn. Pollution from surface water drainage.	Medium	Negligible	None	N/A	Medium	Negligible	None
Sleek Burn (LWS) and Blyth Estuary (SSSI)	Direct disturbance to estuarine sediments by scour caused by the proposed outfall.	Medium	Medium	Moderate	Mitigation measures may include scour protection of the estuary banks , and/or throttling of peak flows from the outfall	Medium	Low	Minor
Unnamed ditches within Section 7 and agricultural field drains throughout	Cables installed. No impacts to surface features.	Low	Negligible	None	N/A	Low	Negligible	None

Construction Phase

13.155 Providing the incorporated mitigation measures are adopted, including construction best practice and adherence to a CEMP with associated detailed method statements where required, no residual impacts from the construction phase are anticipated. Particular attention should be drawn within the CEMP to the Cow Gut open cut watercourse crossing and to the installation of a new outfall at Sleek Burn, both of which are likely to require approval of detailed method statements by the relevant Regulatory body (NCC and EA respectively).

Operational Phase

13.156 The flood risk to the site from fluvial, tidal and groundwater sources has been assessed as low. No further mitigation is required and no residual impacts will arise.

13.157 There is the potential for moderate impacts to water quality during the operational phase due to the potential for scour at the new surface water conveyance and outfall. Once proposals are further advanced, it will be necessary to incorporate mitigation measures as outlined above to address this issue. Providing these measures are incorporated at the detailed design stage then no significant residual impacts are anticipated.

13.158 No residual impacts to Sleek Burn are anticipated directly from pollution arising from the converter station drainage. Measures have been included, as incorporated mitigation, into the design of the converter station drainage in line with the 'treatment train' approach and this will minimise any potential impacts. No further mitigation has been proposed and no residual impacts are anticipated.

13.159 Overall, no residual impacts above minor significance are anticipated for hydrology and flood risk.

Cumulative Effects

13.160 The following major development proposals have been considered as part of the assessment of potential cumulative effects:

- Port of Blyth Biomass Power Station;
- Proposed NGET 400kV GIS Substation;
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site; and
- Residential development – 48 dwellings.

Port of Blyth Biomass Power Station

13.161 The proposed Port of Blyth Biomass Power Station is a consented scheme for which the ES is available at the National Planning Portal website.

13.162 The project is for the construction of a new biomass power plant located at a 5ha site within the Port of Blyth, centred at OSNGR 431012 582712. The site is located approximately 950m east from the closest point of the application area, and approximately 1.6km downstream of the proposed surface water drainage outfall for NSN Link converter station.

13.163 Those features of the Port of Blyth Biomass power station relevant to hydrology are summarised as follows:

- The scheme will require periodic dredging within the port of Blyth to maintain access to the deep water berth for fuel deliveries;
- The scheme is located within an area at risk of tidal flooding – this is reflected in the design and layout such that activities that would be vulnerable to flooding and wave overtopping are made safe or located out of the affected area;
- The scheme includes a waste cooling water outfall to the North Sea.

13.164 Although pollution of surface waters was identified as a potentially significant impact during the construction and operational phases, the impact was reduced through mitigation to negligible.

13.165 A residual impact of minor magnitude was identified for the scheme in relation to the impacts of extreme tidal levels causing inundation of the roundabout used for road access to the power station. However, this impact was assessed as insignificant.

13.166 All other potential impacts post-mitigation were assessed as insignificant.

13.167 No significant residual effects are identified for the Port of Blyth Biomass power station. In addition, no residual effects are identified relating to water quality with a magnitude above 'negligible'. It is therefore concluded that there are no impacts identified for the Port of Blyth Biomass power station that could interact with those identified for NSN Link in such a way as to cause cumulative effects on any receptor.

Proposed NGET 400kV GIS Substation

13.168 The proposed 400kV GIS Substation will be located approximately 400m to the south-east of the proposed converter station site, adjacent to the existing Blyth 275kV Substation. Importantly, it is located within Section 7 of the application area.

13.169 The proposed substation and the cable routes for NSN Link project are being designed sympathetically in order that there are no clashes in the layout and engineering design. NSN Link components to be installed within the substation comprise the HVAC cable route only.

13.170 An EIA for the substation scheme is not available at this time but a provisional layout has been provided showing the following features relevant to this chapter:

- Proposed drainage outfall to Sleek Burn, possibly utilising an existing outfall;
- Site area comprising the majority of the land between Sleek Burn and Brock Lane, the former power station and the roundabout on Brock Lane;
- Access would include an additional access road connecting to the roundabout on Brock Lane; and
- No details of drainage design or impermeable areas are available.

13.171 The potential cumulative impacts between NSN Link and the NGET substation are considered under the following subheadings.

Outfall to Sleek Burn

13.172 Both projects include a surface water outfall to Sleek Burn. The existing drain for the proposed substation site is located approximately 340m downstream of the proposed NSN Link converter station outfall.

13.173 Sleek Burn is a tidal estuary and the anticipated high dilution rates coupled with incorporation of SuDS into the drainage design for the converter station means that the impacts on water quality are expected to be of minor significance.

13.174 It is not possible to establish whether the proposed 400kV substation will demonstrate similar methods of ensuring water quality at the outfall into the design as no information on the drainage design is available at the time of writing, therefore the following basic assumptions have been made concerning the NGET substation drainage:

- Unrestricted discharge to Sleek Burn it expected to be permitted by the EA in line with their approval in principle for the same approach for NSN Link converter station site;
- SuDS will not be included, with the exception of petrol/hydrocarbon interceptors for roads/parking drainage; and
- The outfall will be designed in such a way as to prevent scour of the banks and mud of the estuary.

13.175 Based on the above it is anticipated that the NGET substation would have a minor impact on water quality within the estuary. The residual impacts from NSN Link on the same receptor are also anticipated to be minor. However, the distance between the two outfalls is 340m and over this distance there are unlikely to be any cumulative effects due to high dispersal and dilution. Therefore, no cumulative impacts are anticipated on water quality within Sleek Burn.

13.176 With regards to flooding, it is anticipated that the tidal Sleek Burn can accommodate unrestricted drainage from both schemes without any increase in flood risk and as such no cumulative impacts are anticipated.

Ferguson Business Park Single Turbine

13.177 This project involves the construction of a single wind turbine at the Ferguson Business Park, adjacent to Section 4 of the Proposed Development. The construction of the turbine will involve excavation and ground works which could lead to run off of silt and/or mud. It is reasonable to assume that this would be controlled by good construction practice and on this basis no cumulative effects will arise. During operation it is not anticipated that the wind turbine would have any effect on water quality, flooding or surface water runoff.

Earth Balance Single Turbine

13.178 This project involves the construction of a single wind turbine at a site 1km west of the A189; the site is located 2km west of the Proposed Development. The construction of the wind turbine will involve excavation and ground works which could lead to run off of silt and/or mud which could reach watercourses that then cross the site of the Proposed Development. However, it is reasonable to assume that this would be controlled by good construction practice and on this basis no cumulative effects will arise. During operation it is not anticipated that the wind turbine would have any effect on water quality, flooding or surface water runoff.

Narec Offshore Wind Demonstration Site

13.179 The Narec Offshore Wind Demonstration Site is located 8km to 17km off the Blyth coast. In the context of the hydrology of the Proposed Development the distance of this facility offshore means that there will not be a cumulative effect on surface water run off, water quality or flood risk.

Residential Development – 48 Dwellings

13.180 This project is for a housing development, located to the south of Brock Lane at East Sleekburn, approximately 500m from the closest point of the proposed development (converter station site).

13.181 At present, no drainage proposals are provided, but given the small scale of this project, there are unlikely to be cumulative impacts on hydrological receptors with the proposed development.

Summary and In Combination Effects

13.182 In summary, there are unlikely to be significant cumulative impacts between the Proposed Development and any one of the above planned developments. As a worst case scenario it could be assumed that those developments identified above could occur at the same time, with the potential for in combination effects. The current legislative framework relating to water quality in the UK deals with in combination effects from multiple anthropogenic activities by controlling emissions at source. As such, compliance with current legislation, policy and best practice to control pollution using the methods outlined in this chapter and engagement with statutory consultees through the planning process would prevent in combination effects within the natural environment on a local scale. Whilst in combination effects can occur across administrative boundaries no impacts on water quality are anticipated on this scale for the Proposed Development or the planned developments.

13.183 Similarly, the assessment of flood risk as part of the FRA is aimed at reducing the impacts of a development such that it will not impact upon flood risk to upstream or downstream receptors. There is no allowance within the legislative and permitting framework for residual minor impacts which could then demonstrate in combination effects with other projects. Therefore, no in combination effects are anticipated in relation to flood risk.

13.184 With regards to the effects of surface water runoff, the topography of the area surrounding the Proposed Development is such that the majority of the cumulative schemes, with the exception of the NGET substation do not share surface water catchments; therefore no in combination effects are anticipated.

Conclusions

13.185 This chapter has examined the effects associated with the proposed onshore components of the Proposed Development on water quality and on flood risk and surface water runoff for upstream and downstream receptors. It has also considered the flood risk associated with the construction phase, and whether the proposed development would result in any changes to the surface water regime which would affect existing surface water flow paths.

13.186 The effects on hydrological receptors during construction are reduced by incorporated mitigation measures and by industry best practice, including the following measures which will form part of a CEMP for the project:

- Provision of designated areas during construction for activities such as fuel/chemicals storage and concrete washout areas which will be adequately designed in line with EA PPG and other guidance;
- Installation of temporary drainage along the cable routes during construction, and incorporation of silt control measures such as settling ponds and use of straw bales prior to discharge to watercourses;
- Inclusion in the temporary drainage design of the need to accommodate drainage from severed field drains on agricultural land;
- Responsible dewatering in line with EA guidelines and best practice;
- Soil stockpiles will either be seeded with a suitable grass mix or covered to reduce runoff and silt; and
- Reinstatement of soils in the correct order and in line with best practice for soil management in order to avoid issues with compaction and runoff post construction.

13.187 Similarly, mitigation has also been incorporated into the design of the project to minimise impacts during the operational phase, including:

- Allowance for surface water runoff from the surrounding fields in the converter station drainage design to minimise surface water flood risk in the area;
- Inclusion of a range of SuDS techniques in the converter station drainage design to minimise impacts to water quality at the proposed outfall (Sleek Burn);

13.188 The flood risk to the proposed development from fluvial, tidal and groundwater flooding during the construction and operational phases has been assessed as low.

13.189 A minor risk from surface water flooding has been identified for the construction phase of the development in localised areas but this can be managed by temporary drainage during the construction phase. There is no risk from surface water flooding to the cable routes during the operational phase as they are buried, and the converter station site has been designed such that there is likely to be a minor beneficial effect on surface water flood risk in the area.

13.190 No significant impacts are anticipated for the North Sea from installation of the cable route within the intertidal zone either during construction or operation.

13.191 No significant impacts have been identified for Maw Burn during the construction or operational phases due to cable installation by trenchless methods at this location.

13.192 No significant impacts are anticipated for the unnamed watercourse located within Section 5 of the cable route. This watercourse is of low sensitivity and will be crossed by open cut methods to the same methodology as the Cow Gut crossing (see below).

13.193 Minor impacts were identified for the open cut crossing of Cow Gut during the construction phase. The impacts can be minimised by best practice construction methods. No further mitigation is proposed and the residual impact is assessed as Minor. No impacts are anticipated to Cow Gut during the operational phase.

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- 13.194 Minor impacts are anticipated for water quality at Sleek Burn during construction based on the installation of the new surface water outfall. This impact will be temporary in nature and limited in extent. Any works within the estuary will require consultation with the EA and will need to be carried out in accordance with their requirements. During the operational phase a moderate impact was identified for Sleek Burn due to the potential for scour at the outfall. Mitigation, which may comprise scour protection to protect the estuary banks and/or throttling of discharge rates at the outfall will reduce the impact to Minor.
- 13.195 No significant impacts are anticipated for Sleek Burn as a result of trace contamination associated with surface water drainage from the converter station site, due to the incorporation of SuDS into the drainage design and the high dilution rates anticipated for the estuary.
- 13.196 No impacts are anticipated for groundwater during the construction or operational phase, as groundwater within the bedrock (Secondary A Aquifer) is afforded protection by approximately 30m depth of low permeability glacial till.
- 13.197 During the operational phase, the cable routes will be restored to pre-development conditions and as such there will be no increased risk to water quality once previous land use is re-established.
- 13.198 The potential for cumulative impacts with nearby developments has been assessed. No significant cumulative effects are anticipated for flood risk or water quality impacts for the construction or operational phase. No significant in combination effects are anticipated for the construction and operational phases of the development with regards to flood risk, water quality and surface water runoff.

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14 TRAFFIC AND TRANSPORT

Introduction

- 14.1 This chapter examines the effects associated with the proposed onshore components of NSN Link (“the Proposed Development”) on traffic and transportation.
- 14.2 For details of the project description, reference should be made to Chapter 4 of the Environmental Statement (ES). The application boundary of the Proposed Development has been split into seven sections as presented in Figure 4.5 of the ES.
- 14.3 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance. The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (“NSN Link Ltd”) and their contractors, in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the scheme design to reduce identified impacts.
- 14.4 This chapter is aimed at assessing the potential impacts and the significance of each impact. The assessment has also been used to assess constraints on the development on traffic and transportation and where mitigation measures may be needed.
- 14.5 The assessment has considered the effects that may be generated during the construction phase of the Proposed Development. The operational phase of the development will have no material residual transport impact on the surrounding network. The assessment of this was subsequently removed from the transport assessment at the scoping stage.

Legislation and Policy Context

- 14.6 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on traffic and transport conditions associated with the Proposed Development. This section should be read in conjunction with Chapter 5 which provides a more detailed overview of the policy context however the key policies relevant to this chapter are discussed below.

National Policy

- 14.7 In accordance with current standards, guidance and industry best practice, the following national legislation, standards and guidance are relevant to the assessment:
- Traffic Management Act 2004
 - *Section 105 of the Highways Act 1980, as amended by the Highways (Assessment of Environmental Effects) Regulations 1988*
 - *The Highways (Assessment of Environmental Effects) Regulations 1994 and 1999*
 - National Planning Policy Framework (NPPF)¹

¹ DCLG (2012) *National Planning Policy Framework*

- 14.8 A review of the local and national policy indicates that there is little interaction between the proposals and transport policy. NSN Link conforms to overarching regional and local policy objectives which seek to build a strong and sustainable UK economy.
- 14.9 The need for an Environmental Assessment of the transport related implications of the Proposed Development is highlighted in the following documents and guidance notes:
- DMRB, Volume 11 'Environmental Assessment' ²
 - "Guidance on Transport Assessment" Department for Transport³
 - "Guidelines for the Environmental Assessment of Road Traffic" Institute of Environmental Assessment (IEA) 1993. (Now IEMA).⁴
- 14.10 Most recently, the Department for Transport's (DfT's) document, "Guidance on Transport Assessments" (2007), states:
- "The environmental impacts of any significant development need to be addressed. This might include it being covered by a separate Environmental Statement (ES), which involves an assessment of a development's potential environmental implications, including those that are transport related. This will help ensure the impacts and the scope for mitigating them is properly addressed."*
- 14.11 The above guidance references a key document called "Guidelines for the Environmental Assessment of Road Traffic" produced by the Institute of Environmental Assessment, (1993). This followed a Government White Paper on The Environment in September 1990. The White Paper was a reflection of the growing concern amongst the general public, business and government that the environment needed to be protected.

Local Policy

- 14.12 Northumberland Local Transport Plan 3 2011-2016 has been considered during the preparation of this assessment:

Methodology

Study Area

- 14.13 For details of the project description, reference should be made to Chapter 4 of this ES. The application boundary of the Proposed Development has been split into seven sections as presented in Figure 4.5 of the ES.
- 14.14 It is important to understand the key elements of the project as the transport impact of each element is different and, once combined, they define the highways and transport study area (network). For the purposes of the assessment of traffic and transportation the three main elements of the Proposed Development are:

² Design Manual for Roads and Bridges (DMRB), Volume 11 'Environmental Assessment' Available at: <http://www.dft.gov.uk/ha/standards/DMRB/vol11/index.htm>

³ <https://www.gov.uk/government/publications/guidance-on-transport-assessment>

⁴ Institute of Environmental Assessment (IEA) 1993 *Guidelines for the Environmental Assessment of Road Traffic*. (Now known as the Institute of Environmental Management and Assessment (IEMA))

- The installation and connection of underground HVDC cables from the landfall at Cambois to a new converter station at East Sleekburn;
 - Construction of a new converter station to transform the HVDC electricity into the AC phase; and
 - Installation and connection of underground HVAC cables from the converter station to a substation to connect to the transmission network.
- 14.15 The proposed converter station will be located off the C415 Brock Lane, adjacent to the former Blyth Power Station site. The converter station will have a small workforce on site (approximately 6 personnel per day divided between 3 shifts over a 24 hour period) and a limited number of visiting maintenance personnel present on any one day.
- 14.16 It has been agreed with Northumberland County Council (NCC) that the operational phase of the development will have no material residual transport impact on the surrounding network and has therefore been scoped out of the assessment.
- 14.17 Access will be required during the construction phase to transport materials, people and machinery with construction traffic needing to access the cable route between the landfall (Cambois Bay), the converter station (East Sleekburn) and the substation.
- 14.18 The cable will be buried underground when operational and installed using a combination of either trenched and trenchless construction techniques dependant on site constraints.
- 14.19 The proposed substation will be a new substation adjacent to the existing Blyth 275kV substation building. These works do not form part of this planning application and are therefore only considered as part of this ES in terms of the cumulative assessment.
- 14.20 During the construction phase Abnormal Indivisible Loads (AILs) are expected to arrive by sea. Examples of AILs include the converter station transformers; associated switchgear and cable reels. Initial discussions with the Port of Blyth have confirmed that freighter vessels capable of transporting these items can dock and be safely unloaded at the existing Battleship Wharf part of the Port. Once unloaded the items would be transported 1.7 miles from Battleship Wharf to the converter station under the necessary notice and approvals process. Figure 14.1 shows the proposed route for AILs.
- 14.21 If an AIL cannot be delivered directly to the Port appropriate notice and approvals will be sought for delivery by road. The local road network is well suited to providing AIL access. No AILs are expected during the operational phase.

Assessment Methodology

- 14.22 The methodology outlined below is considered to be applicable for the construction, operational and decommissioning phases.
- 14.23 For the purposes of this chapter and in relation to traffic and transportation, the activities associated with decommissioning are considered to be similar in nature to those of construction. In terms of decommissioning it is understood that the redundant cables would either be left in situ or removed.
- 14.24 The scope of this assessment comprised the following:
- A review of the local road network;

- A review of existing traffic flows;
- A review of data including annual average daily traffic, personal injury accident data;
- A review of public transport provision;
- A review of provision for Non- Motorised Users (NMUs) in the locality;
- A site walkover of the local road network by Curtins;
- Consultation with NCC;
- An assessment of the potential impacts against key network operational criteria including: traffic flow; road safety; severance; noise; driver delay; pedestrian and cyclist delay; fear and intimidation; air quality and dust and dirt deposits; and
- Identification of any mitigation measures that may be required

Consultation

14.25 Consultation with NCC was undertaken as part of the Scoping exercise and as the assessment progressed. As outlined above the operational assessment has been scoped out of the assessment.

Site Walkover

14.26 A site walkover was undertaken by Curtins staff in February 2013. The objective of the walkover was to assess the condition and operation of the existing road network and public transport provisions. The site walkover was carried out from public roads and rights of way.

Assessment of Significance

14.27 Based on existing guidance, the traffic and transport assessment evaluates impact on key receptors across a set of relevant transport criteria, those relevant to this chapter include:

- Traffic flow;
- Road safety;
- Severance;
- Noise;
- Driver delay;
- Pedestrian and cyclist delay;
- Fear and intimidation;
- Air quality; and
- Dust and dirt deposits.

14.28 The evaluation of impacts on sensitive receptors applying transport criteria within an agreed framework enable the assessment of impact and significance.

14.29 In determining whether an impact is significant or not, the sensitivity of the receptor and the magnitude of the impact are combined. Sensitivity, magnitude and significance criteria were developed for the traffic and transportation baseline at the Proposed Development. These are discussed below and detailed in Tables 14.1, 14.2 and 14.3.

14.30 Sensitive receptors for this project are being categorised as of low, moderate or high significance as set out in Table 14.1.

Table 14.1: Sensitivity Criteria

Sensitivity	Criteria	Transport Examples
High	High importance and rarity, national scale	Key motorway junctions or transport hubs or commercial/government facilities of national importance.
Moderate	High or medium importance and rarity, regional scale	Major junctions on the SRN, major transport interchanges, accident blackspots, hospitals, city/town centres and major employment sites.
Low	Low or medium importance and rarity, local scale	Principle routes on the local highway network, congested local roads/junctions, roads with a significant number of accidents, main roads through residential areas, cycle routes and roads without pedestrian facilities. Also, important local facilities sensitive to traffic increases including, schools, colleges, playgrounds, retirement homes and doctors surgeries.

14.31 The sensitive receptors in the study area have been identified as:

- Road users – including drivers; public transport users; pedestrians equestrians; cyclists; and
- The local communities of Cambois and North Blyth that front onto the local road network.

Impact Thresholds - Percentage Increases in Traffic

14.32 The IEA document “Guidelines for the Environmental Assessment of Road Traffic” states that the following criteria should be adopted to determine the need for environmental assessment of traffic impacts associated with a development:

- “Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%); and
- Include any other specifically sensitive areas where traffic flows have increased by 10%, or more.”

14.33 Increases in traffic flows of less than 10% have a negligible impact as daily variance in traffic flows can be of equal magnitude.

14.34 The 30% threshold relates to the level at which humans may perceive change and there may therefore be an effect. Impacts above this level therefore do not suggest that there is a significant impact, only that further consideration is required.

Assessment of Cumulative Effects

14.35 When considered in isolation, the environmental effects of any single project upon any single receptor/resource may not be significant. When individual effects are considered in combination, the resulting cumulative effect may be significant.

14.36 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:

- Port of Blyth Biomass Power Station;
- Proposed National Grid Electricity Transmission Plc (NGET) 400kV GIS Substation;
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site; and
- Residential development – 48 dwellings.

Magnitude Criteria

14.37 The criteria used to determine the magnitude of a potential impact are defined in Table 14.2 below. Assessment of magnitude includes consideration of the amount and intensity of disturbance and duration, such as whether it is temporary or permanent.

Table 14.2: Magnitude of Impact

Magnitude	Criteria	Transport Example
Major	Considerable effect in terms of extent, duration or magnitude that is more than locally significant. In breach of recognised acceptability, legislation or policy or standards	Large change in traffic flows or Heavy Goods Vehicle (HGV) content, potentially exceeding the capacity of the local highway network.
Moderate	Limited effect in terms of extent, duration or magnitude.	Significant change in traffic flows or HGV content, possibly resulting in issues on parts of the local highway network.
Minor	Slight, very short or highly localised	Measurable change in traffic flows or HGV flows but unlikely to cause significant issues on the local highway network.
Largely Imperceptible Effects		
Negligible	Very minor loss or detrimental alteration.	Measurable change in traffic flows but within capacity of road network – no disruption predicted
No change	No discernible change	-

Assessment of Significance

14.38 The main factors influencing the significance of transport impact relate to the magnitude of change, (taking into account the time frame of change) and the number, and sensitivity of any receptors in the area of interest. Once the significance of the impact is understood then

the correct level of assessment can be undertaken, and mitigation can be considered where necessary. This is described within the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5 (2008), which states:

“The significance of the effect is formulated as a function of the receptor or resource environmental value (or sensitivity) and the magnitude of project impact (change). The approach to assigning significance of effect relies on reasoned argument, professional judgement and taking on board the advice and views of appropriate organisations.”

- 14.39 The DMRB sets out a table for helping to define the significance of change. This has been included as Table 14.3 below. The significance of effect category is assigned after taking into account any committed mitigation measures. Significance will also take account of other factors, including whether the effect is permanent or temporary. Therefore a ‘Large’ or ‘Very Large’ significant effect would be a ‘High’ impact on a sensitive receptor of ‘High’ environmental sensitivity.

Table 14.3: Determining the Significance of Effects

Environmental Value (Sensitivity)	Magnitude of Impact (Degree of Change)				
	No Change	Negligible	Minor	Moderate	High
High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
Moderate	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Existing Environment

Site Description

- 14.40 To understand and quantify the future impacts of the Proposed Development an assessment of the existing local highway characteristics and trends has been undertaken.
- 14.41 The nature of the highways likely to be affected, the proximity to residential dwellings or receptors to the proposed construction traffic route, the local highway accident record and the existing traffic levels on key links have been considered. The existing situation is presented below as “drive by” and includes a series of photographic plates and accompanying text.
- 14.42 The local highway network as shown in Figure 14.1 is well connected to the strategic road network, with direct access at East Sleekburn on to the A189 and onwards to the A19 and Newcastle. The A189 and A193 provide access to the nearby town of Blyth and as such would be the main route in to the local area from across the region.

14.43 C415 (Brock Lane/Harbour View); and C403 (Wembley Gardens/Unity Terrace Street) provide access to the local road network and the local communities of Cambois, North Blyth and some smaller neighbouring hamlets. The C415 is a wide single carriageway road of industrial nature (as shown in Plate 14.1) between the A189 and mini roundabout junction with the C403.

Plate 14.1 C415 Brock Lane due east of Proposed Development



14.44 Approximately one dozen residential properties have frontage access to the C415 (Brock Lane) between the A189 junction and Cambois as shown in Plate 14.2. The C415 is subject to the national speed limit of 60 mph in the vicinity of the A189, changing to 30mph within the residential areas of Cambois/North Blyth

Plate 14.2 Frontage Properties on the C415 Brock Lane



14.45 From the mini roundabout junction (as shown in Plate 14.3) with the C415 (Brock Lane) in Cambois, the C403 (Wembley Gardens) runs south to the 3-arm roundabout that provides access to the Port of Blyth as shown in Plate 14.4.

Plate 14.3 C415/C403 Mini Roundabout Junction



Plate 14.4 Port Access Roundabout Junction



14.46 The C403 is lit along this section and subject to a 30mph speed limit with a footway on the east side only. There is a level crossing just north of the port access roundabout as shown in Plate 14.5.

14.47 The Port of Blyth is a deep water rail connected port that offers the opportunity to transport construction materials by water or rail and in doing so reduce the number and distance of lorry movements. The route to the Port via the A189/C415 and C403 is identified as a preferred freight route on the Northumberland Freight Map.

Plate 14.5 Level Crossing south on the C403 (Wembley Gardens)



- 14.48 The C403 passes through the residential area to the north of the C415/C403 mini roundabout and runs north to south parallel to the coastline. Immediately north of the junction there are residential properties with frontage access and on-street parking. Directly north of the built up area and located off the C403 is Cambois Primary School, which is the only significant community facility within this part of Cambois. There are no shops within Cambois on the C415 or C403
- 14.49 The C403 loops around past the site of the former Cambois Colliery and provides access to the northern part of Cambois including the area known as 'The Bucca' which is where the C403 becomes Wembley Gardens, with a 30mph speed limit within the built up residential area. Access can be gained to Cambois Farm Road and the beach slipway (cable landfall point).
- 14.50 Travelling west along Wembley Gardens the road describes a gentle loop back under the A189 and re-joins Brock Lane at a priority junction. Access to Fergusons Business Park and a Waste Water Treatment Works can be gained from this section of road. Close to the access point to Fergusons Business Park there is another level crossing.
- 14.51 The C403 and C415 are advisory cycle routes which connect to a combination of on-road and traffic-free routes to key destinations in the local area. The cycle facilities form part of the National Cycle Network Route 1 which links Dover with the Shetlands and is known as the East Coast Cycle Link. This route offers connectivity with other cycle routes along its length giving the site excellent cycle connectivity with local settlements.

