KEADBY 3
CARBON CAPTURE POWER STATION

A collaboration between **SSE Thermal** and **Equinor**

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The Keadby 3 (Carbon Capture Equipped Gas Fired Generating Station) Order

Land at and in the vicinity of the Keadby Power Station site, Trentside, Keadby, North Lincolnshire

Applicant's Responses to Deadline 6 Submissions, Rule 17 Request of 25 April 2022, and ExQ 1.16.32, 2.1.1, 2.6.4 and 2.6.5

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Applicant: Keadby Generation Limited

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GLOSSARY

Abbreviation	Description
ADMS	Atmospheric Dispersion Modelling System
AGI	Above ground installation
AIL	Additional Abnormal Indivisible Load
AQMAU	Air Quality Modelling and Assessment Unit
AS	Additional Submissions
BAT	Best available techniques
CCGT	Combined Cycle Gas Turbine
CCP	Carbon dioxide capture plant
CEMP	Construction Environmental Management Plan
CHP	Combined heat and power
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
FFL	Finished floor level
FRA	Flood Risk Assessment
HP	High pressure
HRSG	Heat Recovery Steam Generator
MW	Megawatts
MWe	Megawatts electrical
NLC	North Lincolnshire Council
NSIP	Nationally Significant Infrastructure Project
PCC	Proposed Power and Carbon Capture
PINS	Planning Inspectorate
RR	Relevant Representation

SoS	Secretary of State
WFD	Water Framework Directive
ZCH	Zero Carbon Humber

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1.0 INTRODUCTION

1.1 Overview

1.1.1 This 'Applicant's Response to Deadline 6 Submissions' document (**Application Document Ref. 9.19**) has been prepared on behalf of Keadby Generation Limited ('the Applicant') which is a wholly owned subsidiary of SSE plc. It forms part of the application (the 'Application') for a Development Consent Order (a 'DCO'), that has been submitted to the Secretary of State (the 'SoS') for Business, Energy and Industrial Strategy, under Section 37 of 'The Planning Act 2008' (the '2008 Act').

1.1.2 The Applicant is seeking development consent for the construction, operation and maintenance of a new low carbon Combined Cycle Gas Turbine (CCGT) Generating Station ('the Proposed Development') on land at, and in the vicinity of, the existing Keadby Power Station, Trentside, Keadby, Scunthorpe, DN17 3EF (the 'Proposed Development Site').

1.1.3 The Proposed Development is a new electricity generating station of up to 910 megawatts (MW) gross electrical output, equipped with carbon capture and compression plant and fuelled by natural gas, on land to the west of Keadby 1 Power Station and the (under commissioning) Keadby 2 Power Station, including connections for cooling water, electrical, gas and utilities, construction laydown areas and other associated development. It is described in Chapter 4: The Proposed Development of the Environmental Statement (ES) (ES Volume I – [**APP-047**]).

1.1.4 The Proposed Development falls within the definition of a 'Nationally Significant Infrastructure Project' (NSIP) under Section 14(1)(a) and Sections 15(1) and (2) of the 2008 Act, as it is an onshore generating station in England that would have a generating capacity greater than 50MW electrical output (50MWe). As such, a DCO application is required to authorise the Proposed Development in accordance with Section 31 of the 2008 Act.

1.1.5 The DCO, if made by the SoS, would be known as 'The Keadby 3 (Carbon Capture Equipped Gas Fired Generating Station) Order' ('the Order').

1.2 The Proposed Development

1.2.1 The Proposed Development will work by capturing carbon dioxide emissions from the gas-fired power station and connecting into the Humber Low Carbon Pipelines project pipeline network, being promoted by NGCL, for onward transportation to the Endurance storage site under the North Sea.

1.2.2 The Proposed Development would comprise a low carbon gas fired power station with a gross electrical output capacity of up to 910MWe and associated buildings, structures and plant and other associated development defined in Schedule 1 of the draft DCO [**APP-005**] as Work No. 1 – 11 and shown on the Works Plans [**APP-012**].

1.2.3 At this stage, the final technology selection cannot yet be made as it will be determined by various technical and economic considerations and will be influenced by future UK Government policy and regulation. The design of the Proposed Development therefore incorporates a necessary degree of flexibility to allow for the future selection of the preferred technology in light of prevailing policy, regulatory and market conditions once a DCO is made.

1.2.4 The Proposed Development will include:

- a carbon capture equipped electricity generating station including a CCGT plant (**Work No. 1A**) with integrated cooling infrastructure (**Work No. 1B**), and carbon dioxide capture plant (CCP) including conditioning and compression equipment, carbon dioxide absorption unit(s) and stack(s) (**Work No. 1C**), natural gas receiving facility (**Work No. 1D**), supporting uses including control room, workshops, stores, raw and demineralised water tanks and permanent laydown area (**Work No. 1E**), and associated utilities, various pipework, water treatment plant, wastewater treatment, firefighting equipment, emergency diesel generator, gatehouse, chemical storage facilities, other minor infrastructure and auxiliaries/ services (all located in the area referred to as the 'Proposed Power and Carbon Capture (PCC) Site' and which together form **Work No. 1**);
- natural gas pipeline from the existing National Grid Gas high pressure (HP) gas pipeline within the Proposed Development Site to supply the Proposed PCC Site including an above ground installation (AGI) for National Grid Gas's apparatus (**Work No. 2A**) and the Applicant's apparatus (**Work No. 2B**) (the 'Gas Connection Corridor');
- electrical connection works to and from the existing National Grid (National Grid Electricity Transmission) 400kV Substation for the export of electricity (**Work No. 3A**) (the 'Electrical Connection Area to National Grid 400kV Substation');
- electrical connection works to and from the existing Northern Powergrid 132kV Substation for the supply of electricity at up to 132kV to the Proposed PCC Site, and associated plant and equipment (**Work No. 3B**) (the 'Potential Electrical Connection to Northern Powergrid 132kV Substation');
- Water Connection Corridors to provide cooling and make-up water including:
  - underground and/or overground water supply pipeline(s) and intake structures within the Stainforth and Keadby Canal, including temporary cofferdam (**Work No. 4A**) (the 'Canal Water Abstraction Option');
  - in the event that the Canal Water Abstraction Option is not available, works to the existing Keadby 1 power station cooling water supply pipelines and intake structures within the River Trent, including temporary cofferdam (**Work No. 4B**) (the 'River Water Abstraction Option'); and
  - works to and use of an existing outfall and associated pipework for the discharge of return cooling water and treated wastewater to the River Trent (**Work No. 5**) (the 'Water Discharge Corridor');
- towns water connection pipeline from existing water supply within the Keadby Power Station for potable water (**Work No. 6**);

- above ground carbon dioxide compression and export infrastructure comprising an above ground installation (AGI) for the undertaker's apparatus including deoxygenation, dehydration, staged compression facilities, outlet metering, and electrical connection (**Work No. 7A**) and an AGI for NGCL apparatus (**Work No. 7B**);
- new permanent access from the A18, comprising the maintenance and improvement of an existing private access road from the junction with the A18 including the western private bridge crossing of the Hatfield Waste Drain (**Work No. 8A**) and installation of a layby and gatehouse (**Work No. 8B**), and an emergency vehicle and pedestrian access road comprising the maintenance and improvement of an existing private track running between the Proposed PCC Site and Chapel Lane, Keadby and including new private bridge (**Work No. 8C**);
- temporary construction and laydown areas including contractor facilities and parking (**Work No. 9A**), and access to these using the existing private roads from the A18 and the existing private bridge crossings, including the replacement of the western existing private bridge crossing known as 'Mabey Bridge') over Hatfield Waste Drain (**Work No. 9B**) and a temporary construction laydown area associated with that bridge replacement (**Work No. 9C**);
- temporary retention, improvement and subsequent removal of an existing Additional Abnormal Indivisible Load Haulage Route (**Work No. 10A**) and temporary use, maintenance, and placement of mobile crane(s) at the existing Railway Wharf jetty for a Waterborne Transport Offloading Area (**Work No. 10B**);
- landscaping and biodiversity enhancement measures (**Work No. 11A**) and security fencing and boundary treatments (**Work No. 11B**); and
- minor associated development.

1.2.5 The Proposed Development includes the equipment required for the capture and compression of carbon dioxide emissions from the generating station so that it is capable of being transported off-site. NGCL will be responsible for the development of the carbon dioxide pipeline network linking onshore power and industrial facilities, including the Proposed Development, in the Humber Region. The carbon dioxide export pipeline does not, therefore, form part of the Proposed Development and is not included in the Application but will be the subject of separate consent application(s) to be taken forward by NGCL.

1.2.6 The Proposed Development is designed to be capable of operating 24 hours per day, 7 days a week, with plant operation dispatchable to meet electricity demand and with programmed offline periods for maintenance. It is anticipated that in the event of CCP maintenance outages, for example, it could be necessary to operate the Proposed Development without carbon capture, with exhaust gases from the CCGT being routed via the Heat Recovery Steam Generator (HRSG) stack.

1.2.7 Various types of associated and ancillary development further required in connection with and subsidiary to the above works are detailed in Schedule 1

'Authorised Development' of the draft DCO [**APP-005**]. This, along with Chapter 4: The Proposed Development in the ES Volume I [**APP-047**], provides further description of the Proposed Development. The areas within which each numbered Work (component) of the Proposed Development are to be built are defined by the coloured and hatched areas on the Works Plans [**APP-012**].

1.3 The Proposed Development Site

1.3.1 The Proposed Development Site (the 'Order Limits') is located within and near to the existing Keadby Power Station site near Scunthorpe, Lincolnshire and lies within the administrative boundary of North Lincolnshire Council (NLC). The majority of land is within the ownership or control of the Applicant (or SSE associated companies) and is centred on national grid reference 482351, 411796.

1.3.2 The existing Keadby Power Station site currently encompasses the operational Keadby 1 and Keadby 2 Power Station (under commissioning) sites, including the Keadby 2 Power Station Carbon Capture and Readiness reserve space.

1.3.3 The Proposed Development Site encompasses an area of approximately 69.4 hectares (ha). This includes an area of approximately 18.7ha to the west of Keadby 2 Power Station in which the generating station (CCGT plant, cooling infrastructure and CCP) and gas connection will be developed (the Proposed PCC Site).

1.3.4 The Proposed Development Site includes other areas including:

- a high pressure gas pipeline to supply the CCGT including a gas compound for NGG apparatus and a gas compound for the Applicant's apparatus;
- the National Grid 400kV Substation located directly adjacent to the Proposed PCC Site, through which electricity generated by the Proposed Development will be exported;
- Emergency Vehicle Access Road and Potential Electrical Connection to Northern Powergrid Substation;
- Water Connection Corridors:
  - Canal Water Abstraction Option which includes land within the existing Keadby Power Station site with an intake adjacent to the Keadby 2 Power Station intake and pumping station and interconnecting pipework;
  - River Water Abstraction Option which includes a corridor that spans Trent Road and encompasses the existing Keadby Power Station pumping station, below ground cooling water pipework, and infrastructure within the River Trent; and
  - a Water Discharge Corridor which includes an existing discharge pipeline and outfall to the River Trent and follows a route of an existing easement for Keadby 1 Power Station;
- an existing river wharf at Railway Wharf (the Waterborne Transport Offloading Area) and existing temporary haul road into the into the existing Keadby 1 Power Station Site (the 'Additional Abnormal Indivisible Load (AIL) Route');

- a number of temporary Construction Laydown Areas on previously developed land and adjoining agricultural land; and
- land at the A18 Junction and an existing site access road, including two existing private bridge crossings of the Hatfield Waste Drain lying west of Pilfrey Farm (the western of which is known as Mabey Bridge, to be replaced, and the eastern of which is termed Skew Bridge) and an existing temporary gatehouse, to be replaced in permanent form.

1.3.5 In the vicinity of the Proposed Development Site the River Trent is tidal. Therefore, parts of the Proposed Development Site are within the UK marine area. No harbour works are proposed.

1.3.6 Further description of the Proposed Development Site and its surroundings is provided in **Chapter 3:** The Site and Surrounding Area in ES Volume I [**APP-046**].

1.4 The Proposed Development Changes

1.4.1 The Applicant has submitted a request (the 'Change Request') for the following changes to the Proposed Development, together known as 'the Proposed Development Changes'.

1.4.2 The Proposed Development Changes have resulted from design contractor involvement, which has continued to refine the detail of this 'First of a Kind' Project implementation.

- Change No. 1 - Inclusion of riverbed within the Waterborne Transport Offloading Area (Railway Wharf) to be numbered in Schedule 1 of the DCO as **Work 10C**.
- Change No. 2 – not used[1].
- Change No. 3 - Increase to the maximum heights of the carbon dioxide absorbers/ stacks, if two are installed.
- Change No. 4 - Increase to the maximum heights of the carbon dioxide stripper column.
- Change No. 5 - Increase in proposed soil import volumes to create a suitable development platform.

1.4.3 With the Proposed Development Changes, the Proposed Development Site would cover an area of 69.7 hectares (ha) (a minor increase of 0.3ha in the amount of the Applicant's land required).

1.4.4 At the time of writing the Examining Authority is minded to accept the Change Request (as submitted at Deadline 5 and modified at Deadline 6) as stated in a letter dated 29 April 2022 (**PD-019**) but has requested in the same letter that all

[1] The Applicant previously consulted on and, at Deadline 5, proposed another change ("Change No. 2 - Changes to the Additional Abnormal Indivisible Load Route largely within SSE land and all within existing Order Limits". This was subsequently withdrawn by the Applicant by letter dated 26 April 2022 (REP6-018) and forms no part of the DCO examination.

documents and plans comprising the Change Request are submitted, and/or resubmitted, by the Applicant in a single package at Deadline 6a.

1.4.5 It is anticipated that following receipt of this single package the ExA will exercise discretion to accept the Change Request and from this point the Proposed Development Changes would form part of the Proposed Development for the remainder of the DCO examination.

1.5 The Development Consent Process

1.5.1 As a NSIP project, the Applicant is required to seek a DCO to construct, operate and maintain the generating station, under Section 31 of the 2008 Act. Sections 42 to 48 of the 2008 Act govern the consultation that the promoter must carry out before submitting an application for a DCO and Section 37 of the 2008 Act governs the form, content and accompanying documents that are required as part of a DCO application.

1.5.2 An application for development consent for the Proposed Development has been submitted to and accepted for examination by the Planning Inspectorate (PINS) acting on behalf of the SoS. PINS is now examining the Application and will make a recommendation to the SoS, who will then decide whether to make (grant) the DCO.

1.6 The Purpose and Structure of this Document

1.6.1 This document sets out the Applicant's response to Deadline 6 Submissions from Environment Agency [REP6-034], Canal and River Trust [REP6-032] Marine Management Organisation [REP6-035], Natural England [REP6-036], Network Rail [REP6-037], Pollock Associates [REP6-038 to REP6-042 inclusive], United Kingdom Health Security Agency [REP6-043], and North Lincolnshire Council [REP6-031].

1.6.2 In addition further information relating to ExQ 1.16.32 and 2.1.1 is set out, along with further information provided recently by Crown Estate in belated response to ExQ 2.6.4 and 2.6.5, and a response by the Applicant to three questions directed at the Applicant in letter dated 25 April 2022 (**PD-018**).

2.0 APPLICANT'S RESPONSE TO DEADLINE 6 SUBMISSIONS

2.1.1 The Applicant's responses to the Deadline 6 Submissions are set out in the Tables below on the following pages of this document.

2.1.2 We have not in general included the full text of ExQ2 responses since repetition is to be avoided; we have therefore only included points or paragraph where a response or clarification from the Applicant appears to be expected or relevant.

