NORTH FALLS

*Offshore Wind Farm*

# ENVIRONMENTAL STATEMENT

## Chapter 19 Ground Conditions and Contamination

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## Glossary of Acronyms

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|---|---|
| ALC | Agricultural Land Classification |
| BESS | Battery Energy Storage System |
| BGS | British Geological Survey |
| BMV | Best and Most Versatile |
| CDM | Construction Design Management |
| CEA | Cumulative Effects Assessment |
| CL:AIRE | Contaminated Land: Applications in Real Environments |
| CLR11 | Contaminated Land Report 11 |
| CoCP | Code of Construction Practice |
| COMAH | Control of Major Accident Hazard |
| COSHH | Control of Substances Hazardous to Health |
| DCO | Development Consent Order |
| DESNZ | Department for Energy Security and Net Zero |
| DoW CoP | Definition of Waste: Code of Practice |
| EA | Environment Agency |
| ECC | Essex County Council |
| EIA | Environmental Impact Assessment |
| ERP | Emergency Response Plan |
| ES | Environmental Statement |
| ETG | Expert Topic Group |
| EU | European Union |
| GPCL | Guiding Principles for Contaminated Land |
| HDD | Horizontal Directional Drilling |
| HDPE | High-Density Polyethylene |
| HIA | Hydrogeological Impact Assessment |
| HVAC | High Voltage Alternative Current |
| IESS | Institution of Environmental Sciences |
| LNR | Local Nature Reserve |
| LoGS | Local Geological Sites |
| LoWS | Local Wildlife Sites |
| MAGIC | Multi Agency Government Information for the Countryside |
| MCA | Mineral Consultation Area |
| MCZ | Marine Conservation Zone |
| MHWS | Mean High Water Springs |
| MIIA | Mineral Infrastructure Impact Assessment |
| MLP | Minerals Local Plan |
| MMP | Materials Management Plan |

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| MPS | Minerals Policy Statement |
| MRA | Minerals Resource Assessment |
| MSA | Mineral Safeguarding Area |
| MWPA | Minerals and Waste Planning Authority |
| NFOW | North Falls Offshore Wind Farm Limited |
| NGET | National Grid Electricity Transmission |
| NNR | National Nature Reserve |
| NPPF | National Planning Policy Framework |
| NPS | National Policy Statement |
| NSIP | Nationally Significant Infrastructure Project |
| NVZ | Nitrate Vulnerable Zone |
| O&M | Operation and Maintenance |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PCB | Polychlorinated Biphenyl |
| PCOC | Potential Contaminants of Concern |
| PEIR | Preliminary Environmental Information Report |
| PFAS | Perfluoroalkyl and Polyfluoroalkyl Substances |
| PPE | Personal Protective Equipment |
| PPG | Planning Practice Guidance |
| PRA | Preliminary Risk Assessment |
| PRoW | Public Rights of Way |
| SAC | Special Area of Conservation |
| SMP | Soil Management Plan |
| SPA | Special Protection Area |
| SPZ | Source Protection Zone |
| SSSI | Site of Special Scientific Interest |
| SVOC | Semi-Volatile Organic Compounds |
| SWMP | Site Waste Management Plan |
| UK | United Kingdom |
| UXB | Unexploded Bomb |
| UXO | Unexploded Ordnance |
| VOC | Volatile Organic Compounds |
| WCA | Waste Consultation Area |
| WER | Water Environment Regulations |
| WIIA | Waste Infrastructure Impact Assessment |
| WLP | Waste Local Plan |
| ZoI | Zone of Influence |