- 14.52 The C415 has footways on both sides within the lit 30mph zone linking the residential areas within Cambois and at least one footway access to the residential properties alongside. There are no formal crossing facilities for pedestrians at the C415/C403 mini roundabout or the Port Access roundabout.
- 14.53 There are two Public Rights of Way in the local area. Footpath 600/062 is approximately 800 meters long and connects Northfield (off Harbour View) in the southern part of Cambois to Wembley Gardens in the north via a path through Fergusons Business Park. Footpath 600/059 is also approximately 800 metres long and links the C415 and C403 around the site of the former Cambois railway depot.
- 14.54 The local area is served by Public Transport service number 34 which has four buses a day in each direction between Ashington, Bedlington and Blyth. This is supported by Northumberland County Council and operates six days a week excluding Sunday.

Existing Traffic Flows

- 14.55 Annual Average Daily Traffic (AADT) flows have been obtained for the links to be used for access to and from the development during construction. The source of this data is the RES North Blyth Power Station Application (2012) and the data itself was collected from traffic surveys carried out in 2010.
- 14.56 Annual Department for Transport link counts (site ref. 80772 and 81563) carried out in the local area indicate that there have been relatively stable traffic conditions in the period since 2010 and a slight decline in traffic flows recorded. The use of this dataset (2010) represents a robust assessment basis which has been verified through site walkover surveys.
- 14.57 Table 14.4 indicates low levels of traffic on the local roads and the high levels of Heavy Goods Vehicle (HGV) traffic associated with the Port and the other industrial locations/facilities in the area.

Table 14.4 - Existing Traffic Flows (2010 Data)

Location	AADT	% HGVs
C415 Brock Lane	2,355	9%
C403	1,016	20%

(source: RES North Blyth Power Station Application, 2012)

Road Safety

- 14.58 A review of local personal injury accident data has been undertaken to inform the baseline assessment of the local highway links. The data shows there to have been three personal injury collisions in the last reporting period (2010-2013). The records show minor collisions and none indicate any highway design or road defect.

Summary

14.59 A full description of the Proposed Development during the construction and operational phases is given in Chapter 4. The phase of works which are relevant to this chapter are predominantly associated with the construction phase and are as follows:

- Preliminary works;
- Site preparation and establishment;
- Earthworks;
- Civil engineering works;
- Building construction;
- Cable installation;
- Mechanical and electrical works;
- Commissioning and
- Site reinstatement and landscape works

14.60 The following key points regarding construction operations which bear relevance to the traffic and transportation chapter are as follows:

- Cut and fill (reprofiling) works will be required to create a level site for the converter station – a balance of which will be targeted in order to minimise off site material movements;
- The converter station will include a temporary construction compound (approximately 100m x 100m), located to the west of the converter station site.
- Satellite compounds will be established along the cable route; provisional sites may include:
 - North Cambois beach area;
 - Adjacent to the waste water treatment works; and
 - Immediately south of Fergusons Business Park.
- Wheel washing facilities will be provided during construction for plant and vehicles;
- Standard open trenching techniques will be used for excavation, where at the railway crossing where a trenchless technology will be considered, such as HDD, thrust boring or pipe jacking;
- The cable trench cross section will be approximately 1.5m in width at the surface tapering to 1m width at the base,
- The depth of the trench will typically be between 1m-2m below ground level however may be as deep as 3m subject to localised ground conditions;
- Trenches will be backfilled and restored to the existing ground level; Site won material will be re-used on site wherever possible.
- The cables and cement bound sand will occupy a significant volume within the cable trenches – there will be a significant amount of site won material which will require off-site disposal or where appropriate, re-use elsewhere on the site;
- The cable working width of 16m allows for a single drainage channel for surface water runoff during construction. This is located between the trench/s and the haul road;

- Prior to construction, a Construction Environmental Management Plan (CEMP) will be produced which will set out a variety of control measures including as a minimum the mitigation measures identified within this ES.

14.61 Whilst it has been acknowledged that in the operational phase there will be some activities such as: periodic maintenance which could involve occasional visits and deliveries of equipment; visiting and permanent employees working on site; and activities to restore temporary land take to existing land use which bear relevance to traffic and transport in consultation with NCC it has been agreed that these are unlikely to be significant and have therefore been excluded from this assessment.

Assessment of Effects - Converter Station Construction

- 14.62 The proposed converter station will be located off the C415 Brock Lane adjacent to the former Blyth Power Station site. Access will be taken via a new large priority junction with the C415 (Brock Lane) as shown in Figure 4.1. This junction affords generous kerb radii and minor localised widening on the acceleration and deceleration tapers to enable large and abnormal loads to be transported to and from the site. Visibility along the road from the junction is good in both directions, with visibility splays extending eastwards to the new roundabout on Brock Lane (c. 350metres) and 235 metres westwards – achieving minimum DMRB standards (215m for a 60mph design speed).
- 14.63 A short length of access road (150m) will provide access to the proposed site compound area and access to the site itself. When the temporary site compound is removed at the end of the project the resultant spur off the access road will be maintained to provide a potential access point for future development of the Arch Group owned site.
- 14.64 A number of temporary buildings will be delivered by road to the main site compound together with site and compound fencing.
- 14.65 The construction of the converter station and associated infrastructure will require plant and materials to be delivered to and from the site. As part of the assessment of construction phase impact estimates of vehicle movements have been made for those activities set out in Table 14.6.
- 14.66 Ground reprofiling or “cut and fill” may be required at the converter station site. The principle objective of the “cut and fill” exercise is to re-profile ground levels on the site with cognisance of maintaining a materials balance. Where possible site won material will be re-used to minimise material movements on and off site. The duration of the ground works is anticipated to be 6 months.
- 14.67 The extent of the reprofiling will be subject to design development and localised ground conditions. Suitability for reuse will be subject to assessment and material characterised as unsuitable for reuse will be transferred off site to a licenced facility.
- 14.68 For the purposes of this assessment an estimate of the volume of material which will be subject to reprofiling has been assumed as approximately 15,000 cubic metres of which it has been assumed that approximately 25% of the material will be unsuitable for re use. This estimate is considered to be conservative given the sensitivity of the end land use.

- 14.69 In addition to the material which potentially will need to be disposed of off site there will be a requirement to address the balance by means of importing replacement material. Further details on the assumptions used to estimate vehicle movements associated with the reprofiling of the converter station site is provided in Appendix 14.1.
- 14.70 As summarised in Table 14.6 the impact of the reprofiling is estimated to result in a temporary increase of approximately 536 HGV vehicle movements over a six month period.
- 14.71 Similar to the ground profiling works the construction of internal access roads has the potential to generate arisings. Where possible the material will be reuse however there is the potential that material which is unsuitable for reuse will need to be disposed of off site. As detailed above and in Appendix 14.1 it has been assumed that 25% of the material will be unsuitable for re use.
- 14.72 In addition to the material which potentially will need to be disposed of off site there will be a requirement to address the balance by means of importing replacement material. Further details on the assumptions used to estimate vehicle movements associated with the construction of the internal roadways is provided in Appendix 14.1.
- 14.73 For the purposes of this assessment the volume of material that may need to be excavated has been estimated to be 15,000 cubic meters and this is based on the volume of material within the footprint of the surrounding perimeter roads. As summarised in Table 14.6 the impact of this activity is estimated to result in a temporary increase in construction trips of approximately 1071 HGV movements over a six month period.
- 14.74 During earthworks large earth moving plant will be transported to site and will remain on site for some or all of the construction phase.
- 14.75 The transport impact of the civil engineering and construction of the foundations, piles, drainage and internal roads will be mitigated to a degree by the installation of a concrete mixing plant on site. This will be fed by periodic deliveries as needed from local quarries or the materials storage compounds at the Port of Blyth.
- 14.76 During the construction phase articulated lorries will deliver large loads such as steel beams and steel modular panels. Large loads will be lifted from lorries and fixed in position using a variety of construction plant including cranes. The vehicle movements associated with this activity are summarised in Table 14.6 and the assumptions behind these estimated given in Appendix 14.1.

Assessment of Effects - Onshore Underground Cable Construction

- 14.77 As described in Chapter 4 HVDC cable is to be laid between the landfall and the converter station. HVAC cable is to be laid from the converter station to the new Blyth substation as per the details set out in Chapter 4.
- 14.78 The cable will be installed by means of excavating trenches or using trenchless technology.
- 14.79 A temporary working area of 16m width will be required along the length of the HVDC cable (20m required for the HVAC cable) which is expected to be constructed in 500m-1000m lengths/working areas. This enables a haul road, working space, storage space, drainage and temporary security fencing to be provided.

-
- 14.80 For the open trench installation standard excavators are required to clear vegetation from the working area, dig trenches and improve drainage. The cable will be delivered to site using cable drum transporters. Tractors and other smaller vehicles will be used to transport materials around the site and standard tippers will be used to import backfill and remove unsuitable arisings.
- 14.81 The installation of cables will result in the generation of arisings. Where possible site won material will be reused as back fill in trenches however material which is unsuitable for reuse will be disposed of to a licensed facility. As detailed in Table 14.6 the number of vehicle movements associated with this activity has been estimated as 434 HGV movements as shown in Table 14.6 and detailed in Appendix 14.1.
- 14.82 Trenchless technology or ducted installation may be employed at some locations to avoid surface disturbance and for example to cross the railway line or other features.

Abnormal Loads

- 14.83 The movement of abnormal vehicles is controlled by The Motor Vehicles (Authorisation of Special Types) General Order 2003 and subject to management and prior agreement with the Police, (the Highways Agency if needed) and Northumberland County Council.
- 14.84 It is expected that the converter station will require the delivery of large transformers. It is proposed that these will be delivered to the site by road and are anticipated to arrive by sea at the Port of Blyth. Initial discussions with the Port have confirmed that the existing dock facilities and draught availability within the Port mean that any freighters capable of transporting the transformers can safely berth and be unloaded at the Battleship Wharf part of the Port.
- 14.85 It is anticipated that the transformers, which are the largest pieces of equipment constitute abnormal indivisible loads, through weight and width. The transformers are anticipated to weigh up to 260 tonnes.
- 14.86 It is envisaged that all abnormal vehicles would be escorted by a pilot car and Police escort and be scheduled to travel during off-peak hours where possible. This would ensure the safety of other road users and result in minimal disruption.
- 14.87 Initial discussions with hauliers have concentrated on the relatively short haulage distance from the Port (1.3 miles). This means that Self Propelled Modular Transporter/Trailer (SPMT) units could be used to carry the transformers. These SPMT units are extremely manoeuvrable and strong multi wheeled platform vehicles. Powered by battery packs and offering the potential for remote control the individual SPMT units can be coupled together to transport the heaviest or largest loads.
- 14.88 With individual control of each wheel the trailers are extremely manoeuvrable and use hydraulic rams to share the load equally and keep each tyre and vehicle load within the normal highway weight limits. The major dis-benefit is the slow vehicle speeds (up to 5mph only) meaning that SPMT are not suited to long or high speed journeys. Plate 14.6 shows an SPMT moving a 300 tonne cable reel at the Port of Blyth.

Plate 14.6 – Self Propelled Modular Transport



(Source: Port of Blyth)

- 14.89 Initial assessments of the route from the Port of Blyth indicate that the local highway network is feasible for use without major modification for the use of SPMT. At this stage the load width is not available, given potential overhang it may be necessary to dismount street furniture attached to the central splitter islands on approach to the C415/C403 mini roundabout junction. This work would be carried out by the Local Highway Authority with the applicant funding the associated costs for removal and reinstatement.
- 14.90 Abnormal loads transported to/from any other locations will have to use the A189 and C415 Brock Lane which are both suitable routes for this purpose.

Construction Traffic Impact on Traffic Flow

- 14.91 The construction traffic trip generation figures have been calculated for each phase of the onshore works. The trip rates have been developed from first principles, considering the likely construction tasks using information gained from similar scale interconnector projects including “Project NEMO” and “BritNed Isle of Grain” project as valid comparators. This approach and the assumptions adopted are robust and defensible having taken due cognisance of UK assessment guidelines. Paragraph 4.59 of the DfT Guidance on Transport Assessment states:

“However, obtaining an accurate comparison (of development trip generation) is not always straightforward, especially for a typical developments. In these instances it is recommended that, unless there is a clear valid comparable situation, the assessment trips should be constructed from first principles based on a detailed analysis of the daily operation of the proposed development.”

- 14.92 All data sources are referenced and step by step detailed trip generation calculations are shown in Appendix 14.1.
- 14.93 It is anticipated that the site will be operational by 2019/20 and a brief description of project timescales is shown below in Table 14.5.

Table 14.5 – Proposed Project Timescales

UK Onshore element of the NSN Link	Timescales							
	2016/17		2017/18		2018/19		2019/20	
Converter site works								
Construct converter station and lay cables								
Converter site development (e.g. install equipment, connect, test and commission)								
Cable installation (excavate, lay joint and terminate and test)								

- 14.94 The number of anticipated loads required for each phase of construction is provided below. Estimates have been made based on available information for a similar interconnector project (Project NEMO) and are considered to be appropriate for the Proposed Development. The number of trips has been calculated based on the programme outlined in Table 14.5 and assumes 20 working days per calendar month.
- 14.95 The duration of each main construction phase has been assumed within calculations set out in Table 14.6. The duration figures represent a robust assessment of project timescales from a traffic impact point of view.
- 14.96 It is likely a number of the anticipated plant, equipment and material deliveries will be by light goods vehicle (LGV<7.5 tonnes), however, for this assessment all have been assumed to be by HGV, again providing the confidence of a robust assessment.

Table 14.6 – Anticipated Two-Way HGV Trips

Development Phase	Total 2 Way trips	Duration (months)	Monthly Trips	Two-way HGV Trips per Day
Site Earthworks	536	6	89	5
Civil Engineering - Internal Access Road Construction	1071	6	179	9
Converter Station Construction	649	12	54	3
Converter Station Fitting Out	163	12	14	1
Cable Installation	434	12	36	2

(Source: Appendix 14.1 – Construction Traffic Trip Generation Calculations)

- 14.97 In addition to the HGV deliveries anticipated during construction, it is envisaged that 30 two-way car trips and one crew bus trip will be generated per day throughout construction associated with staff accessing/egressing the site.

Vehicle Routeing - General Construction Traffic

- 14.98 It is anticipated that almost all construction vehicles will access the converter station site via the primary highway routes in the region from the A189 and then along the C415 (Brock Lane) into the site. It should be noted that this route does not have any sensitive receptors (residential frontages; school or other community facilities) therefore a 30% impact threshold for consideration has been used.
- 14.99 During the installation of the cables a small number of vehicles will be required to access the various sections of land where cable will be laid. It is anticipated that only three HGVs will be required per day in addition to a small number of private cars/Light Goods Vehicles (LGV) transporting construction workers.
- 14.100 In addition to the main site compound there will be satellite compounds along the cable route. In the northern part of the network vehicles will utilise the network towards North Cambois, 'The Bucca' and Fergusons Business Park. Traffic routed along Brock Lane (West and North) will avoid the residential areas of Cambois.
- 14.101 The C403 at West Bridge Street would be used by the abnormal indivisible loads and specialist materials imported to the port. It is anticipated that there will be a maximum of 2 HGVs per day.
- 14.102 Routeing agreements will be formally agreed with the Local Highway Authority and construction contractor once appointed.
- 14.103 A plan showing the proposed access routes for construction vehicles; sensitive receptors in the area and the key transport infrastructure in the area are included as Figure 14.1.

Construction Traffic Impact on Traffic Flow

Percentage Increase in Traffic

- 14.104 Maximum total daily two-way construction vehicle movements are likely to equate to 10 HGVs, 30 cars/LGVs and one minibus during the peak period of the construction programme (the access road construction). Based on the existing traffic flows collected in the vicinity of the site, this would result in the following percentage increase on key highway links during peak construction activity:

C415 Brock Lane	<ul style="list-style-type: none"> • 1.7% increase in total traffic 	<ul style="list-style-type: none"> • 4.7% increase in HGV traffic
C403 West Bridge Street	<ul style="list-style-type: none"> • 0.2% increase in total traffic 	<ul style="list-style-type: none"> • 1.0% increase in HGVs.

- 14.105 The increases in general levels of total traffic are considered to be low at less than 2%. It is also commonly accepted that daily traffic flows can vary by as much as 10%. As such, given the temporary nature of the increases as a result of the construction phase traffic combined with the existing daily traffic flows, the anticipated temporary increase in traffic is likely to be imperceptible. The environmental impact of the general increase in traffic due to construction has been assessed as **Negligible**.

14.106 The increase in proportion of HGV construction traffic on Brock Lane is less than 5% and calculated to be far less than the 30% threshold impact. Given this and the limited duration of impact the impact has been assessed as **Negligible**.

14.107 These are robust assessments which include for all the major construction activities. It can be seen from Table 14.6 and the conclusions drawn from our analysis that the additional daily vehicular traffic due to the construction is low and has a negligible percentage impact on the local road network.

Construction Traffic Impact on Safety

14.108 The existing safety record of the local road network report three minor collisions between 2010 and 2013. Whilst any accident is regrettable we do not consider the number of recorded collisions to present any evidence of a demonstrable safety issue or problem and the numbers represent a typical total for this road network type. The additional construction traffic would not be expected to make any significant difference in terms of the recorded road safety accident situation as:

- Traffic flows in the area would remain extremely low particularly in relation to the overall link and junction capacity;
- Pedestrian and cyclist activity is limited in the area; and
- HGV traffic will not pass through residential areas.

14.109 A temporary closure of Footpath 600/062 is likely to be required during the installation work in Section 4 (Fergusons Business Park). The appropriate applications will be made to NCC and a temporary diversion route agreed and signed posted.

14.110 Vehicular access to temporary construction compounds will be required during cable installation. Designated construction vehicles may be required to traverse access tracks or permissive paths, to gain access to the working area. Where this occurs, health and safety measures will be implemented to ensure safe access/egress. Measure would include but are not limited to use of banksmen and appropriate signage.

14.111 Any works within the public highway will be subject to the Local Highway Authority consents/notice regime for streetworks. Planned works will have to be approved by NCC and proposals for traffic management will need to be submitted for review and approval. All traffic management for any road works is to be to council specifications.

14.112 The environmental impact of construction traffic on safety has been assessed as **Negligible/None**.

Construction Traffic Impact on Severance

14.113 Severance is defined as the separation of communities through transport, for example, a new motorway cutting through an existing settlement. The minor increases in traffic flow as a result of construction will not reduce the road crossing opportunities for the local community and will not have any substantial or sustained negative impact on local peoples' ability to travel around and access local facilities. Therefore severance has been assessed as **None**.

Construction Traffic Impact on Noise

- 14.114 The environmental impact of construction traffic on noise levels has been assessed separately in Chapter 15.
- 14.115 Noise generated by traffic accessing the site is expected to be negligible given the low percentage increase in vehicle volumes on the proposed access routes to the site. In addition, scheduling of construction vehicles will ensure that noise associated with site traffic will be limited to planning restrictions on hours of operation. The environmental impact associated with the generation of noise from construction traffic accessing the site has been assessed as **Negligible**.

Construction Traffic Impact on Driver Delay

- 14.116 Site access is set back from Brock Lane and delivery vehicles and construction traffic will be turning into or out of the site however, it is considered unlikely that there would be any significant driver delay associated with routine. There may be some minor driver delay during the delivery of slow-moving abnormal loads however these will be infrequent and will require advanced planning and management.
- 14.117 There is the potential for driver delays when the cable crossings are installed beneath the public highway. It is standard practice in road maintenance and construction works to ensure that the public highway remains open during the construction works and this is pertinent given the potentially lengthy diversion routes if Brock Lane or Wembley Gardens were to be closed. Any full closure could have an impact on the Port of Blyth and is unlikely to be accepted by the Local Highway Authority.
- 14.118 Minimising this risk of driver delay could be achieved by means of installing cable ducts through one side/half of the road at a time. If open trenches are dug through the road temporary traffic management will need to be employed to ensure traffic can flow through the works (i.e. shuttle working).
- 14.119 There are expected to be a limited number of slow-moving abnormal load deliveries that have the potential to cause delays to drivers. This impact will be mitigated by scheduling moves for low traffic flow times. Mitigation measures can be implemented to minimise the potential for disruption and driver delay, these include alternative construction techniques and temporary traffic management. The environmental impact of construction traffic Impact on driver delay has been assessed as **Negligible**.

Pedestrian and Cyclist Delay

- 14.120 A small percentage increase in vehicles along the primary routes has been predicted as result of the proposals. There are low usage levels of pedestrian and cycle activity in the area and which combined with the temporary nature of the development have been assessed as **Negligible**.
- 14.121 There is expected to be limited impact on designated Public Rights of Way (PRoW) in the area. A temporary closure of Footpath 600/02 will be required and managed in consultation with the Local Highway Authority.
- 14.122 There is the potential for pedestrian and cyclist delay associated with interfaces between the installation of cables and the public highway, footway and tracks. Measures will need to be

developed by the Contractor to mitigate this impact which could include use of banksmen or vehicles fitted with reversing cameras.

Fear and Intimidation

- 14.123 The scale of perceived fear and intimidation experienced by pedestrians as part of their general amenity is subjective and influenced by the volume and type of vehicle and also the level of protection available. Historic guidance has suggested that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or its lorry component) is halved or doubled.
- 14.124 Pedestrians on footways adjacent to residential properties with a frontage onto Brock Lane or Wembley Gardens may experience a slight degree of increased fear and intimidation due to heightened perceptions of construction traffic following awareness of the construction project. This impact will be mitigated by the available footway width which is substantial and through the appropriate routing of construction traffic.
- 14.125 Given that there will only be a maximum of 5% increase in lorries due to construction traffic passing frontage properties and the limited duration of traffic movement the environmental impacts has been assessed as **Negligible**.

Air Pollution

- 14.126 The environmental impact of construction traffic on existing air quality has been assessed separately in Chapter 16.
- 14.127 The assessment has concluded there to have been a negligible daily increase in total vehicles which combined with the short time frame of the development, the level of pollution associated with the proposals are not anticipated to materially change. The air quality assessment identified that the anticipated road traffic associated with the development will have a **Negligible** impact on existing sensitive receptor locations and therefore measures to mitigate road traffic emissions are not considered necessary.

Mitigation

- 14.128 The assessment has concluded there to be no significant impacts with regards traffic and transportation. Impacts on safety, noise, severance and air pollution will not require specific mitigation measures, other than the standard measures outlined in the CEMP.
- 14.129 The assessment has identified there to be impacts associated with the following which with mitigation the impact can be further reduced:
- Percentage increase in traffic
 - Construction Impact on Road Safety
 - Construction Impact on Driver Delay
 - Construction Impact on Pedestrian and Cyclist Delay
 - Fear and Intimidation
 - Dust and dirt

Percentage Increase in Traffic

14.130 The environmental impact of the general increase of HGV traffic due to construction has been assessed as **Negligible**. It is anticipated that this effect could be mitigated by a standard set of pre-construction conditions.

Construction Impact on Road Safety

14.131 The environmental impact of construction traffic on safety has been assessed as **Negligible/None** and to further reduce this impact the following mitigation will need to be implemented:

- Proposals for the temporary suspension of the existing PRow footpath 600/062; and
- Measures to ensure safety where construction traffic crosses a footway/permissive path in the absence of a formal permanent junction.

Construction Impact on Driver Delay

14.132 The environmental impact of construction traffic impact on driver delay has been assessed as **Negligible**.

14.133 The measures proposed to reduce the impact on driver delay would include:

- Optimise road closures and develop a traffic management plan for submission to and approval by the Local Planning Authority. No total road closures of the public highway during construction
- Schedule abnormal load movements for off peak low traffic flow times (i.e. late night/early morning or Sundays).

Construction Impact on Pedestrian and Cyclist Delay

14.134 There are low usage levels of pedestrian and cycle activity in the area and which combined with the temporary nature of the development have been assessed as **Negligible**. The potential to divert footpath 600/062 around the works areas will be explored to limit the potential impact on users of this footpath.

Fear and Intimidation

14.135 The environmental impact of fear and intimidation has been assessed as **Negligible** and to further reduce this impact the Contractor will be required to instigate and monitor a 'Considerate Driving' education programme. It is expected that this will be relevant for site staff and delivery drivers.

Dust and Dirt

14.136 The potential for dust nuisance is most likely to arise from activities such as topsoil stripping, trench digging and storage of excavated soils, loading and unloading of vehicles. Construction traffic leaving the site may also bear dust and mud from the working areas which can be spread as vehicles move along the local highway network, causing increases in dust and debris along the adjacent roads.

14.137 The number of potential sensitive receptors has already been minimised by the avoidance of urban areas and residential properties during the cable routeing process and the duration of the cable installation works is short-term.

14.138 The impact associated with dust nuisance is considered to be minor and unlikely to cause traffic disruption and on this basis has been assessed as **Negligible**.

14.139 In summary it is considered that with the implementation through a series of appropriate mitigation measures as part of the development of a Construction Environmental Management Plan (CEMP) combined with careful planning and sequencing of works traffic disruption effects can be managed to acceptable levels. A Traffic Management Plan will need to be developed as part of the CEMP process and it is anticipated that this will be the mechanism for capturing standard mitigation measures typical of best practice. The Traffic Management Plan will need to be agreed with the Local Planning Authority however the plan will outline mitigation measures including methods to ensure effective dust suppression, appropriate selection and maintenance of vehicles, notification of vehicle and non vehicular routes.

Residual Effects

14.140 Following the implementation of the proposed mitigation measures outlined above all potential impacts would be reduced, to give either a negligible impact, or remove the impact altogether.

Cumulative Impact

14.141 The following major development proposals have been considered as part of the assessment of potential cumulative effects:

- Port of Blyth Biomass Power Station;
- Proposed NGET 400kV GIS Substation;
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site; and
- Residential development – 48 dwellings.

14.142 These developments are outlined below and where potential cumulative traffic impacts have been identified these are discussed.

Port of Blyth Biomass Power Station

14.143 The ES for North Blyth Biomass Power Station includes a detailed transport analysis and concludes that all transport impacts are considered to be neutral and slight with construction traffic impact will be mitigated by a Construction Phase Traffic Management Plan and Travel Plan. In the scenario whereby a maximum number of construction trips (140)⁵ occurs at the same time as NSN interconnector construction the net impact will still only be negligible and easily accommodated on the surrounding road network. On this basis there are not considered to be any cumulative effects between the two projects.

⁵ RES North Blyth Renewable Energy Project. Volume II Environmental Statement Chapter 13, Table 13.9

NGET 400kV GIS Substation

14.144 It is likely that the proposed NGET 400kV GIS substation will be constructed to a similar programme to NSN Link. Construction of a new substation is required to house the proposed new connections, transformers and switchgear. Previous experience of similar Projects suggests that the site area required for a similar 400kV substation is approximately half the area required for the converter station; the buildings are ostensibly smaller and simpler to construct. It is assumed that the construction traffic impact is likely to be less than the Proposed Development so any cumulative effects will be negligible. There will be a requirement to transport AILs to this site as part of the works. On this basis there are not considered to be any cumulative effects between the two projects.

14.145 An opportunity may exist for traffic management along Brock Lane to be co-ordinated between the two sites through the Local Highway Authority Streetworks co-ordination facilities.

Ferguson Business Park Single Turbine

14.146 The Ferguson Business Park is located approximately 390m west of the cable route and approximately 550m to the north west of the proposed converter station site.

14.147 Other than AILs needed to transport the turbine there from the Port there will be no transport impact on the network as confirmed by the scoping response from NCC indicating no transport impact from this application. On this basis there are not considered to be any cumulative effects between the two projects.