Table 2.1: Applicant's Response to Deadline 6 Submission by Environment Agency (EA) (REP6-033 AND 034)

PARA NO.	DEADLINE 6 SUBMISSION BY EA	APPLICANT'S RESPONSE
1.	We have reviewed the documents in relation to biodiversity and although there is some disconnect between the ES Addendum ([REP5-047] Document Ref 10.8) and the updated Landscaping and Biodiversity Management and Enhancement Plan (LBMEP) ([REP5-035] Document Ref 5.10; April 2022) with regards to legal requirements and the delivery of biodiversity net gain (BNG) Appendix D goes onto consider this. Section 5.2 of the LBMEP reaffirms biodiversity and green infrastructure enhancements are proposed. Any habitat enhancement measures will firstly be guided by the outputs of the BNG Assessment additional measures as listed.	The ES Addendum REP5-047 has now been withdrawn and an updated ES Addendum (Document Ref 10.8) submitted at Deadline 6a removing Change 2 which the Applicant has withdrawn from the Change Request. An updated Landscaping and Biodiversity Management and Enhancement Plan (LBMEP) (Document Ref 5.10 – Rev 3.0) is also being submitted at Deadline 6a, removing reference to Change 2 which no longer forms part of the Change Request. The updated LBMEP will therefore be consistent with the updated ES Addendum. As noted by the Environment Agency, The Applicant's biodiversity and green infrastructure enhancements are informed by the updated Biodiversity Net Gain (BNG) assessment presented in Appendix D of the LBMEP. These are shown in Document Ref. 4.15 – Rev 3.0 submitted at Deadline 6a.
2.	Paragraph 5.2.1 informs us that once created, new habitats will be appropriately maintained for a minimum of 25 years (the proposed lifetime of the Proposed Development). Environmental legislation will require 30 years of maintenance and although we appreciate the Applicant would wish this to align with the lifetime of the proposed development, it is our view that it should be required to reflect forthcoming legislation i.e. 30 years.	The Applicant has addressed the potential impacts of the Proposed Development on Biodiversity in Chapter 11: Biodiversity and Nature Conservation (ES Volume I – Application Document Ref. 6.2) and produced a LBMEP (Document Ref. 5.10 – Rev 03) that sets out its commitments to provide an overall net gain in biodiversity relative to the Order limit's baseline biodiversity value. As noted in Section 1.2 of the LBMEP (Document Ref. 5.10 – Rev 03), the Environment Act 2021 mandates the need for new development to deliver 10% BNG and to maintain this for a period of at least 30 years. However, secondary legislation needs to be enacted before this requirement is legally

		enforceable for Nationally Significant Infrastructure Projects (NSIP). Government has indicated that NSIP will not need to meet this requirement before 2025, so at present commitment to achieve BNG are voluntary, and 25 years remains a substantial commitment given current planning policy requirements in relation to BNG. DEFRA Consultation on Biodiversity Net Gain regulations and implementation opened 11 January 22 and closed on 5 April 2022. Part of the consultation included a question (No. 25) – 'Do you think that 30 years is an appropriate minimum duration for securing off-site biodiversity gains allocated to NSIPs?' Given that the outcomes of the consultation are not yet clear as consultation has only recently closed, it is the Applicant's view that BNG for the Proposed Development should be commensurate with the lifetime of the Proposed Development i.e. 25 years. Furthermore, the Applicant notes that other consultees have not requested a 30 year minimum.
3.	Proposed enhancement measures for Keadby Common Drains and Stainforth & Keadby Canal should also be directed by the outputs of the BNG Assessment and the requirements of the Water Framework Directive.	Ecological assessors visited the Keadby Common Drains and Stainforth and Keadby Canal to appraise the affected reaches for the purposes of the Water Framework Directive (WFD) Assessment presented in Appendix 12B (APP-085) and which informed the baseline condition scores presented in Appendix D (BNG) of the updated LBMEP (Document Ref. 5.10 – Rev 03) submitted at Deadline 6a. The LBMEP including proposed enhancement of Keadby Common Drains and the Canal for the purposes of BNG was informed by the need to achieve no deterioration or prevention of future improvement in any WFD classification element of the relevant WFD Waterbody (Paupers Drain Catchment in the case of Keadby Common Drains). The field drain enhancement works proposed by the Applicant for Keadby Common Drains including re-instating areas with open water that are more suitable to support a greater range of aquatic biodiversity, including water

		vole, this would not be of a scale to improve WFD classifications for Paupers Drain Catchment WFD waterbody at the catchment scale, but do represent significant localised improvements to habitat quality and the water environment, as explained in Section 8 of Appendix 12B (APP-085). The proposed enhancement of an area of the Stainforth and Keadby Canal through creation of marginal emergent vegetation to enhance the north bank would similarly not be of a scale to improve WFD classifications for the Canal WFD waterbody at the catchment scale. Rather, the proposed marginal vegetation would increase vegetation structure and naturalness of the canal from a very low baseline – this has been discussed and agreed in principle with the Canal and River Trust.
4.	Negotiations with the Applicant have continued regarding the Environment Agency's land interests, and some progress has been made. Discussions are currently underway to agree some Heads of Terms for an Option agreement. The Applicant's Agent is drafting proposed easements and lease terms and setting out formal Heads of Terms for the options. We hope to progress these matters further during May but as yet it is too early to say if we will be in a position to withdraw our objection prior to the close of the Examination. We note that proposed change 2 has now been amended to delete the land shown at Bonnyhale Road, which is owned by the Environment Agency (as confirm on page 28 of "Proposed Development Changes: Consultation	The Applicant issued a draft Deed of Variation in respect of North Pilfrey bridge on 26 April 2022 and is awaiting comments and/or completion thereof. A draft Deed of Variation is also being prepared by the Applicant in respect of Mabey and Skew bridges. It is proposed that the Applicant will secure an Option Agreement to draw down the canal abstraction subsoil easement. The Applicant has confirmed to the EA that the EA will continue to benefit from access over the land within which the canal water abstraction will be laid. Once the EA has instructed solicitors, a further discussion can be had as to the best way to secure the temporary rights required for the haul road. In summary, the Applicant believes that the parties are close to agreement in terms of the principles, but the timing of completion is dependent upon how quickly solicitors can be appointed by the EA and formal drafting agreed. In

	Statement" [REP5-042]). Therefore, we have no further comments to make regarding this.	the meantime suitable powers are included in the Applicant's Final Preferred Draft DCO to ensure delivery of the Proposed Development.
5.	We are now aware that Plot 172 may need to be included in our discussions with the applicant; being in the area where we currently have the benefit of an easement. Plot 172 does not appear to have been discussed with us previously, and we need to seek clarity regarding this plot as it does not appear to be mentioned in either Schedule 6 or Schedule 8 of the draft Development Consent Order [REP5-021] for the proposed development changes.	Plot 172 was created by splitting the original Plot 156 into two separate plots known as Plots 156 and 172. This was to reflect the position in respect of the Crown Lease to Railway Wharf Keadby Limited. In other words, the new Plot 172 is merely part of the original Plot 156. Plot 156 was previously discussed with the EA who, at that time, confirmed that they had no land interest therein. The Applicant has subsequently spoken again to the EA in light of their comments and it has been agreed by the EA that the position remains as previously advised, i.e., the EA has no interest in Plot 172. The inclusion of the EA in the Book of Reference in relation to plot 172 is a precautionary measure on the basis that the EA has statutory responsibility in relation to the River Trent, it being a main river.
EA Response to Q2.1.2	The Applicant will need to apply for a UK Emissions Trading Permit and Monitoring, Reporting & Verification requirements are addressed in the regulations and guidance for this. In addition, the Environmental Permit will require the capture plant to be built to achieve a 95% or greater capture rate of CO2 – the EA will utilise the UK Emissions Trading Scheme Monitoring, Reporting & Verification to verify performance.	The Applicant confirms agreement with the EA's position that the Environmental Permit will set the CO2 capture rate and that monitoring, reporting and verification will be facilitated through the UK Emissions Trading Scheme. The Applicant also notes that the draft BAT Guidance for CCS (at https://www.gov.uk/guidance/post-combustion-carbon-dioxide-capture-best-available-techniques-bat) cites a design capture rate of 95% or greater for stable operating conditions and confirms that the design of the Proposed Development is being developed on that basis, such that the application of BAT can be demonstrated. For the avoidance of doubt, this is consistent with the position previously set out by the Applicant during examination that a minimum of 90% capture rate would be achieved when taking into account start-up and shutdown periods and periods of abnormal operation.

Table 2.2: Applicant's Response to Deadline 6 Submission by Canal and River Trust (The Trust) (REP6-032)

PARA NO.	DEADLINE 6 SUBMISSION BY CANAL AND RIVER TRUST	APPLICANT'S RESPONSE
1.	**Question Q.2.16.6 - Land/Rights Purchase Update** The Trust maintains its objection, however the Applicant and the Trust are continuing to progress discussions of a voluntary agreement that would allow the Trust to withdraw its objection. The Trust is pleased to confirm that negotiations are progressing on the voluntary acquisition of land and rights by the Applicant and agreement on other matters of concern to the Trust. However, the Trust considers that further progress needs to be made before the Trust will be in a position to withdraw its objection. The Trust are hopeful that an agreement will be possible ahead of the close of the Examination that would allow its objection to be withdrawn.	The Applicant and the Trust have agreed a price for the acquisition of the freehold interest of Plot 80A, which is proposed to be developed to provide the canal water abstraction pumping station, and a price for the grant of the subsoil canal abstraction pipe easement taking water from the canal to the power station. Completion of the agreement is dependent upon the grant of the Abstraction Agreement (which is subject to DEFRA consent) that would allow the canal water to be abstracted and without which the land and rights would be of no assistance. In addition, terms have been progressed in respect of the North Pilfrey bridge rights and the Applicant is currently amending the previously issued draft agreement to reflect the latest proposal whilst the Trust's agents seek instructions. The Applicant understands that all these agreements are subject to DEFRA consent such that it is unlikely that agreement can be formally completed prior to the close of Examination. In the meantime suitable powers are included in the Applicant's Final Preferred Draft DCO to ensure delivery of the Proposed Development.
	Wharf Management Plan The Trust are pleased that the Applicant has amended the dDCO to seek to address its concerns, however, the amended wording still does not address the Trust's concern in full. As outlined in the Trust's deadline 5 response, the Trust consider that the scope of the wharf management plan should be to	The Applicant agrees to amend the wording of the wharf management plan in the draft DCO to include processes for agreeing in advance the principles around scheduling of abnormal load deliveries that would temporarily obstruct the entrance to Keadby Lock and notifying the Canal and River Trust as to the timing of such deliveries, and to include measures that seek to avoid such deliveries occurring outside of notified timings. Revised wording, adjusted for precision, on the Wharf Management Plan is included in the draft DCO (Document Ref. 2.1) submitted at Deadline 6a.

	seek to avoid unexpected closures, not simply mitigate the risk. The Trust consider that the wording that was proposed at deadline 5 (copied below for reference) would suitably address this: "(c) A wharf management plan. The wharf management plans shall include amongst other things, provision for notification to CRT of abnormal load deliveries, and processes to avoid abnormal load deliveries resulting in obstructions to Keadby Lock outside of times agreed with the Trust." Should the applicant be concerned about the need to accommodate delays at sea, then we suggest that the Management Plan should identify processes for when arrivals occur outside of agreed times	
	Question 6 to Natural England and the Canal and River Trust Proposals described in paragraph 5.2.51 of Appendix D of the Landscaping and Biodiversity Management and Enhancement Plan identify proposals to provide additional marginal vegetation next to the canal. This has the potential to help re-enforce the biodiversity potential of the canal corridor in this location, in line with the principles of paragraph 174 (part d) of the National Planning Policy Framework.	Noted.

	The Trust is aware that the existing condition of the canal bank is of low biodiversity value, as identified in the report, and note that the works proposed could help to improve the biodiversity potential of the canalside area.	
	Schedule 2 (part 6) of the latest draft DCO includes the need for the provision of a landscaping and biodiversity protection plan. We believe it is necessary for additional details to be provided as part of this requirement so that it can be ensured that the final design of works described in paragraph 5.2.51 will be suitable from an ecology and operations point of view. Notably, we believe it necessary for the final position of the coir rolls proposed to be positioned so that they do not interfere adversely with the operation and maintenance of the canal; we also consider it necessary for the species composition of the coir rolls to be identified so that it can be ensured that they will complement the biodiversity potential of the canal corridor.	The Applicant has at this deadline added the Canal and River Trust as a consultee on the discharge of Requirement 6 in relation to the location and proposed species composition of the pre-planted coir rolls and has updated the draft DCO.

Table 2.3: Applicant's Response to Deadline 6 Submission by Marine Management Organisation (MMO) (REP6-035)

PARA NO.	DEADLINE 6 SUBMISSION BY MARINE MANAGEMENT ORGANISATION	APPLICANT'S RESPONSE
1.1.1	The MMO has been provided with an updated draft Deemed Marine Licence (DML) which is to be submitted by the Applicant for Deadline 6, which supersedes the DML submitted for Deadline 5. The MMO have had the opportunity to review and note that the majority of our comments from our Deadline 5 response have been addressed. The MMO's only outstanding and significant concern with the DML is with regard to the timeframe for discharging conditions. The MMO note that (Part 3 (28)), the reasons of which have been noted in our past responses, e.g., Deadline 5 (REP5 053). The MMO's primary concern with a time constraint is that it hinders the ability of the MMO to carry out its regulatory responsibility. Our position on this point remains and we are happy to discuss this with the applicant prior to Deadline 7. The MMO would like to reiterate, in no uncertain terms, that the applying a timeframe to discharge a condition is unacceptable.	Condition 28 (2) was removed in the draft DCO (Document Ref. 2.1) submitted at Deadline 6.
1.2.1	The MMO note that the ExA has requested confirmation that the MMO, in consultation with its scientific advisors, the Centre for Environment, fisheries and Aquaculture has no further concerns regarding potential scour and underwater noise impacts. The MMO are happy that both these points have been sufficiently addressed by the applicant and have no further comments.	The Applicant notes this response, and that there are no outstanding matters to be agreed, as reflected in our signed SoCG submitted at Deadline 6 (REP6-007).

Table 2.4: Applicant's Response to Deadline 6 Submission by Natural England (REP6-036)

PARA NO.	DEADLINE 6 SUBMISSION BY NATURAL ENGLAND	APPLICANT'S RESPONSE
	Natural England welcomes the commitment to BNG and the use of Biodiversity Metric 3.0 to calculate the value in terms of 'biodiversity units' before and after the Proposed Development to ensure net gains are measurable. We advise that the comments made in our letter dated 02 September 2021 have been adequately addressed within the updated LBMEP. We particularly welcome section 4.0 of Appendix D which outlines the intent to apply the BNG good practice principles, along with the detailed maps which have been provided.	Natural England's response is noted by the Applicant. An updated Landscaping and Biodiversity Management and Enhancement Plan (LBMEP) (Document Ref 5.10 – Rev 3.0) is being submitted at Deadline 6a, removing reference to Change 2 which no longer forms part of the Change Request. The updated LBMEP applies the same approach to good practice as the withdrawn version (REP5-034) in Section 4.0 of Appendix D.
	The habitat re-instatement and enhancement detailed in the LBMEP confirm that a gain in habitat units of 10.62%, a net gain of hedgerow units of 27.58% and a net gain in 1.80% river units is achievable, which aligns with requirements of the Environment Bill that developments must achieve a minimum 10% BNG.	This is noted. The Applicant would add that, as noted above, Change 2 no longer forms part of the Applicant's Change Request and therefore an updated Landscaping and Biodiversity Management and Enhancement Plan (LBMEP) (Document Ref 5.10 – Rev 3.0) is being submitted at Deadline 6a which assesses the BNG for the Proposed Development without this change. An estimated gain in habitat units of 10.19% is proposed within the updated LBMEP, which is aligned with the aims of the Environment Act 2021 (not yet in force) to achieve a minimum 10% BNG.
	Natural England notes that the general approach to habitat compensation is like for like. In respect of the loss of 0.25 ha of Urban - Open Mosaic Habitat (OMH) on the former Keadby Ash Tip the LBMEP proposes that the shortfall in OMH will be addressed through the enhancement of improved grassland to native flower-rich grassland habitat.	The Applicant notes the comments by Natural England and has agreed matters in relation to BNG with NLC as set out in our signed SoCG submitted at Deadline 6a (REP6-005).

	We note that NLC have been consulted on this matter as per the recommendation in our letter dated 02 September 2021 and they have agreed on the approach.	

Table 2.5: Applicant's Response to Deadline 6 Submission by Network Rail (NR)

PARA NO.	DEADLINE 6 SUBMISSION BY NETWORK RAIL	APPLICANT'S RESPONSE
Q2.6.6(i)	Network Rail and the Promoter are continuing discussions in relation to protective provisions to be included in the Order and associated additional agreements. Whilst progress has been made, there are still a number of outstanding issues in relation to these documents which will need to be adequately concluded to ensure Network Rail's land, rights and apparatus is properly protected before Network Rail will be in a position to withdraw its objection. Network Rail hope that these matters will be concluded by Deadline 6a and will provide the Examining Authority with a further update at this deadline.	Network Rail have advised the Applicant that they are insistent that they require a restriction on the exercise of compulsory acquisition powers. The Applicant is prepared to reach voluntary agreement whereby it would undertake not to exercise CA powers but is unable to agree to any restriction of CA powers in the absence of such an agreement. Despite being offered three sets of Heads of Terms together with a full draft Deed of Variation and a License for Alterations, NR have not responded nor made any counterproposals. In addition, the Applicant has been advised that NR's solicitors are unable to engage as they have no instructions. NR have advised that they would, in any event, be unable to agree and complete voluntary terms until Sales Clearance has been provided. In this regard, the Applicant submitted the required Sales Clearance forms in March 2021 but NR have not progressed these nor commenced the consultation process despite the fact that they have had 14 months thus far to do so and clearance is supposed to be provided within 6 weeks from receipt by NR. NR has not engaged with the Applicant's attempts to progress a voluntary agreement and, due to NR's failure to commence the Sales Clearance progress, there is limited expectation of any agreement being concluded prior to the date that the Applicant needs to take access over the bridge.

		As the Applicant has previously pointed out, the bridge was constructed and is owned by SSE and is only used in connection with SSE businesses. It is not part of NR's statutory undertaking and is not operational land. Notwithstanding this, the Applicant has included in its preferred form of DCO, protective provisions in favour of Network Rail which put in place various protections in relation to any works being carried out within 15 metres of Network Rail property. It is considered the form of protective provisions provide adequate protection as is explained in the updated Explanatory Memorandum. The Applicant would also advise that terms for the use of the same bridge are at an advanced stage with the Canal and River Trust and EA both of whom also own sections of land over which the bridge passes and without whose consent the bridge cannot be used. Whilst the Applicant would prefer to reach voluntary agreement, there is currently little prospect of NR engaging. Therefore, the Applicant requires CA powers to remove this impediment to the delivery of the development. Network Rail will, should it be necessary to exercise CA powers, be able to claim compensation that, in the case of dispute, be determined by the Upper Tribunal Lands Chamber. In the meantime suitable powers are included in the Applicant's Final Preferred Draft DCO to ensure delivery of the Proposed Development.

Table 2.6: Applicant's Response to Deadline 6 Submission by Pollock Associates (REP6-038 TO 042)

PARA NO.	DEADLINE 6 SUBMISSION BY POLLOCK ASSOCIATES	APPLICANT'S RESPONSE
	Planning application – the land in question is subject to two separate option agreements for two separate solar schemes. The screening requests for these schemes can be found on the North Lincolnshire Council Planning portal at: https://apps.northlincs.gov.uk/application/pascr-2021-8 and https://apps.northlincs.gov.uk/application/pa-scr-2021-7 These screening requests were submitted on the 15th and 25th November respectively and the site location plans are attached. ("Ealand Solar Scheme Site location Plan/ Keadby Solar Scheme Site location Plan") Screening response from the LPA has not yet been issued.	With regard to the option agreements, Pollock Associates emailed the Applicant at 13:11 on 21 April 2022 advising that: *"So we have landowners' and Solafields consent to share a redacted version of the Solar Options. (with all £ signs and amounts redacted) However, I don't have the IT skills to redact the signed PDF's. So attached is a redacted version of an engrossed document for Strawson Notts (Holdings) Option agreement for Ealand Solar farm.* *There are four options in total:* 1. *Keadby Solar:* a. *Woodhouse and Lidsey* b. *Strawson and Lidsey* 2. *Ealand solar:* a. *Strawson Notts holdings and Culham* b. *R H Strawson and Culham"* The Applicant is therefore unclear as to why Pollock Associates refer in their Deadline 6 Submission to two Option Agreements when their email, as quoted above, refers to four agreements. Pollock Associates attached only one of the four Option Agreements to this email. Three of the Agreements have therefore not been provided by Pollock Associates to the Applicant. However, the Applicant understands that the Keadby Solar Option Agreements were completed on 29 August 2021 and the Ealand Option Agreements were completed on 5 November 2021.