## Glossary of Terminology

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| 400kV onshore cable route | Onshore route within which the 400kV onshore cables and associated infrastructure will be located. |
| 400kV onshore cables | The cable circuits which take the electricity from the onshore substation on to the national grid connection point. These comprise High Voltage Alternative Current (HVAC) cables, buried underground. |
| Cable circuit | The onshore and offshore export cables are comprised of cable 'circuits'. Each cable circuit is typically comprised of three power cables, as well as fibre cables and earth cables. It is expected that each circuit would compromises up to seven cables in total. |
| Cable ducts | Housing for the onshore export cables, typically comprising plastic high-density polyethylene (HDPE) pipes buried underground. Each cable circuit will require up to seven individual ducts (i.e. one per cable). |
| Haul road | The track along the onshore cable route used to access different sections of the onshore cable route, the onshore substation and national grid substation connection works. |
| Horizontal directional drill (HDD) | Trenchless technique to bring the offshore export cables ashore at landfall. The technique will also be one of the trenchless techniques used for installation of the onshore export cables at sensitive areas of the onshore cable route. |
| Jointing bay | Underground structures, constructed at regular intervals along the onshore cable route to connect the sections of cable together so that each cable is a continuous length, as well as facilitating the installation of the cables into the buried cable ducts. |
| Landfall | The location where the offshore cables come ashore at Kirby Brook. |
| Landfall compound | Compound at landfall within which horizontal directional drill (HDD) or other trenchless technique would take place. |
| Link boxes | Underground chambers or above ground cabinets next to the onshore export cables housing low voltage electrical earthing links. |
| Main Rivers | Usually larger rivers and streams. The Environment Agency carries out maintenance, improvement or construction work on Main Rivers to manage flood risk. |
| Mean High Water Springs | Mean High Water Springs is the average height throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest (Spring tides). |
| National grid connection point | The grid connection location for the Project. national grid are proposing to construct new electrical infrastructure (a new substation) to allow the Project to connect to the grid, and this new infrastructure will be located at the national grid connection point. |
| National grid substation connection works | North Falls infrastructure required to connect the Project to the new substation at the national grid connection point. |
| Onshore cable route | Onshore route within which the onshore export cables and associated infrastructure would be located. |
| Onshore export cables | The cables which take the electricity from landfall to the onshore substation. These comprise High Voltage Alternative Current (HVAC) cables and auxiliary cables, buried underground. |
| Onshore project area | The boundary within which all onshore infrastructure required for the Project will be located (i.e. landfall; onshore cable route, accesses, |

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| | construction compounds; onshore substation and 400kV onshore cable route), as considered within the ES. |
| Onshore substation | A compound containing electrical equipment required to transform and stabilise electricity generated by the Project so that it can be connected to the national grid. |
| Onshore substation construction compound | Area set aside to facilitate construction of the onshore substation. Will be located adjacent to the onshore substation and within the onshore substation works area. |
| Onshore substation works area | Area within which all temporary and permanent works associated within the onshore substation are located, including onshore substation, construction compound, access, landscaping, drainage and earthworks. |
| Principal Aquifer | These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer. |
| Secondary A Aquifer | These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers. |
| Secondary B Aquifer | These are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers. |
| Source Protection Zone 1 (SPZ1) | Inner protection zone - defined as the 50-day travel time from any point below the water table to the abstraction source. This zone has a minimum radius of 50 metres. |
| Source Protection Zone 2 (SPZ2) | Outer protection zone - defined by a 400-day travel time from a point below the water table. This zone has a minimum radius of 250 or 500 metres around the abstraction source, depending on the size of the abstraction. |
| Source Protection Zone 3 (SPZ3) | Source catchment protection zone - defined as the area around an abstraction source within which all groundwater recharge is presumed to be discharged at the abstraction source. |
| The Applicant | North Falls Offshore Wind Farm Limited (NFOW). |
| The Project<br>Or<br>'North Falls' | North Falls Offshore Wind Farm, including all onshore and offshore infrastructure. |
| Transition joint bay | Underground structures that house the joints between the offshore export cables and the onshore export cables |
| Trenchless crossing | Use of a technique to install limited lengths of cable below ground without the need to excavate a trench from the surface, used in sensitive areas of the onshore cable route to prevent surface disturbance. Includes techniques such as HDD. |
| Trenchless crossing compound | Areas within the onshore cable route which will house trenchless crossing (e.g. HDD) entry or exit points. |
| Unproductive Strata | These are predominantly rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow. |

# 19 Ground Conditions and Contamination

## 19.1 Introduction

1. This chapter of the Environmental Statement (ES) considers the likely significant effects of the North Falls Offshore Wind Farm (hereafter 'North Falls' or 'the Project') on ground conditions and contamination. The chapter provides an overview of the existing environment for the proposed onshore project area, followed by an assessment of likely significant effects for the construction, operation, and decommissioning phases of the Project.

2. This chapter has been written by Royal HaskoningDHV, with the assessment undertaken with specific reference to the relevant legislation and guidance, of which the principal policy documents with respect to Nationally Significant Infrastructure Projects are the National Policy Statements (NPS). Details of these and the methodology used for the Environmental Impact Assessment (EIA) and Cumulative Effect Assessment (CEA) are presented in Section 19.4.