Earth Balance Single Turbine

14.148 The Earth Balance Single Turbine will be located approximately 2km to the west/northwest of the proposed development site.

14.149 Other than AILs needed to transport the turbine there from the Port there will be no transport impact on the network as confirmed by the scoping response from NCC indicating no transport impact from this application. On this basis there are not considered to be any cumulative effects between the two projects.

Narec Offshore Wind Demonstration Site

14.150 The Narec Offshore Wind Demonstration Site is located 8km to 17km off the Blyth coast. This project will comprise a maximum of 15 pre-commercial prototype turbines to be constructed across three arrays, with a maximum number of 5 turbines in each array with turbines positioned in water depths from 35m to 58m and distances from the coast between 5.7km and 13.8km. It is anticipated that the Blyth Offshore Wind Demonstration Project, will be constructed on an array-by-array basis in a maximum of three construction phases.

14.151 Narec is currently in talks with potential investment partners to build out the demonstration site. Construction of the first array is targeted to be completed in 2015. The timescale for the construction of a single array is expected to be around 3-6 months over the summer period. Due to the significant distance between the two sites, there are unlikely to be any significant cumulative interactions between the two projects with regards to traffic and transportation, NCC have confirmed that this will be the case in their scoping response.

Residential Development ref. 13/03937/FUL

14.152 The proposals for 48 dwellings located on land to the south of Brock Lane, adjacent to the East Sleekburn A189/Brock Lane interchange approximately 500m from the closest point of the Proposed Development (converter station site).

14.153 The proposals will result in approximately 240⁶ additional daily trips which equates to approximately 20 trips in peak hours. An additional 20 trips is not considered to be significant in traffic terms and on this basis there are not considered to be any cumulative impacts between the two projects.

Summary

14.154 In summary no significant cumulative effects are expected between the Proposed Development and nearby proposed developments.

14.155 NSN Link and proposed NGET substation are being planned in tandem and are mutually dependent and provisions can be included in the design of the NGET substation such that cumulative impacts within the Proposed Development cable routes are eliminated.

14.156 There may be an opportunity to coordinate traffic management arrangements should the two projects overlap.

14.157 In addition an assessment has been undertaken assuming that NSN Link and the planned developments all come forward at the same time. The assessment has concluded there to be no likely significant in-combination effects.

Conclusion

14.158 This chapter has assessed the potential impacts of the Proposed Development, including the converter station site, HVDC cable routes and HVAC cable routes with regard to traffic and transport related impacts.

14.159 The topics listed below have been discussed in detail within this chapter:

- Relevant transport and environmental policy;
- Established the transport baseline;
- Description of proposed access routes and arrangements;
- Types, volumes and timings of vehicles accessing the site during construction and operation;
- Consideration of abnormal loads;
- The likely significance of environmental effects;
- The likely environmental impacts of the vehicles accessing the site; and
- Measures to be undertaken to mitigate against environmental impacts.

14.160 No significant impacts have been identified and all impacts have been assessed as either **Negligible** or **None** as shown in Table 14.7.

⁶ TRICS, *Database for trip generation of UK residential developments*

Table 14.7 – Assessed Transport Criteria, Scheme Impact, Proposed Mitigation and Post Mitigation Impact

Criteria	Impact	Proposed Mitigation	Post Mitigation Impact
Traffic Flow	Negligible	Dilapidation Survey Routing of construction traffic	Negligible
Road Safety	Negligible	Traffic management for works in the public highway Suspension/diversion of PRow Banksmen/marshals for cable laying areas	Negligible
Severance	None	-	None
Noise	Negligible	-	Negligible
Driver Delay	Negligible	Lane closures only (not full road closures) Schedule abnormal load movements for periods of low traffic flow	Negligible
Pedestrian and Cyclist Delay	Negligible	Explore potential for diverting the PRow 600/062 around the work area	Negligible
Fear and Intimidation	Negligible	The Contractor to instigate and monitor a 'Considerate Driving' education programme for delivery drivers.	Negligible
Air Quality	Negligible	-	Negligible
Dust and Dirt	Negligible	Wheel-washing facilities to be provided Covering of loads transported to and from the site.	None

15 NOISE AND VIBRATION

Introduction

- 15.1 This chapter examines the potential noise and vibration effects associated with the proposed onshore components of the Proposed Development. The assessment has considered the effects that may be generated during the construction, operational and decommissioning phases.
- 15.2 For details of the project description, reference should be made to Chapter 4 of the Environmental Statement (ES). The application boundary of the Proposed Development has been split into seven sections as presented in Figure 4.5 of the ES; these section designations have been referenced within this chapter.
- 15.3 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature. The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (“NSN Link Ltd”) and their contractors, in consultation with the relevant authorities.

Legislation and Policy Context

- 15.4 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects noise and vibration associated with the Proposed Development.

National Legislation and Policy

- 15.5 In accordance with current standards, guidance and industry best practice, the following national legislation, standards and guidance are relevant to the assessment:
- Noise Policy Statement for England, 2010¹
 - National Planning Policy Framework, 2012²
 - British Standard 5228: 2009+A1: 2014 - Part 1³
 - British Standard 5228: 2009 - Part 2⁴
 - British Standards 7445: 2003⁵
 - British Standard 4142: 1997⁶
 - British Standard 8233:2014⁷
 - Advisory Leaflet 72, 1976⁸

¹ The Department for Environment, Food and Rural Affairs (2010). Noise Policy Statement for England.

² Communities and Local Government (2012) National Planning Policy Framework,

³ British Standards Institution (2009+A1:2014). British Standards 5228: Code of practice for noise and vibration control on construction and open sites - Part 1: Noise.

⁴ British Standards Institution (2009). British Standards 5228. Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration

⁵ British Standards Institution (2003). British Standards 7445: Description and measurement of environmental noise. Part 1: Guide to environmental quantities and procedures.

⁶ British Standards Institution (1997). British Standards 4142: Method for rating industrial noise affecting mixed residential areas.

⁷ British Standards Institution (2014). British Standards 8233: Guidance on sound insulation and noise reduction for buildings.

⁸ Department of the Environment (1976). Advisory Leaflet 72. Noise Control on Building Sites. Department of the Environment.

- Calculation of Road Traffic Noise: 1988⁹
- Design Manual for Roads and Bridges: Part 7: HA 213/08 ¹⁰
- ISO 9613-2 Acoustics –Part 2¹¹
- Guidelines for Community Noise. 2000¹²
- Night Noise Guidelines for Europe. 2009¹³

Local Planning Policy

15.6 There are no local policies or acts relevant to this assessment.

Methodology

Study Area

15.7 The study area for the noise and vibration construction and decommissioning phase assessments has considered sensitive receptors that are located within 300m of the Proposed Development boundary. For the reasons set out below this study area is considered to be appropriate and is in accordance with the methodology set out in British Standard 5228:2009.

15.8 The study area for the operational phase assessment has considered receptors that are located within 500m of the converter station boundary. This ensures that the relevant surrounding noise sensitive receptors are considered as part of the assessment.

15.9 The assessment of operational noise and vibration effects associated with the High Voltage Direct Current (HVDC) and High Voltage Alternating Current (HVAC) underground cables have been scoped out (refer to impact assessment methodology below).

Consultation

15.10 The Environmental Health Officer (EHO) at Northumberland County Council (NCC) was consulted regarding the methodology and scope of the noise and vibration assessment for the onshore works. A summary of the consultation is provided in Table 15.1.

Table 15.1: Summary of Consultations

Organisation (Date)	Summary of consultation	Where addressed in this chapter
Northumberland County Council, July 2013	Construction and operational phase noise assessments to be undertaken in accordance with current guidance and best practice.	Addressed in the Method and Mitigation sections.
	Threshold criteria for determining potential significant impacts during construction will be based on the absolute levels contained within BS5228. Absolute noise level of 70 dB L _{Aeq,T} to be adopted for the	Addressed in the Assessment of Effects sections.

⁹ Department of Environment (1988). Calculation of Road Traffic Noise, HMSO.

¹⁰ The Highways Agency (2011). Design Manual for Roads and Bridges: Part 7: HA 213/08 Noise and Vibration: Volume 11: Noise Assessment, Section 3: Environmental Assessment Techniques.

¹¹ ISO (1996) ISO:9613-2 Acoustics – Attenuation of sound during propagation outdoors – Part 2 General method of calculation.

¹² World Health Organisation (2000). Guidelines for Community Noise.

¹³ World Health Organisation (2009). Night Noise Guidelines for Europe.

Organisation (Date)	Summary of consultation	Where addressed in this chapter
	threshold criteria in line with Annex E. The evening and night-time noise level thresholds would be significantly lower, if work was required during these periods.	
	Construction stage assessment for the cabling corridor to consider noise sensitive premises within 300m of the works. The assessment for the converter station is to consider the nearest residential receptors.	Addressed in the Method, Assessment of Effects and Mitigation sections.
	Construction assessment to identify properties that will require specific mitigation to control noise and vibration levels; appropriate mitigation measures can then be put in place for these receptors, which would follow the principles of Best Practicable Means.	Addressed in the Mitigation section.
	NCC normally stipulate the following core working hours for construction activities: <ul style="list-style-type: none"> • Monday to Friday – 8am to 6pm • Saturday – 8am to 1pm 	Addressed in the Method section.
	Converter station noise assessment to be undertaken in accordance with BS4142:1997. NCC stipulated that the noise emissions should not exceed a +5 dB rating level for the BS4142 criteria i.e. marginal significance.	Addressed in the Method, Assessment of Effects and Mitigation sections.
	The proposed methodology for the baseline noise survey for the area surrounding the converter station was discussed and agreed, prior to the survey commencing.	Addressed in the Existing Environment section.

Assessment Methodology - Construction Noise

- 15.11 Construction phase noise assessments have been undertaken for the cabling installation works (HVDC and HVAC), and for the converter station. Due to the proximity of noise sensitive receptors in the vicinity of parts of the proposed construction activities, there is potential for disturbances to occur.
- 15.12 Noise predictions are based on the methodology contained within BS5228:2009+A1: 2014 for construction activities at given distances from the boundary of the Proposed Development. These noise predictions have been used to determine whether the construction phase works would result in significant effects at the surrounding noise sensitive receptors.
- 15.13 The significance criteria given in BS5228-1:2009 Annex E.2 has been used to assess the noise effects during the construction phase. This provides methods for deriving reasonable limits for construction related noise levels. This approach adopts the use of fixed noise limits at the façade of noise sensitive receptors in the vicinity of the proposed construction works. For the purposes of this assessment, a daytime construction noise limit of 70 decibels (dB) $L_{Aeq,T}$ has been considered for the core construction periods as the basis for identifying potentially significant construction effects. Activities undertaken during evening and night-

time periods would be subject to significantly lower noise level criteria dictated by baseline survey measurements in the locality. This would be in accordance with the methodology outlined in E3.2 and E3.3 of BS5228:2009-1.

15.14 For the purpose of predicting the likely noise effects associated with the construction activities, the following phases have been considered.

Table 15.2: Cable Corridor - HVDC and HVAC Cabling

Activity	Section of Route Affected
Setting out and erection of perimeter fencing	Full length of cable route, Sections 1-7)
Topsoil stripping and haul road construction	(Full length of cable route, Sections 1-7)
Tree felling	(Northern and southern areas of Section 6)
Open trench excavations & duct installations	(Full length of cable route, Sections 1-7)
Trenchless techniques i.e. horizontal directional drilling, thrust boring etc.	(Railway/road crossing within Section 3)
Jointing pits and cable pulling	(Required at approx. 500m centres, therefore assumed in all sections)
Haul road removal and topsoil reinstatement	(Full length of cable route, Sections 1-7)
Use of construction compounds	(Located at car park at North Cambois Beach (Section 1), adjacent to the waste water treatment works (Section 3), and immediately south of the Ferguson Business Centre (Section 5).
Converter Station <ul style="list-style-type: none"> • Perimeter fencing erection; • Topsoil stripping & earthworks; • Building & equipment foundations/bases; • Superstructure works; • Converter station equipment installations; • External works; and • Use of construction compound. 	Section 6

15.15 To inform this assessment, noise sensitive properties have been determined from Ordnance Survey mapping and site inspections. The sensitive receptors were agreed with NCC.

15.16 Construction activities would involve the use of a variety of working methods, for which an estimate of the expected noise levels over a representative period has been prepared, in accordance with industry best practice. Noise levels from the construction works experienced by a receptor would vary over time as the distances to noise producing plant and the type of construction activity changes.

15.17 For the purposes of assessing construction effects, it is assumed that each phase of the works noted above would be programmed so it is not affected by preceding or subsequent work phases, as these would be separated by either time or distance.

15.18 It has been assumed that construction activities will in general be undertaken during daytime periods only. Exact arrangements will be agreed with NCC. On weekdays, it is anticipated that the working hours will be between 07.00 to 19.00, and 07.00 to 14.00 at weekends.

There will be certain periods where 24 hour working will be required, for which separate authorisation would be secured with NCC via a Section 61 application.

Assessment Methodology – Noise from Construction Traffic

- 15.19 To assess the noise levels generated by construction traffic on local sections of the public highway, the predicted increases in road traffic has been assessed in accordance with Calculation of Road Traffic Noise (CRTN).
- 15.20 CRTN sets out standard procedures for calculating noise levels from road traffic. The calculation method uses a number of input variables, including traffic flow volume, average vehicle speed and percentage of heavy goods vehicles (HGV).
- 15.21 The daily traffic flow data from the Traffic and Transport Chapter (Chapter 14) has been used to inform the assessment. The assessment focuses on the change in noise levels that are likely to occur on the roads in the vicinity of the site.
- 15.22 The following road links have been considered in the assessment:
- Road link No.1: Brock Lane
 - Road link No.2: West Bridge Street
- 15.23 Abnormal Indivisible Loads (AILs) during the construction phase are expected to arrive by sea to the Port of Blyth, and from there delivered to the site by road. The AILs are likely to include the converter station transformers, associated switchgear and cable reels. The deliveries will be limited in number and will be subject to specific approvals with NCC.

Assessment Methodology - Construction Vibration

- 15.24 Construction activities such as excavation, heavy vehicle movements, hydraulic breaking and driven piling can produce ground-borne vibration, which may be felt in nearby properties.
- 15.25 Part 2 of BS5228 notes that for the majority of people, vibration levels between 0.14 and 0.3 mms^{-1} peak particle velocity (PPV) are just perceptible. A vibration level of 1.0 mms^{-1} is sufficient to cause complaint, but tolerable with prior warning, whereas a level of 10 mms^{-1} is intolerable for anything more than a very brief exposure. Table 15.3 provides indicative distances at which certain activities give rise to a just perceptible level of vibration. These figures are based on historical field measurements contained within BS5228-2. It should be noted that vibration levels exceeding 15 mms^{-1} PPV are typically required to result in minor cosmetic damage in light / unreinforced buildings.

Table 15.3: Distances at which vibration may just be perceptible

Construction Activity	Distance From Activity When Vibration May Just Be Perceptible (m)
Excavation	10 – 15
Heavy vehicles (e.g. dump trucks)	5 – 10
Hydraulic breaker	15 – 20

Construction Activity	Distance From Activity When Vibration May Just Be Perceptible (m)
Driven piling	50 – 100

15.26 The distances detailed in Table 15.3 have been used to assess whether vibration from construction activities would result in an effect on surrounding properties. Properties situated at distances in excess of those presented in Table 15.3 have not been considered further, as the vibration levels are likely to be outside of the perceptible range

Assessment Methodology – Operational Noise

15.27 The assessment of operational noise along the cable corridor has been scoped out, as there are no predicted operational effects in respect of noise arising from the cables once installed underground. On this basis, the operational assessment has considered the effects associated with the operation of the converter station only.

15.28 The procedure in BS4142:1997 has been used to assess the likelihood of complaints from noise attributable to the operation of the converter station. The procedure compares the predicted noise level from the converter station, the “specific noise level”, with the background noise level. A +5 dB(A) character correction is applied to the specific noise level to take account of the potential for acoustic features (if present) to obtain the “rating level”. The likelihood of noise provoking complaints is assessed by subtracting the background noise level from the rating noise level. BS4142 states:

“A difference of around +10 dB or higher indicates that complaints are likely. A difference of around +5 dB is of marginal significance. A difference of -10 dB is a positive indication that complaints are unlikely.”

“The greater the difference, the greater the likelihood of complaints.”

15.29 The BS4142 method is not suitable for assessing the noise measured inside buildings or when the background and rating noise levels are both very low. For the purposes of this standard, background noise levels below 30 dB and rating levels below 35 dB are considered to be very low.

15.30 The predicted noise levels generated by the operation of the converter station have been calculated using the proprietary noise modelling software CADNA-A®, which implements the common European methods of noise prediction. In this instance, the operational noise predictions have been undertaken in accordance with the noise prediction framework set out in ISO 9613-2.

15.31 The converter station will have a small number of permanent personnel on site (approximately 6 personnel per day divided between 3 shifts over a 24 hour period) and the site will be subject to infrequent inspections and maintenance visits whilst in operation. On this basis, an operational phase traffic assessment has been scoped out of the assessment, as there are not predicted to be any significant effects.

Noise Modelling Parameters

15.32 The converter station noise emissions used in the assessment are given in Tables 15.4 and 15.5. It should be noted that these are mitigated noise levels; reference should be made to the incorporated mitigation discussed below for details of the attenuation measures that have been assumed. Reference should be made to Figure 4.2 which identifies the indicative layout of the converter station.

Table 15.4: Converter Station – External Plant Noise Levels

Item of Plant / Area	Sound Power Level per Unit	Number of Units	Height of Noise Source Above Ground Level (m)
Transformer	80 dB(A)	6	4.0
Transformer cooler	80 dB(A)	6	4.0
Valve cooling fans	80 dB(A)	66	2.0

Table 15.5: Converter Station – Noise from Internal Plant Areas

Building	Internal Reverberant Noise Level	Number of Buildings
Phase reactor building	80 dB(A)	2
AC filter building	70 dB(A)	2

Note: Noise generated from within the other converter station buildings is assumed to be negligible

- 15.33 The converter station will be operational on a 24 hour basis and therefore the operational noise assessment has considered both daytime and night-time periods. The assessment has assumed a worst case scenario in which all plant will be operating concurrently and continuously.
- 15.34 The external transformers will be bounded on three sides by 15 m tall concrete blast walls. These have been included within the noise prediction model.
- 15.35 For the purposes of modelling noise break-out from the Phase Reactor and AC Filter buildings, the external envelope has been modelled assuming the use of composite cladding panels which provide a weighted sound reduction of $R_w = 24$ dB.
- 15.36 External doors to the Phase Reactor and AC Filter buildings are assumed to be closed whilst the facility is operational. The doors and junction details are assumed to achieve the equivalent acoustic performance as the main wall panels.
- 15.37 The diesel generator will only operate in the event of an emergency loss of power, which will be an infrequent event and would not be representative of normal operating conditions. On this basis, the generator has not formed part of the noise prediction model.

15.38 The topography on and around the converter station site has been modelled using topographical survey information and Ordnance Survey mapping. The acoustic ground absorbency is modelled according to local conditions.

Incorporated mitigation – Operational Noise

15.39 To minimise the noise effects associated with the operation of the converter station, a series of incorporated mitigation measures have been embedded into the design.

15.40 The incorporated mitigation measures are outlined below:

- Acoustic enclosures to be provided to the external transformers and transformer coolers. For the purposes of the assessment, it is assumed that the enclosures will provide a minimum 10 dB of sound attenuation.
- Relocation of cooling fan block to the west of the DC Hall building. This ensures that the building massing provides acoustic screening to the residential properties to the east and the public right of way to the north-east of the site.
- Provision of an acoustic barrier around the external fan blocks to minimise the noise levels experienced by the sensitive receptors to the south-west, and also to the public right of way to the north-east.
- Relocation of the standby generator to the north-west of the site, thereby minimising its impacts on the nearest noise sensitive receptors when it is in use.

15.41 The finalised strategy for mitigation will be subject to the detailed design, during which alternative systems of mitigation may be adopted to achieve equivalent levels of noise reduction

Assessment Methodology – Operational Vibration

15.42 The assessment of operational vibration along the cable corridor has been scoped out, as there are no predicted operational effects in respect of vibration arising from the cabling once installed underground.

15.43 No significant vibration effects associated with the converter station have been identified by the equipment supplier for the operational phase. On this basis, the converter station would not generate sufficient vibration forces that would be perceptible at the nearest vibration sensitive receptor and therefore this aspect has been scoped out.

Assessment Methodology - Decommissioning

15.44 The noise and vibration impacts during the decommissioning phase would be broadly similar to those defined for the construction phase and hence they have not been considered separately. Reference should be made to the construction phase assessment for details of potential decommissioning effects.

Assessment of Cumulative Effects

15.45 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. However, when individual effects are considered in combination, the resulting cumulative effect may be significant.

15.46 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:

- Port of Blyth Biomass Power Station;
- Proposed National Grid Electricity Transmission Plc. (NGET) 400kV GIS Substation;
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site; and
- Residential development – 48 dwellings.

Assessment of Significance

15.47 The significance of an effect is generally determined as the combination of the ‘sensitivity’ of the affected environmental receptor and the predicted ‘magnitude’ of the effect of change on this receptor.

15.48 The assessment of significance ultimately relies on professional judgement, although comparing the extent of the effect with criteria and standards has guided this judgement.

15.49 The receptor sensitivities presented in Table 15.6 have been used to inform the assessment..

Table 15.6: Sensitivity of Noise Receptor

Sensitivity	Definition
High	Residential properties, schools, hospitals, churches, public houses, hotels, children's nursery, nursing homes
Moderate	Commercial premises, halls, public municipal areas. Areas formally designated for leisure activities (in this case public footpaths)
Low	Industrial premises and areas not formally designated for leisure activities (for example most countryside and land remote from habitation)
Negligible	All other areas such as those used primarily for industrial or agricultural purposes.

15.50 For the purpose of this assessment, the criteria in Table 15.8 have been adopted for the magnitude of the effect. It should be noted that the construction phase effects would be temporary in nature, and the operational phase effects arising from the converter station would be permanent.

Table 15.7: Magnitude of Effect Criteria

	Effect	Criteria for Magnitude			
		Negligible	Low	Medium	High
Construction	Noise from construction activities	Façade noise level less than 65 dB(A)	Façade noise level between 65 - 70 dB(A)	Façade noise level between 70 - 75 dB(A)	Façade noise level in excess of 75 dB(A)
	Road traffic noise	0.1 to 0.9 dB increase in road traffic noise	1.0 to 2.9 dB increase in road traffic noise	3.0 to 4.9 dB increase in road traffic noise	>5 dB increase in road traffic noise
	Vibration from construction activities	Undetectable levels of vibration (<0.15 mms ⁻¹ PPV)	Just detectable levels of vibration (0.15 to 0.30 mms ⁻¹ PPV)	Vibration levels may cause complaint, but tolerated with prior warning (up to 1.00 mms ⁻¹ PPV)	Intolerable levels of vibration (>1.00 mms ⁻¹ PPV)
Operation	Noise from converter Station	Receptor rating noise level more than 10 dB(A) below background noise level*	Receptor rating noise level not exceeding the background noise level*	Receptor rating noise level not exceeding 5 dB(A) above background noise level*	Receptor rating noise level in excess of 10 dB(A) above background noise level*

* Subject to lower bound rating noise level of 35 dB(A) where the background noise levels are ≤ 30 dB(A), in accordance with BS4142. In this instance, a low magnitude is considered

15.51 The significance of an effect within this assessment has been defined as shown in Table 15.8.

Table 15.8: Significance of Effect

Magnitude	Sensitivity of Receptor			
	High	Moderate	Low	Negligible
High	Major	Major / Moderate	Moderate	Minor
Medium	Moderate	Moderate	Minor	Minor / Negligible
Low	Minor	Minor	Minor	Negligible
Negligible	Minor / Negligible	Minor / Negligible	Negligible	Negligible

15.52 The significance of effect can be described as follows:

- **Minor:** Slight, very short or highly localised;
- **Moderate:** Limited effect in terms of extent, duration or magnitude; or
- **Major:** Considerable effect in terms of extent, duration or magnitude or more than local significant or in breach of recognised acceptability, legislation or policy or standards.

15.53 The nature of an effect can be classified as adverse, negligible (or no effect), or beneficial:

- **Adverse:** Classifications of significance indicate disadvantageous or negative effects to an environmental receptor, which may be of **Minor, Moderate, or Major Significance**;
- **Negligible/None:** Classifications of significance indicate imperceptible effects to an environmental receptor. Although it should be noted that noise and vibration levels may still be audible/detectable, particularly during the construction phase.
- **Beneficial:** Classifications of significance indicate advantageous or positive effects to an environmental receptor, which may be of **Minor, Moderate or Major Significance**.

15.54 Timescales associated with effects are categorised as follows:

- **Short Term:** a period not exceeding 12 months i.e. transient cabling installation works;
- **Medium Term:** a period between one year and five years i.e. converter station construction works; and
- **Long Term:** a period of more than five years i.e. operation of converter station.

Existing Environment

Site Description

15.55 The Proposed Development encompasses an area between the landfall point at Cambois Bay and the existing Blyth substation at East Sleekburn. The area of the Proposed Development has been split into seven sections as shown in Figure 4.5, and an overview of each section is contained within the Project Description of the ES (Chapter 4).

15.56 Current land use at the Development primarily comprises the following:

- Cambois Beach and associated slipway;
- Open grassland (Cambois Links);
- Agricultural fields;
- Roads and railway line;
- A public footpath (PRoW);
- Light industrial parks (Ferguson's Business Park and Sleekburn Business Centre);
- A motorbike scramble track;
- Watercourses; and
- Areas of juvenile planting.

- 15.57 The topography of the Proposed Development area is relatively flat with limited topographical features.
- 15.58 The converter station site is located on level agricultural land to the north of Brock Lane, at East Sleekburn. The site is bounded by agricultural fields, areas of tree planting and Brock Lane. The nearest residential properties to the converter station site are situated to the east and south-west, located on Sandfield Road (~170m) and Havelock Mews (~300m) respectively. There is a public right of way to the north/east of the converter station site, which links Sandfield Road to Wembley Gardens Road to the north (~40m at closest point to converter station buildings).

Baseline Noise Survey – Converter Station

- 15.59 Noise surveys were undertaken in the vicinity of the converter station site to establish the baseline noise conditions, against which the predicted operational noise effects from the converter station have been assessed.
- 15.60 The survey comprised a series of attended measurements taken on the 11th and 12th July 2013. Measurements were taken at three locations which are denoted as ST1, ST2 and ST3 in Figure 15.1. The locations were chosen to be representative of the converter station itself and sensitive receptors in the form of residential properties to the east and south-west of the Proposed Development. Measurements were taken under free field conditions i.e. >3.5m away from reflecting surfaces unless otherwise stated. All measurements were undertaken at a height of 1.5m above local ground level.
- 15.61 The sound meters (SLM) had been calibrated to traceable standards within the preceding two years and the calibrators within the previous 12 months; calibration certificates are available upon request. The SLM was field calibrated once it was set up in the measurement positions and on completion of the survey. No significant drift in the calibration was recorded at any times during the survey.
- 15.62 The weather conditions during the survey were dry with wind speeds below 5m/s.

Figure 15.1: Noise Monitoring Location Plan



15.63 A summary of the noise levels measured during the baseline noise surveys at the Proposed Development are provided in Tables 15.9, 15.10 and 15.11.