		In this context, the dDCO was accepted for examination on 28 June 2021 which was prior to any of the four Option Agreements being entered into. The landowner was therefore already aware, both via formal notification as part of the DCO process, and prior engagement with the landowner on private treaty negotiations, of the proposed development. The Applicant comments in respect of the scoping opinions below.
	Planning Decision: As the screening request has not yet been received there is no planning decision.	A screening application is not equivalent to a planning application and does not have the same status. Once actual planning applications are submitted by the solar farm developers, the Applicant will, at that time, make appropriate representations. Full account of the Applicant's dDCO scheme will be taken by the Planning Authority in determining the nature of any planning permission and the form of conditions to be attached to that permission. At present, therefore, the proposed development has still yet to be scrutinised and tested by the Local Planning Authority. No indication has been provided by the solar farm developers as to when they are likely to submit planning applications for their scheme(s). As such, there is no certainty as to when or if such applications will be granted planning permission nor when such permission is likely to be implemented. The position in respect of the Applicant's scheme is set out within the dDCO and supporting documents.
	Details of the proposed The proposed depth of the cables have not yet been confirmed but we understand from the solar developers that they are	It is incumbent upon the Affected Persons to provide full copies of any connection agreements applied for in respect of the solar farm development to the Applicant.

	proposing two 33kv export only cables. We understand that there are still ongoing discussions with Northern Power Grid for both solar schemes and the Keadby 3 scheme about the details of these connections but that connection offers have been made and accepted. We do not have evidence of these connecit6on agreements that we can share. However, we do have consent from the solar developers to share the Option plans that clearly show the intended Easement corridors ("Option Keadby 20 08 21 Strawson….plan" and "Signed Option Ealnad 5 11 21 ….. Plan").	There is no reason, that the Applicant is aware of, preventing such disclosure by the Affected Persons or the solar farm developers. In this regard, should it become necessary for the Applicant to exercise CA powers, the Upper Tribunal Lands Chamber would require full unredacted disclosure of all relevant agreements which the Applicant considers would include all four of the Option Agreements and all connection agreements. In addition, the Upper Tribunal will have regard to the extent to which the claimants mitigated their loss in pursuing a particular course of action in light of the information available in the public domain. Of relevance is Article 8(2) of the draft Order which provides that any permission granted prior to commencement of the authorised development will cease to have effect to the extent it is inconsistent. The Applicant is willing to work with Pollock Associates and their clients but is dependent on the Affected Persons and solar farm developers providing full disclosure of all relevant matters in a timely manner. The position in respect of the information set out in the single Option Agreement provided to the Applicant is as follows: The Easement Strip is defined within this agreement as *"...the easement strip so defined in the Lease of Rights and/or the Adjoining Development Land Lease of Rights".* *Lease of Rights is defined as* *"…a lease of rights for the Lease Term from the date of Completion in substantially the same form as the draft lease of rights annexed hereto subject to the insertion of those terms to be contained in the applicable*

		Option Notice and any amendments reasonably required by any Funder." *The draft Lease of Rights defines the Easement Strip as "…such part of the Landlord's Property (including the airspace above and the subsoil below) as comprises a strip thereof of 5 metres in width the approximate position of which strip is shown edged red on Plan 1."* Easement Corridor is defined as "…that part of the Landlord's Property shown coloured yellow on the Plan". Whilst a Plan is attached to this Option Agreement it only details the Easement Corridor and the Easement Strip is not marked. As such, the Applicant has only been provided with plans that have a 5m wide strip drawn on them. Other than the plans attached to the Scoping Opinion applications which are red line boundary only, no other plans have been provided to the Applicant.
	Discussions continue between the Solar developer and Keadby 3 including a conference call hosted by Pollock associates on the 21st April 2022 to try to work through how both sets of cables can be accommodated within the easement corridor. However, lack of detailed engineering information from both parties (and from Northern Power Grid is hampering final agreement. The parties are all hopeful of a resolution to this.	The Teams Meeting invite was issued by the Applicant who had been requesting an urgent conference call with Pollock Associates and the solar farm developers. This Team Call took place on 21 April 2022 and was originally proposed by the Applicant to take place at 4PM but was pushed back to 5PM at the solar farm developer's request. Bearing in mind that Pollock Associates' email including the Option Agreement (as referred to above) was only received by the Applicant at 13:11PM on the same day as the call, the Applicant had not had

		the opportunity to fully review and take legal advice on the interpretation thereof. Notwithstanding this, it was agreed during the call between the Applicant, Pollock Associates and the solar farm developer on 21 April 2022 that, inter alia: 1. The solar farm developer would provide the Applicant with a sketch of the proposed cabling – this is awaited 2. The Applicant would discuss these proposals with their engineers – further commentary is set out below. 3. Consideration would be given as to how the Option Agreements could be amended to incorporate the dDCO requirements. The Applicant currently only has a redacted copy of one of the four Option Agreements but, in any event, this is a matter for the parties to those agreements i.e., the solar farm developer and the Affected Persons. There has been no further exchange of emails or documents since the 21 April 2022. With regard to separation distances the Applicant can confirm that they will comply with all relevant standards and will work with the Affected Persons, Northern Power Grid, the local Distribution Network Operator and the solar farm developers with regard to the design of the cable route. This is not possible at this stage given the 132kV Connection Offer was only issued to the Applicant on the 6th May and the solar farm developers are yet to provide any detailed design beyond the generic plans that simply detail a 5m desired corridor.

		In this regard, the parties will, together with Northern Power Grid, need to consider cable type, size, lay approach (ducted or direct), bending radiuses, etc. before any separation distances can be finalised. The Applicant would reiterate that their intention to install a 132 KV cable was clearly set out within the dDCO but they were only made aware of the solar farm proposals in March 2022. As such, the Applicant's intentions have been in the public domain for the past 11 months, but the existence of the Option Agreements was only raised within the last 2 months. In the meantime suitable powers are included in the Applicant's Final Preferred Draft DCO to ensure delivery of the Proposed Development.
1.	In answer to your question at Deadline 5 response, as to whether we consider the procedures for the compulsory acquisition of land have been followed and enough time to negotiate agreement has been allowed, we refer you to our previous correspondence setting out timeframes of our negotiations. (repeated below) The evidence of a cable requirement was only provided after submission of the scheme. The suggestion of the permanent acquisition of land for bridge footings was only made in December 2021 as well as use of the land for laydown. Clearly not long enough for parties to agree in principle, when detailed information on these proposals is still not forthcoming, let alone to document these requirements in tri- or quad-party agreements. Contrary to the Government	A full response is provided at Appendix 1 of Deadline 6 Submission – 9.17 Applicant's Response to the Examining Authority's Further Written Questions [REP-016] and Table 2.4 2 Document 9.18 [REP-017]. In summary, as Pollock Associates are aware, the full documentation supporting together with the Developer's Application for the dDCO included: 1. The Book of Reference 2. Document ref: 4.2 "Land Plans" 3. Document ref:4.8 "Indicative Electrical Connection Plans 4. Document ref: 4.4 "Access and Rights of Way Plans" 5. Document ref: 4.17 "Emergency Access Bridge General Arrangement and Section" 6. Document Ref: 4.3 "Works Plans"

	guidance related to procedures for the compulsory acquisition of land, no alternative dispute resolution has been proposed. (Although given the lack of information on cable separation distances and crossing and the related lack of information from Northern Power Grid, a resolution to these issues may have been challenging at an earlier date). We continue to discuss terms with the Applicant and feel confident that a resolution allowing all projects to progress should be achievable but probably not by the time of Deadline 6(A).	These documents have been publicly available since the commencement of this application and the National Infrastructure Planning website states that they were published on 28 June 2021. Pollock Associates, the Affect Persons and the solar farm developers would therefore have been able to examine and scrutinize the details thereof. The Option Agreements were entered into in August and November 2021, i.e., after publication and acceptance of the dDCO. It would therefore be expected that the parties to the Option Agreements would, as part of their due diligence, have fully reviewed the published dDCO documents and taken them into account in agreeing terms and drafting the Agreements. The Applicant has been in negotiations with Pollock Associates since 10 December 2020 and, Pollock Associates have had every opportunity to clarify and discuss matters with the Applicant so that their clients were fully informed prior to and during the negotiations in respect of the Option Agreements. The Applicant's requirements of the landowners have not changed since submission of the dDCO and it is not correct for Pollock Associates to imply that the requirements for the cable and/or bridge rights have only arisen since the submission of the dDCO. The fact remains that these requirements were clearly set out in the dDCO from its acceptance. As has been previously pointed out, the Applicant has served consultation and land questionnaires on the Affected Persons at various points and Pollock Associates would have been aware that

		they were required to give accurate and full accounts of **all** interests in their client's land to the Applicant and the ExA. Unfortunately, despite the fact that the landowners entered into Option Agreements in August and November 2021, Pollock Associates only brought the existence of these agreements to the Applicant's attention in March 2022 and only provided a redacted copy of one of the four Option Agreements on 21 April 2022. It is therefore the case that, as at 8 March 2022, the Applicant understood that the Heads of Terms for the cable easement, emergency access easement, laydown and bridge footings were agreed and no mention had been made by Pollock Associates of the Option Agreements. It is only since then that Pollock Associates have advised that the Affected Persons could not proceed with the agreed terms because of the existence of the Option Agreements. The Applicant is unclear as to the extent to which Pollock Associates were aware of the existence of these Option Agreements prior to the 8 March 2022 and, if they were, why the Heads of Terms were considered to be agreed if there was a conflict. Clearly, had Pollock Associates informed the Applicant prior to the 8 March 2022 of the existence and impact of the Option Agreements, it is highly likely that alternative Heads of Terms would have been proposed. In summary, the Applicant can only proceed on the basis of the information before it. Pollock Associates did not raise the issue of the Option Agreements with the Applicant until March 2022, they only provided a copy of one of the four Option Agreements on 21 April

		2022 and they have yet to provide copies of the other Option Agreements and/or copies of the Connection Agreements. As such, the delay in progressing agreement is a direct and causal consequence of the Affected Persons not providing full disclosure of all matters affecting the land identified within the dDCO as being in their ownership despite being both required to provide full details of all interests in the land and having the opportunity to do so voluntarily as part of the negotiations well before April 2022. The Applicant would be happy to enter into an agreement that provides for alternative dispute resolution ie, Independent Expert, Arbitration or voluntary reference to the Upper Tribunal Lands Chamber. However, their jurisdiction could only be in respect of the amount of compensation payable and would not include matters such as the location, specification, design and depth of the cables. In effect, these matters need to be agreed before any third-party determination. In the meantime suitable powers are included in the Applicant's Final Preferred Draft DCO to ensure delivery of the Proposed Development.

Table 2.7: Applicant's Response to Deadline 6 Submission by United Kingdom Health Security Agency (UKHSA) (REP6-043)

PARA NO.	DEADLINE 6 SUBMISSION BY UKHSA	APPLICANT'S RESPONSE
3	We have reviewed the updated SoCG (revision VP2.0, dated March 2022, received 8th April 2022) against our recommendations provided in the consultation responses (as detailed above) and also at the Registration of Interest stage. Please note, there are	The Applicant has continued to engage with the UKHSA (please refer to Table 3.1 of our updated SoCG (REP6-011) submitted at Deadline 6). The additional comments (position statement) submitted by the UKHSA into examination at Deadline 6 (REP6-043) were provided to the Applicant on 22 April 2022 prior to Deadline 6. The Applicant therefore included the

	outstanding areas which the UKHSA cannot currently agree until the provision of further information. In addition, we are aware that the Examining Authority confirmed it was seeking views from all Interested Parties on whether the advice contained in the consultation responses from the UKHSA and/ or the Ministry of Defence would have had any bearing on the approach or findings of the Environmental Statement submitted with the application, in light of a clerical error (please letter from Planning Inspectorate dated 7th Dr Richard Lowe Director, E&GE Energy Sector Lead AECOM 2 City Walk Leeds LS11 9AR 22 nd April 2022 March 2022- Rule 17, Request for further information), which may lead to further consultations with the UKHSA. Please see detailed comments which are detailed in Appendix 1.	UKHSA additional comments in a new Appendix 2 of our updated SoCG and addressed all of the comments in the updated SoCG (REP6-011) submitted at Deadline 6. A clean and tracked version of the previous SoCG was also provided to the UKHSA on 26 April 2022 for ease of reference on how matters 1-8 have been addressed.

Items 1 – 3 relating to Table 3.1 are addressed by the changes below (shown here as tracked) in the submitted SoCG at Deadline 6.

	The UK Health Security Agency recommended providing clearer and more accurate identification, reference and justification for selection of the human health receptors in the assessments.¶ It was stated that emissions of particulate matter from all potential sources do not appear to have been assessed and clarification is needed in light of the potential for unabated emissions from the CCGT plant.¶ The UK Health Security Agency additional comments are provided in Appendix 2.
March 2021 (additional technical engagement following Stage II Consultation)	Public Health England (now the UK Health Security Agency) was consulted in March 2021 following Stage II Consultation. The UK Health Security Agency responded on 18th April 2021 confirming thar the submitted information had been reviewed and that they had no additional comments to those provided in their response dated 19th January 2021.
August 2021	Public Health England (now the Applicant wrote to the UK Health Security Agency) to offer assistance in signposting relevant parts of the DCO Application and additional environmental information on waste submitted following the Application (OD-003). The UK Health Security Agency confirmed that they were in the process of assessing the documentation and would contact the Applicant if they felt a discussion would be beneficial.
UK Health Security Agency Relevant Representation dated 02 September 2021 (RR-013)	Public Health England (now the UK Health Security Agency) submitted a relevant representation to PINS in September 2021. In summary, the following comments were made:¶

	• Clarification on receptors within 200m of affected roads and query why Roe Farm and Vazon Bridge were not included as receptors. • A number of clarifications, justifications and mitigation measure recommendations for land contamination.
December 2021	Draft SoCG provided by AECOM and the Parties agreed to submit a SoCG at Deadline 2.
January 2022 – March 2022	Comments on draft SOCG provided by UK Health Security Agency (refer to Appendix 1).
April 2022	Comments on version 2 draft SOCG provided by UK Health Security Agency (refer to Appendix 2) following publication of a Rule 17 letter by the ExA.

Item 4 (also consultation) is addressed by the Applicant by the following change:

Table 4.1: List of Matters Agreed between the Applicant and the UK Health Security Agency

Matter Agreed	Commentary
Consultation	Whilst aA summary of pre-application consultation available to the Applicant is contained in the Consultation Report (**APP-030**) and Appendix 16A: Population and Health Signposting (**APP-096**) in ES Volume II, it. ~~It~~ is agreed that the consultation summary in Section 3 of this SoCG provides an accurate record of consultation with the UK Health Security Agency/ Public Health England on application matters to date.

Item 5 is addressed by the following changes to the SoCG:

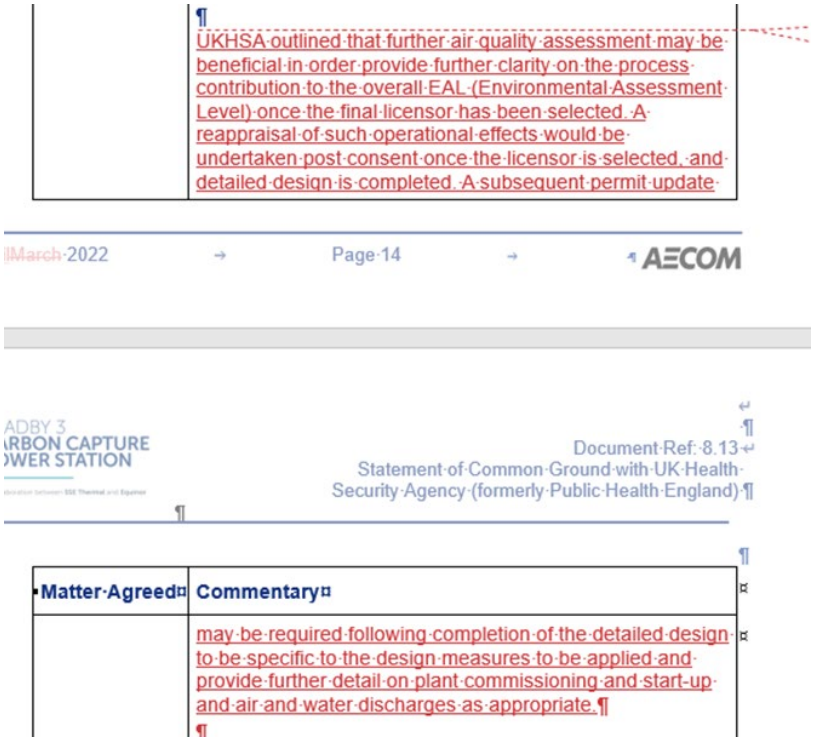
Matter Agreed	Commentary
	may be required following completion of the detailed design to be specific to the design measures to be applied and provide further detail on plant commissioning and start-up and air and water discharges as appropriate. It is agreed that the UK Health Security Agency will be consulted at the relevant time by the Environment Agency on the detail of the environmental permit application in accordance with consultation guidance on environmental permits. The Proposed Changes to the DCO include an increase in the height of the twin absorbers if they are to be used for the Proposed Development. The changes have been assessed in Chapter 8 and Appendix 8B of the ES Addendum (REP5-047) including consideration of air quality effects. The revised air quality impact assessment shows that the increased stack heights for the twin absorbers slightly reduces the potential air quality effects on human health receptors although there is no change in the significance of predicted effects which remains negligible. Based on the above clarifications, it is agreed by both Parties that the issues raised by the UK Health Security Agency in their Relevant Representation have been appropriately addressed.

In relation to Item 6, the Applicant has accepted UKHSA proposed wording.

Item 7 (Draft DCO Requirements and Protective Provisions), the UKHSA noted in its position statement (22 April 2022) that it was unable to comment on the changes as it had not been provided with an updated Air Quality

Chapter or Appendices. The Applicant notes that the Deadline 5 submissions on 5 April 2022 for the Change Request included an ES Addendum (REP5-047).

In relation to Item 8, (1) the UKHSA proposed wording has been added in the SoCG.