3. The assessment should be read in conjunction with the following linked chapters:

   - Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23) covers hydrology, hydrogeology and flood risk. There is the potential for construction works to mobilise pre-existing contamination which may migrate into the surrounding water environment impacting on the quality of water resources. There is also the potential for construction works to create new preferential pathways between currently unconnected sources and receptors;
   - Chapter 22 Land Use and Agriculture (Document Reference: 3.1.24) covers agricultural land designations and soils. There is the potential for pre-existing contamination to be mobilised, or for new sources of contamination to be introduced as part of the construction, operation and decommissioning of North Falls. Activities that may lead to the mobilisation of or introduction of new sources of contamination have the potential to adversely impact on the quality of agricultural land, potentially reducing its productivity;
   - Chapter 23 Onshore Ecology (Document Reference: 3.1.25) covers receptors including designated sites, habitats and protected and notable species. There is the potential for pre-existing contamination to be mobilised, or for new sources of contamination to be introduced as part of the construction, operation and decommissioning of North Falls. Any migration and discharge of contamination into surface waters could lead to a reduction in surface water quality and impact on the ecological habitats they support; and
   - Chapter 28 Human Health (Document Reference: 3.1.30) covers the health and well-being of the surrounding population. Potential impacts to and on the health and well-being may arise as a result of the mobilisation of pre-existing contamination or through the introduction of new sources of contamination during the construction, operation and decommissioning of North Falls.

4. Additional information to support the ground conditions and contamination assessment includes:

- Appendix 19.1 Geo-Environmental Desk Study and Preliminary Risk Assessment Report (Document Reference: 3.3.20).
- Appendix 19.2 Mineral Resource Assessment, Five Estuaries Offshore Wind Farm (Document Reference: 3.3.21)
- Appendix 19.3 Waste Assessment (onshore) (Document Reference: 3.3.22)
- Figures 19.1 to 19.6 (Document Reference: 3.2.15).

## 19.2 Consultation

5. Consultation with regards to ground conditions and contamination has been undertaken in line with the general processes described in ES Chapter 6 EIA Methodology (Document Reference: 3.1.8). The key elements to date have included scoping and the ongoing technical consultation via the Water Resources, Flood Risk, Land Quality and Geology Expert Topic Group (ETG). The feedback received has been considered in preparing the ES. Table 19.1 provides a summary of how the consultation responses received to date have influenced the approach that has been taken.

6. This chapter has been updated following the consultation on the Preliminary Environmental Impact Report (PEIR) in order to produce the final assessment. Full details of the consultation process will also be presented in the Consultation Report as part of the Development Consent Order (DCO) application.

**Table 19.1 Consultation responses**

| Consultee | Date / Document | Comment | Response / where addressed in the ES |
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| Affinity Water Ltd | 29/07/2021<br>Scoping Opinion | At this stage, no comments. Concern will only be at the point of landfall and associated development in terms of connections to existing grid infrastructure; in those instances, Affinity Water will want to ensure there are no potential contamination issues. | It is acknowledged that there are potable water supply pipes operated by Affinity Water within and surrounding the onshore project area. A review of the existing environment, including identification of potential sources of contamination, is discussed within Table 19.10 and Table 19.11.<br>of this chapter. Further details on these parameters are provided within Appendix 19.1 (Document Reference: 3.3.20).<br>Impacts, including the potential to introduce contaminants to the onshore project area and mitigation measures to reduce the significance of effect to the surrounding environment, are set out in Table 19.3 and Sections 19.6.1 and 19.6.2. |
| Environment Agency | 16/08/021<br>Scoping Opinion | We are pleased to see that the report has scoped in Ground Conditions and Contamination. We agree with the proposals to establish baseline conditions and undertake a PRA [ Preliminary Risk Assessment]. This will assist in determining the need for intrusive investigation and subsequently, remediation. | The existing environment is discussed within Table 19.10 of this chapter and within Appendix 19.1 (Document Reference: 3.3.20). Embedded mitigation measures are discussed in Table 19.3. Impacts, including potential additional mitigation measures, are set out in Sections 19.6.1 and 19.6.2. |
| Essex County Council | 20/08/2021<br>Scoping Opinion | Whilst we note that non-statutory designated sites have not been requested at this stage, we highlight that details of Local Geological Sites (LoGS) should be requested from GeoEssex for the onshore geology assessment in addition to onshore ecology chapter needing details of Local Wildlife Sites (LoWS).<br>Please add GeoEssex to the list of stakeholders to be consulted and onshore geology added to the ES scope for assessment. | A review of LoGS, recorded on the GeoEssex website, within the onshore project area has been undertaken as part of the preparation of this chapter (Table 19.10, see also Figure 19.4 (Document Reference: 3.2.15) which illustrates the location of LoGS in relation to the onshore project area). |
| | | [Essex County Council (ECC)] is the host Minerals and Waste Planning Authority in the two tier administrative area of Essex. The Essex Minerals Local Plan - Adopted July 2014 concerns the administrative area of Essex and seeks to ensure a local supply of aggregates for the County is retained for as planned growth.<br>The Essex and Southend on Sea Waste Local Plan - Adopted October 2017 concerns the administrative area of Essex and Southend on Sea only.<br>Both the above are Adopted material planning considerations. | Details of the Mineral Safeguarding Areas (MSA) present within the onshore project area are outlined in Table 19.10 (with additional detail provided in Appendix 19.1 (Document Reference: 3.3.20). Potential impacts to identified MSAs during construction and operation are provided in Sections 19.6.1.4 and 19.6.2.3 respectively.<br>In line with Policy S8, a Mineral Resource Assessment has been completed as the onshore project area constitutes a non-mineral development within MSAs. The Minerals Resource Assessment has been submitted as part of the DCO application. Consultation with Essex County Council in relation to the methodology of the Mineral Resource Assessment was |
| | | The onshore ‘project area’ forms the basis for the minerals and waste safeguarding assessment set out below. It is recognised that the ‘project area’ takes the form of a large Area of Search within which it is intended to | |