Table 15.9: Monitoring Position ST1 – South-West of Converter station Site

Date	Time Period	L _{Aeq, 15min} dB	L _{AF(max)} dB	L _{A90,15min} dB
11/07/13	14:43 to 14:57	47.2	63.7	38.0
	14:57 to 15:12	47.9	63.3	38.8
	15:12 to 15:27	47.1	61.0	37.6
	16:50 to 17:05	46.6	68.1	38.3
	17:05 to 17:20	45.5	57.2	37.2
	17:20 to 17:35	44.9	60.1	37.8
	22:57 to 23:12	43.2	57.3	35.9
	23:12 to 23:27	39.8	57.4	34.8
12/07/13	10:23 to 10:38	47.9	59.5	39.0
	10:38 to 10:53	48.3	59.8	38.6
	10:53 to 11:08	47.7	59.1	36.8

15.64 The noise climate at monitoring location ST1 during the daytime was dominated by road traffic noise from Brock Lane and bird song/calls. During the evening and night-time periods, noise from overhead power lines and the Blyth substation were prominent.

Table 15.10: Monitoring Position ST2 – Western Boundary of Converter Station

Date	Time Period	L _{Aeq, 15min} dB	L _{AF(max)} dB	L _{A90,15min} dB
11/07/13	13:00 to 13:15	41.3	59.5	38.0
	13:15 to 13:30	42.0	60.0	38.8
	13:30 to 13:45	42.9	61.0	38.7
	13:45 to 14:00	41.2	54.9	38.5
	17:55 to 18:10	46.5	72.0	38.2
	18:10 to 18:25	46.4	71.5	38.6
	18:25 to 18:40	44.7	66.1	38.5
	21:03 to 21:18	44.9	62.8	35.6
	21:18 to 21:33	44.0	58.8	35.7
	21:33 to 21:48	42.9	57.2	35.9
12/07/13	01:01 to 01:16	38.4	48.4	36.9
	01:16 to 01:31	36.6	47.1	34.9
	01:31 to 01:46	36.6	53.4	32.5
	09:22 to 09:37	46.5	63.6	44.1
	09:37 to 09:52	45.5	64.9	43.1
	09:52 to 10:07	45.6	52.4	43.5

15.65 The noise climate at monitoring location ST2 during the daytime was dominated by road traffic noise from Brock Lane, rustling grass/leaves and bird song/calls. During the evening and night-time periods, noise from overhead power lines and the Blyth substation were prominent.

Table 15.11: Monitoring Position ST3 – East of Converter Station Site

Date	Time Period	L _{Aeq, 15min} dB	L _{AF(max)} dB	L _{A90,15min} dB
11/07/13	13:00 to 13:15	41.3	58.3	38.7
	13:15 to 13:30	42.2	57.5	38.5
	13:30 to 13:45	43.3	58.7	37.5
	13:45 to 14:00	42.7	57.4	37.8
	17:55 to 18:10	46.1	67.4	38.0
	18:10 to 18:25	45.7	62.2	38.1
	18:25 to 18:40	43.8	61.2	37.6
	22:00 to 22:15	44.5	56.9	35.6
	22:15 to 22:30	40.0	59.5	34.5
	22:30 to 22:45	42.3	55.4	34.1
12/07/13	01:56 to 02:11	32.3	44.5	30.1
	02:11 to 02:26	34.7	45.1	30.6
	02:26 to 02:41	35.1	54.5	30.6
	09:22 to 09:37	50.4	64.5	43.4
	09:37 to 09:52	49.9	63.9	42.2
	09:52 to 10:07	49.5	59.3	41.8

15.66 The noise climate at monitoring location ST3 during the daytime was dominated by road traffic noise from Brock Lane, rustling leaves, crickets chirping and bird song/calls. During the evening and night-time periods, noise from overhead power lines and the Blyth substation were prominent.

Description of the Proposed Development

15.67 Reference should be made to Chapter 4 of the Environmental Statement for a description of the Proposed Development.

Assessment of Effects of HVDC Cables

Construction Phase - Noise

15.68 Table 15.12 presents the predicted noise levels for the various phases of the HVDC cabling installation works. The detailed assessment is provided in Appendix 15.1.

Table 15.12: Predicted Noise Levels for HVDC Cable Installation Works

Element of Works	Overall Activity Noise level at 10m (L _{Aeq,T} dB)
Setting out and fencing	80
Tree felling	88
Topsoil Strip and haul road construction	83
Excavation of trenches	80
Trenchless techniques - HDD	88
Jointing pits and cable pulling	83
Haul road removal and topsoil reinstatement	86
Use of construction compounds	74

15.69 Table 15.13 presents the noise levels (dB) at various distances from the activities by estimating the noise reduction with distance from the source, assuming a 6dB reduction per doubling of distance. A +3 dB building façade correction factor has been applied in accordance with BS5228 and this explains the higher values at a distance of 10m when compared to Table 15.13 above.

Table 15.13: Noise Levels for HVDC Cabling Works at Various Distances

Site Activity	Distance to Receptor (metres)						
	10	20	30	40	50	100	200
Setting out and fencing	83	77	73	71	69	63	57
Tree felling	91	85	81	79	77	71	65
Topsoil strip and haul road construction	86	80	76	74	72	66	60
Excavation of trenches	83	77	74	71	69	63	57
Trenchless techniques - HDD	91	85	81	78	77	71	65
Jointing pits and cable pulling	86	80	77	74	72	66	60
Haul road removal and topsoil reinstatement	89	83	80	77	75	69	63
Use of construction compounds	77	71	68	65	63	57	51

15.70 Based on the distances to the receptors in the vicinity of the cable corridor and the noise levels presented in Table 15.14, there is potential that the threshold noise criteria of 70dB L_{Aeq,T} will be exceeded as a result of the HVDC cable installation works. There is also the potential for exceedances to occur at the locations presented in Table 15.15.

Table 15.14: HVDC Construction Activities Resulting in Noise Levels Above 70 dB(A)

Section of Cable Route	Site Activity	Affected receptor (Receptor Sensitivity in Brackets)
Section 1	<ul style="list-style-type: none"> • Setting out and fencing • Topsoil Strip and haul road construction • Excavation of trenches • Jointing pits and cable pulling • Haul road removal and topsoil reinstatement • Construction Compounds 	<ul style="list-style-type: none"> • Oma House (High) • No.1 Cambois Farm Wayside Cottages (High) • No.1 Cambois Farm Cottages (High) • No.1-6 The Paddocks (High) • No.4 Bay Wynd (High) • Public House / restaurant, the Bucca (High)
Section 2	<ul style="list-style-type: none"> • Setting out and fencing • Topsoil Strip and haul road construction • Excavation of trenches • Jointing pits and cable pulling • Haul road removal and topsoil reinstatement 	<ul style="list-style-type: none"> • No.4-6 The Paddocks (High)
Section 3	<ul style="list-style-type: none"> • Trenchless techniques 	<ul style="list-style-type: none"> • Industrial units at Ferguson’s Business Park (Low) • Industrial units at Sleekburn Business Centre (Low)
Section 4	<ul style="list-style-type: none"> • Setting out and fencing • Topsoil Strip and haul road construction • Excavation of trenches • Jointing pits and cable pulling • Haul road removal and topsoil reinstatement 	<ul style="list-style-type: none"> • Industrial units at Ferguson’s Business Park (Low) • Industrial units at Sleekburn Business Centre (Low)

15.71 Based on a high receptor sensitivity for residential dwellings and the public house/restaurant, together with a high magnitude of effect based on noise levels above 75dB $L_{Aeq,T}$, the unmitigated HVDC cable installation works have been assessed to be of **major adverse significance** over a **short term** period. It should be noted that this significance would only be applicable in a limited number of areas along the length of the Proposed Development. Due to the transient nature of the works, the duration of these impacts would be limited.

15.72 Based on a low receptor sensitivity for industrial units at the business park and business centre and a high magnitude of effect based on noise levels above 75dB $L_{Aeq,T}$, the HVDC cable installation works have been assessed to be of **moderate adverse significance** over a **short term** period.

15.73 These effects are considered to be **significant**, and therefore appropriate mitigation measures will be required to control the noise emissions generated by the HVDC works in a limited number of areas. Refer to the Mitigation section below.

Construction Phase – Vibration

- 15.74 Due to the proximity of the boundary of the Proposed Development to receptors within Sections 1, 2 and 4, there is potential that unmitigated construction induced vibration has the potential to exceed just perceptible levels at the nearest receptors i.e. where properties are located within approx. 20m of the cable corridor.
- 15.75 Based on high receptor sensitivity for residential dwellings and the public house/restaurant, together with a medium magnitude of effect, the HVDC cable installation works have been assessed to be of **moderate adverse significance** over a **short term** period. It should be noted that this significance would only be applicable in a limited number of areas along the length of the application area. Due to the transient nature of the works, the duration of these impacts would be limited.
- 15.76 Based on low receptor sensitivity for industrial units at the business park and business centre and a medium magnitude of effect, the HVDC cable installation works have been assessed to be of **minor adverse significance** over a **short term** period.
- 15.77 These effects are considered to be **significant**, and therefore appropriate mitigation measures will be required to control the vibration levels generated by the HVDC works in a limited number of areas. Refer to the Mitigation section below.

Assessment of Effects of the Converter Station

Construction Phase

- 15.78 Table 15.15 presents the predicted noise levels during the construction of the converter station. The detailed assessment is provided in Appendix 15.2..

Table 15.15: Predicted Construction Noise Levels for the Converter Station Works

Element of Works	Overall Activity Noise level at 10m (L _{Aeq} dB)
Use of construction compound	79
Site stripping and earthworks	87
Substructure works - driven piling	93
Superstructure works	81
Equipment installations	85
External works	86

- 15.79 Table 15.15 presents the noise levels (dB) at various distances from the activities by estimating the noise reduction with distance from the source, assuming a 6dB reduction per doubling of distance. A +3dB building façade correction factor has been applied in accordance with BS5228 and this explains the higher values at a distance of 10m when compared to Table 15.165above.

Table 15.16: Noise Levels for Converter Station Construction at Various Distances

Site Activity	Distance to Receptor (metres)					
	10	25	50	100	200	250
Construction compound	82	74	68	62	56	54
Site stripping and Earthworks	90	82	76	70	64	62
Substructure works - driven piling	96	88	82	76	70	68
Superstructure works	84	77	71	64	58	57
Equipment Installations	88	80	74	68	62	60
External Works	89	81	75	69	63	61

- 15.80 It can be seen from Table 15.16, that the noise levels are expected to be highest whilst the driven piling works are being undertaken. At the nearest piling location, the works will be approximately 200m from the closest residential receptors, and therefore the noise levels are not predicted to exceed the threshold criteria.
- 15.81 Due to the location of noise sensitive residential receptors relative to the converter station construction works, the noise levels are not predicted to exceed 70 dB $L_{Aeq,T}$ and will typically be below 65 dB $L_{Aeq,T}$.
- 15.82 Based on high receptor sensitivity for residential properties surrounding the Proposed Development, and a low magnitude of effect, the construction noise levels associated with the converter station have been assessed to be of **minor adverse significance** over a **medium term** period. This effect is therefore considered to be **not significant**.

Construction Phase – Vibration

- 15.83 Due to the considerable distances to the nearest residential receptors from the boundary of the converter station site, the vibration associated with the construction of the converter station is not predicted to give rise to perceptible levels.
- 15.84 On the basis of high receptor sensitivity for residential properties surrounding the site, and a negligible magnitude of effect, the construction phase vibration levels for the converter station are assessed to be of **negligible significance** over a **medium term** period. This effect is therefore considered to be **not significant**.

Operational Phase

- 15.85 Based on the modelling parameters outlined in the Assessment Methodology section, the predicted noise levels at the closest noise sensitive premises have been assessed.
- 15.86 An extract of the noise prediction model showing the contour plot attributable to the operation of the proposed converter station is presented in Figure 15.2. The figure presents the specific noise levels attributable to the converter station, and therefore excludes the +5 dB acoustic feature correction.

Figure 15.2: Extract from Noise Prediction Model

(Noise contours presented at 4m AGL)



15.87 Based on the BS4142 assessment criteria, a +5 dB(A) acoustic feature correction has been applied to the noise emissions from the converter station to obtain the rating noise levels. This is to take account of the character of the noise source, i.e. tonal emissions.

15.88 The predicted rating noise levels at the closest noise sensitive receptors are noted below:

- Sandfield Road receptors: $30 + 5 = 35 \text{ dB(A)}^{14}$
- Havelock Mews Receptors: $29 + 5 = 34 \text{ dB(A)}^1$

15.89 The lowest daytime and night-time background noise levels measured during the baseline noise survey regardless of location are noted in Table 15.17 below.

Table 15.17: Lowest Background Noise Levels from Baseline Survey

Survey Monitoring Position	Lowest Background Noise Levels (dB $L_{A90,15min}$)	
	Daytime	Night-time
ST3	34	30

15.90 Based on the information presented above, the BS4142 assessment table is shown in Table 15.18

¹⁴ Specific noise level + acoustic feature correction = Rating noise level

Table 15.18: BS4142 Assessment Table

Receptor	Predicted Rating Noise Level at Receptor (dB L _{Aeq,T})	Comparison with Measured Background Noise Levels			
		Daytime Noise Levels (dB L _{A90,15min})	Daytime Difference	Night-time Noise Levels (dB L _{A90,15min})	Night-time Difference
Sandfield Road	30 + 5 = 35	34	+1 dB	30	+5 dB
Havelock Mews	29 + 5 = 34		0 dB		+4 dB

- 15.91 It can be seen from Table 15.18 that the rating noise levels at the nearest residential receptors are 35 and 34 dB(A) for Sandfield Road and Havelock Mews respectively. The lowest measured background noise level from the baseline survey was 30 dB which occurred during the night-time period; higher noise levels were recorded during the daytime and evening periods.
- 15.92 The rating noise level is therefore predicted to be 5 dB above the lowest background noise levels. Based on high receptor sensitivity for residential properties and a low magnitude of effect, the operational noise levels from the converter station are assessed to be of **minor adverse significance** over a **long term** period. This effect is therefore considered to be **not significant**.

Assessment of Effects of High Voltage Alternating Current Cables

Construction Phase - Noise

- 15.93 The construction phase noise levels generated by the High Voltage Alternating Current (HVAC) cable installation works are predicted to be similar to those generated during the installation of the HVDC cables (refer to tables 15.12 and 15.13).
- 15.94 Based on the distances to the receptors in the vicinity of the cable corridor and the noise levels presented in Table 15.13, there is potential that the threshold noise criteria of 70dB L_{Aeq,T} will be exceeded as a result of the HVAC cable installation works, in the north-eastern area of Section 7. There is potential for exceedances to occur at the locations presented in Table 15.19.

Table 15.19: HVAC Construction Activities Resulting in Noise Levels Above 70 dB(A)

Section of Cable Route	Site Activity	Affected Receptor (Receptor Sensitivity in Brackets)
Section 7	<ul style="list-style-type: none"> • Topsoil strip and haul road construction • Jointing pits and cable pulling • Haul road removal and topsoil reinstatement 	<ul style="list-style-type: none"> • No.2 Sandfield Road (High) • No.4 Sandfield Road (High) • No.6 Sandfield Road (High) • No.8 Sandfield Road (High) • No.10 Sandfield Road (High) • No.12 Sandfield Road (High) • No.14 Sandfield Road (High) • No.16 Sandfield Road (High) • No.18 Sandfield Road (High) • No.20 Sandfield Road (High)

15.95 Based on a high receptor sensitivity for residential dwellings and a medium magnitude of effect based on noise levels between 70 and 75 dB $L_{Aeq,T}$, the HVAC cable installation works have been assessed to be of **moderate adverse significance** over a **short term** period. It should be noted that this significance would only be applicable in a limited area within the boundary of the Proposed Development. Due to the transient nature of the works, the duration of these impacts would be limited..

15.96 This effect is considered to be **significant**, and therefore appropriate mitigation measures will be required to control the noise emissions generated by the HVDC works in a limited number of areas. Refer to the Mitigation section below.

Construction Phase – Vibration

15.97 Due to the distance to the nearest residential receptors from the application boundary, the vibration associated with the installation of the HVAC cabling is not predicted to give rise to perceptible levels.

15.98 On the basis of high receptor sensitivity for residential properties surrounding the Proposed Development, and a negligible magnitude of effect, the construction phase vibration levels associated with the installation of the HVAC cabling are assessed to be of **negligible significance** over a **short term** period. This effect is therefore considered to be **not significant**.

Assessment of Effects of Road Traffic Noise during Construction

15.99 Construction traffic associated with the Proposed Development has the potential to give rise to noise effects at surrounding sensitive receptors. The effect of construction traffic is generally greater on local sections of road closest to the site access routes, or on sections of road that are subject to low levels of pre-construction traffic. The total maximum daily two-way construction vehicle movements across the public highway network are predicted to result in 10 HGV, 30 cars / light goods vehicles, and one minibus. The traffic flow data was derived from the Traffic and Transportation assessment (Chapter 14).

15.100 The additional vehicle movements would result in the following percentage increase in traffic flows during the peak construction activity:

- Brock Lane: 1.7% increase in total traffic and a 4.7% increase in HGV movements.
- West Bridge Street: 0.2% increase in total traffic and a 1.0% increase in HGVs.

15.101 The increases in traffic flows have been calculated and would only constitute a negligible increase in the noise levels i.e. less than 0.5 dB. The duration of the increased traffic movements would also be limited.

15.102 Based on a high receptor sensitivity and a negligible magnitude of effect and an increase in noise levels not exceeding 1 dB, the construction traffic movements have been assessed to be of **negligible adverse significance** over a **short term** period.

Mitigation

Construction Phase

Siting of the cable corridor within the Proposed Development

15.103 Where significant effects are reported as a result of the cable installation works due to the proximity of the Proposed Development boundary to the surrounding sensitive receptors, an effective form of mitigation will be to provide a clear buffer zone between source and receiver positions. The required separation distance will be a function of the construction task being undertaken, however, Table 15.14 provides a guide to the reduction in noise with increased propagation distance.

15.104 Where feasible the works shall be located away from sensitive receptors in order to limit the noise and vibration levels experienced by the nearest receptors.

Temporary Noise Barriers

15.105 Where the noise threshold levels cannot be achieved by separating source and receiver positions, temporary noise barriers may be required at the boundary of the cable corridor in strategic locations. The requirement for noise barriers will be a function of the cable corridor location within the Proposed Development. The final siting of the cables within the corridor has yet to be defined at this stage..

15.106 In the absence of a defined cable corridor within the Proposed Development boundary, it is envisaged that temporary noise barriers will be required to provide an enhanced level of noise attenuation to the following noise sensitive receptors:

- Oma House, Cambois (Section 1);
- No.1 Cambois Farm Wayside Cottages, Cambois (Section 1);
- No.1 Cambois Farm Cottages, Cambois (Section 1);
- No.4 Bay Wynd, Cambois (Section 1);
- Public House / restaurant, the Bucca, Cambois (Section 1);
- No.1-6 The Paddocks, Cambois (Section 1 and 2);
- Industrial units at Ferguson's Business Park (Section 4, if required); and
- Industrial units at Sleekburn Business Centre (Section 4, if required).

15.107 Temporary noise barriers typically comprise earth bunds, solid fencing with appropriate surface mass, or proprietary acoustic screening systems. Consideration would be given to the barrier reflections during the detailed design phase, which may dictate the use of absorptive barrier materials.

15.108 BS5228-1:2009 states that the approximate acoustic attenuation provided by a barrier will be 5 dB when the top of the plant is just visible to the receiver over the noise barrier and 10 dB when the barrier completely hides the noise sources from the receiver.

Vibration Mitigation

15.109 Construction activities that have the potential to result in significant vibration effects would be effectively managed so that, where practicable, they are undertaken away from sensitive receptors. Where required, the works would be undertaken using alternative methods and techniques to ensure that vibration threshold limits would not be exceeded, such as the use of smaller plant items which generate lower source levels of vibration.

15.110 In exceptional circumstances, it may be necessary to introduce localised cut-off trenches to interrupt the direct transmission path of vibrations between source and receiver positions. It should be noted that the vibration criteria used for the assessment is based on the likelihood of perceptibility, rather than causing damage to property, for which the magnitude is significantly higher.

Best Practicable Means

15.111 Best practicable means (BPM), as defined by the Control of Pollution Act¹⁵, would be implemented as part of the working methodology. A Noise and Vibration Management Plan would be prepared by the Contractor to outline measures to minimise the noise and vibration effects at receptors in the vicinity of the construction works. The reduction in noise levels provided through the implementation of BPM varies depending on the nature of the works; however, reductions of 5 to 10 dB are typically expected through a combination of appropriate measures.

15.112 Typically BPM measures include:

- Restricted working hours;
- Where reasonably practicable, quiet working methods to be adopted, using plant with lower noise emissions;
- Where reasonably practicable, adopt working methods that minimise vibration generation;
- Locating plant away from noise and vibration sensitive receptors, where feasible;
- Use of silenced and well-maintained plant conforming with the relevant EU directives relating to noise and vibration;
- Avoid where practicable breaking out hard surfaces using percussion techniques;
- Avoid unnecessary revving of engines and switch off equipment when not required;
- Carry out regular inspections of noise mitigation measures to ensure integrity is maintained at all times;
- Provide briefings for all site-based personnel so that noise and vibration issues are understood and mitigation measures are adhered to;

¹⁵ HMSO (1974) *Control of Pollution Act 1974*.

- Manage plant movement to take account of surrounding noise sensitive receptors, as far as is reasonably practicable; and
- Carry out compliance monitoring of on-site noise and vibration levels to ensure that the agreed limits are being adhered to.

Residual Effects

Construction Phase – Noise

HVDC and HVAC Cables

- 15.113 It is considered that with the implementation of a series of appropriate mitigation measures, together with careful planning and sequencing of the works as part of the Construction Environmental Management Plan (CEMP), the likely noise effects can be managed to achieve acceptable noise levels at the surrounding sensitive receptors.
- 15.114 Based on high receptor sensitivity for residential dwellings and the public house/restaurant, together with a low magnitude of effect, the residual effects associated with the HVDC and HVAC cable installation works have been assessed to be of **minor adverse significance** over a **short term** period.
- 15.115 Based on low receptor sensitivity for industrial units at the business park and business centre and a medium magnitude of effect, the residual effects associated with the HVDC cable installation works have been assessed to be of **minor adverse significance** over a **short term** period.

Converter Station

- 15.116 No significant construction phase noise and vibration effects have been identified as part of the assessment for the converter station. On this basis, the residual impacts are as presented in the main assessment section.

Construction Phase – Vibration

- 15.117 It is considered that with the implementation of a series of appropriate mitigation measures, together with careful planning and sequencing of the works as part of the CEMP process, it is considered that the likely vibration effects can be managed to achieve acceptable levels at the surrounding sensitive receptors.
- 15.118 On the basis of high receptor sensitivity for residential properties surrounding the site, and a low magnitude of effect, the residual effects for the construction phase vibration levels associated with the installation of the HVDC cabling are assessed to be of **minor significance** over a **short term** period.
- 15.119 No significant construction induced vibration effects have been identified as part of the assessment for the converter station and HVAC cabling installation works. On this basis, the residual impacts are as presented in the main assessment section.

Operational Phase

- 15.120 No significant operational phase noise and vibration effects have been identified as part of the assessment. On this basis, the residual impacts are as presented in the main assessment section.

Cumulative Effects

15.121 A number of development proposals have been considered as part of the assessment of cumulative effects.

Port of Blyth Biomass Power Station

15.122 The Port of Blyth Biomass Power Station will be located at Blyth Harbour approximately 1.5km to the south-east of the proposed converter station site.

15.123 Due to the considerable separation distance between the Proposed Development and the Port of Blyth Biomass Power Station site, construction and operational noise and vibration effects are not envisaged. On this basis, cumulative effects with the Port of Blyth Biomass Power Station are considered to be **not significant**.

Proposed NGET 400kV GIS Substation

15.124 The proposed 400kV GIS substation will be located approximately 400m to the south-east of the proposed converter station site, adjacent to the existing Blyth 275kV Substation.

15.125 NSN Link Ltd have advised that there will not be any significant noise and vibration producing infrastructure associated with the proposed 400kV GIS Substation. On this basis, it is assumed that the proposed substation will not contribute to the noise and vibration levels in the area once the facility is operational.

15.126 There is potential for cumulative noise effects from construction activities if the converter station and substation are constructed concurrently. The potential cumulative effects would be most significant at the receptors on Sandfield Road. Based on the distances between the converter station site and substation site to the Sandfield Road receptors (approximately 200m and 300m respectively), the cumulative construction impacts are not predicted to give rise to a significant effect.

15.127 On the basis of the analysis presented above, cumulative effects with the proposed NGET 400kV GIS substation are considered to be **not significant**.

Ferguson Business Park Single Turbine

15.128 The proposed wind turbine is situated approximately 1km to the north of the converter station site and hence there is potential for cumulative effects during the operational phase of the developments. The planning submission for the turbine installation did not include a noise impact assessment and hence the predicted noise emissions at the surrounding sensitive receptors have not been defined.

15.129 Based on the estimated sound power levels generated by the turbine, there is potential for a cumulative increase in the noise levels experienced by the sensitive receptors in the vicinity of the converter station. This increase is expected to be limited to approximately 1dB(A) when the turbine is operating in high wind speeds.

15.130 The increase in noise during these meteorological conditions will be offset by elevated background noise levels attributable to the wind noise in trees and vegetation. This will have the effect of increasing the allowable noise criteria, and hence the minimal increase in operational noise is not predicted to give rise to a significant impact.

15.131 On this basis, cumulative effects with the Ferguson Business Park Turbine are considered to be **not significant**.

Earth Balance Single Turbine

15.132 The proposed wind turbine is situated approximately 2km from East Sleekburn, to the west of the A189 highway, and as such cumulative effects during the construction and operational phase are not envisaged due to the considerable separation distance between the two sites.

15.133 On this basis, cumulative effects with the Earth Balance Single Turbine are considered to be **not significant**.

Narec Offshore Wind Demonstration Site

15.134 The Narec Offshore Wind Demonstration Site is located 8km to 17km off the Blyth coast. The noise impact assessment undertaken for the offshore wind demonstration site has identified that the operational noise levels from all turbines will be compliant with the simplified assessment criterion of 35 dB, $L_{A90,10min}$ at all noise sensitive receptor locations. The airborne noise effects were therefore reported to be **not significant**.

15.135 On this basis, cumulative effects with the Narec Offshore Wind Demonstration Site are considered to be **not significant**.

Residential Development 48 Dwellings

15.136 The residential development will result in approximately 240 additional daily trips, which equates to around 20 trips during the peak hours. Due to the current traffic flows along Brock Lane, the increased traffic generated by the residential development in addition to the construction traffic from the Proposed Development will not constitute a significant cumulative traffic impact.

15.137 If construction works overlap with the Proposed Development then traffic management arrangements should be co-ordinated to minimise potential impacts.

15.138 The dwellings forming part of the residential development will form additional noise sensitive receptors that have the potential to be affected by the Proposed Development. The residential development is situated to the west of existing East Sleekburn properties, and therefore the noise levels experienced by these receptors are not predicted to change the outcome of the assessment presented elsewhere in this chapter.

15.139 On this basis, cumulative effects with the East Sleekburn residential development are considered to be **not significant**.

Summary

15.140 In summary, no significant cumulative impacts are expected between the Proposed Development and nearby proposed developments. In addition, if all of the developments were to come forward for construction at the same time the assessment concludes no likely significant in combination impacts to arise.

Conclusion

15.141 This chapter has assessed the potential noise and vibration effects associated with the proposed onshore components of the Proposed Development.