UKHSA outlined that further air quality assessment may be beneficial in order provide further clarity on the process contribution to the overall EAL (Environmental Assessment Level) once the final licensor has been selected. A reappraisal of such operational effects would be undertaken post consent once the licensor is selected, and detailed design is completed. A subsequent permit update

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ADBY 3
RBON CAPTURE
WER STATION

Document Ref: 8.13
Statement of Common Ground with UK Health Security Agency (formerly Public Health England)

Matter Agreed	Commentary
	may be required following completion of the detailed design to be specific to the design measures to be applied and provide further detail on plant commissioning and start-up and air and water discharges as appropriate.

UKHSA has said (e-mail 10 May 2022) that they did not receive formal consultation requests for updated documents. However,

		ExA confirmed to Interested Parties (the UKHSA has registered as an Interested Party) on 11 April 2022 that Deadline 5 submissions, which included the Air Quality Assessments for the change request, were published. The Applicant therefore assumes that at this stage, the UKHAS would be notified of the Deadline 5 submissions and the Air Quality assessment for the Change Request. The Applicant continued to try to agree a SoCG, and received a response from UKHSA on 22 April 2022 clarifying UKHSA position. The Applicant took the position statement into account, including it in full in a new Appendix of the SoCG and addressing all matters raised in the version submitted at Deadline 6 on 26 April 2022, providing in advance of submission, a copy for UKHSA directly. Change No. 2 is no longer being progressed by the Applicant but this has no material difference in relation to the Air Quality assessments submitted at Deadline 5 and therefore available for UKHSA review and comment since notification by the ExA that the submissions were published. In relation to item 8 (2), the Applicant's assessment of impacts and effects in relation to human health are presented in **Chapter 8**: Air Quality – Rev 02 and **Appendix 8B**: Air Quality Operational Phase – Rev 02. These were previously submitted at Deadline 5 (REP5-047) as 'Change Request – Document Ref. 10.8 Proposed Development Changes: Environmental Statement (ES) Addendum - Volume II (Chapters and Appendices) - Rev 2'. The Applicant is resubmitting Chapter 8 (Air Quality) and Appendix 8A: Air Quality Operation of the ES Addendum at Deadline 6a. At the time of writing the Examining Authority is understood to be minded to accept the Change Request (as submitted at Deadline 5 and modified at Deadline 6) as stated in a letter dated 29 April 2022 (PD-019)

Table 2.8: Applicant's Response to Deadline 6 Submission by North Lincolnshire Council (NLC) (REP6-030 AND 031)

PARA NO.	DEADLINE 6 SUBMISSION BY NLC	APPLICANT'S RESPONSE
1.	NLC has no record of a formal planning application(s) being submitted to them as the LPA for the referenced solar scheme. However two separate Screening Requests have been submitted to the LPA in respect of two proposed solar farms at Land west of Chapel Lane, Keadby and Land north of Chapel Lane, Keadby. These Screening Requests were submitted to the LPA by Sirius Planning Ltd on 16 December 2021 and both are still pending, with no formal Screening Opinion adopted by the LPA to date. The LPA is currently awaiting further information from the agent prior to issuing these Screening Opinions.	Noted. The Applicant notes that these schemes have not yet been submitted into the planning process. The EIA screening requests have been lodged some time later than the first S42 consultation and S44 notifications (in 2020) and the acceptance of the DCO application (July 2021) for the Keadby 3 Carbon Capture Power Station, and appear to be missing information that would allow the local authority to determine them within normal timescales.
NLC Response to Q.2.16.1	NLC's comments were sent to the applicant on 04/04/22 and a response was received on 20/04/22. The response from the applicant addressed almost all of the outstanding points of clarification. The only point that NLC is awaiting clarification on is that the Applicant will be responsible for any structural maintenance/defects at the new site access between the completion of the site access and the end of construction, at which point responsibility would revert to NLC. It is anticipated that this final point of clarification regarding maintenance responsibilities can be addressed quickly to allow NLC to formally agree the departures. All other matters, including the design of the access have been resolved.	Wording has been added into the drafting of Article 11 submitted at Deadline 6 to address NLC's request. The amended wording is shown below: **Construction and maintenance of new or altered means of access** 11.—(1)a) Those parts of each means of access specified in Schedule 5 (those parts of the access to be maintained at the public expense) to be constructed under this Order must be completed to the reasonable satisfaction of the highway authority and, unless otherwise agreed by the highway authority, must be maintained by and at the expense of the undertaker for a period of 12 months from their completion and from the expiry of that period (and following an inspection by the highway authority and it being satisfied with the standard of the highway works including for the avoidance of doubt any remedial works carried out by the undertaker) by and at the expense of the highway authority.

NLC Response to Q2.16.3	NLC are not aware of the mechanism(s) that the Applicant proposes to secure off-site biodiversity enhancement if required. This is not a matter that has been discussed with the LPA. It is noted that the Applicant has put forwards evidence to demonstrate that net gain is deliverable on-site (net gain assessment at appendix D of the LBMEP (APP-039)) and it is understood that R6 is drafted to allow off-site delivery purely to provide an alternative option should a more beneficial means of providing the net gain elsewhere materialise (i.e. on publicly accessible land or part of a strategic proposal brought forwards by others). It is NLC's understanding that R6 has not been drafted to allow for off-site delivery because of any uncertainty over the ability to provide the requisite net gain on-site, merely to allow an element of flexibility should a more suitable means of delivery be identified. Whilst NLC has no objection to land outside of the Order Limits being used for biodiversity enhancement if beneficial the LPA would require this biodiversity enhancement to be delivered locally.	Noted. This interpretation is correct. Local delivery is secured in all events, via the wording in requirement 6(5)(c) of the draft DCO submitted at Deadline 6 ("measures to enhance biodiversity and habitats within Order Land or land within the Borough of North Lincolnshire that is under the control of the undertaker or other land within the Borough of North Lincolnshire provided it is accompanied by detailed implementation proposals incorporating an implementation timetable"). We believe therefore that this matter is agreed.

3.0 FURTHER INFORMATION

Table 3.1: Further Information in Response to ExQ 1.16.32

PARA NO.	EXAMINERS QUESTION	APPLICANT'S FURTHER INFORMATION
1.16.32	Art 42 – Defence to proceedings in respect of statutory nuisance) - the ExA notes that Art 42(1) reference nuisances falling within paragraph (b), (c), (d), (e), (f), (fb), (g) or (h) of section 79(1) of the Environmental Protection Act 1990. Bearing this in mind, the ExA would ask the Applicant to direct it to where in the submitted documentation information has been provided that justifies these references within this Art. Alternatively the ExA would ask the Applicant to provide the justification for the removal of these nuisances from the proceedings under section 79(1) of the Environmental Protection Act 1990.	Further to our original response in REP2-006 we have identified that the nuisance category (f) in the legislation (animals) remained in the defence in article 40 in recent draft DCO submissions. We have corrected this, and have now deleted "(f)" from the draft DCO at this deadline. In parallel we have taken the opportunity to update the Statutory Nuisance Statement (Document Ref. 5.9) to make clear that we are not seeking a defence in respect of category (f), along with types (a) (state of premises) and fa (insects), which are not listed in article 40 but are listed in the Statutory Nuisance Statement. The latest submitted Statutory Nuisance Statement and Draft DCO and the response in REP2-006 are therefore consistent and provide suitable justification for the required categories for which a defence is sought.

Table 3.2: Further Information in Response to ExQ 2.1.1

PARA NO.	EXAMINERS QUESTION	APPLICANT'S FURTHER INFORMATION
2.1.1	The Applicant's response to the Examining Authority's First Written Questions (ExQ1) Q1.1.1 is noted. However, the Examining Authority (ExA) would ask the Applicant to direct it to the evidence within the submitted	Further to our original response in REP6-016, the Applicant encloses recent evidence in the form of e-mail correspondence with National Grid Gas (Appendix 1 - Email: Keadby 3 Power Station | Pipeline Capacity) that demonstrates the capacity of the existing natural gas pipeline spur that will

	documents that demonstrates the capacity of the existing natural gas pipeline would preclude the operation of Keadby 1 and the Proposed Development at the same time or to enter such evidence into the Examination.	feed Keadby 3 Carbon Capture Power Station. Some explanation of the technical content of this e-mail is provided below. As described in our application documentation the Proposed Development is supplied by a spur to the National Transmission System, known as Feeder 7. This has a stated internal diameter of 450mm which under Institute of Gas Engineers and Managers Guidance for Transmission and Distribution IGEM/TD/13 Edition 2 and IGEM/TD/1 Edition 5 allows a maximum gas velocity of 20 metres per second (m/s) for unfiltered gas under established pre-defined conditions. The velocity exceeds 20 m/s when both Keadby 1 and the Proposed Development are modelled under their assessment methodology, which tests conformity of the pipeline design with their standards. No proposals to widen Feeder 7 or install a new gas supply pipeline are included in the Draft DCO. For clarity, the gas pipeline in Work No. 2 comprises the necessary new connection between the generating station and the proposed above ground installation at Feeder 7 Accordingly a scenario in which the Proposed Development and Keadby 1 could run simultaneously remains precluded by the physical size of the gas connection. For the avoidance of doubt, the additional constraint referred to in response to ExQ 1.1.1 (REP2-006) i.e. the 400kV export grid connection commercial arrangements) remains – i.e. the Bilateral Connection Agreement (BCA) for the Proposed Development.

Table 3.3: Further Information Provided in Response to ExQ 2.6.4-5 by Crown Estate (See also Appendix 2)

PARA NO.	EXAMINERS QUESTION	APPLICANT'S FURTHER INFORMATION
2.6.4	The Applicant's responses to ExQ1 Q1.6.17 are noted, as is the Applicant's most recent document entitled 'Update on Progress with Affected Persons' [REP5-018], but the	The Crown's agent, following discussion with the applicant on the 9th May 2022, emailed to confirm the following:-

	ExA would ask for evidence to be entered into the Examination that demonstrates: • the Crown agrees that no further agreement is required from them in respect of the outfall and river abstraction rights; or • the Crown has agreed rights in respect of outfall and river abstraction rights.	*"Having reviewed existing documentation and rights, we can confirm that no further agreement is required for the purposes of the DCO for the outfall and river abstraction rights."* A copy of this email is included in Appendix 2 (Please note that we have redacted personal information)
2.6.5	Pursuant to question Q2.6.4 above, and bearing in mind the Applicant's most recent document entitled 'Update on Progress with Affected Persons' [REP5-018], please provide an update as to progress on reaching agreement with the Crown in respect of the use of the Railway Wharf. If agreement has been reached, please enter evidence of such an agreement into the Examination.	The Crown's agent, following discussion with the applicant on the 9th May 2022, emailed to confirm the following:- *"The principle of the use of the Railway Wharf has been discussed and, subject to consideration being agreed, the Crown Estate has no concerns over the principle. The outline of a mechanism to allow this is being discussed, as legal advice will be required as to the documentary mechanism required, but a licence or similar, document is anticipated to suffice."* A copy of this email is included in Appendix 2

Table 3.4: Response to Request for Further Information dated 25 April 2022 (Annex B of PD-018)

PARA NO.	REQUEST FOR FURTHER INFORMATION	APPLICANT'S RESPONSE
1.	The Electricity Connection Statement [REP5-010] states: "Engagement has been ongoing with NGESO (National Grid Electricity System Operator) and NGET…" and that "NGESO has confirmed to the Applicant that there is sufficient capacity at the Keadby 400kV Substation and transmission system to accommodate the	The Applicant has received a revised offer from National Grid ESO, increasing the demand requirement in line with forecasted maximum start up loads. The offer confirms that this can be achieved without any physical change to the connection works agreed to in the existing Bilateral Connection Agreement (BCA). Thus it is anticipated that the new offer will be accepted within the validity period and form the new BCA.

	export from the Low Carbon Electricity Generating Station…" (Paragraph 3.1.1). This document also states: "A signed Bilateral Connection Agreement is in place between the Applicant and NGESO for the required export capacity" (Paragraph 3.1.2). In the light of these statements, the Examining Authority (ExA) would ask what consents/ agreements are still required from NGET in relation to this Proposed Development and, if consents/ agreements from NGET are still required what stage has been reached in obtaining those consents/ agreements.	
4.	Pursuant to Question 3 above, the ExA would ask the Applicant/ NLC (as the LPA) to confirm whether they are aware of any planning application(s) submitted to the LPA for the above mentioned proposed solar scheme. This includes any planning application(s) submitted to the LPA but not yet formally registered, for example any planning application(s) submitted to the LPA but deemed by them to be 'Invalid'. In the event of a formal planning application having been lodged please provide, where possible/ relevant: i. the planning application reference number issued by the Local Planning Authority (LPA); and ii. a copy of the planning decision issued by the LPA.	The Applicant notes the response of NLC in this matter and has provided a response in table 2.8 earlier in this document.

5.	Please provide the ExA with information regarding separation distances required between the 132kV thermal cable and the proposed ground cable that would link the proposed solar scheme referred to in the letter from Pollock Associates (submitted on behalf of Messrs Strawson and Severn) [REP5-057] and the related attachments ([REP5-058], [REP5-059] and [REP5-060]), including any information such as discussions and correspondence between you and Pollock Associates (on behalf of Messrs Strawson and Severn) in relation to this matter.	The Applicant has received a Connection Agreement offer in respect of the northern 132 KV route which sets out two options. The first option would be for the Applicant to use an approved contractor to build out the "Contestable Works" which would then be adopted by Northern Powergrid. The second option would be for Northern Powergrid to build out the full connection and take on the responsibility of installing the 132kV cable between K3CC and the Keadby 132kV Substation. The Northern Powergrid Policy for the Installation of Distribution Power Cables will be adhered to irrespective of whether the circuits are installed by Northern Power Grid or an approved contractor if the long term ownership is to sit with the DNO, copy included in Appendix 3. The Applicant understands that the solar farm developers are seeking a connection agreement for two 33KV circuits between the Northern Power Grid Substation and the solar farm. In this regard, the Applicant previously considered installing a 33KV connection but was informed that this would require a new 33KV satellite substation to be built by Northern Power Grid on Northern Power Grid land. Due to the anticipated timescales, cost and technical issues that would need to be addressed, the Applicant decided to pursue only the 132KV cable. As the Affected Persons have not provided copies of their connection agreements, the Applicant does not know whether the solar farm 33KV connections would also result in the need for a 33KV satellite substation but based on their own prior investigations are of the opinion that there is at least a probability that this would be required. The Applicant considers, based on its own prior discussions with Northern Powergrid, that there is significant material uncertainty as to whether a

		33KV connection for the solar farm development is actually viable. As such, even if it is assumed that planning permission would be forthcoming, there is no certainty that any solar farm development that is dependent upon the installation of 33KV cables and, consequentially, the construction of a new satellite substation by Northern Power Grid, would be viable and implementable. If such a scheme was viable, there would still be likely to significant delays whilst the solar farm developers wait for Northern Powergrid to arrange for the construction of the substation. This, of course, assumes that Northern Powergrid agree to locating such substation on their land. In summary, there remains, in the absence of any evidence or documentation to the contrary being provided by the Affected Persons or the solar farm developers, considerable uncertainty that the 33KV cables will, in fact, be required and, even if they are required, there is likely to be a significant delay before they are designed, installed and operational. The Applicant will need to install the 132KV cable before the solar farm developers will be in a position to install their 33KV cables and is unable to wait for the solar farm developers to secure planning permission, complete connection agreements and wait for Northern Power Gird to provide the required infrastructure, assuming that the 33KV option is in fact viable. To the extent that the installation of the Applicant's 132KV cables might impact upon the future installation of the 33KV cables, which has yet to be proven, it should be pointed out that the Affected Persons own significant land along the northern boundary of the dDCO and there is no reason that the Applicant is aware of as to why the 33KV cable route(s) could not completely avoid the proposed 132KV cables.

		In that scenario, the Affected Persons would be able to submit a claim to the Upper Tribunal Lands Chamber and receive statutory compensation to recover any losses in accordance with the Compensation Code which have arisen as a consequence of them being disposed of their land. In effect, the Affected Persons have, inter alia,: 1. Not provided full detail of their proposals; 2. Not demonstrated that their 33KV solution is viable; 3. Not demonstrated that there is no alternative solution within the Affected Persons' land that does not conflict with the dDCO. In other words, the Affected Persons have not demonstrated to the Applicant that their preferred route is feasible nor that there are no alternative solutions. Notwithstanding these comments, it is the Applicant's preference to find a solution that allows the dDCO to be implemented and the solar farm development to come forward. The Applicant's position is that the minimum distance between the centre of one 132kV cable and another is generally in the region of 600mm. In this regard, the sole Option Agreement provided by Pollock Associates refers to an easement corridor of 5000mm. At face value, therefore, there should be no issue. However, the cable depths may differ and the actual designed distance between circuits can depend on a series of factors including ground conditions, voltage level, cable type, soil resistivity, duct or direct laid, joint locations, etc.

		It is therefore not possible or realistic to be definitive in respect of separation distances until all information has been provided and Northern Powergrid has been engaged by both the Applicant and the Affected Persons in the design process. In this regard, the Applicant would expect that the solar farm developers are already engaging with Northern Power Grid in respect of their design and will continue to do so. In this context, Northern Powergrid have a "Policy for the Installation of Distribution Cables", a copy of which has already been referred to and included in Appendix 3. In order to take discussions forward, the Applicant is seeking to acquire the following documents from the Affected Persons: 1. Full unredacted copies of all four Option Agreements; 2. Full copies of the Connection Agreements; 3. Full detailed design and specifications of the proposed 33KV cabling and associated infrastructure; 4. Site ground condition surveys; 5. Confirmation that the solar farm developers and the Affected Persons are prepared to amend their Option Agreements to account for the dDCO requirements Further information may be required by the Applicant following review of this information. In the meantime and without prejudice to the above points, in order to de-risk the cable routes, the Applicant has scoped a Route Proving Study that will consider co-location with the solar farm 33KV cables provided that the solar farm developer and Affected Persons provide the required information.