| Consultee | Date / Document | Comment | Response / where addressed in the ES |
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| | | locate onshore equipment associated with the offshore wind farm and that there is no intention to develop anything approaching the full extent of the area.<br><br>Safeguarding Mineral Resources<br><br>Within the Area of Search, there lies approximately 6819.7ha of land which is designated as a Mineral Safeguarding Area (MSA) for sand and gravel. Depending on the final location and land-take of the on-shore element of the proposal, the application may trigger Policy S8 of the Essex Minerals Local Plan 2014 (MLP). The MLP can be viewed on the County Council's website via the following link: https://www.essex.gov.uk/minerals-waste-planning-policy/minerals- local-plan<br><br>Policy S8 of the MLP requires that a non-mineral proposal located within an MSA which exceeds defined thresholds must be supported by a Minerals Resource Assessment to establish the existence, or otherwise, of a mineral resource capable of having economic importance. This will ascertain whether there is an opportunity for the prior extraction of that mineral to avoid the sterilisation of the resource, as required by the National Planning Policy Framework (Paragraph 210). The NPPF requires policies that encourage the prior extraction of mineral where it is practical and environmentally feasible.<br><br>The threshold set out in Policy S8 of the MLP for sand and gravel is 5ha, and the policy therefore applies if the proposed non-mineral development covers 5ha or more of land covered by a MSA designation. Policy S8 states that "… Proposals which would unnecessarily sterilise mineral resources or conflict with the effective workings of permitted minerals development or Preferred Mineral site allocation shall be opposed."<br><br>Where non-mineral development proposals are made which intersect with 5ha or more of sand and gravel, a Minerals Resource Assessment (MRA) is required as part of the planning application to establish the practicality and environmental feasibility of the prior extraction of mineral such that the resource is not sterilised where this can be avoided. If found to be practical and environmentally feasible, prior extraction is expected to take place ahead of sterilisation by non-mineral development.<br><br>The relationship between the sand and gravel MSA and the project area is shown in Appendix One. | undertaken for the Five Estuaries Offshore Wind Farm ('Five Estuaries') in September 2023. The Minerals Resource Assessment is provided in Appendix 19.2 (Document Reference: 3.3.21) has been based on the following data sources:<br><br>• British Geological Survey (BGS) data (borehole records, geological mapping, mineral assessment reports and mineral mapping);<br>• Ground investigation data;<br>• Natural England;<br>• Historic England;<br>• Environment Agency;<br>• Google Earth; and<br>• Essex County Council Minerals Local Plan (2014) and Mineral Policy Map.<br><br>Following the refinement of the onshore project area, the project no longer interacts with Mineral Consultation Areas (areas separate to those designated as an MSA). As such, a MIIA is not required. |