15.142 The following topics have been considered in detail within this chapter.

- Relevant legislation and policy related to noise and vibration;
- The baseline noise climate in the vicinity of the converter station site;
- Assessment of construction phase noise and vibration effects;
- Assessment of operational phase noise and vibration effects;
- Assessment of cumulative noise and vibration effects;
- The likely significance of noise and vibration effects; and
- Measures to mitigate any significant effects arising from the assessments

15.143 A summary of the noise and vibration effects is presented in the Table 15.20. The decommissioning effects will be consistent with the reported construction phase effects.

Table 15.20: Summary of Effects

Criteria	Significance of Effect	Proposed Mitigation	Residual Significance
Construction Phase			
Noise generated by construction activities – HVDC cabling	Major adverse (short term)	Siting of the cable corridor within the application boundary to provide buffer zone to sensitive receptors. Temporary Noise Barriers. Adoption of BPM as defined in the Control of Pollution Act 1974. Onsite noise monitoring at sensitive receptors to ensure compliance with agreed limits. Management procedures to be in place for instances of non-compliance.	Minor adverse (short term)
Noise generated by construction activities – converter station	Minor adverse (medium term)	Adoption of BPM as defined in the Control of Pollution Act 1974.	Minor / Negligible adverse (medium term)
Noise generated by construction activities – HVAC cabling	Moderate adverse (short term)	Siting of the cable corridor within the application boundary to provide buffer zone to sensitive receptors. Adoption of BPM as defined in the Control of Pollution Act 1974.	Minor adverse (short term)

Criteria	Significance of Effect	Proposed Mitigation	Residual Significance
Construction Traffic Noise	Negligible adverse (short term)	Routing of construction traffic to avoid noise sensitive receptors. Adoption of BPM as defined in the Control of Pollution Act 1974.	Negligible adverse (short term)
Vibration - HVDC cabling	Moderate adverse (short term)	Siting of the cable corridor within the application boundary to provide buffer zone to sensitive receptors. Adoption of BPM as defined in the Control of Pollution Act 1974.	Minor adverse (short term)
Vibration – converter station	Negligible (short term)	-	Negligible (short term)
Vibration - HVAC cabling	Negligible (short term)	-	Negligible (short term)
Operational Phase			
Noise emissions from converter station	Minor adverse (long term)	(See incorporated mitigation)	Minor adverse (long term)
Noise from cable corridor	Negligible (long term)	-	Negligible (long term)
Noise from road traffic	Negligible (long term)	-	Negligible (long term)

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16 AIR QUALITY

Introduction

- 16.1 This chapter examines the effects associated with the proposed onshore components of NSN Link (“the Proposed Development”) on air quality.
- 16.2 For details of the project description, reference should be made to Chapter 4 of the Environmental Statement (ES). The application boundary of the Proposed Development has been split into seven sections as presented in Figure 4.5 of the ES.
- 16.3 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance.
- 16.4 The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (“NSN Link Ltd”) and their contractors in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the scheme design to reduce identified impacts.
- 16.5 Given the nature of the development and as part of the EIA scoping process a proposal to omit the assessment of operational effects was made to Northumberland County Council (NCC), this proposal was accepted by the NCC and on this basis the assessment of air quality and this chapter considers the construction and decommissioning phases only.
- 16.6 The potential effects on air quality during the construction phase are:
- Dust from construction activities;
 - Emissions from construction related traffic;
 - Disrupted traffic on the local road network may lead to increased emissions; and
 - Emissions to air as a result of contaminated land and waste.
- 16.7 Effects on air quality during construction from emissions of onsite plant such as generators, excavators and trucks were discussed with NCC at the EIA scoping stage. As reported in the Scoping Report¹ a proposal was made to omit this assessment on the grounds that the proposals were unlikely to be significant in terms of air quality as works would require small numbers of plant operating across a relatively large area. This proposal was detailed in the EIA scoping report and agreed with NCC.

Legislation and Policy Context

- 16.8 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on and from air quality associated with the Proposed Development. This section should be read in conjunction with Chapter 5 which provides a more detailed overview of the policy context however the key policies relevant to this chapter are discussed below.

¹ TEP (January 2014) Scoping Report for NSN Link Ltd, doc reference TEP25336.071r02

National Legislation

16.9 In accordance with current standards, guidance and industry best practice, the following national legislation, standards and guidance are relevant to the assessment:

- Air Quality Standards Regulations 2010²
- Air Quality Strategy for England, Scotland, Wales and Northern Ireland³
- Local Air Quality Management Technical Guidance.⁴
- National Planning Policy Framework (NPPF)⁵

16.10 Section 11 of the NPPF refers to the conservation and enhancement of the natural environment and states policies should:

*"...sustain compliance towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas."*⁶

16.11 Planning decisions in an Air Quality Management Area will need to adhere to the local air quality plan by ensuring that any new development does not produce emissions which exceed local limits.

Local Planning Policy

16.12 There are no specific planning policies in the Wansbeck District Local Plan (adopted July 2007) or the emerging Northumberland Local Development Plan which relate specifically to air quality. However, Saved policy GP23 – Pollution and Nuisance from the Wansbeck District Local Plan (2007), seeks to prevent development that has the potential to cause pollution or nuisance.

16.13 The air quality assessment also considers the provisions of the Local Air Quality Management Guidelines, produced by Defra, which is primarily designed to support local authorities in carrying out their duties to review and assess air quality in their area, but are also of interest to other bodies associated with air quality management, and bodies whose actions may impact on air quality, such as those involved in planning and transport.

Methodology

Study Area

16.14 The assessment was undertaken for the Proposed Development as shown in Figure 1.2 and the study area of the air quality assessment has been determined based on the expected changes in traffic flows as provided in Chapter 14.

² Office of Public Sector Information (OPSI). (2010). *The Air Quality Standards (England) 2010 Regulations*. Statutory Instrument No. 1001. London

³ DEFRA. (January 2000, Addendum 2003 and 2007). *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Working Together for Clean Air*

⁴ DEFRA. (2009). *Local Air Quality Management Guidance LAQM.PG (09)*

⁵ DCLG (2012) *National Planning Policy Framework*

⁶ DCLG (2012) *National Planning Policy Framework* Paragraph 124. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

16.15 The Proposed Development area for the construction phase assessment has considered receptors that have the potential to experience air quality effects during the installation of the cables and the construction of the converters station. This ensures that the relevant surrounding air quality sensitive receptors are considered as part of the assessment.

Assessment Methodology

16.16 A desk-based air quality impact assessment has been undertaken to determine the potential air quality effects on receptors arising from the Proposed Development.

16.17 The methodology outlined below is considered to be applicable for the construction and decommissioning phases. The methodology includes the assessment of the potential impacts arising from construction traffic but does not include an assessment of operational effects for the reasons outlined above.

16.18 For the purposes of this chapter and in relation to air quality, the activities associated with decommissioning are considered to be similar in nature to those of construction with redundant cables either left in situ or removed. On this basis no separate assessment has been undertaken for the decommissioning phase.

16.19 The anticipated operational life for the cable route and converter station is 40 years but this may be extended dependent on the lifespan of the components. At decommissioning the cables may be either disconnected and removed or disconnected and left in place in the ground. A decision would be made on whether to leave the redundant cables in place or remove them on decommissioning based on a number of factors including the conditions of the cables at the time.

16.20 The air quality effects at sensitive receptors were assessed against the guidelines identified in this chapter and appropriate mitigation measures recommended.

16.21 The scope of this assessment comprised the following:

- A review of protected sensitive air quality areas/receptors likely to be impacted by the Proposed Development;
- A review of environmental regulatory information relating to air quality⁷⁸;
- A site walkover of cable route and converter station by TEP;
- Consultation with NCC to agree the sensitive receptors; and
- An assessment of the potential impacts arising from construction traffic and any mitigation measures that might be required.

Site Walkover

16.22 A site visit was undertaken by TEP in August 2013. The objective of the walkover was to confirm the existing land use and identify sensitive air quality receptor(s). The walkover was limited by restricted access to certain parts of land and therefore some areas were not visited. Areas not visited included the Blyth substation land (to the south of Brock Lane).

⁷ Northumberland City Council (2011) LAQM Detailed Assessment – Technical Report. Available at: <http://www.northumberland.gov.uk/ldoc.ashx?docid=e80709e8-049f-4f1a-a481-fa848c035b45&version=-1>.

⁸ Northumberland City Council (2013) 2013 Air Quality Progress Report. Available at: <http://www.northumberland.gov.uk/default.aspx?page=813>

Consultation

- 16.23 The Environmental Health Officer at Northumberland County Council (NCC) was consulted regarding the methodology and scope of the air quality assessment.
- 16.24 Discussion was held with the Environmental Health Officer regarding the identification of sensitive receptors for assessment of air quality effects arising from construction traffic.

Assessment Criteria

- 16.25 In the absence of formal guidance documents defining a framework for the specific assessment of impacts, particularly with regards to dust, conclusions have been drawn through reference to relevant legislation, professional judgement and evaluation.

Air Emissions

- 16.26 Vehicle emissions have the potential to reduce air quality and can affect human health. Nitrogen dioxide (NO₂) and oxides of nitrogen (NO_x) gases are formed as a by-product of temperature combustion of fossil fuels (such as petrol and diesel) by the oxidation of nitrogen in the air. NO_x primarily comprises nitrogen oxide (NO) and NO₂. Once emitted the former can be oxidised in the atmosphere to produce further NO₂. NO₂ is associated with health impacts, which can affect lung function and airway responsiveness and may also increase reactivity to natural allergens.
- 16.27 For particulate matter (PM₁₀), size fractions are defined as particulate matter with an aerodynamic diameter of less than 10 microns (µm). The full extent of health impacts of fine particulate matter is currently unclear. However research has found that exposure to increased levels of matter is associated with respiratory and sustained cardiovascular illness and mortality.
- 16.28 The air quality significance criteria (taken from Environmental Protection UK (EPUK) document 'Development Control: Planning for Air Quality'⁹ relate only to NO₂ and PM₁₀ as these are the pollutants most likely to exceed the air quality objectives.
- 16.29 In the absence of project specific data verification of the NO₂ or PM₁₀ concentrations has not been undertaken and a desk assessment of NO₂ and PM₁₀ concentrations arising from the Proposed Development has been carried out.
- 16.30 To inform this desk based assessment background concentrations from 2010 Defra Background Maps¹⁰ have been obtained and used to assess the impact to sensitive receptors. The Defra Background Maps hold data for multiple points within the Proposed Development corridor and those appropriate to each sensitive receptor have been adopted.
- 16.31 NO₂ and PM₁₀ concentrations at the sensitive receptors have been predicted for the following scenarios:
- 2010 base year;
 - 2016 future baseline without the Proposed Development; and
 - 2016 future baseline with the Proposed Development.

⁹ Environmental Protection UK, 'Development Control: Planning for Air Quality', 2010.

Available online: <http://www.environmental-protection.org.uk/committees/air-quality/air-pollution-and-planning/>

¹⁰ Defra Background Maps : 2010-based background maps for NO_x, NO₂, PM₁₀ and PM_{2.5} for years 2010 to 2030 Available: <http://laqm.defra.gov.uk/maps/maps2010.html> [date first accessed January 2014]

16.32 The EPUK document indicates that the concentration at the receptor locations should be taken into account in combination with the magnitude of change. This approach is appropriate for the assessment of annual mean concentrations of NO₂ and PM₁₀ where the objective concentration is 40µg/m³.

16.33 The assessment of potential effects arising from construction activities has referred to experience of similar construction and cables installation projects. A qualitative assessment of the magnitude of change has been made based on professional judgement.

Dust

16.34 Dust is defined as all particulate matter up to 75µm in diameter as set out in BS6069 and comprises both suspended and deposited dust.

16.35 There is no nationally adopted UK, European, or World Health Organisation (WHO) assessment criteria for nuisance arising from the deposition of dust.

16.36 In general, it is not possible to quantify the emissions from construction activities with reasonable certainty due to the varied nature of the emitting sources. A qualitative assessment based on professional judgement has been carried out to determine the potential effects from construction dust on local sensitive receptors.

Sensitive Receptors

16.37 There are a number of sensitive receptors in proximity to the road network forming the Project which have been identified for the purposes of the local air quality assessment. Sensitive receptors are defined as locations where members of the public are regularly present and are likely to be exposed to potential effects associated with construction activities.

16.38 Using the areas described in Chapter 4 sensitive receptors have been identified. These receptors have been identified on the grounds that they are most likely to experience deterioration in air quality as a result of construction activities (without mitigation). The selection of sensitive receptors outlined below has been based on a qualitative assessment, professional judgement and in consultation with NCC:

- Residential development at Wembley Gardens (reference ID ESR1); and
- Residential development to the east of the converter station location at Sandfield Road (reference ID ESR2).

Assessment of Cumulative Effects

16.39 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. When individual effects are considered in combination, the resulting cumulative effect may be significant.

16.40 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:

- Port of Blyth Biomass Power Station;
- Proposed National Grid Electricity Transmission Plc (NGET) 400kV GIS Substation;
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site; and

- Residential development – 48 dwellings.

Existing Environment

Site Description

- 16.41 The Proposed Development encompasses an area between the landfall point at Cambois and the existing Blyth substation at East Sleekburn. The area within the Proposed Development has been split into seven sections as shown in Figure 4.5 and an overview of each section is contained within the Project Description of the ES (Chapter 4).
- 16.42 The topography of the Proposed Development site is relatively flat with limited topographical features, however, there are in places small banks and earthworks associated with former development.
- 16.43 The converter station site is located to the north of Brock Lane, at East Sleekburn. The site is bounded by agricultural fields, areas of juvenile plantation woodland and Brock Lane.
- 16.44 There are residential properties situated to the east and south-west of the proposed converter station site on Sandfield Road (~170m) and Havelock Mews (~300m). There is a public right of way to the north/east of the converter station site, which links Sandfield Road to Wembley Gardens Road to the north (~40m at closest point to converter station buildings).

Air Emissions

- 16.45 The background concentration for PM₁₀ within the Proposed Development is reported to be between 11.96 µg/m³ and 15.77 µg/m³.
- 16.46 The background concentration of NO₂ within the Proposed Development is reported to be between 10.33 µg/m³ and 12.08 µg/m³.

Dust

- 16.47 Construction sites have historically been a significant source of dust emissions at the local level, primarily due to mechanical handling operations and haulage of material on un-surfaced roads during a typical working day, but also from storage stockpiles over a 24-hour period. In the absence of project specific data for dust deposition, it dust is assumed to be absent from the local environment. This is considered to be a conservative assumption on the grounds that dust deposition will be occurring naturally in the surrounding environment, which in places is industrial in nature.

Assessment of Significant Effects - Construction Phase

Construction Traffic

- 16.48 Pollutants associated with exhaust emissions from construction equipment and vehicles have the potential to impact on local air quality during the construction phase. An assessment of the predicted increase in traffic flows is provided in Chapter 14 – Traffic and Transport.
- 16.49 The 2016 ‘without development’ annual mean NO₂ concentration (uncorrected) are predicted to range between 8.52µg/m³ and 10.06µg/m³ for the sensitive receptor locations.

Exceedance of the annual mean objective concentration for NO₂ (40µg/m³) is not predicted to occur.

- 16.50 The 2016 'without development' annual mean PM₁₀ concentrations (uncorrected) are predicted to range between 11.40µg/m³ and 15.10µg/m³ for the sensitive receptor locations. Exceedance of the annual mean objective concentration for PM₁₀ (40µg/m³) is not predicted to occur.
- 16.51 The effect of the development proposal on NO₂ and PM₁₀ concentrations are assessed as **negligible /not significant**.
- 16.52 The daily increase in total vehicles as assessed in Chapter 14 Traffic and Transport is negligible. Predicted increases in general traffic levels are less than 2% along Brock Lane and West Bridge Street and less than 5% for HGV movements. Given that daily traffic flows can vary as much as 10%, the increases in air quality are therefore considered to be of a low magnitude of effect, which when combined with moderate sensitivity of receptors, is predicted to give a **negligible/not significant impact**.
- 16.53 The existing sensitive receptor locations (ESR1 and ESR2) are considered to be moderately sensitive. Given the temporary nature of the construction phase the magnitude is considered to be **negligible / minor**.
- 16.54 When the magnitude of impact is considered along with the sensitivity of the receptor, all existing receptor locations are predicted to experience a '**negligible/not significant**' impact as a result of the Proposed Development. Such effects will be of a temporary nature during the construction phase of the proposed works only.

Dust

- 16.55 Dust has the potential to affect local air quality during construction. Dust will be a short-term nuisance caused by the deposition of dust settling on properties, vehicles, street furniture and nearby crops. Dust has the potential to affect local air quality during construction, particularly during prolonged periods of dry weather.
- 16.56 The potential for dust nuisance is most likely to arise from activities such as topsoil stripping, trench digging and storage of excavated soils, loading and unloading of vehicles. Construction traffic leaving the site may also bear dust and mud from the working areas which can be spread as vehicles move along the local highway network, causing increases in dust and debris along the adjacent roads.
- 16.57 The number of potential sensitive receptors has already been minimised by the avoidance of urban areas and residential properties during the cable routing process. The duration of the cable installation works is short-term and there are a limited number of properties within 100m of the cable route corridor, converter station and substation site. For these properties a **negligible impact** would be expected due to dust in the construction phase. With improvements in understanding of dust occurrence from construction sites, and the use of appropriate mitigation methods, dust issues arising from construction-related activities can be significantly reduced.

Assessment of Effects during Decommissioning

- 16.58 The anticipated operational life of the converter station and cables is approximately 40 years. This could however be extended dependent on the operation of the component parts and would be assessed during the operation of the link.
- 16.59 The decommissioning of the converter station would involve similar activities to those described previously for construction. The main components would be dismantled and removed for recycling wherever possible or for disposal in accordance with the relevant waste disposal regulations at the time of decommissioning.
- 16.60 The underground cables may be cut and left in the ground at the end of their operational lives or could be removed. Removal would involve similar activities to installation.
- 16.61 The effects of decommissioning of the cables will be dependent on whether redundant cables are left in situ or removed. Where cables remain in situ the effects of decommissioning are considered to be negligible. In the event that cables are to be removed there will be a need for plant, equipment and labour resulting in increased vehicle movements and potential to generate dust. These effects are considered to be similar in nature to that of the construction phase and have been assessed as **'negligible/not significant'**.

Mitigation

- 16.62 The installation of the cables will entail site preparation, excavation, cable installation and remediation. The construction of the converter station will entail site preparation works, excavation for foundations/bases/superstructure works, installation of converter station equipment and external works. A temporary construction compound will be located at the converter station.
- 16.63 The works associated with the cable installation and construction of the converter station will be carried out over a short period of time with the installation of the cables planned for approximately 12 months and between one and five years for the converter station.
- 16.64 It is considered that with the implementation through a series of appropriate mitigation measures as part of the development of a Construction Environmental Management Plan (CEMP) combined with careful planning and sequencing of works air quality effects can be managed to acceptable levels. An Air Quality Management Plan will need to be developed as part of the CEMP process and it is anticipated that this will be the mechanism for capturing standard mitigation measures typical of best practice. The Air Quality Management Plan will need to be agreed with the Local Planning Authority however the plan will outline mitigation measures including methods to ensure effective dust suppression, selection and maintenance of vehicle, re use of site won materials and effective stockpile management.

Residual Effects

- 16.65 Following the implementation of mitigation measures, effects on air quality resulting from construction traffic and dust generating activities have been assessed as **negligible**.

Cumulative Effects

16.66 The following major development proposals have been considered as part of the assessment of potential cumulative effects:

- Port of Blyth Biomass Power Station
- Proposed NGET 400kV GIS Substation
- Ferguson Business Park Single Turbine;
- Earth Balance Single Turbine;
- Narec Offshore Wind Demonstration Site; and
- Residential development – 48 dwellings.

Port of Blyth Biomass Power Station

16.67 The Port of Blyth Biomass Power Station will be located at Blyth Harbour approximately 1.5km to the south-east of the proposed converter station site.

16.68 This development is currently on hold. During the construction of the Biomass Power Station there is the potential for the generation of dust and emissions from plant and machinery and associated traffic movements. These effects would however be temporary and localised. Significant air quality effects are considered unlikely to occur however dust and other emissions are capable of mitigation using well established industry-standard techniques. On this basis there are not considered to be any cumulative effects between the two projects.

Proposed NGET 400kV GIS Substation

16.69 The proposed 400kV GIS Substation will be located approximately 400m to the south-east of the proposed converter station site, adjacent to the existing Blyth 275kV Substation. Importantly, it is located within Section 7 of the Proposed Development area.

16.70 During the construction of the substation there is the potential for the generation of dust and emissions from plant and machinery and associated traffic movements. These effects would however be temporary and localised. Dust and other emissions are capable of mitigation using well established industry-standard techniques.

16.71 Significant air quality effects are considered unlikely to occur and on this basis there are not considered to be any cumulative impacts between the two projects. Furthermore as the Proposed Development and the proposed NGET 400kV GIS Substation projects are being planned in tandem and are mutually dependent, provisions can be included in the design of the NGET substation such that cumulative impacts with the Proposed Development cable route are eliminated.

Ferguson Business Park Single Turbine

16.72 The Ferguson Business Park Turbine will be located approximately 390m west of the cable route and approximately 550m to the northwest of the proposed converter station site.

16.73 Significant air quality effects are considered unlikely to occur however dust and other emissions are capable of mitigation using well established industry-standard techniques. On this basis there are not considered to be any cumulative effects between the two projects.

Earth Balance Single Turbine

- 16.74 The Earth Balance Single Turbine will be located approximately 2km to the west/northwest of the proposed converter station site.
- 16.75 Significant air quality effects are considered unlikely to occur however dust and other emissions are capable of mitigation using well established industry-standard techniques. On this basis there are not considered to be any cumulative effects between the two projects.

The Narec Offshore Wind Demonstration Site

- 16.76 The Narec Offshore Wind Demonstration Site is located 8km to 17km off the Blyth coast. Significant air quality effects are considered unlikely to occur partly owing to the distance between the two sites. Dust and other emissions are capable of mitigation using well established industry-standard techniques. On this basis there are not considered to be any cumulative effects between the two projects.

Residential Development – 48 Dwellings

- 16.77 This project is for a housing development, located to the south of Brock Lane at East Sleekburn, approximately 500m from the closest point of the Proposed Development (converter station site).
- 16.78 Significant air quality effects are considered unlikely to occur however dust and other emissions are capable of mitigation using well established industry-standard techniques. On this basis there are not considered to be any cumulative effects between the two projects.
- 16.79 Given the proximity of the proposed development there may be some opportunities to coordinate traffic management measures should the construction phases overlap.

Summary

- 16.80 There is the potential for cumulative air quality effects to arise during the construction phases of the planned construction works for those development outlined above. The majority of the other unrelated developments are scheduled either to have been completed before NSN Link project commences in 2016/2017 or are due to commence upon completion of the construction works. Further traffic levels are predicted to be negligible and the predicted effects on air quality are not considered to be significant. Where overlap of the construction traffic associated with the onshore elements of NSN Link may occur with construction and operation traffic associated with other projects, significant air quality effects can be avoided through the implementation of industry standard mitigation measures.
- 16.81 All onshore cumulative effects will be of a temporary nature during the construction phases of the Proposed Development and the impacts are not considered to be significant.
- 16.82 In addition to planned development described above there is the potential for cumulative effects on air quality from the onshore elements of NSN Link in combination with other components of the project (i.e. UK and Norwegian subsea cables and Norwegian onshore infrastructure).
- 16.83 Given the distance between the element of the project combined with the fact that dust and vehicle emissions will be controlled during construction and none of the components of NSN Link will result in significant air quality impacts during operation as effects are temporary, of

very low quantities and localised. No significant cumulative impacts on air quality are therefore predicted.

In addition an assessment has been undertaken assuming that NSN Link and the planned development all come forward at the same time. The assessment has concluded there to be no likely significant in-combination effects.

Conclusions

- 16.84 This chapter examines the effects associated with the proposed onshore components of NSN Link (“the Proposed Development”) on air quality.
- 16.85 Given the nature of the Proposed Development a proposal to omit the assessment of operational effects was made at the Scoping stage. This proposal was accepted by the Local Planning Authority and on this basis this chapter considers the construction and decommissioning phases only.
- 16.86 The scope of this assessment comprised the following:
- A review of protected sensitive air quality areas/receptors were likely to be impacted by the Proposed Development;
 - A review of environmental regulatory information relating to air quality;
 - A site walkover of cable route and converter station by TEP;
 - Consultation with NCC to agree the sensitive receptors; and
 - An assessment of the potential impacts arising from construction traffic and any mitigation measures that might be required.
- 16.87 The assessment concludes that there are no significant impacts for air quality sensitive receptors and effects will be temporary nature during the construction phase of the proposed works only.
- 16.88 For the purposes of this chapter the activities associated with decommissioning are considered to be similar in nature to those of construction with redundant cables either left in situ or removed. The effects of decommissioning of the cables will be dependent on whether redundant cables are left in situ or removed however for both scenarios no significant impacts have been identified and the effects will be temporary in nature.
- 16.89 Dust has the potential to affect local air quality during construction however these are not considered to be significant and improvements in understanding of dust occurrence from construction sites, and the use of appropriate mitigation methods, dust issues arising from construction-related activities can be significantly reduced.
- 16.90 It is considered that with the implementation through a series of appropriate mitigation measures as part of the development of a CEMP combined with careful planning and sequencing of the works air quality effects can be managed to acceptable levels. An Air Quality Management Plan will need to be prepared as part of the development of the CEMP and it is anticipated that this will be the mechanism for capturing standard mitigation measures typical of best practice.

- 16.91 Following the implementation of mitigation measures, effects on air quality resulting from construction traffic and dust generating activities have been assessed as negligible.
- 16.92 An assessment has been made of the potential for cumulative effects between the Proposed Development and six planned developments. .
- 16.93 The potential for cumulative effects between the Proposed Development and the six schemes identified with regards to air quality have been ruled out and are not considered to be significant.
- 16.94 In addition to planned development there is the potential for cumulative effects on air quality from the onshore elements of NSN Link in combination with other components of the project (i.e. UK and Norwegian subsea cables and Norwegian onshore infrastructure. Given the distance between the elements of the project combined no significant “in-combination” effects are predicted.

17 ELECTRIC AND MAGNETIC FIELDS

Introduction

- 17.1 This assessment considers electric and magnetic fields (EMFs) produced by the Proposed Development which consists of a converter station, onshore high voltage direct current (HVDC) mass impregnated cables and 400kV mass impregnated high voltage alternating current (HVAC) cables (see Chapter 4 – Project Description).
- 17.2 All equipment that generates, distributes or uses electricity produces EMFs. The power frequency of alternating current equipment in the UK is 50 Hz, and AC equipment will produce electric and magnetic fields with a principal frequency of 50Hz. These EMFs are known as Extremely Low Frequency (ELF) EMFs. DC equipment produces steady state electric and magnetic fields and these are referred to as static fields.
- 17.3 All static and alternating fields can have different effects, but in both cases, there are exposure limits set by independent organisations, designed to prevent all established effects of EMFs on people.
- 17.4 NSN Link uses both AC and DC technology, so both static and alternating electric and magnetic fields will be produced and their predicted effects are discussed in this chapter.
- 17.5 The electric and magnetic fields produced by transmission assets may potentially interfere with other electronic or electrical products in close proximity, such as pacemakers and visual display units. These potential electromagnetic compatibility (EMC) issues, or indirect effects, are also discussed in relation to the Proposed Development.