		In summary, the Applicant's position is as follows: 1. All information currently within the Applicant's possession that is relevant to the positioning of the 132KV cables and interaction with the solar farm development has been provided to Pollock Associates; 2. Significant information is awaited by the Applicant from the solar farm developers and Affected Persons in order to inform the design of alternative solutions; 3. The Applicant full intends to engage with Pollock Associates in order to agree engineering and technical matters with the intention of progressing alternative options; 4. The Affected Persons own significant land holdings which could be made available to the solar farm developers to facilitate alternative 33KV routes; 5. The Applicant is of the opinion that the 132KV cable will come forward before the solar farm developers have obtained planning permission for their scheme and the necessary infrastructure is in place to enable the 33KV connection to be implemented; 6. Any solar farm development will be dependent upon the grant of planning permission the form of which, in the absence of any application, has yet to be finalized with any degree of certainty. 7. The Applicant's position is that the solar farm development does not affect the Draft DCO, since two 132kV cable routes have been provided for in the Works Plans and the Draft DCO, with Article 21 and the requirements providing appropriate safeguards to prevent both routes being developed (as explained in the response to ExQ1.13.2 in REP2-006) and appropriate powers are included in the DCO to compulsorily acquire all interests existing within the required plots as at the date that the acquisition notices take effect in order to develop the various elements of this associated development.

		8. The Affected Persons are entitled to compensation in accordance with the Compensation Code and regard will be had to the extent to which any losses were mitigated. It is therefore in the Applicant's interests to enable the mitigation of losses to the extent that it is able to do so. 9. The Applicant has held detailed discussions with Strawson and Severn over an extended period of time beginning December 2020, but we were only made aware of the option agreements late in examination severely limiting our ability to address their concerns. Pollock Associates had the opportunity to raise these points in submissions prior to the CA hearings to allow these matters to be explained and answered at the hearing but declined to do so. 10. While the Applicant will endeavor to find a solution to allow the schemes to coexist, it remains the case that the Affected Persons have sufficient land to implement an alternative access to their solar farm scheme should this not be possible. As such, even in a worst case scenario, the implementation of the dDCO would not prevent the solar farm development on the Affected Persons' land as alternative solutions would still be available to them to achieve the grid connection.

APPENDIX 1 EMAIL: KEADBY 3 POWER STATION | PIPELINE CAPACITY

Colin Turnbull

From: Guzman, Felipe <Felipe.Guzman@nationalgrid.com>
Sent: 29 April 2022 09:44
To: Murchie, Kyle C; Dart, Tim
Cc: Thermal Grid Services; Lereculey, Arnaud
Subject: RE: [EXTERNAL] Keadby 3 Power Station | Pipeline Capacity

Good morning Kyle,

I hope you are doing well.

The existing spur coming of the NTS has a nominal pipe dimeter of 450mm (as shown on Table 1). As per both IGEM/TD/13 Edition 2 & IGEM/TD/1 Edition 5. It states that pipework should be sized such that the gas velocity will not exceed 20 m s-1 for unfiltered gas and 40 m s-1 for filtered gas in the outlet header of the PRI under conditions of maximum flow and lowest operational pressure (38 barg).

As shown on Table 2 – The velocity exceeds the 20 m s-1, therefore the pipeline capacity is physically not large enough for all the demand load coming off the Feeder 7 transmission pipeline.

Please note, the demand load is the full operation load of all connecting parties coming off the spur – From a National Grid perspective we must utilise the full operation load of all parties to ensure our pipeline is adequately designed to meet our standards.

Table 1

Nominal pipe diameter	450	mm	≡	18	"
Pipe wall thickness	9.5	mm			
Pipe outside diameter	457.0	mm			
Pipe inside diameter	438	mm			
Pipe internal area	150,673.93	mm^2	≡	0.1507	m^2

Table 2

Gas Velocity Calculations								
Gas Temperature (ºC) ➔	-5.0		5.2		10.0		20.0	
	Z	V (m/s)	Z	V (m/s)	Z	V (m/s)	Z	V (m/s)
Pressure (barg) ➔								
40	0.8886	**20.61**	0.8963	**21.18**	0.9028	**21.71**	0.9149	**22.77**
38	0.8942	**21.80**	0.9014	**22.40**	0.9076	**22.94**	0.9191	**24.05**

Any questions, please do not hesitate to contact me.

Kind Regards,

Felipe Guzman
Project Development Engineer
Construction
nationalgrid

M 01926656760

National Grid House, WarwickTechnology
Park, Gallows Hill, Warwick, CV34 6DA

From: Murchie, Kyle C [redacted]
Sent: 27 April 2022 16:01
To: Dart, Tim [redacted]; Guzman, Felipe [redacted]
Cc: Thermal Grid Services <ThermalGridServices@sse.com>; Lereculey, Arnaud [redacted]
Subject: [EXTERNAL] Keadby 3 Power Station | Pipeline Capacity

Hello Tim and Felipe,

I hope you are well and have had a good week.

We have discussed the Keadby 3 project in some detail of late as part of the A2O application process, but would appreciate a clarification relating to the existing spur capability.

Please could you confirm the existing natural gas pipeline capacity is not physically large enough to support simultaneous running (i.e. operation at full load) of Keadby 1 and Keadby 3. Appreciate if you could respond by citing flow rates or other evidence.

Kind regards,

Kyle

Kyle Murchie || Senior Grid Services Engineer

SSE Thermal
Inveralmond House
200 Dunkeld Road
Perth, PH1 3AQ

[redacted]

[redacted]

form part of a binding contractual agreement.

SSE plc
Registered Office: Inveralmond House 200 Dunkeld Road Perth PH1 3AQ
Registered in Scotland No. SC117119
Authorised and regulated by the Financial Conduct Authority for certain consumer credit activities.
[redacted]

APPENDIX 2 EMAIL FROM CROWN'S APPOINTED AGENT

[redacted]

From: [redacted]
Sent: 09 May 2022 13:07
To: [redacted]
Subject: Keadby 3 DCO [CJ-WORKSITE.FID643610]

Dear Peter,

Further to our conversation on Friday and in response to the questions set out below, I would respond as follows:

Q2.6.4 - Having reviewed existing documentation and rights, we can confirm that no further agreement is required for the purposes of the DCO for the outfall and river abstraction rights.

Q2.6.5 – The principle of the use of the Railway Wharf has been discussed and, subject to consideration being agreed, the Crown Estate has no concerns over the principle. The outline of a mechanism to allow this is being discussed, as legal advice will be required as to the documentary mechanism required, but a licence or similar, document is anticipated to suffice.

Happy to discuss if not quite what was agreed….in typical fashion, I was side-tracked yet again.

Kind regards

Guy

Classification L2 - Business Data

[redacted]
Associate

Carter Jonas
Simply better property advice

[redacted]
82 Micklegate, York, YO1 6LF


Please consider the environment. Do you really need to print this email?

APPENDIX 3 NORTHERN POWERGRID POLICY FOR THE INSTALLATION OF DISTRIBUTION POWER CABLES

NSP/002 – Policy for the Installation of Distribution Power Cables

1. Purpose

The purpose of this document is to detail Northern Powergrid's (the Company) policy for the installation of distribution power cables at all voltage levels (230V up to and including 132kV) for connection to the Company's network. This policy also helps to attain the distribution business goal of being a leading safety performer within our industry sector.

All parties installing new underground distribution power cables and auxiliary cables for connection to the Company's network shall follow the content of this document.

This policy shall be used as the primary source of information for the installation of distribution power cables. Guidance on elements of the installation of distribution power cables not covered within this policy shall be sought from other appropriate Company documentation.

This document supersedes the following documents, all copies of which should be destroyed.

Ref	Version	Date	Title
NSP/002	2.0	Sept 2015	Policy for the Installation of Distribution Power Cables

2. Scope

This document applies to the installation of all distribution power cables. Distribution power cables are defined as those cables used directly for the transfer of electricity from the 132kV system through to the low voltage (LV) service at customers' premises.

The document provides guidance and sets out the Company policy on the procedures that are to be followed when installing distribution power cables. The document covers the excavation of trenches, trench preparation, installation of ducts, installation of safety features and warning signs, laying and pulling in of cables, back filling of trenches, re-making of ground and recording of cable positions.

This document does not detail specific cable installation solutions but refers to such issues in general terms. Specific cable installations shall follow codes of practice and guidance documents where available alternatively they shall be developed on an individual basis and agreed with an appropriate Company representative. Details covering the specific requirements for power cables and their associated accessories including ducts, tile tape and other markers are provided by individual Network Product Specifications (NPS) in each case.

It also offers sources of information to Northern Powergrid, its contractor's and Independent Connection Providers (ICP). It enables all of the different functions within the business and its contractors to make informed design, construction and operational decisions that will mitigate the risks associated with the installation of distribution power cables.

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3. Policy

3.1. Assessment of Relevant Drivers

Northern Powergrid operates circa 58,500km of underground distribution power cable (excluding service cable) and installs, around, 720km of cable every year. This consists of 8km of 132kV, 65km of EHV, 302km of HV, 345km of LV and 23,450 underground services per year.

Berkshire Hathaway Energy (BHE) has made a commitment within its corporate goal statements to be a leading safety performer within our industry sector. In addition, this policy will make a positive contribution to the following business values:

- Employee Commitment
- Regulatory Integrity
- Environmental Respect

The 'Electricity Safety, Quality and Continuity Regulations 2002' (ESQCR), Part IV, Underground Cables and Equipment, gives absolute requirements for general restrictions, protective screens and excavations and depths of underground cables. The supplementary Department for Business Enterprise & Regulatory Reform document, 'Guidance on the Electricity Safety, Quality and Continuity Regulations 2002', gives further detailed guidance on the same absolute requirements.

3.2. Key Policy Requirements

The objectives of this policy are:

- To ensure the general safety of the public, including third parties excavating in the vicinity of our power cables.
- To prevent Northern Powergrid from having a major breach of legal compliance through incorrect installation of distribution power cables and their associated safety features.
- To specify the requirements for the installation of distribution power cables for voltages up to and including 132kV.
- To maximise the life of the underground cable system through ensuring the cable is installed using well proven techniques.

3.2.1. General

The following section describes general requirements for work carried out for the installation of distribution power cables.

Compliance with Policy

In terms of cable route planning and installation, this policy offers in every instance the preferred approach. It is understood that engineering difficulties may be encountered that result in the preferred approach not being practically or economically achievable. Where this situation arises, authorisation for any deviation from the preferred approach shall always be sought and agreed with the Northern Powergrid project / design manager at any point from initial design through to final works completion.

Excavation Work

All distribution cable excavation work carried out shall be in accordance with the Health and Safety Executive Guidance Note HS (G) 47 - 'Avoiding Danger from Underground Services'.

Work which is undertaken on the public highway shall be done so in accordance with the 'New Roads and Street Work Act 1991' (NRSWA) and, 'The Traffic Management Act 2004 Regulations' and codes of practice.

Cable Laying

All 33kV cables and above shall be laid in accordance with the requirements of Energy Networks Association Technical Specification (ENA-TS) 09–2, 'Specification for the Supply, Delivery & Installation of Power Cables with Operating Voltages in the Range 33kV to 400kV and Associated Auxiliary Cables' unless varied by this specification. Additionally all relevant cable laying activities shall comply with Engineering Recommendation (ER) C61 - 'Installation Bending Radii of 33kV and Higher Voltage Cables' and Engineering Recommendation (ER) C55/5 – 'Insulated Sheath Power Cable Systems'.

All other cables including those not covered in (ER) C61 shall be laid in accordance with this policy.

Contractor Management

Any equipment used for cable installation work which is defined under the 'Lifting Operations and Lifting Equipment Regulations 1998', shall be rated, tested, inspected and operated in accordance with the 'Lifting Plant and Equipment (Records of Test and Examination) Regulations 1992'.

The Contractor and his representatives shall fully comply with regulations issued by Network Rail, any relevant statutory bodies and in accordance with Northern Powergrid Safety Rules regarding electrical apparatus and the safety of men working thereon. In addition, the 'IEE Regulations on the Electrical Equipment for Buildings' (BS 7671) shall be observed where applicable.

Cable Installation

Cable installation work will also be carried out in accordance with 'The Construction (Design and Management) Regulations 2015' whenever they apply.

Record Management

Any persons (including ICP's, IDNO's and contractors) carrying out works on the company's cable network shall ensure that all appropriate information is provided for all new cable installation positions/routes including cable details, duct arrangement, and/or joint markers. This information shall be passed to Information Management and where appropriate the Northern Powergrid responsible project manager and shall be recorded on the appropriate records within Northern Powergrid. This shall be in accordance with the Highway Authorities and Utilities Committee, 'Code of Practice for Recording of Underground Apparatus in Streets', Nov 2002. Additionally, where engineering difficulties result in the installation of the cable results in a non-standard layout, previously agreed with the Northern Powergrid project manager, then this information shall also be recorded.

Environmental

All aspects of the cable lifecycle from design through to installation, operational life, decommissioning and removal (where appropriate) shall comply with ENV/001 – 'Policy for Environmental Management' and all other relevant Company environmental standards.

Auxiliary Circuits

As part of any underground cable schemes (e.g. new installation, replacement or diversion) all associated pilot and telecommunications cables shall be considered for replacement as described in IMP/001/913 – 'Code of Practice for the Economic Development of the EHV System' and IMP/001/914 – 'Code of Practice for the Economic Development of the 132kV System'.

3.2.2. Fire Precautions

All apparatus, connections and cable works shall be designed and arranged to minimise the risk of fire, and any damage which might be caused in the event of fire. Where relevant, all reasonable precautions shall be taken to comply with Energy Networks Association Engineering Recommendation (ENA-ER) S2/4 - 'Limitation of Fire Risk in Substations at 132kV and below and in Enclosed Cableways' and ENA-TS 09-22 - 'Protection of Cable Installations Against the Effects of Fire' and any other regulations as are applicable to the situation.

Where cables pass through a switch room floor into a basement or cable tunnel, precautions shall be taken to prevent:

- The draining of oil from the switch room into the basement or tunnel.
- The ingress of water or any noxious or explosive liquid or gas, into any enclosed space.
- The slipping of cables, if burnt away from their cable boxes, into the basement or tunnel. To comply with these requirements, cables shall be clamped or suitably supported above, and immediately below, the switch room floor level.

3.2.3. Cables Routed in Communal Positions

Where service cables are installed in communal locations such as shopping centres, high rise flats, consideration shall be given to the following in order to minimise the risk of harm to the public and damage to other assets in that location:

- Installations shall ensure that the cables are suitably physically protected to minimise the risk of damage from third parties.
- The cables shall be suitably supported to minimise inadvertent movement or disturbance including during fault conditions.
- The cables shall be suitably 'marked' / 'labelled' to ensure that persons working in the vicinity are aware of our cables.
- The installation shall be suitably designed to minimise the risk of fire in accordance with section 0 - Fire Precautions.
- Consideration shall be given to the ability to access the cable location for future replacement, maintenance and repair.
- Consideration shall also be given to the level of access to the public from a site safety and security perspective.

3.2.4. Route Planning

Services

All new service cable installations shall be run only within the boundaries of the properties it supplies, i.e. a service to any one property shall not cross land belonging to another.

When replacing or re-locating existing cable assets, dedicated underground services as described above shall be provided where economically and physically practicable.

LV Mains

All new mains cables schemes up to and including 400V shall in the first instance be laid direct in a footpath and/or verge.

LV mains cables shall not be routed within the boundary of private properties and shall not be installed in footpaths at the rear of properties with only pedestrian access.

HV Mains

All new mains cables schemes up to and including 20kV shall in the first instance be laid direct in a footpath and/or verge.

33kV to 132kV Mains

Schemes at 33kV and above shall in the first instance be laid in suitable duct arrangements in the footpath and/or verge.

General Planning

All new cables shall in the first instance be laid in public land unless engineering difficulties dictate otherwise. In these circumstances, agreement shall be sought from the Northern Powergrid responsible project manager for alternate laying options.

Where it is necessary to lay any cables in private land then the route shall be secured by a permanent easement and meet the requirements of all Northern Powergrid wayleave policies. The route chosen shall not hinder future access for maintenance, repair, replacement or recovery of the cables.

When routing new cables, consideration shall be given to the potential for future network extension to cater for load development.

Where practicable the route shall avoid sections of exposed cable e.g. bridge crossings. If sections of exposed cables are unavoidable, they should have a level of protection suitable for the security risk at that site as detailed in section 3.2.8 – Exposed Cables.

Routes should ideally be simple, direct with minimal bends and the minimum of cross-over particularly in the open trench work of substations. Consideration shall also be given to minimising the volume of joints required as part of the installation. Where practical and economic, cables shall be laid on a route that is separate from other cables supplying or providing security to a given group of customers. Where cables are laid in proximity to existing cables or other heat sources, sufficient spacing should be allowed to prevent de-rating of either circuit. Where multiple cables enter a building (e.g. switchroom), where practicable these cables shall be laid direct to minimise the effect of mutual heating.

All measures shall be taken to avoid damage to other utilities and third party plant and equipment. All other statutory undertakers and the local authorities shall be contacted to determine the position and depth of their apparatus in the proposed route before any trial holes, excavation or trenchless installation is carried out.

Ground Penetrating Radar (GPR) surveys or hand dug trial holes may be necessary if information regarding a cable route is not readily available from Northern Powergrid or other undertakers' plans. Trial holes shall be taken at proposed joint positions and at other positions along the route to determine the best practical position of the cable relative to the other services. This will also confirm the location of existing Northern Powergrid assets and other utilities along the proposed cable route.

Trial holes shall generally be at right angles to the route of the cable and at least 150mm deeper than the proposed trench. The number and size of the trial holes required will depend upon the congestion likely to be encountered and whether the trench is being hand or machine dug.

Further detail on route planning can be found in the following documentation:

- IMP/001/911 –, Code of Practice for the Economic Development of Low Voltage Networks'.
- IMP/001/912 – 'Code of Practice for the Economic Development of the HV System'.
- IMP/001/913 – 'Code of Practice for the Economic Development of the EHV System'.
- IMP/001/914 – 'Code of Practice for the Economic Development of the 132kV System'.

3.2.5. Location of Cable Trenches

Having decided upon the route the requisite clearances from other Utility equipment and Northern Powergrid cables shall be observed and trench depths maintained as detailed in section 3.2.6.