| Consultee | Date / Document | Comment | Response / where addressed in the ES |
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| | | The scope and level of detail of a Minerals Resource Assessment will be influenced by the specific characteristics of the site's location, its geology, and the nature of the development being applied for. However, a number of key requirements can be identified which are likely to satisfy the MWPA that the practicality and environmental feasibility of prior extraction have been suitably assessed in the MRA. The detail to be provided should be in proportion to the nature of the proposed application. The MWPA welcomes early engagement to clarify the requirements of MRA. | |
| | | To ensure that a comprehensive assessment of the mineral resource at risk of sterilisation is undertaken, it is recommended that:<br>- Any questions regarding the scope of an MRA are discussed with the MWPA as early as possible;<br>- a draft borehole location plan is agreed prior to commencement, and preferably as part of pre- application;<br>- the borehole depths should be sufficient to prove the depth of the safeguarded deposit;<br>- borehole analysis must note the depth of the water table;<br>- a non-stratified sampling technique is applied. An initial spacing of approximately 100m-150m centre to centre should be considered, with additional locations if required to determine the extent of deposits on site; and<br>- The MRA provides documented evidence confirming any commercial interest in working the resource at risk of sterilisation based on its quality, quantity, and viability of prior extraction. | |
| | | Any application, through a MRA or otherwise, is required to be submitted with sufficient information such that the issues raised through Policy S8 of the MLP can be appropriately considered. | |
| | | The project area passes through a number of Mineral Consultation Areas as shown in Appendix One and listed in Appendix Two. With regard to Mineral Consultation Areas, Policy S8 of the MLP seeks to ensure that existing and allocated mineral sites and infrastructure are protected from inappropriate neighbouring developments that may prejudice their continuing efficient operation or ability to carry out their allocated function in the future. Policy S8 of the MLP defines Mineral Consultation Areas as extending up to 250m from the boundary of an infrastructure site or allocation for the same. | |

| Consultee | Date / Document | Comment | Response / where addressed in the ES |
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| | | Due to the proposed project passing through a Mineral Consultation Area, a Mineral Infrastructure Impact Assessment (MIIA) is required as part of the planning application. The MWPA has designed a generic schedule of information requirements that should be addressed as relevant through an MIIA. The detail to be provided should be in proportion to the nature of the proposed application. | |
| | | A MIIA is expected to be evidence based and informed by quantified information. It is recognised that the requirements of an MIIA may be addressed through other evidence base documents, such as those addressing transport, odour and noise issues. In these instances, it would be acceptable for the MIIA to signpost to the relevant section of complementary evidence supporting the planning application. The MWPA welcomes early engagement to clarify the requirements of MIIA. | |
| | | The project area passes through a number of Waste Consultation Areas shown in Appendix One. Its location within these Waste Consultation Areas means that the application is subject to Policy 2 of the Essex and Southend-on-Sea Waste Local Plan 2017 (WLP). The WLP can be viewed on the County Council's website via the following link: https://www.essex.gov.uk/minerals-waste-planning-policy/waste-local-plan | Route refinement that has been undertaken following the submission of Scoping Report. The refinement has resulted in the onshore project area no longer interacting with Waste Consultation Areas.<br>Although no longer interacting with Waste Consultation Areas, the construction of the Project will result in the production of waste materials. A waste assessment for the construction phase of North Falls has therefore been produced and forms Appendix 19.3 (Document Reference: 3.3.22). The appendix also discusses the relevant waste legislation and policy applicable to the Project. |
| | | Policy 2 of the WLP seeks to ensure that existing and allocated waste sites and infrastructure are protected from inappropriate neighbouring developments that may prejudice their continuing efficient operation or ability to carry out their allocated function in the future. Policy 2 defines Waste Consultation Areas as extending up to 250m from the boundary of existing or allocated waste infrastructure, unless they are Water Recycling Centres, where the distance increases to 400m. | |
| | | Due to the proposed project passing through a Waste Consultation Area, a Waste Infrastructure Impact Assessment (WIIA) is required as part of the planning application. In order to satisfy the provisions of Policy 2, the MWPA has designed a generic schedule of information requirements that should be addressed as relevant within the supporting evidence of any application which falls within a Waste Consultation Area. The detail to be provided should be in proportion to the nature of the proposed application. | |
| | | A WIIA is expected to be evidence based and informed by quantified information. It is recognised that the requirements of a WIIA may be | |