Electric Fields

- 17.6 Electric fields depend on the operating voltage of the equipment producing them. They are measured in V/m (volts per metre). The operating voltage of the equipment is a relatively constant value. Electric fields are shielded by most common building materials, trees and fences and diminish rapidly with distance from the source.
- 17.7 As a consequence of their design, some types of equipment do not produce an external electric field. This applies to the underground cables (both AC and DC), which are proposed for NSN Link, which are enclosed in a metal sheath (a protective metal layer within the cable).
- 17.8 The converter station may have some bare conductors in the central portion of the site. These will produce an electric field which drops quickly with distance. The security fencing and buildings, however, will screen the electric field at the boundary of the site. These types of bare conductors have been demonstrated to be inherently compliant with exposure guidelines.
- 17.9 Evidence for this is maintained at <http://www.energynetworks.org/electricity/she/emfs.html>. As such, electric fields have not been considered further in the assessment.

Magnetic Fields

- 17.10 Magnetic fields depend on the electrical currents flowing and these vary according to the electrical power requirement at any given time. Magnetic fields are measured in μT (microteslas). They are not significantly shielded by most common building materials or trees but they diminish rapidly with distance from the source.
- 17.11 AC magnetic fields arising from electric cabling and equipment are found in all areas where electricity is in use (e.g. in offices and homes). In UK houses, typical AC magnetic fields will be in the range of 0.01 – 0.2 μT with higher values in localised areas close to electrical appliances.
- 17.12 The earth also produces its own DC magnetic field, which in the UK is around 48 μT , but this can vary due to geomagnetic material such as rocks.

Legislation and Policy Guidance

- 17.13 There are no statutory limits on EMFs in the UK. It is the responsibility of Public Health England (PHE) to recommend guidelines for exposure to EMFs. In 2004 it recommended that the UK adopt the 1998 guidelines from the International Commission on Non-Ionizing Radiation Protection¹ which cover 50Hz frequencies. The Government accepted this recommendation, stating that the guidelines should be applied in the terms of EU Recommendation 1999/519/EC². The EU recommendation also includes guidance on static field exposure limits, taken from ICNIRP's guidance on static magnetic fields³. These are the guidelines that currently apply in the UK.
- 17.14 The 50 Hz guidelines and their application are explained in the Code of Practice, 'Power Lines: Demonstrating compliance with EMF public exposure guidelines – a voluntary Code of Practice' (DECC, 2011c) published by the Department of Energy and Climate Change (DECC). It is the electricity industry's policy to comply with Government guidelines on EMF, and this Code of Practice forms an integral part of this policy. This application does not include new overhead lines. However, this assessment has been performed in line with the principles of the Code of Practice. This Code of Practice covers 50 Hz fields specifically, but the overall principles of demonstrating compliance have been applied to the DC assessment also, using the appropriate exposure limits.
- 17.15 There is also a second Code of Practice, Optimum Phasing of high voltage double circuit Power Lines⁴, which sets out the principles for optimum phasing of overhead lines. The application is not proposing a new overhead line, so an assessment against the optimum phasing code of practice is not required.
- 17.16 There has been extensive research to establish whether or not long term exposure to fields at lower levels than the ICNIRP guidelines might be a cause of ill health in humans, and this

¹ International Commission on Non Ionising Radiation Protection (1998) *Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields*, Health Physics

² EU Council (1999) *Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC)*

³ International Commission on Non Ionising Radiation Protection (1994) *Guidelines on limits of exposure to static magnetic fields*, Health Physics

⁴ Department of Energy and Climate Change (2011) *Optimum Phasing of high voltage double-circuit Power Lines. A voluntary Code of Practice*

research has been extensively reviewed by bodies such as the PHE and the World Health Organization (WHO). There is some evidence to suggest that high magnetic fields may be associated with an increased risk of one particular disease, childhood leukaemia. However, the weight of scientific evidence is against electric and magnetic fields causing ill health in humans at levels below the ICNIRP guideline limits. The government has addressed this uncertainty by adopting precautionary measures set out in the Code of Practice 'Optimum Phasing of high voltage double-circuit Power Lines', which the electricity industry follows, where appropriate.

- 17.17 The evidence that leads to some health concerns about EMFs from electric power systems is specific to AC fields, at 50 Hz, and does not apply to DC fields. The fact that humans have evolved in the Earth's DC magnetic field makes it unlikely that there are any adverse health effects from any sources of fields at levels below the guideline limits.
- 17.18 The policies followed in this chapter result from a comprehensive risk assessment performed at a National Level. The Codes of Practice (DECC, 2011c, d) effectively represent the conclusions of a health impact assessment conducted nationally and applied generically to all power lines, cables and substations.

Method

Study Area

- 17.19 The assessment included all areas where the magnetic fields could potentially extend from the electrical assets proposed by NSN Link. Extensive operational experience has shown that equipment operating at this voltage and rating will not produce magnetic fields greater than background levels at distances of more than 100m. 100m corridors around the substation, converter station and HVDC cables were defined as an appropriate assessment area.
- 17.20 All magnetic fields were calculated at 1m above ground level as set out in the Code of Practice (DECC, 2011c).
- 17.21 As external electric fields are not produced by equipment enclosed in metal sheaths or which have solid metal enclosures, the assessment does not consider electric fields from the fenced converter station or HVDC cables due to the reasons set out in section 17.7.

Assessment of Significance

- 17.22 The assessment considers magnetic fields produced by the HVDC converter station and the onshore HVDC/HVAC cables. The final asset configuration and manufacturer for the converter station equipment are not finalised, so the worst case assumption in terms of magnetic field exposure has been considered for this assessment.
- 17.23 Magnetic fields have been assessed as per the conditions set out in the Code of Practice (DECC, 2011c) and compared with UK Government exposure guideline levels. The onshore underground HVDC cables are a mass impregnated design with a maximum cable rating of 1480 MW at ± 515 kV equating to approximately 1400 Amps. The cables will be installed primarily in excavated trenches either direct placed or in pre placed ducts. Where the onshore underground cables will cross obstructions, such as the railway, a "trenchless

technology”, such as horizontal directional drilling (HDD). Each of these configurations has been considered separately. The configuration of each are:

- Trough installation - Cables buried at 1m depth with cables 500mm apart;
- Horizontal directional drilling (HDD) - Cables will be installed at 2.5m apart, and the depth will vary between approximately 1.2m and 10m. The worst and best case depths of 1.2m and 10m were used for the calculations giving the potential range of exposures.

17.24 The 1998 ICNIRP guidelines are based on the avoidance of known adverse effects of exposure to EMF at frequencies up to 300 GHz, which includes the 50 Hz EMF associated with electricity transmission. This equates to public exposure limit for uniform AC magnetic fields exposure of 360 μ T (DECC, 2011c).

17.25 For static magnetic fields, the recommended exposure limit used in the EU recommendation is 40 000 μ T (40 millitesla). ICNIRP’s 1994 guidance states³ that there are potential indirect effects, such as injuries due to flying ferromagnetic objects and potential interactions with implantable medical devices which could occur at the levels below the exposure limits. A lower restriction of 500 μ T should be considered where indirect effects may be an issue. The assessment would demonstrate a significant impact if non-compliance with the EMF exposure limits was demonstrated using the principles set of in Codes of Practice ‘Power Lines: Demonstrating compliance with EMF public exposure guidelines – a voluntary Code of Practice’ (DECC, 2011c).

Assessment of Significance of Potential Impacts

Converter Station

17.26 The proposed converter station will be Voltage Source Current (VSC) technology. Until a manufacturer for the converter station equipment has been appointed and the detailed configuration has been confirmed a full assessment cannot be performed. However, specific EMF design criteria will be incorporated into the proposed converter station’s technical specification to ensure that the finalised design is compliant with public exposure limits at and beyond the converter station boundary. These specifications will ensure the following criteria are employed in the design:

- Static magnetic fields at the boundary fence of the proposed converter station site will not exceed the ICNIRP public exposure limits defined above; and
- AC magnetic fields at the boundary fence of the proposed converter station site shall not exceed the general public exposure limit defined above.

High Voltage Direct Current Cables

17.27 The onshore underground HVDC cables installation techniques are described in section 17.22 above. As the cables operate as a bipole system, the current in each cable runs in opposition leading to a significant cancellation of the magnetic field. The magnetic field for each installation technique has been calculated at 1m above ground using the maximum current rating of the cable. Table 17.1 and Table 17.2 show the calculated magnetic field in the 2 different cable installations, including the maximum field and the field at perpendicular

distances from the centre of the cables. All of the calculations are independent of the Earth's geomagnetic field.

Table 17.1: Calculated Magnetic Fields for Standard Direct Buried or Trough Installed HVDC Cables

Cable Burial Depth	Calculated DC Magnetic Field 1m above Ground			
	Maximum Calculated Field	10m from Centre of Cables	50m from Centre of Cables	100m from Centre of Cables
1m	34.5 μ T	1.35 μ T	0.06 μ T	0.014 μ T

Table 17.2: Calculated Magnetic Fields for HDD Installed HVDC Cables

Cable Burial Depth	Calculated DC Magnetic Field 1m above Ground			
	Maximum Calculated Field	10m from Centre of Cables	50m from Centre of Cables	100m from Centre of Cables
1.2 m	109.3 μ T	6.77 μ T	0.28 μ T	0.07 μ T
10.0 m	5.71 μ T	3.17 μ T	0.27 μ T	0.07 μ T

- 17.28 The calculations of magnetic fields demonstrate that the highest field produced by the onshore HVDC cables would be 109.3 μ T when the cables are installed via a HDD technique and at the minimum depth of 1.2m. At a burial depth of 10m, the maximum calculated magnetic field would be 5.71 μ T. These represent the range of possible worst case magnetic fields produced when the cables are installed via HDD. Where a standard direct buried or trough installation is used the maximum magnetic field produced by the cables is 34.5 μ T. All calculations were performed in accordance with the conditions set out in the Code of Practice (DECC, 2011c); using the maximum rating of the cables at 1 m above ground and ignoring harmonics.
- 17.29 The calculated magnetic fields for all installation methods are all below the precautionary level of 500 μ T for static fields and are therefore compliant with exposure limits and present no indirect effects.

High Voltage Alternating Current Cables

- 17.30 The converter station will be connected to the three phase AC substation by 400kV AC cables. Where two cables per phase are installed, as is proposed here, the currents flowing in the cables will be half the value compared to where one cable per phase is installed. Magnetic fields are a result of current flowing in the electric cables. To calculate the maximum magnetic fields a one cable per phase option has been considered, ie three cables spaced 0.55 m apart and buried at a depth of 1.1m. This option has been assessed for compliance with the Government exposure limits. Calculations were performed using maximum continuous rating for the cable circuit of 2020 Amperes per circuit and minimum burial depth. The magnetic field strength will be lower in the two cable per phase solution proposed.

Table 17.3: Calculated Magnetic Fields for Standard Direct Buried Installed HV AC Cables

Cable Burial Depth	Calculated AC Magnetic Field 1m above Ground			
	Maximum Calculated Field	10m from Centre of Cables	50m from Centre of Cables	100m from Centre of Cables
1m	82.6 μ T	3.70 μ T	0.15 μ T	0.04 μ T

17.31 The calculated AC magnetic fields are shown in Table 17.2. The maximum calculated worst case magnetic field produced by the AC cables is 82.6 μ T, below the ICNIRP reference levels and compliance with the ICNIRP exposure limits quoted in EN-5.

Indirect Effects including EMC

17.32 Magnetic fields can affect Active Implantable Medical Devices (AIMDs), such as pacemakers, insulin pumps and defibrillators if the field strength exceeds the immunity of the device. All modern AIMDs should operate unaffected in field levels below the General Public Reference Levels (100 μ T at 50 Hz) of 1999/519/EC² and 500 μ T static fields, where the AIMD has been implanted and programmed in a standard manner.

17.33 EU directive 90/385/EEC states that *‘Devices must be designed and manufactured in such a way as to remove or minimise as far a possible...risks connected with reasonably foreseeable environmental conditions such as magnetic fields, external electrical influences..*

17.34 The maximum magnetic fields in a public area will be below 500 μ T for static fields and the ICNIRP public exposure reference levels for 50 Hz will not be exceeded in areas where the public would frequent. No interference with Active Implantable Medical Devices is expected. The Department of Energy and Climate Change (DECC) document National Policy statement for electricity infrastructure⁵ states that “The Department of Health’s Medicines and Healthcare Products Regulatory Agency (MHRA) does not consider that transmission line EMFs constitute a significant hazard to the operation of pacemakers”.

17.35 One potential EMC issue arising from magnetic fields is the potential distortion of images on Cathode Ray Tube Visual Display Units (VDU) screens although these are less commonly used with modern television and computer equipment. The distortion to Cathode Ray Tube VDUs may occur, depending on the design and orientation, in magnetic fields greater than 0.5 μ T. Liquid Crystal Displays (LCD) and plasma VDUs are immune to this interference. It is unlikely that VDU interference will occur, given the distance to the nearest business premises and properties.

Mitigation

17.36 No mitigation is required for the proposed converter station or cables as the assessment has demonstrated EMFs are within UK Government guideline levels.

17.37 If VDU interference is reported, it will be investigated and remedied if found to be due to the project.

⁵ Department of Energy and Climate Change (2011) *NPS for Electricity Network Infrastructure (EN-5)*

17.38 There is potential for induction effects to arise on other metallic infrastructure from the magnetic fields of underground electricity cables. In the case of the HVDC onshore underground cables, there will be relatively weak magnetic fields and low probability of such effects arising. Where there are other installations such as cables and pipes which may run near or be crossed by the onshore underground cables, NSN Link Ltd will liaise with the owners and operators of these services to ensure that no adverse effects arise. This liaison and subsequent mitigation of potential effects by separation or other measures is standard practice for utility installations.

Cumulative Impacts

- 17.39 Potential cumulative effects of EMF produced from the onshore elements of NSN Link in combination with other components of the Project (i.e. UK and Norwegian subsea cables and Norwegian onshore infrastructure) are described in the Bridging Document which will be issued with this ES.
- 17.40 Potential cumulative effects of NSN Link UK onshore infrastructure in combination with the grid connection required to facilitate the operation of NSN Link, are not considered to be significant given that both will operate in accordance with conditions set in the Code of Practice⁶ and well within Government Exposure Guidelines.
- 17.41 In relation to potential cumulative effects from unrelated planned developments described in Table 3.1, Chapter 3, fields produced from the onshore infrastructure will combine with the fields already present in the area from other sources, which will vary with time depending on electricity usage. The way in which the fields combine with each other is complex; however, in this situation, where all the fields are well below guideline levels, it is not necessary to assess this in more detail as the combined field will also be well below guideline levels.

Conclusions

- 17.42 The proposed converter station will be designed to ensure that it is compliant with ICNIRP public exposure guidelines for EMFs. With all installation techniques, it has been demonstrated that both the HVDC and HVAC cables would be compliant with exposure limits so there will be no significant EMF effects resulting from NSN Link. There is some scientific evidence of possible effects at lower levels, and the electricity industry takes this evidence seriously and recognises that it can generate public concern however the evidence has been extensively reviewed, and the UK Government have not considered it appropriate to implement any restrictions or guidelines on the basis of this evidence.

EMF Advice

- 17.43 The Electricity Industry takes the concerns of the public seriously, and a team of EMF Advisers are available to answer questions and address any concerns. The EMF Unit can be contacted on 0845 702 3270. Members of the public can speak to an EMF adviser directly

⁶ Department of Energy and Climate Change (2011) *Power Lines: Demonstrating compliance with EMF public exposure guidelines. A voluntary Code of Practice*

on this number. A website with further information on all aspects of EMFs: www.emfs.info is also available.

References

Electric Power Research Institute (1999) Electric and magnetic fields management reference report TR-114200, 1st Edition

18 SOCIO-ECONOMICS

Introduction

- 18.1 This chapter examines the socio economic effects associated with the proposed onshore components of NSN Link (“the Proposed Development”).
- 18.2 For details of the project description, reference should be made to Chapter 4 of this Environmental Statement (ES).
- 18.3 NSN Link will involve the laying of a cable over approximately 730km of the seabed and construction of a converter station landside in both the UK and Norway. NSN Link is of considerable national economic significance and represents a large-scale capital in excess of £1bn and will be the longest interconnector of its type.
- 18.4 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance. The final installation techniques and their sequencing will be determined by National Grid NSN Link Ltd (NSN Link Ltd) and their contractors, in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the scheme design to reduce identified impacts.

Legislation and Policy Context

- 18.5 This section outlines the legislation, policy and guidance relevant to the assessment of potential socio-economic effects associated with the UK converter station site. This section should be read in conjunction with Chapter 5 which provides a more detailed overview of the policy context however the key policies relevant to this chapter are discussed below.
- 18.6 The assessment has examined the following core socio-economic indicators:
- Population;
 - Employment - Covering Economic Activity; Unemployment Rates; Wage Levels; and Gross Added Value (GVA);
 - Education and Skills: - Covering Educational Attainment and Occupational Structure;
 - Industrial Base;
 - Deprivation;
 - Housing; and
 - Coastal tourism and recreation.
- 18.7 In addition to examining these core economic and social indicators, the assessment has sought to also take into consideration the regeneration plans that have been put forward in the area, in particular Northumberland County Council’s BEREZ Initiative – Blyth Estuary Renewable Energy Zone and its inclusion within the North East Local Enterprise Partnership (NELEP) Enterprise Zone proposal.
- 18.8 Relevant policy and legislation relating to the assessment of socio-economic effects includes the following:
- Northumberland Economic Strategy 2010 – 2015;

- BEREZ Initiative;
- North East Local Enterprise Partnership (NELEP); and
- NELEP Enterprise Zone.

Methodology

Study Area

18.9 The assessment was undertaken for the UK onshore cables, converter station and connection to the proposed NGET substation. The assessment does not include the marine or Norwegian onshore component of the Project.

Assessment Methodology

18.10 The methodology outlined below is considered to be applicable for the construction, operational and decommissioning phases.

18.11 For the purposes of this chapter and in relation to socio-economic effects, the activities associated with decommissioning are considered to be similar in nature to those of construction. The cables might require repair during the operational phase in which case there may be a need to excavate down to them. In terms of decommissioning it is understood that the redundant cables would either be left in situ or removed.

18.12 The methodology applied for the assessment has been designed specifically to provide a set of robust quantitative and qualitative evidence in relation to socio-economic impact of NSN Link on the Blyth area.

18.13 The scope of this assessment comprised the following:

- Review of existing information to establish a baseline;
- Review of regeneration plans;
- Review of development activity and aspirations;
- Consultation with Northumberland County Council (NCC); and
- An assessment of the potential impacts and mitigation measures.

18.14 The review undertaken to establish a socio-economic baseline provides a solid foundation for the assessment of impacts and has been compiled using data sourced primarily from the Office for National Statistics (ONS) and consultation with the economic development team at Northumberland County Council (NCC). An important part of establishing the baseline has been to develop an understanding of the area in terms of regeneration plans and other development activity.

18.15 A socio-economic baseline for the study area was developed in order to provide a robust foundation for the assessment of socio-economic impacts. This review was undertaken in two parts:

- Part 1 - A review of the following socio economic indicators relevant to the Blyth Valley and Wansbeck areas of Northumberland within which the proposed UK converter station site is situated considering

- Population;

-
- Employment – including Economic Activity; Unemployment Rates; Wage Levels; and Gross Added Value (GAV);
 - Education and Skills: - including Educational Attainment and Occupational Structure;
 - Industrial Base;
 - Deprivation;
 - Housing; and
 - Coastal tourism and recreation.
- Part 2- A review of the regeneration and economic development objectives for the wider area.

Desk Study Information

18.16 The assessment is based on a review of the latest available secondary sources and does not involve primary surveys. A review of published information for the Blyth Valley and Wansbeck Districts in the context of Northumberland, the north east and England has been undertaken. The data utilised was the latest available at the time of the assessment.

Consultation

18.17 Consultation with NCC was undertaken as part of the Scoping exercise and as the assessment progressed.

Site Walkover

18.18 This scope of this assessment has been desk based. A site walkover has not been undertaken.

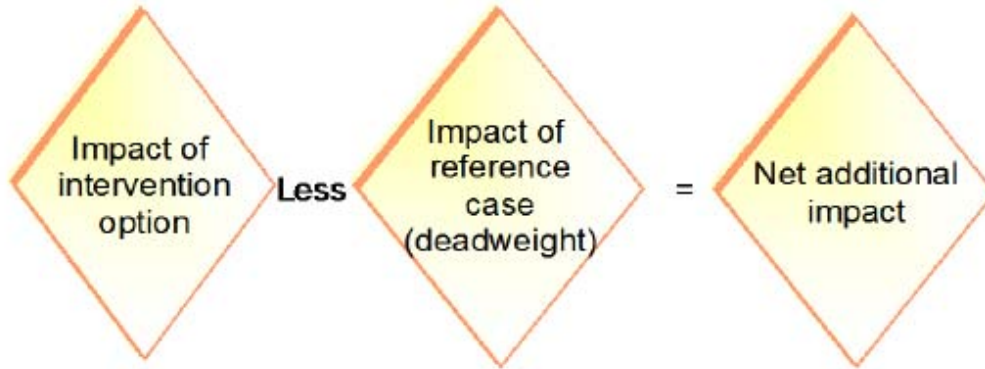
Impact Analysis

18.19 As illustrated in Inset 18.1 the impact analysis is focused on understanding the ‘net additional’ socio-economic impact associated with the proposal against the established ‘reference’ case (in which the proposals do not occur). To enable this, a profile of NSN Link has been created drawing on available project information provided in Chapter 4. Where information is currently unavailable or unknown assumptions have been made based on knowledge of similar schemes and professional judgement.

18.20 The assessment of employment impacts is reported in terms of full-time equivalent (FTE) jobs to one decimal place. This approach to reporting has the benefit of providing both a consistent basis for employment impacts and transparency in the method applied in estimating impacts. It is emphasised that this approach to reporting should not be interpreted as implying preciseness in the estimated impacts. As is outlined at appropriate stages throughout the analysis, only indicative estimates can be made at this stage of the project and on the basis of information available. In practice, a range of outcomes would be expected.

18.21 The assessment process is in accordance with guidance on economic impact assessment provided in the HM Treasury Green Book¹ and Homes and Communities Agency (HCA) Additionality Guide².

Inset 18.1: Net Additionality Framework



Source: HCA (2014).

18.22 The assessment identifies and assesses the significance of impacts during both the construction and operation phases of the development. As detailed above the activities associated with decommissioning are considered to be similar in nature to those of construction.

18.23 The impact assessment analyses the employment, income (measured by gross value added, (GVA)) and non-quantifiable impacts covering direct, indirect, induced, wider and strategic impacts. The net employment and income that is generated is calculated by incorporating deadweight, leakage, displacement and multiplier effects in the analysis. These terms are defined as follows:

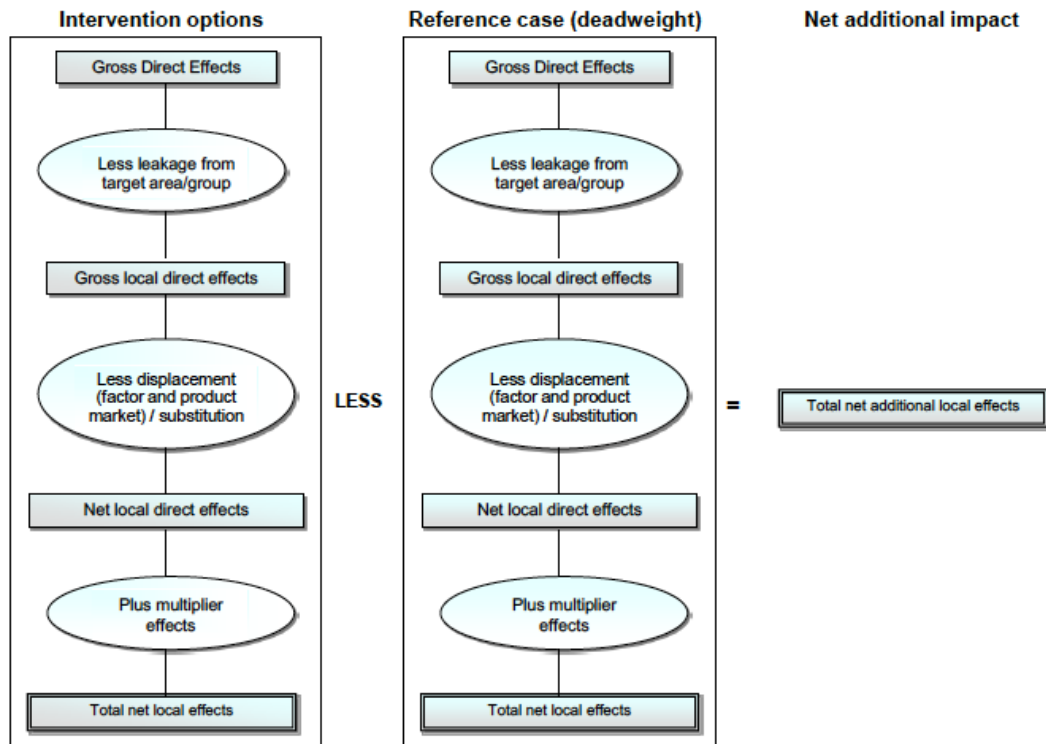
- **Deadweight** – Refers to the estimate of the outcomes that would be produced in the ‘reference’ case (i.e. if the UK converter station was not developed);
- **Leakage** – Refers to the estimate of outputs (occurring under the reference case and options) that benefit those outside of the project’s target area or group. In assessing the converter station proposals, leakage is considered in spatial terms (i.e. to account for the proportion of jobs and income that will fall outside the local area);
- **Displacement** – Refers to the proportion of outputs (occurring under the reference case and options) accounted for by reduced outputs elsewhere in the target area; and
- **Economic multiplier effects** – Refers to further economic activity (jobs, expenditure or income) associated with additional local income, local supplier purchases and longer-term development effects that need to be added.

18.24 The assessment process is illustrated in Inset 18.2.

¹ Her Majesty’s Treasury (2011), *The Green Book: appraisal and evaluation in central government*

² Homes and Communities Agency, (2014) Fourth Edition, *Additionality Guide*

Inset 18.2: Approach to Project Level Additionality



Source: HCA (2014).

18.25 The range of socio-economic indicators has been determined by data availability and discussions with NCC. The identification and assessment of impacts for the construction and operation phases of the NSN Link is reported separately.

Assessment of Significance

18.26 The significance of effect can be described as follows:

- **Minor:** Slight, very short or highly localised;
- **Moderate:** Limited effect in terms of extent, duration or magnitude; or
- **Major:** Considerable effect in terms of extent, duration or magnitude.

18.27 The nature of an effect can be classified as adverse, negligible (or no effect), or beneficial:

- **Adverse:** Classifications of significance indicate negative socio-economic effects on the study area;
- **Negligible:** Classifications of significance indicate imperceptible socio-economic effects on the study area; and
- **Beneficial:** Classifications of significance indicate advantageous or positive socio-economic effects.

18.28 Timescales associated with effects are categorised as follows:

- **Short to Medium Term:** Timescales where the effect is temporary and last for the period of the construction works or less; and
- **Long Term:** Timescales where the effect remains for a substantial time, perhaps permanently, after construction even though the activity that created it may have ceased some time ago.

Assessment of Cumulative Effects

- 18.29 When considered in isolation, the effects of any single project upon a receptor may not be significant. However, when individual effects are considered in combination, the resulting cumulative effect may be significant.
- 18.30 In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:
- Port of Blyth Biomass Power Station;
 - Proposed National Grid Electricity Transmission plc. (NGET) 400kV GIS Substation;
 - Ferguson Business Park Single Turbine;
 - Earth Balance Single Turbine;
 - Narec Offshore Wind Demonstration Site; and
 - Residential development – 48 dwellings.