The exact location of each trench shall be approved on site. Cables shall be positioned, including their relation to other services, in accordance with the current National Joint Utilities Group (NJUG) guidance document, 'NJUG Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus'

3.2.6. Depths of Cables

The minimum depths to the top of the uppermost cables or duct for the various laying conditions are shown in Table 1 – Minimum Depths:

Minimum Depths			
Voltage	**Roadways and land open to traffic (mm)**	**Good agricultural land (mm)**	**Footpaths, verges, uncultivated land, pasture agreed to be permanent and land not open to vehicular traffic (mm)**
132kV	900	910	900
66 kV	750	910	750
33 kV	750	910	750
20 kV	750	910	600
11 kV	750	910	600
LV & Services	600	910	450
Aux	600	910	450

Table 1

All cables / cable ducts shall be installed as close as practicable to the minimum depth described in the above table in order to avoid future operational access issues, safety issues, reduce de-rating effects and additional expenditure. Auxiliary cables installed with a power cable shall be installed at the same depth as its associated power cable.

Where this is unavoidable, cables can be laid to a maximum depth in accordance with Table 2 – Maximum Depths. If this cannot be achieved, then permission is required from the Northern Powergrid responsible project manager before cable installation commences.

Maximum Depths			
Voltage	**Roadways and land open to traffic (mm)**	**Good agricultural land (mm)**	**Footpaths, verges, uncultivated land, pasture agreed to be permanent and land not open to vehicular traffic (mm)**
132kV	1000	1010	1000
66 kV	850	1010	850
33 kV	850	1010	850
20 kV	850	1010	700
11 kV	850	1010	700
LV & Services	700	1010	550
Aux	700	1010	550

Table 2

Where it is impractical to achieve the minimum depths, one option is to employ additional physical and visual protective measures, as explained in more detail in section 3.2.7 – Shallow Cables. This may require further engineering design.

If the installed cable is outside of the minimum and maximum depths shown in tables 1 & 2; this may require further physical engineering design. In all cases agreement shall be sought from the Northern Powergrid project manager prior to commencement of works.

Additionally, where the thermal resistivity of the ground, depth of or type of installation (e.g. ducts) or proximity to other heat sources may affect the circuit rating, consideration shall be given to an increased cable size, stabilized backfill material or application of bentonite to ducts as necessary. In all cases agreement shall be sought from the Northern Powergrid project manager prior to commencement of works.

3.2.7. Shallow Cables

The Electricity Safety, Quality and Continuity Regulations 2002 requires that …….. 'Every underground cable shall be kept at such a depth or be otherwise protected so as to avoid, so far as is reasonably practicable, any damage or danger by reason of such uses of the land which can be reasonably expected'.

Initial identification and Determination of Cable Depth

The following stages shall be employed in order to reach a suitable conclusion for any cables identified as shallow in accordance with section 3.2.6 – Depth of Cables.

1. Information related to underground cables identified as having the potential to be buried at a depth shallower than that defined in section 3.2.6 can be provided from a number of sources both internal and external. In the first instance this information shall be directed to the Condition Assessment Manager who shall log the information provided. The Condition Assessment Manager has the initial primary responsibility to liaise with the information provider to identify the level of risk that the cable presents to the public. A risk assessment shall be carried out for every incidence of a shallow cable being identified. The Condition Assessment Manager shall initiate urgent remediation should the level of risk exposure deem such a response necessary.
2. The Condition Assessment Manager shall then inform Information Management of the potential that the identified cable is laid at a level shallower than that specified in section 3.2.6. Information Management shall then 'mark up' the asset records as required to identify this issue.
3. If as part of the Condition Assessment Manager's initial risk assessment the cable depth cannot be confirmed, they shall then request that the capital work programme responsible officer progresses investigations to determine the laid depth to the top of the cable and the length of cable buried at that depth along its route. The depth of the cable shall then be used to determine the type of remediation required as described in the section titled 'Mitigation Response Based upon Cable Depth'.
4. The work programme responsible officer shall then endeavour to identify the party who installed the cable at the incorrect depth or the party who changed the depth due to excavation works etc. Typically where the cable has been installed at the incorrect depth then it is expected that the party responsible shall carry out all necessary remediation (at their cost) to re-install the cable at the required depth. In the case of changes to ground level; if the party responsible are not qualified to re-install the cable at the correct depth then all costs incurred by the company to carry out remediation works shall be recovered from the responsible party. The course of action to be taken will depend of the contractual terms and conditions.
5. For each instance of identification of shallow cables, associated tile tape or tiles as detailed in section 3.2.10 – Installation Medium and Positioning of Cables, shall, in all circumstances be re-positioned at their correct depth with the necessary mechanical protection installed (tile tape, duct, tiles). All known incidences of shallow cables shall be resolved within a maximum period of 6 months subject to associated wayleaves and permissions.

Mitigation Response Based Upon Cable Depth

The approach adopted for dealing with shallow cables shall depend upon the magnitude of non-compliance with the minimum cable depths specified in section 3.2.6 – Depth of Cables. The two options are as follows:

1. Cables installed shallower than the depth of Tile Tape or Tiles - Any cable found to be buried shallower than the specified depth of tile tape or tiles for that cable as detailed in section 3.2.10, shall, in all circumstances be re-positioned or replaced at its correct depth with the necessary mechanical protection installed (tile tape, duct, tiles). For each identified shallow cable, a risk assessment shall be carried out in each case to determine the appropriate response time for the level of risk posed. All known incidences of shallow cables shall be resolved within a maximum period of 6 months subject to associated wayleaves and permissions.
2. Cables installed shallower than the specified depth but deeper than the Specified Tile Tape or Tile Depth - Any cable that is found to be buried shallower than its specified depth as detailed in section 3.2.6, but at a depth no more shallow than the specified depth of tile tape / tiles for that cable (i.e. a distance of 150mm above the minimum specified cable depth detailed in 3.2.6), may be left at that depth if extra mechanical protection is installed. This shall consist of a duct and tile tape.

There will be instances where non-compliance will be unavoidable. These may include cable installations across bridges and structures, where statutory depths cannot be achieved due to the construction/design. In these instances, site specific designs shall be used and will consist of extra mechanical / visual protection e.g. cables covered by steel plate, concrete surrounding ducts etc. Guidance is available in (ER) C98 – 'Physical Protection of Cables Crossing Bridges'. Where the installed depth to existing cables is reduced as a result of construction activities e.g. drop kerbs, then the application of extra protection shall only be considered once all other options including cable diversion have been explored.

Any instance where a cable cannot be mechanically protected or diverted into a more secure position so far as reasonably practicable shall be disconnected from the live cable system until an appropriate solution has been employed.

3.2.8. Exposed Cables

When cables are exposed during the course of any works, they shall be suitably blinded or otherwise protected e.g. by portable security type fencing, blinding material as detailed in section 3.2.12 - Cable Trenches where practical and as soon as is reasonably practicable, to protect against interference / vandalism from third parties. Tile tape should also be applied above the cable to warn of the presence of a buried cable below should future ground work be undertaken over the cables. No underground cable may be left exposed and accessible to the public without justifiable cause supported by documentary evidence to show thorough consideration of the associated risks and the availability of appropriate control.

If the site is considered to be high risk e.g. adjacent to a school, public recreational area, housing estate or any other place where frequent public access occurs, then in all cases when the site is left unattended, the exposed cables shall be suitably blinded or otherwise protected.

3.2.9. Minimum Cable Spacing

The following minimum spacing's shown in Table 3 - Minimum Spacing between Centres are required between the centres of two or more three core cables or groups of single core cables to ensure failure of one cable does not damage any other cable.

Minimum Spacing Between Centres (mm)	
Any cable and a street lighting or service cable	100
A metallic/fibre optic auxiliary cable and another metallic/fibre optic auxiliary cable (Unless the metallic/fibre optic auxiliary cables are associated with the same power cable, in which case it can be laid adjacent)	225
A power cable and a cable containing telephone pairs (Unless the pilot telephone cable is associated with the power cable, in which case it shall be laid adjacent)	225
An LV, 11 kV or 20 kV cable and another LV, 11 kV or 20 kV cable	300
An LV, 11 kV or 20 kV cable and a 33 kV or 66 kV cable	450
A 33 kV or 66 kV cable and a 33 kV or 66 kV cable	450
All 132kV cables	600

Table 3

Consideration shall be given to proximity de-rating issues, at all cable voltages. Information on cable de-rating issues should be sought from the Northern Powergrid project manager.

A gap of 50mm shall be allowed between any cable/duct and the trench sides to allow any tile tape or boards to adequately overlap the cable as defined in 3.2.10 - Installation Medium and Positioning of Cables.

All clearances should exceed minimum spacing requirements where practicable to permit subsequent jointing on the cables. This data is re-produced as a guideline only. Minimum spacing's may need to be increased depending on actual cable sizes and soil conditions, in which case an individual specification for the particular installation shall be produced.

De-ratings shall be applied to cables laid in close proximity. Further guidance on acceptable de-rating factors should be sought from the Northern Powergrid project manager.

3.2.10. Installation Medium and Positioning of Cables

Trenchless Excavation

Where appropriate, trenchless excavation (see section 0 - Trenchless Excavation) shall be considered as a viable option when installing underground cable. Application of this option shall always employ the cable being laid in a suitable and approved duct as shown in Table 4 - Trenchless Installation Duct Requirements.

Trenchless Installation Duct Requirements		
Cable Type	**Cable Size**	**Duct (Outside Diameter)**
Metallic Auxiliary	All	125mm PE SDR-11 Black
Fibre Auxiliary	All	125mm PE SDR-11 Black
Fibre Auxiliary (sub-duct)	All	32mm PE SDR-11 Black
LV Service	All	75mm PE SDR-11 Black
LV Main	All	125mm PE SDR-11 Black
11kV to 20kV	Triplex up to 300mm^2	125mm PE SDR-11 Black
	Triplex above 300mm^2	160mm PE SDR-11 Black
33kV	Single core	160mm PE SDR-11 Black
	Triplex up to 400mm^2	160mm PE SDR-11 Black
66kV to 132kV	All	180mm PE SDR-11 Black

Table 4

Note 1: All duct sizes for ducts installed in trenchless excavation are outer diameter.

Note 2: All ducting used in trenchless excavation shall be solid wall circular section duct (SDR-11) as specified in ENA-TS 12-24 – 'Plastic Ducts for Buried Electric Cables 2008'and NPS/002/003 – 'Technical Specification for Protective Tile, Tile Tape and Cable Ducting'.

Note 3: For trenchless excavation, all cables require advanced warning and this will normally be in the form of an embossed black duct compliant with ENA-TS 12-24 - 'Plastic Ducts for Buried Electric Cables 2008'.

Open Cut Trench

Table 5 - Installation Requirements details the installation mediums and local safety features that shall be installed.

Cable Type	Cable Size	Public Footpath (OD/IDmm)	Private Domestic (OD/IDmm)	Private Non-Domestic (OD/IDmm)	Road (OD/IDmm)
Metallic Auxiliary	All	96.5/90 Duct + Tile Tape	96.5/90 Duct + Tile Tape	96.5/90 Duct + Tile Tape	96.5/90 Duct + Tile Tape
Fibre Optic Auxiliary	All	96.5/90 Duct + Tile Tape	96.5/90 Duct + Tile Tape	96.5/90 Duct + Tile Tape	96.5/90 Duct + Tile Tape
LV Service	All	Laid Direct + Tile Tape	38/34 or 50/46 Duct + Tile Tape	Laid Direct + Tile Tape	150/125 Duct* + Tile Tape
LV Main	All	Laid Direct + Tile Tape	150/125 Duct* + Tile Tape	Laid Direct + Tile Tape	150/125 Duct* + Tile Tape
11kV to 20kV	Up to 300mm^2	Laid Direct + Tile Tape	150/125 Duct* + Tile Tape	Laid Direct + Tile Tape	150/125 Duct* + Tile Tape
	Above 300mm^2	Laid Direct + Tile Tape	175/150 Duct* + Tile Tape	Laid Direct + Tile Tape	175/150 Duct* + Tile Tape
33kV	Triplex up to 400mm^2	160/150 Duct + Tile Board	160/150 Duct + Tile Board	160/150 Duct + Tile Board	160/150 Duct + Tile Board
	All single Core	160/150 Duct + Tile Board	160/150 Duct + Tile Board	160/150 Duct + Tile Board	160/150 Duct + Tile Board
66kV to 132kV	All single Core	160/150 Duct + Tile Board	160/150 Duct + Tile Board	160/150 Duct + Tile Board	160/150 Duct + Tile Board

Table 5

*Assumes twin wall ducting. All others are single smooth wall design.

Note 1: All sizes for ducts installed in open trenches are nominal diameter measurement.

Note 2: All new cable installations shall have tile tape or tile board installed above the cables / ducts.

At all voltages tile tape and/or tile boards shall be installed to ensure an overlap of 50mm either side of the cable(s)/duct(s).

In order to effectively deliver this, tile tape is supplied in various widths as detailed in NPS/002/003 – 'Technical Specification for Protective Tile, Tile Tape and Cable Ducting'. Where the correct width of tile is not available, then overlapping of the tile tape and/or tile boards is acceptable.

Note 3: Cables in the range 230V to 20 kV shall be laid under tile tape positioned 150mm directly above the top of the uppermost cable / duct.

Cables in the range 33kV to 132kV shall be laid under tile boards positioned 75mm directly above the top of the uppermost cable / duct. Each tile board shall be closely interlocked with adjacent covers throughout the length of the cable.

Note 4: Multiple metallic auxiliary cables may be installed in a single duct. However, metallic auxiliary cables associated with different power circuits must normally be installed in separate ducts to afford increased system security by reducing the risk of multiple cables suffering damage at a single location. Refer to NSP/002/005 – 'Code of Practice for Cable Locations in Trench Layouts (Draft in development)'.

Note 5: Fibre Optic auxiliary ducts shall normally contain two Fibre Optic Sub-Ducts associated with a single power circuit only as per NSP/002/001 – 'Guidance document for the installation of Fibre Optic Underground Cables'.

Note 6: All ducting used in open trench excavation shall be used as part of cable installation works shall be as specified in NPS/002/003 – 'Technical Specification for Protective Tile, Tile Tape and Cable Ducting'.

Note 7: De-rating factors shall be considered and applied for ducted cable installations. Selection of duct dimensions shall also consider the number of installed cables, physical cable size, minimum bending radius, pulling tension and proposed pulling route.

Note 8: All cables shall be installed in the footpath/verge where possible. However this may not always be reasonably practicable, particularly at EHV when taking account of interference with or by other existing utilities equipment. If this cannot be avoided then the preferred option is to install the cable in ducts in the road with appropriate tile tape and/or tile boards, parallel to the footpath.

In some cases however, it may not be practical to install in ducts, for example: LV cables with many service connections, HV, EHV or 132kV cables that may have problems with de-rating factors due to duct installations. In such cases where the laid direct option is more suitable, cables shall always have the required tile tape / tile boards installed. Prior agreement to this option shall be sought from the Northern Powergrid project manager before commencement of works.

Note 9: Cables installed for future jointing to existing cables shall be adequately overlapped to allow easier jointing.

Note 10: Some residential developments are laid out as 'Home Zones', or similarly have a single thoroughfare dedicated to pedestrian, rather than vehicle, use. However, these thoroughfares are still highways and will experience vehicle traffic. In such areas, mains cables shall be laid in the 2m service margin within the thoroughfare provided by the developer. All cables passing through this service margin shall be installed to the standard required for a roadway: ducts are required only for road crossings etc.

This contrasts with 'Design Bulletin 32' (Residential Roads and Footpaths) estates, which have a conventional roadway but no footpath. Here, the developer provides a 2m service reserve to the side of the thoroughfare, generally in the gardens of the properties. In such areas, mains cables shall be laid within that reserve to the standard required for footpaths and verges (except where road crossings are required, in which case the relevant standard shall apply).

Diagram 1 - NJUG Guidance of Positioning of Utility Apparatus details the National Joint Utilities Group guidance (taken from 'NJUG Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus') on placement of distribution power cables (in addition to other utilities services) in a 2 metre wide footpath. The location of new Northern Powergrid power cables shall follow this guidance wherever possible, unless a greater depth is required under section 3.2.6.

In terms of this diagram, NJUG guidelines classify LV as up to and including 1,000V and HV as over 1,000V. For 11kV cables laid in the footpath, Northern Powergrid specifies a minimum depth to the top of the cable of 600mm as described in section 3.2.6. Diagram 1 has been modified to reflect this requirement.

NJUG Guidance of Positioning of Utility Apparatus

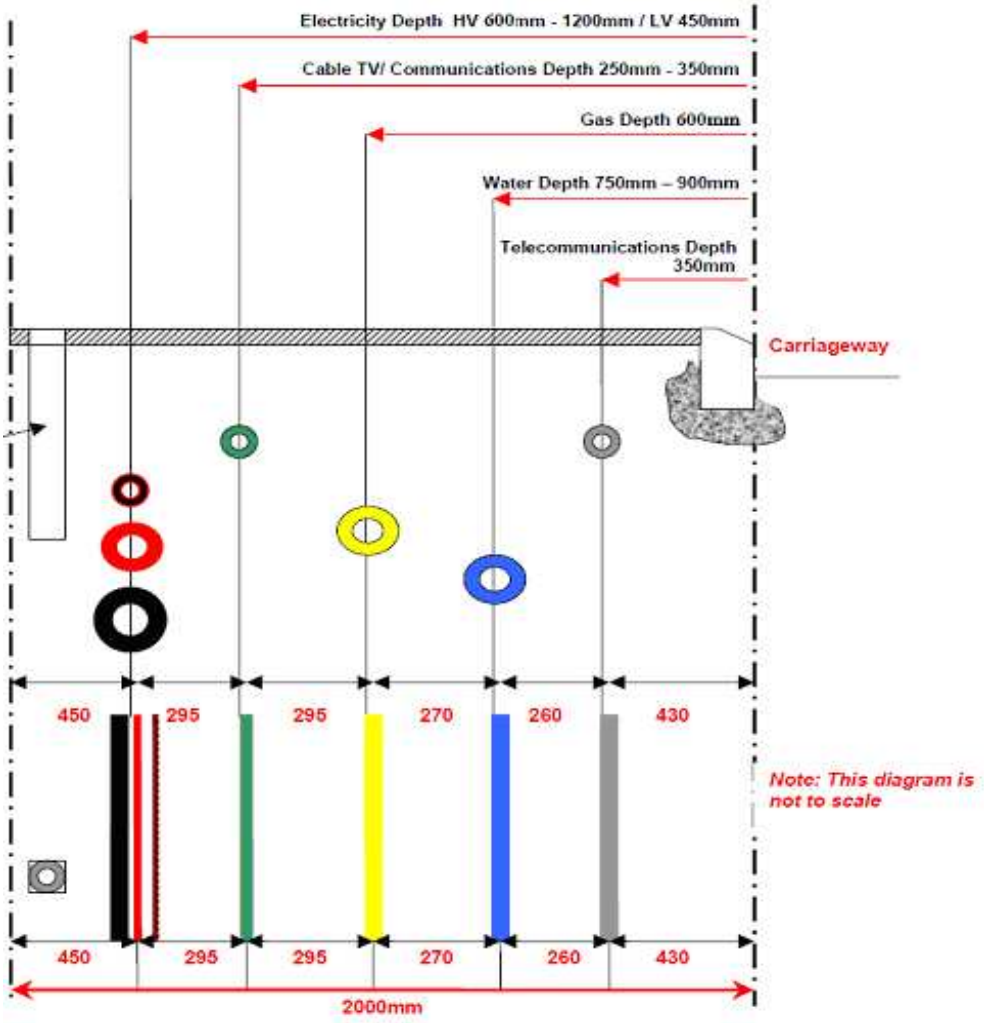

Diagram 1

The location of any utilities services shall never be assumed to lie in the positions described in NJUG guidance.