| Consultee | Date / Document | Comment | Response / where addressed in the ES |
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| | | addressed through other evidence base documents, such as those addressing transport, odour and noise issues. In these instances, it would be acceptable for the WIIA to signpost to the relevant section of complementary evidence supporting the planning application. The MWPA welcomes early engagement to clarify the requirements of WIIA. | |
| | | This response deals with mineral policy matters and waste policy matters in turn. A spatial representation of the project area and the matters discussed can be found in Appendix One. A list of relevant designations and specific facilities which would potentially be affected are listed, with their most recent planning application reference where relevant, in Appendix Two. | |
| Public Health England | 13/08/2021<br>Scoping Opinion | Land quality<br>We would expect the applicant to provide details of any hazardous contamination present on site (including ground gas) as part of a site condition report and associated risk assessment.<br>Emissions to and from the ground should be considered in terms of the previous history of the site and the potential of the site, during construction and once operational, to give rise to issues. Public health impacts associated with ground contamination and / or the migration of material off-site should be assessed in accordance with the Environment Agency publication Land Contamination: risk management and the potential impact on nearby receptors; control and mitigation measures should be outlined. | A review of the existing environment, including identification of potential sources of contamination, is discussed within Table 19.10 and Table 19.11 of this chapter. Further details on these parameters are provided within Appendix 19.1 (Document Reference: 3.3.20) which has been completed in line with the Environment Agency Land Contamination Risk Management guidance (Environment Agency, 2023), as well as other relevant land contamination guidance.<br>Potential impacts during the construction and operation of North Falls are set out in Sections 19.6.1 and 19.6.2 of this chapter. The assessment methodology, including the legislation, guidance and policy, followed as part of the impact assessment can be found in Section 19.4. |
| | | Waste<br>The applicant should demonstrate compliance with the waste hierarchy (e.g. with respect to re-use, recycling or recovery and disposal).<br>For wastes arising from the development the ES should assess:<br>• The implications and wider environmental and public health impacts of different waste disposal options<br>• Disposal route(s) and transport method(s) and how potential impacts on public health will be mitigated<br>• If the development includes wastes delivered to the installation:<br>• Consider issues associated with waste delivery and acceptance procedures (including delivery of prohibited wastes) and should assess potential off-site impacts and describe their mitigation | A waste assessment for the construction phase of North Falls forms Appendix 19.3 (Document Reference: 3.3.22). |

| Consultee | Date / Document | Comment | Response / where addressed in the ES |
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| Planning Inspectorate | 26/08/2021<br>Scoping Opinion | Physical impacts on geological designated sites (SSSIs) during operation.<br>Limited information is presented in the Scoping Report as a justification for scoping this matter out of the ES. The Inspectorate also notes that the Scoping Report identifies the potential for direct impacts to the Ardleigh Gravel Pit SSSI (designated for its geological interest) from construction activities including cable laying, which it is considered could potentially also result in permanent physical works within the SSSI.<br>In addition, there is no consideration within the Scoping Report as to whether there could be indirect impacts to SSSIs designated for geological interest during operation, e.g. as a result of altered hydrogeology, for example paragraph 474 of the Scoping Report notes that subsurface flow patterns could be altered.<br>The Inspectorate therefore does not agree to scope this matter out of the ES and considers that impacts to the Ardleigh Gravel Pit SSSI should be scoped into the ES.<br>Section 3.5 of the Scoping Report also identifies a number of other SSSIs designated for the geological interest within proximity to the scoping boundary, including Holland on Sea Cliff (0.3km), Wivenhoe Gravel Pit (1.3km), St Osyth Pit (2.5km), Clacton Cliffs and Foreshore (2.7km) and The Naze (3.6km). These are not referenced as part of the description of the baseline within section 3.1 of the Scoping Report. Where there is potential for likely significant effects to occur during operation at these designated sites, they should also be scoped into the ES. | A review of the existing environment, including the identification of designated sites, is discussed in Table 19.10 with further detail provided in Appendix 19.1 (Document Reference: 3.3.20). The review identified that there are no geological designated sites, nationally or locally, located within the onshore project area or the 250m buffer zone. Following the refinement of the onshore project area since the production of the scoping report, Arleigh Gravel Pit SSSI is located approximately 1.7km west of the onshore substation (inclusive of wider works and national grid connection works). As such, the source-pathway-receptor linkage is broken, and the designated feature will not be impacted by the Project.<br>Figure 19.4 (Document Reference: 3.2.15) illustrates the locations of geological designated sites relative to the onshore project area.<br>As there are no geological designated sites located within the onshore project area, or within 250m, an assessment of the potential impacts during the operational phase of North Falls has not been included within this chapter. |
| | | Loss, damage or sterilisation of mineral resources during decommissioning.<br>Limited information is presented in the Scoping Report as a justification for scoping this matter out of the ES and no information is presented about the methods of decommissioning to be used, and whether these would result in any further loss, damage or sterilisation of mineral resources as compared to construction activity, which is scoped into the ES. As such the Inspectorate does not have sufficient information on which to conclude that significant effects are not likely, and this matter should be scoped into the ES. | The likely significant effects associated with the loss, damage or sterilisation of mineral resources have been assessed for the construction and operational phases of North Falls in Section 19.6.<br>In relation to potential effects during the decommissioning phase, no decision has been made regarding the final decommissioning policy for North Falls as it is recognised that industry best practice, rules and legislation change over time. It is however, anticipated that the likely significant effects would be similar or less than those during construction. |
| | | The ES should specify and describe the habitats / receptors that have been considered in the assessment of impacts to groundwater and surface water quality from contamination. The selection of receptors should be based on the potential for contamination pathways and likely | The existing environment, including environmentally sensitive areas / receptors, is discussed in Table 19.10. Impacts to the ecologically designated sites are set out in Sections 19.6.1 and |