Existing Environment

- 18.31 The area of land identified for the development of the UK converter station site is known as the “East Sleekburn site” and for the purposes of this Socio economic assessment referred to as the “converter station site”. For details of the project description and project setting reference should be made to Chapter 4.
- 18.32 The socio-economic assessment was undertaken using the latest datasets, and supplemented by information provided through consultation with NCC.
- 18.33 The review of socio-economic indicators highlights that the Blyth and Wansbeck areas are of great importance to Northumberland. The area lags behind regional and national averages in terms of employment and GVA. This is largely explained through low performance in terms of education and skills and an economic base that is skewed towards manufacturing, public administration and education.
- 18.34 The review of NCC’s economic strategy indicates that future growth in the low carbon and environmental sectors is expected to significantly exceed growth in other sectors. The North East LEP (Local Enterprise Partnership) has recently submitted its final Strategic Economic Plan (SEP) for the wider area that seeks to drive forward this agenda and promote regeneration and economic growth more broadly. The Blyth area is identified in the SEP as an area of particular need due its relatively high levels of deprivation.
- 18.35 In terms of economic development and regeneration objectives, NCC’s economic strategy is geared around developing the low carbon and renewables sectors with the Blyth Estuary and Cambois areas in particular a focus for this activity. This is being taken forward through the BEREZ (Blyth Estuary Renewable Energy Zone) initiative.

18.36 The findings of the review of socio-economic indicators are provided in Table 18.1. The findings of the review of economic development and regeneration objectives are provided in Table 18.2.

Table 18.1: Summary – Key Findings of Assessment of Socio-Economic Indicators

Socio Economic Indicator	Key Message(s)
Population	The population of working age (16 – 64) is lower than regional and national levels, with a higher proportion of people aged 65+.
Employment	<p>Blyth Valley has a higher than Northumberland, regional and national level of economically active population, whereas Wansbeck has lower than average levels. The area suffers from a high proportion of the economically active population that are unemployed, higher than the national average and the average across the Northumberland area.</p> <p>Wage levels in Wansbeck are lower than the Northumberland and national average.</p> <p>Northumberland's economic growth, as measured by GVA, is relatively low. Too few people in employment and low levels of productivity produce a gap in prosperity.</p>
Education and Skills	<p>A high proportion of people with no qualifications, percentages skewed towards qualification level 1 and 2, with a small proportion of people with qualifications of level 3 or above.</p> <p>The area has a high proportion represented within some of the lower skilled and lower value occupations (4 – 9) with an under representation of higher skilled and higher value posts (1-3).</p>
Industrial Base	<p>A reliance on several sectors such as manufacturing, public administration and education it is not an economic base that is particularly broad or diverse.</p> <p>Forecasts that predict growth in low carbon and environmental industries in Northumberland will outstrip growth in other industries by a significant margin between 2009 and 2020.</p>
Deprivation	Those individual measures falling within the most deprived wards in England are employment and health within as being the most acute problems, followed by education and income.
Housing	Key housing issues include: affordability and poor stock condition. This is of particular concern to housing renewal areas in close proximity to the potential converter station sites.
Coastal Tourism and Recreation	Coastal tourism is an important component of Northumberland's tourism offer that as a whole is a significant contributor to the economy. There are no hotels or B&B facilities within close proximity of the East Sleekburn site or the proposed cable landing r. Some facilities in the area such as Blyth Beach are visited by tourists and used by recreational users.

Table 18.2: Summary – Key Findings of Review of Economic Development and Regeneration Objectives

Economic Development and Regeneration Objective	Key Message(s)
Northumberland Economic Strategy	<p>The main objective is for Northumberland to become a low carbon economy, through exporting green technology and renewable energy; supporting low carbon economic development and developing low carbon skills.</p> <p>The Blyth Estuary and Cambois peninsula is identified as providing a focus for low carbon activity.</p>
BEREZ	<p>The BEREZ initiative outlines site-specific development opportunities for sites, some of which are currently being examined for their suitability accommodating a potential converter station.</p> <p>This would build on the Blyth Estuary as an established employment and energy production location.</p>
NELEP	<p>The main objective of the NELEP is to decrease the gap between the Region and national average on GVA, increase the private sector employment density, improve business density, and increase the employment rate of the Region. The success of designated Enterprise Zones will be important in achieving this vision.</p>
Enterprise Zone Proposal	<p>The inclusion of BEREZ within the NE LEP Enterprise Zone provides the potential to create the new business and jobs to benefit the wider economic area; based on business rates discounts and simplified planning in Enterprise Zones areas.</p>
Narec	<p>Recognised centre of excellence for testing new and renewable energy production; helping the transition to a low carbon economy, building on the Blyth Estuary as a location for employment and energy production location and an attractor for energy firms/supply chain companies considering to locate in SE Northumberland.</p>

Assessment of Socio-economic Effects

- 18.37 NSN Link will involve the laying of a cable over approximately 730km of the seabed and construction of a converter station landside in both the UK and Norway. NSN Link is of considerable national economic significance and represents a large-scale capital project in excess of £1bn. Once operational it will have a capacity of approximately 1400MW.
- 18.38 The UK onshore components which make up the NSN Link are discussed in detail in Chapter 4 and in summary comprise the laying of high voltage direct current (HVDC) subsea and onshore underground cables, the construction of a converter station and the installation of a short section of 400kV high voltage alternating current cables linking the converter station to the proposed NGET 400kV Gas Insulated Switchgear (GIS) substation.
- 18.39 The proposed NGET substation will be subject to a separate planning application although it is assessed in this ES as part of the cumulative assessment.
- 18.40 The requirement for a UK converter station will involve an investment of in excess of £100m and a construction period of 3 - 4 years.

18.41 The converter station will have a warehouse type appearance with the possibility of some outdoor switchgear. To meet the timescale NSN Link will need to become operational on 1st April 2020.

Summary of Proposed Development

18.42 A full description of the NSN Link during the construction and operational phases is given in Chapter 4. Those features and assumptions relevant to this chapter are summarised as follows, including best practice methods.

18.43 The proposed converter station and associated cabling represents a major capital investment by NSN Link Ltd. The construction of NSN Link project will be associated with significant capital spend and labour requirements.

18.44 The assessment of socio-economic effects is concerned with the UK onshore elements of NSN Link and not the offshore undersea cable or Norwegian onshore element. It is acknowledged there is some overlap depending on the method of procurement for example procured as a complete “turnkey package” or separate major component parts. In the event that contracts are tendered separately it is likely that contracts for the manufacture and installation of cables could be separate from those of the converter station.

18.45 The construction phase has been considered in three major components:

- Manufacturing of the subsea cable and corresponding cable installation;
- Civil construction of two converter stations; and
- Manufacturing and installation of the required electrical equipment and components in the converter stations

18.46 This construction phase reflects the key elements of works and their associated economic impacts. Only the UK elements of these components are assessed in the examination of socio-economic effects in this assessment. For the purposes of this ES chapter, the main findings are provided under the headings of onshore HVDC cables, converter station and onshore HVAC cables.

18.47 The number of staff on site will vary according to the construction phase and activities being undertaken. It is expected that staff levels will be at their highest during the converter station earthworks and civil engineering works phases. As construction is progressed through to the commissioning phase, staffing levels will generally decrease.

18.48 The scale of the construction phase has the potential to generate significant positive employment and income effects across all the three components outlined above. The potential economic impact of this activity on the local area will depend on a number of factors, especially contracting arrangements and the geographical sourcing of materials and labour. These local impacts are explored below for each element of NSN Link.

Assessment of Effects of Onshore HVDC Cables

Construction Phase

18.49 NSN Link will involve the laying of approximately 730km of subsea HVDC cable.

- 18.50 In relation the socio-economic effects of the offshore element of the subsea HVDC cable, this assessment has assumed that potential manufacturers are not UK based. It is expected that the majority of direct impacts of the investment will in economic terms leak outside of the local area. The impact associated with the offshore subsea HVDC cable is therefore expected to be a **short-term negligible beneficial effect** on employment.
- 18.51 The onshore element of the subsea cable component of NSN Link does have the potential to generate economic benefits locally however. The offshore subsea cables will connect to the HVDC onshore underground cables that will connect to the converter station (a distance of approximately 2km).
- 18.52 The HVDC onshore underground cables will be delivered to a contractor's compound. Temporary works compounds are anticipated to be established close to or on the existing car parking area at North Cambois Beach, adjacent to the waste water treatment works. The compounds will serve the onshore underground cable installation works from which plant, material and workers will travel to and from thus minimising vehicle movements.
- 18.53 A combination of trenched and trenchless technology will be used for the installation of the HVDC onshore underground cables. Activities will include excavation, laying the cables, jointing, terminating and testing the cables and are programmed for a period of 12 months in 2019 and 2020.
- 18.54 The most likely installation method for the onshore element of the HVDC cables is an "open cut" installation method. Under this method, cables would be landed from a vessel that would approach as far inshore as is possible. The process would involve using mechanical diggers to construct a trench across the beach from low to high water and floating the cable from the ship to the lower end of the trench.
- 18.55 It is expected that fishermen would be employed to provide guard vessels during the cable laying and installation campaign. Exact numbers of vessels and duration are not known at this stage but could be in the order of 3-5 vessels during a typical cable installation campaign between April and September for 1 to 2 years.
- 18.56 On the basis of 2 persons per vessel, this would generate income for 8 fishermen over the 2-year period. Expressed in terms of full time equivalent posts, this represents roughly 0.4 FTE jobs, representing a **short-term minor beneficial effect** on employment. This will support further employment though induced effects via the spending of these fishermen in the local area.
- 18.57 Joint bays will be required as part of the HVDC cable installation. Approximately three joint pits will be required in addition to the transition joint pit at the coast. The approximate locations will be subject to the preferred technology and local ground conditions.
- 18.58 The development of the joint pits will generate economic activity through the labour input involved. The excavation, preparation and construction of a joint bay is approximately 1-2 weeks, of which 7-10 days will involve 24 hour working. Depending on the contractor appointed, this element of the work could potentially be suitable for workers from the local area. This will represent a **short-term minor beneficial effect** in supporting employment.

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- 18.59 During construction a small area of the beach at East Sleekburn will be out of use in order to bury the HVDC cable. This will be a temporary closure during construction and alternative routes would be signed during the duration of the closure.
- 18.60 A car park close to Charlton's public house will also be temporarily closed in order to bring the marine cables onshore at the slipway. Alternative car parks will be sign posted during the duration of closure.
- 18.61 The PRoW which runs through Ferguson's Industrial Estate would require temporary closure during the cable installation. The works to install the cables will be of short duration and alternative routes would be signed during the duration of the closure.
- 18.62 The temporary closure of sections of the beach, PRoW and car park will result in **short-term minor adverse effect** on tourism and recreational activities in the area.

Operation Phase

- 18.63 The socio-economic impacts associated with the operational phase of the HVDC cables are covered within the assessment of the operation of the UK converter station.
- 18.64 Access to the beach is required to maintain the HVDC cable and may lead to the closure of small sections. However, this would only be necessary in extreme circumstances and the proposals are unlikely to adversely affect coastal tourism or recreation in the longer term. It is therefore expected to represent a **long-term negligible effect**.

Assessment of Effects of Converter Station

Construction Phase

- 18.65 For the purposes of the assessment of socio-economic effects construction of the converter station will involve the following activities:
- Preliminary Works;
 - Site Preparation and Establishment; and
 - Earthworks.
- 18.66 It is expected that the contractor will depend on the manufacturer chosen. The nature of the construction works is anticipated to be less specialised than the requirements for equipment manufacture and installation, therefore offers a greater opportunity for local firms and workers.
- 18.67 Prior site investigation works have been undertaken with expenditure of approximately £0.5m. Much of this work has already been undertaken as part of a package of preliminary works..
- 18.68 The civil construction works will provide valuable temporary employment, including positions that could potentially be taken by the local population. It is estimated that the activity will generate approximately 24FTE net jobs to the local area of Blyth and Northumberland. This represents **short-term minor beneficial effect** on employment.
- 18.69 There is also the potential for current employment (approximately 96 posts) at the Port of Blyth to be supported through the movement of construction materials. Support of the Port is

therefore significant in the local context. The quantity of construction materials that will pass through the port is currently unknown and therefore this impact cannot be quantified. It is expected to generate a **short-term minor beneficial effect** on employment.

- 18.70 The requirement for a temporary construction workforce is expected to generate significant positive impacts in respect of injecting income into the local economy. The scale and profiling of the construction workforce is such that peak numbers are not of the scale that would require a 'construction camp'. This means that spending of workers is more likely to be retained locally. It also means that the presence of temporary workers is not expected to generate significant adverse impacts on the public services utilised by the existing resident population.
- 18.71 For the purposes of this assessment a conservative approach to the potential economic benefits is adopted and it is assumed that the majority of the manufacturing of the cable would leak outside the UK and the local area.
- 18.72 It is estimated that the installation works will generate a labour need of approximately 598.3 man years, equivalent to 59.8 gross direct jobs. A conservative approach has been adopted in considering the impact on local employment and a high level of leakage of 85% has been assumed. After accounting for indirect and induced effects, the impact for Blyth and Northumberland is estimated to be 12.6 FTE net jobs – representing a **short-term moderate beneficial effect** on employment.

Operation Phase

- 18.73 The converter station is expected to be operational from 1st April 2020.
- 18.74 The socio-economic impacts during the operational phase are considered in terms of both core and wider impacts. The emphasis of the assessment has been on understanding the wider economic impacts of the NSN Link as whilst less tangible, NSN Link is of considerable national economic significance and represents a large scale capital project.
- 18.75 The day-to-day requirement for 2-3 staff to be on-site on a 24/7 basis implies a full-time equivalent employment of in order of 6 FTE gross jobs. These 6 FTE gross operational staff will be direct employees of NSN Link Ltd. The salaries for operatives will be up to £30k per annum gross. Taking into account leakage and economic multiplier effects across Blyth and Northumberland, it is expected that the proposed converter station will generate 7.56 net additional FTE jobs – representing a **long-term moderate beneficial effect** on employment. These posts are expected to include electrical engineering skills requirements.
- 18.76 It is anticipated that the socio-economic effects of the converter station on the surrounding area would be largely positive. In particular, NSN Link provides a development that is compatible with the wider economic development plans for the area. This would result in a long-term beneficial effect. The following wider impacts have been identified:
- Synergies with the development of the energy sector – The Proposed Development is particularly well aligned with economic development policy to further develop the off shore wind sector. The chosen technology will allow multi nodal connections thereby allowing offshore wind to connect - **Long-term moderate beneficial effect;**

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- Education and up-skilling opportunities – There is potential for work related training and up-skilling opportunities via contractors and for beneficial linkages to local educational establishments – **Long-term moderate beneficial effect;**
 - Contribution of rates to local revenues – Business rates will be payable locally and could be allocated to support economic development - **Long-term moderate beneficial effect.**

Assessment of Effects of HVAC Cables

18.77 The HVAC cables will run from the convertor station to the proposed NGET 400kV substation.

Construction Phase

18.78 The socio-economic impacts associated with the construction phase of the HVAC cables are covered within the assessment of the construction of the UK converter station.

Operation Phase

18.79 The socio-economic impacts associated with the operational phase of the HVAC cables are covered within the assessment of the operation of the UK converter station.

Mitigation

Construction Phase

18.80 This section outlines the mitigation measures to offset the potential negative impacts that are highlighted in the assessment of impacts.

18.81 As assessed, the only negative impacts that were identified were in relation to coastal tourism and recreation. The closure of sections of the beach, car park and Public Rights of Way (PRoW) at East Sleekburn during construction will be mitigated by signposting other suitable routes for users. It will be ensured that works affecting the beach, PRoW and car park will be undertaken quickly and outside peak season where possible to minimise disruption for users.

18.82 There are no other negative economic or social impacts identified for the construction phase and therefore no additional mitigation is required. However, it is emphasised that the use of local labour will be important in maximising the benefits of the construction investment to the local economy. The awarding of a contractor who already has local labour will be beneficial in this respect. There is also the potential for any chosen contractor to engage with local educational establishments and the local Learning and Skills Council (LSC) to try to increase even further the employment of local labour.

Operation Phase

18.83 As assessed, the only negative impacts that were identified were in relation to coastal tourism and recreation. The identified impact relates to beach access being required to maintain the onshore HVDC cable over its lifetime, potentially involving closure of small sections of the beach. This is determined as negligible however and no mitigation measures are identified.

Residual Effects

- 18.84 This section describes the residual effects of the proposed project following the implementation of the mitigation measures outlined above.
- 18.85 The impact assessment has only identified one short-term minor adverse impact requiring mitigation. The identified mitigation measures will ensure that the resulting effect is not any greater than a short-term minor adverse effect on coastal tourism and recreation.

Cumulative Effects

- 18.86 The following major development proposals have been considered as part of the assessment of potential cumulative effects:
- 18.87 The following developments have been considered:
- Port of Blyth Biomass Power Station;
 - Proposed NGET 400kV GIS Substation;
 - Ferguson Business Park Single Turbine;
 - Earth Balance Single Turbine;
 - Narec Offshore Wind Demonstration Site; and
 - Residential development – 48 dwellings.

- 18.88 None of these developments will have a significant influence on the expected socio-economic impacts of NSN Link. A summary of the assessment is set out below.

Port of Blyth Biomass Power Station

- 18.89 The Port of Blyth Biomass Power Station will be located at Blyth Harbour approximately 1.5km to the south-east of the proposed converter station site.
- 18.90 There are no cumulative effects expected between this project and NSN Link project. There is ample capacity in the labour market to provide the required skills during the construction phase should there be any overlap in skills required and timing of requirement. Staff needs are completely distinct between the two projects in the operational phase and therefore there are no cumulative effects.

Proposed NGET 400kV GIS Substation

- 18.91 The proposed 400kV GIS Substation will be located approximately 400m to the south-east of the proposed converter station site, adjacent to the existing Blyth 275kV Substation. Importantly, it is located within Section 7 of the Proposed Development area.
- 18.92 There are no cumulative effects expected between this project and NSN Link project since the substation labour requirements will be of a small scale and not significant.

Ferguson Business Park Single Turbine:

- 18.93 The Ferguson Business Park Turbine will be located approximately 390m west of the cable route and approximately 550m to the northwest of the proposed converter station site.

18.94 There are no cumulative effects expected between this project and NSN Link project since they will not compete for labour during construction or operation.

Earth Balance Single Turbine:

18.95 The Earth Balance Single Turbine will be located approximately 2km to the west/northwest of the proposed converter station site.

18.96 There are no cumulative effects expected between this project and NSN Link project since they will not compete for labour during construction or operation.

Narec Offshore Wind Demonstration Site:

18.97 The Narec Offshore Wind Demonstration Site will be located over 6km to the east of the proposed converter station site.

18.98 There are no cumulative effects expected between this project and the NSN Link project since there is ample capacity in the labour market to provide the required skills during both construction and operation phases.

Residential Development – 48 Dwellings

18.99 This project is for a housing development, located to the south of Brock Lane at East Sleekburn, approximately 500m from the closest point of the Proposed Development (converter station site).

18.100 There are no cumulative effects expected between this project and NSN Link project. There is ample capacity in the labour market to provide the required skills during the construction should there be any overlap on labour requirement and timing.

Summary

18.101 In summary no significant cumulative effects are expected between the Proposed Development and nearby proposed developments. In addition an assessment has been undertaken assuming that NSN Link and that the planned developments all come forward at the same time. The assessment has concluded there to be no likely significant in-combination effects.

Conclusions

18.102 The summary of the appraisal is provided in Table 18.3. This sets out potential effects with their associated timescale, significance, mitigation/enhancement measures, spatial scale and residual effects.

18.103 It is anticipated that the socio-economic effects of the converter station on the surrounding area would be largely positive. The converter station is an integral part of the NSN Link and provides a development compatible with the wider economic development plans for the area.

18.104 The analysis of local quantifiable impacts indicates that net additional employment of 38.8 FTE jobs and 7.56 FTE jobs will be created in the construction and operational phases respectively. **The project is therefore expected to generate a total of 46.36 FTE jobs in**

the local area. This is equivalent to a contribution to local GVA of in order of £2m per annum³.

18.105 **In addition to quantified impacts, a number of wider economic benefits have also been identified, which whilst not easily quantifiable, are considered significant** in terms of the overall assessment of socio-economic impacts:

- Synergies with the development of the energy sector;
- Education and up-skilling opportunities; and
- Contribution of rates to local revenues.

18.106 NSN Link is a key energy infrastructure project in a European context and as such is identified as a Project of Common Interest. Estimates of local impact have adopted a conservative approach however it is recognised that the scale of NSN Link will generate a much greater economic impact over a wider geographic area bringing lower energy prices to consumers, enhanced energy security and a cleaner environment through opportunities for the integration of renewable, low carbon energy sources.

³ UK Industry Performance Report (2011) - *UK Industry Performance Report based on the construction industry key performance indicators*. Estimated wages of operational staff based on GVA per worker in the construction sector.

Table 18.3: Appraisal Summary Table

Potential Effect	Timescale	Significance (Severe, Major, Moderate, Minor, Negligible, Beneficial, Adverse Negligible)	Mitigation/ Enhancement Measures	Scale (National /Regional/ Local)	Residual Effects (After Mitigation /Enhancement)
HVDC Cables					
Employment - Cable manufacture and installation	Short-term	Negligible beneficial	None	Local	Short-term negligible beneficial
Employment - Development of the joint pits	Short-term	Minor beneficial	None	Local	Short-term minor beneficial
Coastal tourism and recreation - temporary closure of sections of the beach, PRow and car park	Short-term	Minor adverse	Signposted diversion of footpaths	Local	Short-term minor beneficial
Coastal tourism and recreation - Access to the beach is required to maintain the HVDC cable and may require the closure of small sections of the beach	Long-term	Negligible adverse	None	Local	Long-term negligible adverse
Employment - Fishermen would be employed to provide guard vessels during the cable laying and installation campaign - 0.4 FTE jobs	Short-term	Minor beneficial	None	Local	Short-term minor beneficial
Converter Station					
Employment - Prior site investigation works - 0.9 FTE jobs	Short-term	Minor beneficial	None	Local	Short-term minor beneficial
Employment - Civil construction works - 24.9 FTE net jobs	Short-term	Minor beneficial	None	Local	Short-term minor beneficial
Employment – Support of 96 Port of Blyth jobs	Short-term	Minor beneficial	None	Local	Short-term minor beneficial
Employment – Installation of the equipment - 12.6 FTE net jobs	Short-term	Moderate beneficial	None	Local	Short-term moderate beneficial
Employment – creation of 7.56 net additional FTE jobs – representing a long-term moderate beneficial effect on employment.	Long-term	Moderate beneficial	None	Local	Long-term moderate beneficial

Potential Effect	Timescale	Significance (Severe, Major, Moderate, Minor, Negligible, Beneficial, Adverse Negligible)	Mitigation/ Enhancement Measures	Scale (National /Regional/ Local)	Residual Effects (After Mitigation /Enhancement)
Economic development - Compatible with the wider economic development plans for the area.	Long-term	Moderate beneficial	None	Local	Long-term moderate beneficial
Wider impacts – Synergies with the development of the energy sector	Long-term	Moderate beneficial	None	Local/ Regional	Permanent Moderate Positive
Wider impacts – Education and up-skilling opportunities	Long-term	Moderate beneficial	None	Local/ Regional	Permanent Moderate Positive
Wider impacts – Contribution of rates to local revenues	Long-term	Moderate beneficial	None	Local	Permanent Moderate Positive
<u>HVAC Cables</u>					
Impacts are considered under the converter station assessment	-	-	-	-	-

19 CONCLUSIONS

- 19.1 This concluding chapter presents a summary of the development proposals and a summary of main conclusions arising from the environmental assessment of the Proposed Development.
- 19.2 The interconnector known as “NSN Link” is a proposed high voltage direct current (HVDC) electricity interconnector with an approximate capacity of 1400 megawatts (MW). NSN Link would allow the bi-directional transfer of electrical power between the UK and Norway via subsea cables. NSN Link is of national importance and represents a large-scale project in excess of £1 billion and would be the longest interconnector in the world.
- 19.3 NSN Link will allow the bi-directional trade of energy, giving the UK access to Norwegian hydro power whilst giving Norway access to UK’s increasing portfolio of wind and other renewable technology generation.
- 19.4 This Environmental Statement (ES) accompanies National Grid NSN Link Ltd.’s (“NSN Link Ltd”) planning application for the UK onshore elements of NSN Link, which was submitted to Northumberland County Council on 15th November 2013 (application reference number 13/03524/OUT).
- 19.5 Several alternative options for a grid connection point, converter station sites, underground cable routes, landfalls and subsea cable routes have been considered in the development of NSN Link since 2011.
- 19.6 Feasibility study confirmed the preferred onshore elements of NSN Link which comprise a converter station site at East Sleekburn; a landfall at the existing slipway in north Cambois; a DC cable route through agricultural land and Ferguson Business Park; and a short AC connection between the converter station site and a proposed new substation adjacent the existing Blyth Substation. The new substation would be owned and operated by National Grid Electricity Transmission plc (NGET).
- 19.7 The Proposed Development assessed in this Environmental Statement is the preferred option in relation to technical feasibility, economic viability and deliverability and is expected to cause the least disturbance to the environment and people relative to other options that have been considered.
- 19.8 Detailed environmental and technical studies together with consultation have been used to refine the preferred option and further reduce the potential environmental effects of NSN Link. This work included considering the emerging results from environmental assessment with initial technical designs and consultation with stakeholders, land owners and local communities.

Proposed Development

- 19.9 The UK onshore components of NSN Link are subject to an application for outline planning consent which includes all elements of the proposed development from the Low Water Mark.
- 19.10 All components are described and assessed in this ES and in brief comprise:

- High voltage direct current (HVDC) subsea and onshore underground cables;
- A converter station; and
- High voltage alternating current (HVAC) underground cables from the converter station to a new 400kV Gas Insulated Switchgear (GIS) substation.

19.11 A new 400kV GIS substation is proposed adjacent to the existing Blyth 275kV electricity substation. This substation would be owned and operated by NGET and would be subject to a separate planning application. The substation is however assessed in this ES as part of the cumulative assessment.

HVDC Subsea

19.12 The subsea cables in UK waters are subject to a consenting regime under the Marine and Coastal Access Act 2009. That regime extends to the high water mark and planning permission extends to the low water mark. The subsea cables between the low water mark and the high water mark (the intertidal area) falls under the provisions of both the Town and Country Planning Act (1990) and the Marine and Coastal Access Act 2009.

19.13 An ES for the UK marine elements of the project has been undertaken by Intertek on behalf of NSN Link Ltd. The UK Marine ES presents the environmental assessment for the marine cable route within UK waters. The study area of the UK Marine ES is from the UK/Norway median line to MHWS at Cambois, Blyth; a distance of approximately 340km.

19.14 There is some overlap in the assessment of the intertidal area as reported in the UK Onshore ES and the UK Marine ES. An assessment of these overlaps and their likely in combination effects is provided in the Bridging Document which accompanies this UK Onshore ES.

HVDC Onshore

19.15 The subsea cables would be laid separately and joined to the HVDC onshore underground cables in a transition joint pit (TJP). The approximate distance between the low water mark and the TJP would be approximately 500m.

19.16 The TJP would be an excavated pit and once the connection has been made the excavation would be backfilled to original ground levels and once restored there would not be any visible sign of the TJP.

19.17 From the low water mark the underground subsea cables would be laid through the beach and slipway to the TJP. From here the underground cables would be laid through agricultural land and through Ferguson Business Park to the converter station.