Duct Installation and Formation

All ducts installed in road crossings for up to and including 20kV cables shall have an equivalent spare duct installed to one side of the main duct in accordance with section 3.2.9 Minimum Cable Spacing. All ducts shall normally be laid in a flat formation. Dependent upon the number of cables to be laid, 'banking' of ducts is permissible but shall be agreed with the Northern Powergrid project manager prior to installation.

Service cables and LV mains cables shall be installed one cable per duct. It is however permissible to install two service cables in the same duct in a road crossing.
11kV and 20kV triplex power cables shall be laid in a single duct. However for large cross sectional areas (e.g. transformers to primary switchgear), cables may be installed as single cores in a single duct.
33kV single core cables may be installed in a single duct if the cores are adequately secured to ensure that they remain in a trefoil formation without damaging the cables.

Larger 33kV single core cables shall be installed one cable per duct, with the ducts arranged in a trefoil formation.

Spare ducts for power cables shall not be installed at 33kV and above unless specifically agreed with the Northern Powergrid project manager; however ducts for communications shall always be considered.

Ducts required for Northern Powergrid protection and telecommunication circuits shall normally be laid to the side of the power cable or attached to the trefoil group as detailed in NSP/002/005 – 'Code of Practice for Cable Locations in Trench Layouts (Draft in development)'. The pilot cable shall be laid nearest to their associated power cable. In the case of fibre optic cables these ducts may be installed as part of the tre-foil group and are to be installed in accordance with NSP/002/001 – 'Guidance document for the installation of Fibre Optic Underground Cables'.

Ducts installed for road crossings shall normally be installed at right angles to the kerb, will extend approximately 150 mm beyond the kerb foundation into the pavement or grass verge.

Ducts will be laid in such a manner to avoid any permanent obstructions located within one metre of the duct ends.

A draw rope suitable for purpose shall be installed.

Immediately after installing, ducts must be rodded clean and sealed. Spare ducts should be filled with a wooden plug before sealing

If the ground is to be backfilled before the duct is used, the position of the duct ends shall be clearly marked with yellow marker paint.

3.2.11. Excavated Materials and Site Restrictions

Excavated material shall be placed so as to prevent unnecessary nuisance or damage to adjacent hedges, trees, ditches, drains, gateways, other property or contamination of adjacent finished surfaces. Excavated material shall be stacked a safe distance from the trench and in such a manner to avoid undue interference with traffic and to keep footways open wherever possible. Where, because of traffic or other considerations, excavated material cannot be retained on site, it shall be removed and returned later for backfilling ensuring no contamination with other materials has taken place throughout this process. The position of stockpiles of excavated materials or new materials shall be determined beforehand. All excavations in made ground shall be backfilled with imported backfill.

Where the obstruction due to site works will be such that it is considered necessary to close the road to traffic, an application shall be made to the street authority for a Temporary Traffic Regulation Order.

To facilitate the re-use, where appropriate, of excavated material for road foundations, the excavated road surface materials and base foundations shall be separately stacked from the excavated sub-soils. Turf, chippings and the like shall be removed over a predetermined width on either side, or on both sides, of the trench to reduce the possibility of damage and/or contamination to those surfaces adjacent to the trench line. When the cable trench is routed through property other than public roads or pathways, the appropriate conditions will be agreed with the owner and occupier.

3.2.12. Cable Trenches

Trenches shall be kept as straight as possible and each trench shall be excavated to the dimensions which will be sufficient to allow cables to be installed at the depth and spacing specified in sections 3.2.6 and 3.2.9 including the installation of tile tape/boards as specified in section 3.2.10. The trenches shall have vertical sides which shall be timbered, sheet piled or trench sheeted where necessary so as to avoid subsidence and damage or possible injury. The contractor shall take all reasonable precautions to prevent damage to the highway or ground surface from a slip or breaking away of the side of the trench. Excavation and filling in shall be so executed that all underground assets including but not limited to railways, tramways, walls, roads, sewers, drains, pipes, cables, tree roots, structures shall be reasonably secure against risk of subsidence or injury. The works shall be carried out to the satisfaction of the Authorities concerned. The provisions of BS6031 – 'Code of Practice for Earthworks' shall be carried out as far as is applicable.

All precautions shall be taken to minimise environmental impact when excavating in the vicinity of trees, bushes and hedgerows as discussed in EOC/17 – 'Protection of Plants, Animals and Conservation Areas'.

Where a change of level is necessary, the bottom of the trench shall rise or fall gradually; there shall never be any step changes in the bottom level of a trench.

The contractor shall deal with and dispose of water so as to prevent any risk of the cable and other materials to be laid in the trenches being detrimentally affected. He shall provide pumps and appliances required and shall carry out the necessary pumping and bailing in a safe, clean and environmentally friendly manner.

LV, 11kV and 20kV cables may only be laid on the bottom of the trench when it is smooth and free from loose or projecting stones, rubble, rock etc. Where these conditions do not apply, an additional 75mm depth shall be excavated and replaced with an appropriate smooth bedding (E.g. sand).

LV, 11kV and 20kV cables shall be blinded with stone free soil, selected sand or limestone dust to a level of 75mm above the top of the uppermost cable/duct. The blinding material shall be hand rammed over and around the cables. Mechanical rammers must not be used for this purpose.

All 132kV, 66kV and 33kV cables shall be laid on a 75mm bed of selected sand / cement bound sand (CBS), and after laying be blinded with selected sand / CBS to a depth of 75mm above the top of the uppermost cable/duct. Arrangement drawings showing the cable trench configuration shall be provided for EHV cable installations.

Cable/duct surround material (e.g. selected sand, CBS) shall be as specified in section 3.5.4 - Backfilling and Reinstatement.

Unless otherwise agreed, provision shall be made during the excavation and until reinstatement, for reasonable access of persons and vehicles to properties or places adjacent to the route of excavation. All crossing boards and gangways shall be of adequate strength for their purpose and, where appropriate, shall be secured together in such a manner as to reduce the risk of accidental displacement.

Consideration shall be given to the safety of staff working on site when carrying out excavation activities with regard to ease of access and egress form excavations as deemed appropriate.

NSP/002/005 – 'Code of Practice Detailing Cable Arrangements within Trench Layouts at all Voltages' provides additional guidance.

3.2.13. Obstructions

When obstructions due to third party plant or assets are encountered, or alterations to buildings or foundations are required, or a special form of trench is necessary, or natural obstructions such as tree roots are encountered, the Northern Powergrid project manager shall determine the required action. All associated records should be updated to identify all obstructions encountered at site.

3.3. Trenchless Excavation

3.3.1. General

Northern Powergrid encourages the use of trenchless technology wherever cost effective and practicable. Trenchless technology shall only be used where a duct can be pulled in behind. Cables shall not be laid direct when using trenchless methods.

Northern Powergrid accepts the use of guided boring for short and direct LV and HV installations only. All other trenchless installations shall utilize Horizontal Directional Drilling (HDD) or Auger Bore techniques.

Before commencing trenchless excavation, all obstacles shall be identified. All measures shall be taken to avoid damage to all utilities' and other third parties' plant and equipment.

Where ducts are required to be fusion jointed, this shall be carried out to manufacturer specification unless otherwise stated by Northern Powergrid, the ducts must be de-beaded as appropriate to ensure a smooth inner surface (Electro-fusion should not result in internal bead formation).

All directional drills shall be operated by trained competent staff in accordance with the guidelines of UKSTT (UK Society for Trenchless Technology), industry standard procedures and best working practises.

Operatives are required to record by surface marking and/or marking plans to log the position of the line of the bore every 5m and the depth every 15m. More frequent measurements may be required for any significant changes in direction. All this information shall be freely made available to Northern Powergrid for mains record purposes.

The contractor shall be able to meet any special criteria specified by a third party, e.g. Network Rail, Environment Agency, drainage boards, Canal and River Trust and local authorities. This would normally include detailed engineering designs, method statements and site specific risk assessments.

3.3.2. Depth of guided boring / directional drills

The minimum and maximum cable depths as detailed in section 3.2.6 shall be observed. In some circumstances it may be necessary to install the ducts deeper. However, the additional depth shall be kept to a minimum, whilst adhering to the requirements of any third parties, to avoid de-rating the cable and ensure the cable is readily accessible for jointing. Whilst parts of the installation may be deeper (assuming this has been agreed with the Northern Powergrid project manager), the ends of the ducts start and finish at the standard installation depths.

3.3.3. Multiple Crossings

A minimum distance of 0.6m shall be maintained between bores for most installations, for 33kV up to 132kV the minimum distance is 3m. Each bore shall be ducted before commencing another crossing as the high compression force involved during boring may cause previous bores to collapse.

3.3.4. Railway Crossings

Railway crossings are subject to the engineering and wayleave requirements of the rail operator whose advice must be sought at an early stage.

3.3.5. River and canal crossings

River and canal crossings are subject to the engineering and wayleave requirements of the Canal & River Trust and Environment Agency (EA) whose advice must be sought at an early stage.

3.3.6. Protective Covers

Under no circumstances shall any cables be laid direct using trenchless technology.

All pipes and ducts shall be installed in an approved manner as agreed with the Northern Powergrid project manager.

All ducts for trenchless excavation by guided systems shall be black SDR 11 design (see table 4, section 3.2.10), suitably embossed with a warning of the presence of an Electric Cable and comply with ENA-TS 12-24 – 'Plastic Ducts for Buried Electric Cables, 2008' and current Northern Powergrid Standards document, NPS/002/003 – 'Technical Specification for Protective Tile, Tile Tape and Cable Ducting'.

3.4. Pulling in Cables

3.4.1. General

The contractor shall give the Northern Powergrid project manager reasonable notice when cable laying is about to commence. Laying of cables shall not be started until the contractor has obtained the Northern Powergrid project manager's sanction to proceed with the work. Prior to installation the cable shall be checked to ensure the ends are sealed, the cable is undamaged and the correct cable for the project.

Cables shall be installed in accordance with ENA-TS 09-2 – 'The Specification for the Supply, Delivery and Installation of Power Cables with operating voltages on the range 33kV to 400kV and associated auxiliary cables' and in accordance with the cable manufacturer's recommendations.

Cables Laid Direct

Cables shall be laid either by hand or by winch. Whenever cables are hand or winch pulled, an adequate number of cable rollers shall be used to avoid cable damage. Cable rollers shall be arranged to support the cable during pulling in with special attention being paid at points where a change in trench direction takes place. On a straight length of cable trench, the cable rollers shall be placed at a maximum of 4 metres apart.

Cables Laid In Ducts

The cable shall always be pulled in line with the duct sockets, to prevent snagging of the cable sheath on the protruding lip. When re-entering a duct run, to create a joint bay, the ends of ducts shall be cleanly cut and smoothed, and rollers fitted where necessary to prevent damage of the cable sheath. A brush shall be drawn through the ducts to remove and dirt and debris. A wooden mandrel shall be drawn through the ducts to confirm ovality. Lubrication shall be applied to the duct and the cable(s) as deemed appropriate to reduce the pulling tension.

Both ends of the duct shall be uniquely marked prior to pulling in the cable to ensure correct identification of the cable ends.

3.4.2. Maximum Pulling Tensions

Table 6 - Maximum Pulling Tensions is re-produced as a guideline only. Guidance for specific manufacturer's types of cable should be obtained from Policy and Standards section.

Maximum Pulling Tensions		
Cable Type	**Size (sq. mm)**	**Maximum Pulling Tension (kg)**
LV Waveform Cable	95 185 300	285 650 650
11kV PICAS	185 300	650 850
11, 20kV PILC 1c	300 Cu 500 Cu	2000 2000
11, 20kV PILSWA 3c	185 300	1650 2000
11/20kV XLPE 1c	300 Cu 400 Cu 500 Cu 630 Cu	1500 2000 2000 2000
11kV / 20kV Triplex	95 Al 185 Al 300 Al	850 1650 2000
33kV XLPE 1c	300 Cu 400 Cu 500 Al 630 Cu 630 Al 800 Al	1500 2000 1500 2000 2000 2000
66kV XLPE 1c	300 Cu 500 Cu	1500 2000
132kV XLPE 1c	400 Cu 630 Cu 1000 Cu 1200 Cu	2000 2000 2000 2000

Table 6

3.4.3. Cable Pulling Techniques

By Hand – On occasions there will be a need to pull in short lengths of cable by hand (e.g. fault repairs), where this applies it is permissible to use a correctly sized cable stocking fitted to the cable. Where deemed appropriate a second means of securing the cable shall be considered to prevent the stocking from becoming detached during cable installation.

By Winch – Cable pulling by winch shall only be carried out where there is a serviceable and accurate dynamometer calibrated in kgs. The maximum pulling force for any method of cable pulling shall not exceed the values shown in 3.4.2.

The winch rope shall be fitted with a swivel eye that must be in good working order and freely rotates to prevent the cable from twisting.

When pulling cables by mechanical winch, a load-limiting device must be used to ensure that the pulling tension applied to the cable does not exceed the maximum permissible tensions.

The pulling of cable by direct and unmonitored mechanical means (e.g. hitched to a vehicle, Land rover winch) is not permitted.

The method of connecting the winch to the cable is detailed in Table 7 - Winch to Cable Connection.

Winch to Cable Connection	
Cable	**Connection Method**
• LV Waveform • 11/20kV Triplex XLPE • 11/20kV 1c XLPE • 33kV 1c XLPE (up to 400mm^2)	Connection to correctly sized cable stocking over roughened cable oversheath.
• 11kV PICAS	Connection to correctly sized cable stocking over roughened cable oversheath (sheaths and cores to be drilled, pinned and sealed against moisture ingress).
• 11, 20kV PILC 3c	Connection to correctly sized cable stocking (Assumes no PVC oversheath).
• 11kV/20kV PILC • 33kV 1c XLPE (above 400mm^2) • 66kV/132kV 1c XLPE	Connection to conductor, sealed against moisture ingress.

Table 7

Special Circumstances – There may be occasions when special requirements dictate alternative means of pulling in cables (e.g. bond pulling). Where these are intended the maximum pulling tension shall not exceed the values shown in 3.4.2. If necessary, guidance should be obtained from Policy and Standards section.

Further detail can be found in the following documentation:

- ENA-ER C.82 – 'Pulling in 11kV Aluminium Sheathed, Consac and Waveform Cables'.
- ENA-TS 09-2 – 'The Specification for the Supply, Delivery and Installation of Power Cables with operating voltages on the range 33kV to 400kV and associated auxiliary cables'.

3.4.4. Bending Radius

No cable shall be bent to a radius smaller than that given by Table 8 - Minimum Bending Radius. Cables can be permanently damaged by over bending and the following minimum radii must be observed during and after installation. Wherever possible, larger installation radii should be used.

This data is re-produced as a guideline only. Guidance for specific manufacturer's types of cable should be obtained from the manufacturer's data sheet for the particular cable or the Policy and Standards Section.

Further detail can be found in the following documentation, Engineering Recommendation (ER) C61 – 'Installation Bending Radii of 33kV and Higher Voltage Cables'.

Minimum Bending Radius		
Cable Type and Voltage	**Size sq. mm**	**Minimum Bending Radius (mm)**
LV – **Service (Plastic Types)**	All Single Phase CNE All Single Phase SNE Three Phase CNE	125 150 250
LV Waveform (3-core)	95 120 185 300	550 600 700 850
LV Waveform (4-core)	95 185 300	600 800 1000
11 kV PICAS	95 185 300	600 750 900
20 kV PILC	All Sizes	1200
XLPE single core 11kV	300 400 630	800 880 1040
XLPE single core 20kV	400	1060
Triplex 11 kV	95 185 300	880 1020 1170
Triplex 20 kV	95 185	1030 1170
XLPE 1c 33kV	300 400 630	995 1070 1220
XLPE 1c 66kV & 132kV with solid metallic sheath:- ("D" is the diameter of the cable and should be taken from the manufacturer's datasheet or measurement of the cable) - Adjacent Joints & Terminations - Laid Direct - Pulled into Ducts	All Sizes	 20D 30D 35D

Table 8

3.4.5. Ambient Temperature

Cables can be permanently damaged by being moved at low temperatures. Cable laying shall take place only when the ambient temperature is at or above 0°C and has been at this temperature for the previous 24 hours or special precautions have been taken to maintain the cables above this temperature to avoid the risk of damage during handling.

3.4.6. Cutting and Sealing Cables

Where a cable is to be cut, a clean cut shall be made at right angles to the axis of the cable. Each cable end shall be sealed by the application of a suitable end cap.

All cables up to and including 33kV installed on the Company's behalf shall be fitted with company approved earthed cap ends, unless the cable is to be jointed before any backfilling of the cable route has taken place. The presence of an earthed cap end, indicated by the green oversheath, is an indication to assist with correct cable identification, but in the case of LV cables it is necessary to open the cable as if live, as specified in Distribution Safety Rule 8.3.1(b).

Conductors on decommissioned cables shall also be connected together and bonded to the cable sheath / screen. Table 9 - Cable Capping Requirements details the required method of capping cables that are not in service. These methods are designed to protect the cable, prevent moisture ingress and prepare for installation as required. This data is re-produced as a guideline only. Guidance for specific manufacturer's types of cable should be obtained from Policy and Standards section or the manufacturer.