| Consultee | Date / Document | Comment | Response / where addressed in the ES |
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| | | significant effects to occur. This should include consideration of receptors beyond the scoping boundary where an impact pathway is identified, for example Hamford Water SPA [Special Protection Area], Ramsar and SAC [Special Area of Conservation] and Stour and Orwell Estuaries SPA. | 19.6.2 with further detail provided in ES Chapter 23 Onshore Ecology (Document Reference: 3.1.25). |
| | | The Scoping Report does not present a defined study area for assessment, but states that it will comprise the area within the DCO application boundary, plus a buffer of 250m for potential sources of contamination and a further 1km buffer for historical maps and groundwater and surface water abstraction points.<br>In line with the Inspectorate's comments at ID 5.1.1 and 5.1.3, the study area used for the purposes of the assessment of this aspect should also be informed by an understanding of the likely contamination / impact pathways that exist. The study area should include the nearshore area and be of sufficient extent to enable an assessment of all likely significant effects arising from ground conditions and contamination, including where this extends into the offshore area." | The onshore project area includes land located landward of Mean High Water Springs (MHWS). The study area for this chapter includes the land located both within the onshore project area (landward of MHWS) and a 250m buffer zone (extending to 1km in relation to Control of Major Accident Hazard sites (COMAH) and groundwater abstractions). An explanation of the study area, and justification, is provided within Section 19.3.1.<br>The baseline environment and assessment discussed within this chapter have been informed by the Geo-Environmental Desk Study and Preliminary Risk Assessment which reviewed potential sources of contamination, pathways and receptors that may be present (see Appendix 19.1 (Document Reference: 3.3.20)). |
| | | The Scoping Report indicates that it is not proposed to undertake any intrusive site investigation to inform the assessment, relying instead on desk-based sources. The Inspectorate notes the potential presence of a range of contamination sources within the onshore scoping area and considers that limiting the approach to desk study only may not provide sufficient baseline information to inform the assessment. The Applicant should not rule out intrusive investigation and should instead seek to agree the approach to establishing baseline conditions with relevant consultation bodies, undertaking intrusive site investigation where it is deemed necessary to inform a robust assessment of significant effects. | Potential mitigation measures, including the undertaking of targeted ground investigations in areas of potential contamination, are discussed within Table 19.3 and Section 19.6. Any ground investigations that may be required to determine the extent and source of contamination would be completed post consent, prior to the commencement of the construction phase. Following the completion of targeted ground investigations (if required), a generic quantitative risk assessment would be undertaken with recommendations included for further works should they be deemed necessary. |
| | | The Inspectorate notes that loss, damage or sterilisation of mineral resources is scoped into the ES; however, limited information is presented as to the scope of the assessment and how effects would be determined. The assessment should take into account factors such as; the nature of the mineral resource, the constraints and opportunities that exist for extraction. | Details of the mineral resources present within the onshore project area are outlined in Table 19.10 (with additional detail provided in Appendix 19.1 (Document Reference: 3.3.20)). Potential impacts to identified resources during construction and operation are provided in Sections 19.6.1.4 and 19.6.2.3 respectively. |
| | | The Inspectorate notes that the onshore scoping area passes through a mineral consultation area (MCA) and a waste consultation area (WCA); the baseline scenario should include relevant information about the | A Mineral Resource Assessment (originally undertaken for Five Estuaries) has been completed and will be submitted as part of |