Converter Station

- 19.18 The converter station would be constructed on land immediately to the east of the A189 spine road, to the north of East Sleekburn. The site is approximately 1.5km north east of Blyth, on the north side of the Blyth estuary and 1km inland from the Northumberland coastline.
- 19.19 The proposed converter station site and part of the HVDC cable route corridor, south of Ferguson's Business Park are located on land which forms one of the BEREZ strategic sites; the East Sleekburn Strategic Site, which is identified for use as a blade or nacelle manufacturing plant or other major manufacturing operations associated with the Port and offshore renewables. It is also subject to a Local Development Order (LDO), which offers a potential fast-track planning approval for developments specified within the order.
- 19.20 The converter station site would occupy a footprint of approximately 5 hectares and would be designed for a 40 year lifespan. The converter station and associated buildings would be metal clad buildings and are not expected to exceed 25m in height.
- 19.21 Access to the converter station is proposed via a new access off Brock Lane. Permanent roads around the perimeter of the converter station and internal roads would be constructed to provide access to the different building units for regular and ad hoc maintenance activities and for the delivery of materials to site.
- 19.22 Landscaping around the perimeter of the converter station would help integrate the Proposed Development site into the landscape setting. The existing native planting to the road frontage and around the site would be largely retained and supplemented with additional native planting around the converter station site.
- 19.23 The converter station would be contained within a secure fenced compound. The majority of electrical equipment would be indoors to prevent exposure to saline air as salt deposition can lead to damage and the need to prematurely replace equipment.

HVAC Cables

- 19.24 The converter station will be connected to the three phase AC substation by 400kV AC cables. Where two cables per phase are installed, as is proposed here, the currents flowing in the cables will be half the value compared to where one cable per phase is installed. The HVAC cables would be the same type as the HVDC cables (mass impregnated) and would be approximately 150mm in diameter. The total length of the HVAC cables route is less than 1km. They would be laid in two banks of three, with a separation gap between them. A construction corridor of about 20m would be required and this would accommodate a haul route along the length of the cable, sufficient operating space around the works, areas for stockpiling top soil and excavated material, and space for drainage and temporary security fencing.

Environmental Impact Assessment

- 19.25 Northumberland County Council (NCC) issued a Screening Opinion on 6th December 2013, setting out the Local Authority's view that it considered the proposed NSN Link would fall

under Part 10 (Infrastructure Projects) of Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2011, which requires that applicants proposing development on sites exceeding 0.5ha to be screened.

- 19.26 NCC makes reference to Schedule 3 Paragraph 2 of the EIA Regulations in their Screening Opinion which states that the sensitivity of geographical areas likely to be affected must be considered. The opinion states the proposed NSN Link has the potential to give rise to significant impacts on the Northumberland Shores Site of Special Scientific interest (SSSI) and the Blyth Estuary Site of Nature Conservation Importance (SNCI). It also stated that due to the scale of the development and proximity to residential properties it has potential to give rise to effects on the landscape and visual appearance of the area.
- 19.27 NCC has therefore concluded that the proposed development would be so significant so as to require an Environmental Impact Assessment.
- 19.28 A Scoping Report was prepared in accordance with the guidelines set out in Regulation 8 and Schedule 4 of the 2011 Regulations and seeks the opinion of the Local Planning Authority regarding the proposed approach for the environmental assessment of the Proposed Development.
- 19.29 The Scoping Report for NSN Link was submitted to NCC on 20th January 2014 and ensured that technical information necessary for a comprehensive EIA was obtained and provided an opportunity for statutory bodies and other consultees to make formal representations on the content of the EIA.
- 19.30 On 28th April 2014 NCC provided comments on the Scoping Report and in their response NCC commented on the relevance and method of assessment for each representation. This Environmental Statement has addressed the issues raised in this response.

Cumulative Assessment

- 19.31 When considered in isolation, the environmental effects of any single project upon a receptor may not be significant. When individual effects are considered in combination, the resulting cumulative effect may be significant. In terms of cumulative assessment, the following major development proposals have been considered, in accordance with Chapter 3 of the ES:
- Port of Blyth Biomass Power Station;
 - Proposed NGET 400kV GIS Substation;
 - Ferguson Business Park Single Turbine;
 - Earth Balance Single Turbine;
 - Narec Offshore Wind Demonstration Site; and
 - Residential development – 48 dwellings.

Summary of Potential Environmental Effects

19.32 The feasibility study and review of technical constraints has resulted in a development proposal in which the environmental effects have been reduced or eliminated to such an extent that there are few significant residual effects. A summary of the likely effects is described below and any effects that are not considered to be significant have been described within the preceding chapters and are not included here.

Ecology

19.33 The ecological assessment identified:

- one ecological receptor of international value (Northumbria Coast SPA/Ramsar);
- one receptor of national value (Northumberland Shore SSSI);
- one receptor of county value (Blyth and Sleekburn Estuary LWS);
- two receptors of local value (plantation woodland and bats); and
- 12 receptors of site value (semi-improved neutral grassland, trees, hedgerows, ditches, non-native species, amphibians (excluding great crested newts), water voles, otter, reptiles, wintering birds, breeding birds and other S.41 species (e.g. invertebrates and eels).

19.34 There will be no direct impacts on receptors of international value. The assessment has identified there to be direct impacts in the intertidal zone of the Northumberland Shore SSSI during cable installation. These effects will be temporary only and very localised. No rare or protected species or habitats of conservation importance were identified in the vicinity of the cable works and intertidal species recover quickly from physical disturbance so the impact will not be significant.

19.35 Without mitigation, there is the potential for indirect impacts on international and national sites through disturbance to designated bird species. There is also the potential for indirect impacts on the Blyth and Sleekburn Estuary LWS through potential pollution due to the drainage outfall and/or disturbance of wintering and breeding birds.

19.36 There are no predicted likely significant effects on the Northumbria Coast SPA as a result of NSN Link project alone or in-combination with other projects. There is no requirement to undertake an Appropriate Assessment.

19.37 The majority of impacts relating to both cable routes during construction are temporary only as all habitats will be reinstated following completion of cable installation. The only permanent loss of habitat for the cable routes will be due to the 7m easement above the cables where plantation woodland cannot be reinstated. Shrubs and grassland will however be planted in these areas.

19.38 The inherent design, standard mitigation measures and actionable mitigation measures identified serve to ensure that the remaining adverse impacts associated with the development are managed to acceptable levels.

19.39 The inherent design, standard mitigation measures and actionable mitigation measures serve to ensure that the remaining adverse impacts associated with the development relate to a small reduction in an area of plantation woodland and hedgerow due to a 5-15m easement above the cable routes, and the loss of one defunct hedgerow for the development of the converter station itself. However, the majority of plantation woodland

and hedgerows will be unaffected by the development proposals, so this minor loss will not result in any significant impacts.

- 19.40 The inherent mitigation measures relating to ecological constraints include: cable route selection to avoid features of high ecological value, reinstatement of all habitats along cable routes following installation, retention of the band of existing plantation woodland to south and east of the converter station to maintain connectivity, and the use of trenchless technologies at crossings, to avoid impacts.
- 19.41 Standard and actionable mitigation measures would be developed in accordance with industry standards, best practice and guidance and embedded within the CEMP. Measures would include but are not limited to protection of retained trees and hedgerows, implementation of standard pollution prevention measures and timing of works to minimise any potential for impacts on species such as wintering and breeding birds.

Landscape

- 19.42 The installation of the underground cable would give rise to short term minor adverse effects on the local landscape. Following the reinstatement of the cable swathe the operation of the cables would give rise to an effect of neutral significance. The converter station would be consistent with existing industrial development but siting and design have been considered in the development of the project to reduce the significance of this effect. There are several large scale metal clad buildings in the area and the former Blyth Power Station site and overhead lines increase the industrial influences in the landscape. The use of colour graded cladding and the retention of existing vegetation would assist in reducing the effect of the Proposed Development within the wider landscape context giving rise to a minor adverse significance of effect on the landscape.

Views

- 19.43 The installation of the cable would give rise to short term effects on views from receptors within a small geographic area. These predicted effects would be reversible with the landscape reinstated to its original condition and therefore the residual effects are not considered to be significant. The converter station would be a large structure, but siting and design have been considered in the development of the project to reduce the significance of effect on views. There are relatively few views into the site and juvenile planting around the East Sleekburn site would be retained and as it matures would filter views where they are available. The residual effects of the converter station on views would be similar to those arising at the year of operation however provided that mitigation is embedded into the siting and design of the converter station can be reduced to acceptable.

Historic Environment

- 19.44 There are two Grade II listed buildings and 68 non-designated heritage assets potentially affected by the Proposed Development, however the construction and operation of NSN Link would have no permanent negative effects on the settings of any of these heritage assets. The construction and operation of the Proposed Development would have an adverse effect on two historic hedgerows however following mitigation this is not considered significant. Ten areas of known buried archaeology have been identified in the Proposed Development area however a scheme of investigation, monitoring and recording is proposed to mitigate this risk.

Land Use

- 19.45 The location of the converter station site will result in a permanent loss of 5 hectares of Grade 3 agricultural land however the aspirations policy set out in LDO Policy EMP3 take precedence. Whilst NSN Link does not qualify under strict criteria it is similar in nature and furthermore does not preclude future development under the Cambois Zone of Economic Opportunity.
- 19.46 The assessment has concluded that predicted effects on land use from NSN Link generally relate to the construction phase although there would be a minor adverse effect from the overall land take required for the converter station site. During the construction phase there will be restrictions on open space and recreation routes including part closure of the foreshore and public car park however these are localised, temporary and of minor significance and are easily mitigated.
- 19.47 Soil is a finite resource and predicted effects can be managed to acceptable levels through the implementation of mitigation measures, which consist of appropriate best practice and industry standard mitigation and compliance with Natural England Technical Information Note TIN049, and the Defra Code of Practice for the sustainable use of soils on construction sites.
- 19.48 Following installation the cable trenches would be reinstated to existing albeit with some restrictions to the planting mix and overall the loss of land is considered negligible.

Geology and Ground Conditions

- 19.49 Site investigation has been carried out by Worley Parsons in 2013 and 2014 with no elevated concentrations of soil contamination identified. Slightly elevated concentrations of contaminants were identified in groundwater and mitigation measures would need to be implemented during the construction works to ensure that the Proposed Development does not introduce pathways for contaminant migration.
- 19.50 The BACTEC Explosive Ordnance Threat Assessment report identified Sections 1 and 2 as being in a medium risk zone from UXO with the remaining areas being at low to medium risk. These risks can be mitigated through the implementation of recommendations outlined in the BACTEC report.
- 19.51 No significant impacts are predicted for geohazards. The Arup coal mining risk assessment concluded that the impacts to the project from ground instability as a result of historic coal mining is very low, but recommended basic precautions in relation to the construction phase and the possibility of discovering unrecorded mine workings.
- 19.52 Potential moderate adverse significant impacts from ground gas were identified for the construction phase; these impacts can be reduced with mitigation. No significant impacts from ground gas were identified for the operational phase.
- 19.53 No significant impacts have been identified to groundwater resources during the operational stage.
- 19.54 Moderate adverse significant impacts on soils were identified from handling and storage during construction and from the potential for pollution during the establishment of the construction compound. These impacts can be mitigated by best practice construction

methods and compliance with Defra guidance on soil management. All other potential impacts on soils were assessed as low.

- 19.55 The Worley Parsons site investigation indicates that the risk of workers coming into contact with contamination during construction or the operational phase is low. Mitigation measures such as the use of appropriate PPE or the treatment/removal of contamination could be implemented to ensure the risk remains low.
- 19.56 Moderate adverse significant impacts associated with the migration of contamination in cable trenches have been identified for the construction and operational phases but can be mitigated by best practice.
- 19.57 Moderate adverse impacts have been identified relating to aggressive ground conditions and the potential for damage to buried structures including the cable route infrastructure; these can be mitigated through design.
- 19.58 In summary providing incorporated mitigation is undertaken in the form of compliance with all relevant construction and design standards and practices such as EA pollution control guidelines and health and safety measures no significant residual impacts are anticipated for geology and ground conditions.

Hydrology and Flood Risk

- 19.59 The effects on hydrological receptors during construction would be reduced to minor significance through the implementation of appropriate best practice and industry standard mitigation. Siting and design of the proposed converter station has been considered to minimise impacts during the operational phase, including allowance for surface water runoff in the converter station drainage design to minimise surface water flood risk in the area and inclusion of a range of SuDS techniques in the converter station drainage design to minimise impacts to water quality at the proposed outfall (Sleek Burn).
- 19.60 During the operational phase a moderate impact has been identified for Sleek Burn due to the potential for scour at the outfall. Mitigation, which may comprise scour protection and/or throttling of discharge rates at the outfall would reduce the impact to minor.
- 19.61 The flood risk to the Proposed Development from fluvial, tidal and groundwater flooding during the construction and operational phases has been assessed as low. A minor risk from surface water flooding has been identified for the construction phase of the development in localised areas but this can be managed by temporary drainage during the construction phase.

Traffic and Transportation

- 19.62 The assessment has concluded there to be no significant impacts with regards traffic and transportation. Impacts on safety, noise, severance and air pollution will not require specific mitigation measures, other than the standard measures outlined in the CEMP.
- 19.63 A Traffic Management Plan will need to be developed as part of the CEMP process and it is anticipated that this will be the mechanism for capturing standard mitigation measures typical of best practice. The Traffic Management Plan will need to be agreed with the Local Planning Authority and will outline mitigation measures including methods to ensure effective dust suppression, appropriate selection and maintenance of vehicles, notification of vehicle and non-vehicular routes.

Noise and Vibration

- 19.64 Best practicable means as defined by the Control of Pollution Act 1974, would be implemented as part of the working methodology. Mitigation measures would be incorporated into the design of the converter station and substation to ensure that the noise target is achieved. With best practicable means and embedded mitigation predicted effects generated with construction activities associated with the cabling and converter station have been assessed as minor adverse. With mitigation the operational phase effects of noise emissions from the converter station have been assessed as minor.

Air Quality

- 19.65 The assessment concludes that there are no significant impacts for air quality sensitive receptors with predicted effects being temporary in nature during the construction phase of the works. The effects of decommissioning of the cables will be dependent on whether redundant cables are left in situ or removed however for both scenarios no significant impacts have been identified and the effects will be temporary in nature.
- 19.66 Dust has the potential to affect local air quality during construction. Predicted effects are not considered to be significant and with the use of industry standard appropriate mitigation methods, dust issues arising from construction-related activities can be significantly reduced.

Electric and Magnetic Fields

- 19.67 The proposed converter station will be designed to ensure that it is compliant with International Commission on Non-Ionizing Radiation Protection guidelines (ICNIRP, 1998). With all installation techniques, it has been demonstrated that both the HVDC and HVAC cables would be compliant with exposure limits so there will be no significant EMF effects resulting from NSN Link.

Socio Economic

- 19.68 The proposed development would bring benefits to the areas during the construction through direct employment and through the use of local businesses.

Cumulative Effects

- 19.69 No significant adverse cumulative effects are anticipated to arise from the UK onshore element with any other aspect of NSN Link during the construction or operation phases. The assessment has also concluded that there are no predicted long term cumulative effects resulting from the Proposed Development and any or all of the planned development in the study area. Any potential effects are likely to be localised and temporary during construction and can be mitigated by the use of appropriate best practice and industry standard mitigation.

Mitigation

- 19.70 Mitigation measures have been proposed to avoid, offset or reduce impacts where these are predicted. These mitigation measures are considered to be industry standard and in accordance with best practice are detailed in the individual technical chapters.

Summary Conclusions

- 19.71 The construction of NSN Link is in accordance with European Union and UK policy to increase transmission capacity between countries and to ensure robust electricity supplies.
- 19.72 NSN Link would allow the bi-directional transfer of electrical power between the UK and Norway via subsea cables. NSN Link will give the UK access to Norwegian hydro power whilst giving Norway access to UK's increasing portfolio of wind and other renewable technology generation. NSN Link is of national importance and represents a large-scale project in excess of £1 billion and would be the longest interconnector in the world.
- 19.73 The construction and operation of NSN Link would not give rise to any significant long term effects. Any impacts identified as part of the assessment are considered to be localised and appropriate mitigation measures would be implemented to avoid, offset or reduce impacts.

Glossary and Abbreviations	
Alternating Current (AC)	An electric current that reverses its direction at regularly recurring intervals.
Assessment of Likely Significant Effects (ALSE)	Assessment of Likely Significant Effects developed to inform the Appropriate Assessment, an assessment to be carried out by the competent Authority.
Abnormal Indivisible Loads (AIL)	A vehicle, or combination of vehicles, carrying a load, which without undue expense or risk of damage, cannot be divided into two or more loads, and is of such dimensions or weight that it cannot be carried on a vehicle that complies in all respects with the Construction & Use Regulations.
Above Ordnance Datum (AOD)	The height above a vertical datum point used by the Ordnance Survey as a point of reference for the level or altitude of any point, usually mean sea level.
Agricultural Land Classification (ALC)	The ALC is a well-established classification system used for categorising soils. The ALC can be used to determine the physical quality of the land at national, regional and local levels.
Area of Outstanding Natural Beauty (AONB)	Areas of special landscape character and value, of national importance. Such areas are considered to represent landscapes of high sensitivity. Their care has been entrusted to local authorities, organisations, community groups and the individuals who live and work within them or who value them.
Baseline	A standard by which things are measured or compared.
Bridging Document	The combined environmental impacts of the project are considered and assessed in a separate standalone Bridging Document. The Bridging document provides an overview of the consented Norwegian onshore and intertidal components and assessment of the combined effects of the proposed development scheme for the subsea cables and the UK terrestrial elements of the NSN Link.
Below Ground Level (BGL)	A term used in topographical mapping to describe the distance below ground of a particular datum.
Borehole (BH)	A hole drilled into the ground to recover information on ground condition including geotechnical properties.
Cable Ducts	Pipe through which cables are drawn.
Cable Drums	Reel on which a cable is kept and for transportation.
Cement Bound Sand (CBS)	A thermally stable backfill of cement bound sand is used to ensure a known thermal conductivity around the cables in order to maintain the cable rating.
Climate Change	A term used to refer to all forms of climate inconsistency but especially change from one prevailing climatic condition to another. The term is usually used synonymously with the term global warming.
Conservation Areas	A local designation of area of land and buildings of special architectural or historic interest, the character or appearance of which local authorities consider should be preserved or enhanced.
Construction Environmental Management Plan (CEMP)	Document which sets out a variety of control measures for managing the potential environmental effects of construction works including control and management of noise, dust, surface water runoff, waste and pollution control.
Converter Station	Terminal equipment for high voltage direct current transmission line in which direct current is converted into alternating current and vice versa.
Converter Transformers	These change AC voltage to an appropriate level for conversion within a valve hall.

Glossary and Abbreviations	
Calculation of Road Traffic Noise (CRTN).	The central reference document in the UK for the monitoring and prediction of road traffic noise is the technical memorandum ' <i>Calculation of Road Traffic Noise</i> ' (CRTN).
Current	A flow of electrons in an electrical conductor.
Development Plan	A document setting out the local planning authority's policies and proposals for the development and use of land and buildings on the authority area. It includes unitary, structure and local plans prepared under transitional arrangements and development plan documents prepared under the Planning and Compulsory Purchase Act 2004.
Direct Current (DC)	The unidirectional flow of electric charge.
Discharge	To release water into a natural or manmade system.
Distribution System	The portion of an electric system that is dedicated to delivering electric energy to the end user. In England and Wales the electric system typically operates at 132kV or less.
Disturbance	A variation in normal conditions.
Dust	Dust is made up of solid particles between 1 and 75 microns in size. The term is used to describe particles resting on the ground or other surfaces that can become airborne before returning to the surface.
Easement	An easement is a right to use or access the land of another for a specified purpose.
Environment Clerk of Works (ECoW)	A competent environmental professional whose role is to implement the construction environmental management plan during the construction phase.
Electromagnetic Field (EMF)	A physical field produced by electrically charged objects.
English Heritage	The Government's statutory adviser on the historic environment.
Environment Agency (EA)	Executive non-departmental public body responsible to the secretary of state for the environment, food and rural affairs.
Environmental Impact Assessment (EIA)	A statutory assessment of the possible positive or negative impact that a proposed project may have on the environment, together consisting of the natural, social and economic aspects.
Environmental Statement (ES)	Document containing the findings of the Environmental Impact Assessment (EIA).
Fauna	All of the animals found in a given area.
Flora	All plant life found in a given area.
Gas Insulated Switchgear (GIS)	In an electric power system, switchgear is the combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. Switchgear may be a simple open-air isolator switch or it may be insulated by some other substance. An effective although more costly form of switchgear is the gas insulated switchgear (GIS), where the conductors and contacts are insulated by pressurized sulfur hexafluoride gas (SF ₆).
Habitat	Ecological or environmental areas that are inhabited by a particular species of animal, plant or other type of organism.
Horizontal Directional Drilling (HDD)	The drilling of non-vertical wells for the installation of underground cables.

Glossary and Abbreviations	
High Voltage Alternating Current (HVAC)	Cables transmitting alternating electrical current.
High Voltage Direct Current (HVDC)	Cable transmitting direct current bulk electrical power, typically over long distances.
Interconnector	HVDC cable linking two separate transmission systems.
Joint Pit (JP)	Area within which two sections of cable are joined together.
Landfall	A cable landing point, where a submarine cable comes ashore/makes landfall.
Landscape Character Assessment	This is an approach to understanding the differences between landscapes, and can serve as a framework for decision-making that respects the local distinctiveness.
Local Biodiversity Action Plan (LBAP)	Outline the actions to be taken at a local level.
Local Development Frameworks (LDF)	A non-statutory term used to describe a folder of documents, which includes all the local planning authorities' local development documents.
Local Development Order (LDO)	Local Development Orders are made by local planning authorities and give a grant of planning permission to specific types of development within a defined area.
Local Nature Reserves (LNR)	Sites with wildlife or geological features that are of a special interest locally.
Local Planning Authority	The local authority or Council that is empowered by law to exercise planning functions.
Made Ground (MG)	Material that has been placed by man and can be divided into those composed of reworked natural soils and those composed of man-made materials.
Marine Cable Route	Marine cable route from the UK to Norway through Norwegian and UK waters.
Marine Management Organisation (MMO)	The MMO is an executive non departmental public body which was established and given powers under the Marine and Coastal Access Act 2009. The MMO is an enabling marine regulator.
Mass Impregnated (MI) cables	<p>Mass impregnated (MI) cable is used to date for long high capacity submarine links. Each cable is approximately 150mm in diameter, and weighs approximately 60kg/m.</p> <p>MI cables have a copper core, are insulated by MI paper (or alternatively MI polypropylene paper laminate (PPL)) and are protected by steel cable armoring.</p>
Mitigation	Measures and actions taken to minimise, reduce, remedy and/or compensate for the adverse impacts of development.
Mean Low Water (MLW)	The height of the mean low water springs is the average height obtained by the two successive low waters during the same period. The height of MLWS is measured above Chart Datum.
Mean High Water Springs (MHWS)	The height of mean high water springs is the average throughout the year of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest. The height of MHWS is measured above Chart Datum.
Natural England (NE)	Independent public body whose purpose is to protect and improve England's natural environment.

Glossary and Abbreviations	
National Grid Electricity Transmission Plc (NGET)	National Grid Electricity Transmission Plc is a part of the National Grid group and operates the high voltage transmission system in Great Britain.
Northumberland County Council (NCC)	Northumberland County Council is the planning and competent authority.
NSN Link	Bi directional interconnector link allowing import and export of electricity between the UK and Norway.
Ordnance Datum (Newlyn)	Is the datum of the land levelling system on the mainland of England, Scotland and Wales, and on some of the closer islands offshore; this datum was established at the level of the average value of Mean Sea Level at Newlyn for the six-year period 1915-21.
Phase 1 Habitat Survey	A standardised method of survey of land and water, developed by the Nature Conservancy Council, which maps all types of habitat and vegetation at 1:10,000 scale on colour-coded plans based on field recording.
Planning Permission	Formal approval sought from a Council, often granted with conditions, allowing a proposed development to proceed.
Power Station	Facility for the generation of power/electricity.
Public Right of Way (PROW)	Rights of way are minor public highways that exist for the benefit of the community at large. They are the most widely recognised facility that gives the public the opportunity to enjoy the English countryside.
Ramsar	Wetland sites that are protected under the Conservation of Wetlands (Ramsar, 1971) called the Ramsar Convention. It is an intergovernmental treaty that embodies the commitments of its member states to maintain the ecological character of their Wetlands of International Importance.
Renewable Energy	Energy resources that are naturally replenishing.
River Basin Management Plans (RBMP)	RBMP documents set out the current situation within each River Basin Districts, with respect to the key objectives, and discuss how they can be met in order to comply with the Water Framework Directive. Surface water and groundwater is included in the River Basin Management Plans.
Scheduled Monuments	These are monuments which range from the prehistoric standing stones, burial mounds, through to many types of medieval site, castles, monasteries, abandoned farmsteads and villages to the more recent results of human activity such as colliers that are of national importance.
Self Powered Modular Trailer (SPMT)	A trailer capable of transporting abnormally large or heavy loads which can operate without a separate tractor unit to tow or push the trailer carrying the abnormal load.
Sites of Biological Importance	Non statutory designations used locally by a number of local authorities in England.
Sites of Importance to Nature Conservation (SINC)	Site of Importance for Nature Conservation. This is a local (County, Borough etc. designation, below the level of SSSI).
Site Environmental Manager (SEM)	A competent environmental professional whose role is to implement the construction environmental management plan during the construction phase. The SMP may delegate some of their duties to the ECOW.
Species	A group of interbreeding organisms that seldom or never interbreed with individuals in other such groups, under natural conditions.

Glossary and Abbreviations	
Special Area of Conservation (SAC)	A site designated for protection under the EC Habitats Directive.
Special Protection Area (SPA)	Strictly protected sites classified in accordance with Article 4 of the EC Birds Directive which came into force in April 1979.
Site Waste Management Plan (SWMP)	Document prepared by the Contractor in consultation with the Local Planning Authority which details how waste would be managed during construction of the development.
Sites of Special Scientific Interest (SSSI)	Designated sites that provide protection for the best examples of the UK's flora, fauna, geological or physiological features. Also used to underpin other national and international conservation designations. Most SSSIs are privately owned or managed, some are managed or owned by public bodies or nongovernmental organisations.
Subsea	Technology and methods employed for cable installation in the marine environment.
Substation	Facility equipment that switches, changes, or regulates electricity voltage.
Transformer	An electrical device for changing the voltage of an alternating current.
Transmission	The movement or transfer of electric energy over an interconnected group of lines and associated equipment between points of supply and points at which it is transformed for delivery to consumers or is delivered to other electric systems. Transmission is considered to end when energy is transformed for distribution to the consumer.
Transmission Joint Pit (TJP)	Area within which marine and terrestrial sections of cable are joined together.
Transmission System	An interconnected group of electrical transmission lines and associated equipment for moving or transferring electric energy in bulk between points of supply and points at which it is transformed for delivery over the distribution system lines to consumers or is delivered to other electrical systems.
Transport Management Plan	Document which sets out a variety of control measures for managing the potential transport effects during the construction period.
Tree Preservation Orders (TPOs)	A mechanism for securing the preservation of single or groups of trees of acknowledged amenity value. A tree that is subject to an order may not normally be topped, lopped or felled without the consent of the Local Planning Authority.
Trunk Road	Strategic or major road usually containing high volumes of heavy goods vehicles.
Valve Halls	Contain power electronics equipment that converts from AC to DC (or vice versa).
Voltage	The difference in electrical potential between any two conductors or between a conductor and ground. It is measure of the electric energy per electron that electrons can acquire and/or give up as they move between the two conductors.
Water Framework Directive (WFD)	European Union directive which commits European Union member states to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one nautical mile from shore) by 2015. It is a framework in the sense that it prescribes steps to reach the common goal rather than adopting the more traditional limit value approach.
World Heritage Site (WHS)	A cultural or natural site of outstanding universal value designated by the International Council on Monuments and Sites (ICOMOS)

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