Cable Capping Requirements			
Cable	**Situation**	**Method**	**Period**
LV, 11kV, 20kV and 33kV (except Gas or Fluid Filled)	On the drum or in air outdoors	Mastic or adhesive coated heat shrinkable end cap	3 months providing cable is not taken off the drum
33kV to 132kV Lead or Al Sheathed Solid, Gas, Fluid Filled and XLPE	On the drum or in air outdoors	Lead plumbed cap + Mastic or adhesive coated heat shrinkable end cap	Permanent
LV	Buried direct	Mastic or adhesive coated heat shrinkable end cap	1 Month
		Permanent insulated stop end	Permanent
11kV, 20kV, 33kV (except Gas or Fluid Filled)	Buried direct	Mastic or adhesive coated heat shrinkable end cap	1 Month
		As above + Resin filled box	Permanent
33kV to 132kV Lead or Al Sheathed Solid, Gas, Fluid Filled and XLPE	Buried direct	Lead plumbed cap	1 Month
		As above + Resin filled box	Permanent

Table 9

When heat shrinkable end caps are used on cables which have a PVC/PE oversheath, the cap shall be fitted directly on to the PVC/PE, this having first being roughened.

On hessian covered lead sheathed cables the heat shrinkable cap shall be fitted on to the lead sheath which shall be cleaned with an approved cleaning cloth followed by a dry rag.
Sealing operations on cable ends which are going to be buried shall be carried out with the cable in the horizontal position.

3.4.7. Sealing of Cable Entries

It is a statutory requirement to prevent danger due to the influx of water, or any noxious or explosive liquid or gas from the surrounding ground into substations, street boxes and buildings. An approved method and materials shall be used to seal ducts in all new or altered cable installations.

These entries shall be sealed with or without cables installed. The mouth of ducts carrying cables must be cleaned and the space between the cable and duct filled using an approved mastic compound or other approved alternative (e.g. polyurethane foam) to a depth of 150mm. Care must be taken to ensure that the cable is supported from the bottom of the duct and the compound is in intimate contact with the cable to make a good seal with the duct.

Spare ducts shall first be fitted with a plug and then sealed around the duct edge or alternatively an approved end cap and the edge sealed with anti-corrosion tape where necessary.

To further reduce the possibility of gas entering a building, sub-station, street box etc. where continuous ducting is laid, a break shall be provided in the duct run, if possible, immediately outside the building or equipment.

All cable ducts entering substations or buildings shall be sealed by products assessed by Northern Powergrid and installed in accordance with the manufacturer's instructions to prevent the ingress of gas and water and generally in accordance with ENA-ER G17/3 – 'Leakage of Flammable Gases'.

3.5. Route and Joint Markers

3.5.1. General

Cable route markers shall be used for indicating the route of cables on public or private property where difficulty might be experienced in locating the cables due to the absence of permanent landmarks and as an indication of the presence of electric cables where it is considered in the interests of safety that a warning should be given or where it has been agreed with another Authority that markers will be provided. Specifically, cable route markers shall be installed where cables traverse the following locations:

- Motorways
- Bridges
- Waterways
- Railways

For all new cable installations including service cable, marker posts will be erected in accordance with ENA-ER G.57 – 'Cable Laying on Agricultural Land' to indicate the precise route of all new cables laid on good agricultural land.

Cable joint markers will generally be used for the location of cable joints only where the absence of permanent landmarks would otherwise make it difficult to identify the position from mains records. They shall normally be used where the joints are on generating stations and substation sites and where it has been agreed to provide them at the request of other Authorities. In addition, marker blocks may be used in situations where vehicular movement may be impeded by the use of marker posts.

Directional drill markers should be used, where appropriate, at entry and exit points to positively identify the start and finish of directional drills, for example when crossing the following:

- Motorways
- Waterways
- Railways

All markers shall be recorded on the Company's records systems.

3.5.2. Installation

The cable route and joint markers shall be in accordance with Northern Powergrid specification NPS/002/003 – 'Technical Specification for Protective Tile, Tile Tape and Cable Ducting'.

Cable route markers will normally be erected with the post buried in the ground half its height and will be placed as near as possible on the route of the cable but set back against adjacent walls or fences to avoid obstruction wherever possible.

Cable joint markers will normally be erected with the post buried in the ground half its height but where this would cause undue obstruction and there is no likelihood of its being buried or overgrown the post may be buried with only 300mm exposed. The marker shall be placed immediately opposite the centre of the joint in such a position that no obstruction is caused. The distance between the marker, the joint and the nearest permanent landmark shall be shown on the records.

3.5.3. Installation of Markers on Network Rail Property

When cables are laid on Rail Property, cable and joint markers shall be installed of the types approved by Network Rail.

Concrete cable route marker blocks approved by Network Rail shall be laid over the route of the cable at intervals to be agreed and at each change of direction. Where it is required to denote the position where Northern Powergrid cables cross railway tracks, a plastic coated aluminium plate shall be bolted to a marker post approved by the rail operator. The line between the posts shall indicate the line of the cable crossing.

Guidance for access to Network Rail Infrastructure is provided in NSP/005/001 – 'Access Arrangements to Network Rail Infrastructure'.

3.5.4. Backfilling and Reinstatement

Unless otherwise specified all reinstatements, materials and plant shall meet the requirements of the New Roads and Street Works Act Specification for the Reinstatement of Openings in Highways. Where special backfill is required for cable/duct surround, this shall be in accordance with ENATS 97-1 – 'Special Backfill Materials for Cable Installations'. The use of foamed concrete will be considered in special circumstances and by agreement with the Northern Powergrid project manager. The density of the foamed concrete if required shall be agreed with the Northern Powergrid project manager.

3.5.5. Cables Installed on Bridges / Structures / Overhead Terminations

When carrying out the installation of new or replacing existing cables, fixing to the exterior of bridges and structures (e.g. cable trays) shall be avoided where possible while taking account of all safety, operational and financial implications. Potential solutions include cable ducts which are suitably mechanically protected such as SDR11 as used in trenchless excavations and contained within the body of the structure or cable diversion as required.

If connection to the exterior of the structure cannot be avoided, then the installation shall be protected to a suitable standard to guard against 3rd party interference. In addition signing should be applied to warn other workers of the presence of cables in such a manner so as to not outwardly attract vandals/interference.

Further guidance can be found in NSP/002/010 – 'Guidance on the physical protection of cables crossing bridges EREC C98'.

When terminating cables on overhead structures such as terminal poles or substation busbars, cleating arrangements shall be applied to ensure that they:

- Adequately support the weight of the cable,
- Minimise cable movement,
- Withstand the physical impact of cable short circuit currents.

Before the cable is terminated it shall stand in situ for and adequate period of time to allow for any initial 'settling' to take place. Cables must be cleated into position before any termination works are commenced.

Cleating arrangements shall be agreed with the Northern Powergrid project manager prior to the commencement of any works.

3.6. Earthing and Bonding

3.6.1. Earthing and Bonding of EHV and 132kV Cables

The earthing and bonding of cables, 33kV up to and including 132kV shall be in accordance with the requirements of ENA-ER C55-5 – 'Insulated Sheath Power Cable Systems'.

In both cases manufacturer's recommendations may be considered providing they do not contradict this document.

All 33kV, 66kV and 132kV cable systems shall be solidly bonded to earth at both ends as per Section 4.3 'Solidly Bonded Systems' of ENA ER C55-5 – 'Insulated Sheath Power Cable Systems'. In addition; all cable systems shall be bonded to earth at suitable 'bonding intervals' in order to prevent damage to the outer sheath due to high internal sheath voltages during a fault. All bonding at 33kV, 66kV and 132kV shall provide for the disconnection of the

sheath from earth without the requirement for excavation or modification of the cable system, except to remove/disconnect lugs or links.

Single core cable systems shall be bonded to earth as in accordance with Table 10 - Use of Link Boxes and Bonding Leads.

Use of Link Boxes and Bonding Leads			
Voltage	**End Points**	**Bonding Intervals**	**Bonding Lead**
33kV	Removable lug(s)	LBM 14	120mm^2 Cu
66kV	LBM 1 or Removable lug(s)	LBM 14	120mm^2 Cu
132kV	LBM 3	LBM 16	300mm^2 Cu*

Table 10

*A 300mm^2 Cu bonding lead is required due to the Northern Powergrid 132kV maximum earth fault rating of 31.5kA for 1 Second.

Sheath sectionalising joints may be used at bonding interval positions in order to provide sectionalising capability for testing and sheath fault location.

3.6.2. Earthing and Bonding of LV and HV Cables

The earthing and bonding of 230/400V, 11kV and 20kV cables shall be in accordance with the requirements of IMP/010/011 'Code of Practice for Earthing LV Networks and HV Distribution Substations'.

3.7. Testing and Commissioning of newly installed Underground Cables

Newly installed XLPE cable circuits at 33kV cable and above shall be subject to cable sheath testing prior to and after completion of each jointing section. Tests unless otherwise specified shall be a 5kV DC 'megger test' applied for 1min. The tester shall be connected to the conductor and the metallic sheath in order to reduce capacitive charging effects. The unit may take several seconds to reach a full 5kV, particularly on long circuits, it is at this point that the 1 min timer shall commence. Values above 10 MegOhms shall be considered acceptable (unearthed cable cores should be discharged at the same time as the cable screen/sheath).

Where a section of cable is 'let into' an existing circuit (e.g. fault repair or diversion), as an absolute minimum the un-jointed new cable section shall be tested immediately prior to jointing, however consideration should be given to testing the end to end circuit on completion of jointing.
Where test results are below acceptable values, appropriate investigations, remedial action / repair works shall be carried out.

Following installation and jointing and before energising, all cables (other than approved exceptions) shall be subjected to an overvoltage test in accordance with the requirements of the Operational Practice Manual – section WE4.1 Cables.

Further detail on cable testing is presented in NSP/003/002 – 'Code of Practice for Insulation Testing of Network Assets'.

4. References

4.1. External Documentation

Reference	Title
Statutory Instrument 2002 No. 2665	The Electricity Safety, Quality and Continuity Regulations 2002
Department for Business Enterprise & Regulatory Reform document	Guidance on the Electricity Safety, Quality and Continuity Regulations
HS (G) 47	Avoiding danger from underground services
NRSWA	New Roads and Street Work Act 1991
	Traffic Management Act 2004 Regulations
ENA-TS 09-2	The Specification for the Supply, Delivery and Installation of Power Cables with Operating Voltages on the Range 33kV to 400kV and Associated Auxiliary Cables
ENA ER C.61	Installation Bending Radii of 33kV and Higher Voltage Cables
ER C55/5	Insulated Sheath Power Cable Systems
	Lifting Operations and Lifting Equipment Regulations 1998
	Lifting Plant and Equipment (Records of Test and Examination) Regulations 1992
BS7671	IEE Regulations, Electrical Equipment for Buildings
HSE	The Construction (Design and Management) Regulations 2015
Highway Authorities and Utilities Committee document	Code of Practice for Recording of Underground Apparatus in Streets 2002
ENA ER S2/4	Limitation of Fire Risk in Substations at 132kV and below and in Enclosed Cableways
ENA-TS 09-22	Protection of Cable Installations Against the Effects of Fire
National Joint Utilities Group Publications	NJUG Guidelines volumes 1 to 6
ENA ER C.98	Physical Protection of Cables Crossing Bridges
ENA-TS 12-24	Plastic Ducts for Buried Electric Cables 2008
BS 6031	Code of Practice for Earthworks
UKSTT	UK Society for Trenchless Technology
ENA ER C.82	Pulling in 11kV Aluminium Sheathed, Consac and Waveform Cables
ENA ER C.61	Installation Bending Radii of 33kV and Higher Voltage Cables
ENA ER G.17/3	Leakage of Flammable Gases
ENA ER G.57	Cable Laying on Agricultural Land
ENA TS 97-1	Special Backfill Material for Cable Installations
Environment Agency and Member DNO Joint Agreement	An Operating Code on the Management of Fluid Filled Cable Systems (1995), Issue 2
	The Construction Regulations (General Provisions)
ENA G37	Avoidance of Danger from Underground Electricity Cables
Design Bulletin 32	Residential Roads and Footpaths – Layout Considerations
ENA TS PO5	Protection of Telecommunication Lines from Power Lines

4.2. Internal documentation

Reference	Title
ENV/001	Northern Powergrid Environmental Management
EOC/17	Protection of Plants, Animals and Conservation Areas, Version 6, 2014
	Northern Powergrid Wayleaves Policy
NPS/002/003	Technical Specification for Protective Tile, Tile Tape and Cable Ducting
NSP/002/005	'Code of Practice for Cable Locations in Trench Layouts (Draft in development)'.
IMP/001/911	Code of Practice for the Economic Development of Low Voltage Networks
IMP/001/912	Code of Practice for the Economic Development of the HV System
IMP/001/913	Code of Practice for the Economic Development of the EHV System
IMP/001/914	Code of Practice for the Economic Development of the 132kV System
NSP/002/001	Guidance document for the installation of Fibre Optic Underground Cables
NSP/005/001	Access Arrangements to Network Rail Infrastructure
IMP/010/011	Code of Practice for Earthing LV Networks and HV Distribution Substations
NSP/003/002	Code of Practice for Insulation Testing of Network Assets
	Appendix 1, Safety Risk Assessment for Northern Powergrid – Underground Electricity Cables that are not in Substations
	Risk Assessment for Underground Cable Installations
OPM	Operational Practice Manual
DSR	Distribution Safety Rules

4.3. Amendments from Previous Version

Reference	Title
General	Document updated into the latest CDS template
1.0 Purpose	Updated to include auxiliary cables
2.0 Scope	Scope updated to reference Independent Connection Providers
3.2.1 General	Sub section added titled 'Compliance with Policy' to reinforce requirements to agree any installation variances against policy with the Northern Powergrid project manager prior to the commencement of works Reinforce the recording of non-standard installations on company records
3.2.4 Route Planning	Section re-ordered to clarify information on route planning
3.2.6 Depths of Cables	Section updated to add additional clarification for cables installed beyond the maximum depths
3.2.9 Minimum Cable Spacing	Table updated to include detail on cable spacing between mains and telecommunications cables
3.2.10 Installation Medium and Positioning of Cables	Table updated for trenchless installation duct requirements providing greater clarity across the voltage range Table updated for open cut trench requirements providing greater clarity across the voltage range Section updated covering the installation of tile tape and boards. Particularly the requirement to overlap the cable or duct by 50mm at either side LV and HV cables to have tile tape installed 150mm above uppermost cable/duct Section on duct formation updated to cover triplex and 33kV single core cables Information provided for auxiliary cables
3.4 Pulling in Cables	Information added covering marking duct ends for identification when pulling in cables
3.4.3 Cable Pulling Techniques	Table covering cable pulling methods updated to provide greater detail for certain cable sizes

Reference	Title
3.4.6 Cutting and Sealing Cables	Table covering cutting and sealing of cables updated to provide greater detail for the voltage ranges covered
3.5.5 Cables Installed on Bridges / Structures / Overhead Terminations	Section updated to include sub section covering cleating arrangements for above ground cables
3.6.1 Earthing and Bonding of EHV and 132kV Cables	Updated to reference EHV and 132kV earthing in accordance with ENA-ER C55-5 – 'Insulated Sheath Power Cable Systems' Update to reference bonding leads at 132kV can be either 300mm^2 Cu PVC or 240mm^2 Cu XLPE
3.6.2 Earthing and Bonding of LV and HV Cables	Updated to reference LV and HV earthing in accordance with IMP/010/011 'Code of Practice for Earthing LV Networks and HV Distribution Substations'
4.1 External Documentation	External documentation updated to include all referenced external documentation
4.2 Internal Documentation	Internal documentation updated to include all referenced Internal documentation

5. Definitions

Reference	Title
The Company	Northern Powergrid
BHE	Berkshire Hathaway Energy
ESQCR	Electricity Safety, Quality and Continuity Regulations
EA	Environment Agency
DNO	Distribution Network Operator
Contractor	Any persons working on cable installation work for Northern Powergrid, either in house or external.
LV	A voltage up to and including 1000V
HV	A voltage greater than 1000V, but less than 33,000V
EHV	A voltage at 33,000V up to and including 132,000V
NJUG	National Joint Utilities Group
HAUC	Highway Authorities and Utilities Committee
NRSWA	New Roads and Street Works Act
ENA TS	Energy Networks Association Technical Specification
ENA ER	Energy Networks Association Engineering Recommendation
CBS	Cement Bound Sand – as per ENATS 97-1
ICP	Independent Connection Provider
GPR	Ground Penetrating Radar
XLPE	Cross Linked Polyethylene
PVC	Polyvinyl Chloride
NPS	Network Product Specification
HDD	Horizontal Directional Drilling
OPM	Operational Practice Manual
DSR	Distribution Safety Rules

6. Authority for issue

6.1. CDS Assurance

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

		Sign	Date
Dan Rodrigues	CDS Administrator	Dan Rodrigues	05/10/2016

6.2. Author

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

Review Period - This document should be reviewed within the following time period.

Standard CDS review of 3 years	**Non Standard Review Period & Reason**	
Yes	Period: n/a	Reason: n/a
Should this document be displayed on the Northern Powergrid external website?		Yes

		Sign	**Date**
Paul Hollowood	Policy & Standards Engineer	Paul Hollowood	05/10/2016

6.3. Technical Assurance

I sign to confirm that I am satisfied with all aspects of the content and preparation of this document and submit it for approval and authorisation.

		Sign	**Date**
David Gazda	Senior Policy & Standards Engineer	David Gazda	10/10/2016
Dave Sillito	Primary Engineering Projects Manager	Dave Sillito	28/10/2016
Steve McDonald	Head of Programme Delivery	Steve McDonald	17/10/2016
Paul Norton	Head of Safety	Paul Norton	03/11/2016

6.4. Approval

Approval is granted for publication of this document.

		Sign	**Date**
Mark Nicholson	Head of System Strategy	Mark Nicholson	06/10/2016

6.5. Authorisation

Authorisation is granted for publication of this document.

		Sign	**Date**
Mark Drye	Director of Asset Management	Mary Baulk (under delegations of Mark Drye)	01/11/2016