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| | | features and emissions of any facilities associated with the MCA and WCA, e.g. noise, dust, odour, traffic, and lighting. | the DCO application and forms Appendix 19.2 (Document Reference: 3.3.21).<br>With regards to the WCA, a waste assessment for the construction phase of North Falls forms Appendix 19.3 (Document Reference: 3.3.22). |
| | | Figure 1.3 Table 2.4<br>Designated sites.<br><br>The Inspectorate notes the presence of Holland on Sea Cliff SSSI within the Scoping Study Area that has been designated for its geological interest.<br>The ES should therefore identify the location of any other relevant statutory or non-statutory sites protected for their geological interest as part of the baseline studies. The ES should assess any likely significant effects on the Holland on Sea Cliff SSSI, alongside any other sites that are identified. | A review of the existing environment, including the identification of designated sites, is discussed in Table 19.10 with further detail provided in Appendix 19.1 (Document Reference: 3.3.20). The review identified that there were no geological designated sites, nationally or locally, located within the onshore project area or the 250m buffer zone (see Section 19.3.1 for details on how the study area for this chapter has been defined). Figure 19.4 (Document Reference: 3.2.15) illustrates the locations of geological designated sites relative to the onshore project area which has been further refined since the production of the Preliminary Environmental Impact Report.<br>As there are no geological designated sites located within the onshore project area, or within 250m, an assessment of the potential impacts during the operational phase of North Falls has not been included within this chapter. |
| | | Section 3.1.4<br>Assessment methodology<br><br>The Scoping Report states that guidance listed at paragraph 437 will be used to inform the assessment, together with the outcome of further liaison with stakeholders. No detailed assessment methodology is presented, nor is any criteria presented to identify how significance of effect will be determined in relation to this aspect. No cross reference is made to the generic methodology presented in section 1.8 of the Scoping Report. The ES should be clear on how the assessment has been undertaken, using an aspect specific methodology where this is relevant. | The assessment methodology relevant to the assessment of impacts associated with ground conditions and contamination is outlined in Section 19.4.3. Table 19.6 discusses the sensitivity of potential ground conditions and contamination receptors. Table 19.7 discusses the magnitude of impact on identified receptors relevant to this chapter. |
| | | Table 3.3<br>Mineral resources.<br><br>The Inspectorate notes that loss, damage or sterilisation of mineral resources is scoped into the ES; however, limited information is presented | Details of the mineral resources present within the onshore project area are outlined in Table 19.10 (with additional detail provided in Appendix 19.1, (Document Reference: 3.3.20)). Potential impacts to identified resources during construction |

| Consultee | Date / Document | Comment | Response / where addressed in the ES |
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| | | as to the scope of the assessment and how effects would be determined. The assessment should take into account factors such as; the nature of the mineral resource, the constraints and opportunities that exist for extraction. | and operation are provided in Sections 19.6.1.4 and 19.6.2.3 respectively. |
| | | The ES should include details regarding the location of groundwater and surface water abstraction points presented on a figure. | Information relating to groundwater and surface water abstractions has been received from the EA and Tendring District Council, the information relevant to this chapter is included within Table 19.10 (with additional detail provided in Appendix 19.1, (Document Reference: 3.3.20) and location of abstractions illustrated on Figure 19.6 (Document Reference: 3.2.15). Potential impacts to identified resources during construction and operation are provided in Sections 19.6.1.2 and 19.6.2.2 respectively. |
| Essex County Council | 29/06/2021<br>Onshore Water Resources and Flood Risk, Land Quality and Geology Expert Topic Group Minutes | The Principal Planning Officer would like dialogue if working over [a mineral] safeguarding area. ECC would object to any development in principle but noted that it could be mitigated.<br><br>The Principal Planning Officer stated a materials management plan would be absolutely necessary (post-consent) if crossing these areas. | Engagement with the Essex Minerals and Waste Planning Authority would be undertaken to aid in identifying potential mitigation measures during the construction and operational phases of North Falls. Potential mitigation measures are discussed within Section 19.6.<br>A materials management plan would be produced post consent for the areas of overlap between mineral safeguarded areas and the onshore development area. |
| Environment Agency | 29/06/2021<br>Onshore Water Resources and Flood Risk, Land Quality and Geology Expert Topic Group Minutes | The Environment Agency assumed there would be a risk assessment for HDD [Horizontal Directional Drilling], and hydrogeological risk assessments also provided at this stage. | The requirements in relation to risk assessments for HDD, including hydrogeological risk assessments, would form part of the Outline CoCP to be submitted as part of the DCO application and included within the final CoCP post-consent (secured by DCO Requirement). |
| | | The Environment Agency was pleased to see NFOW were intending to undertake a Preliminary Risk Assessment (PRA) as a first step and wanted to advise that historic landfills should be avoided. | The Geo-Environmental Desk Study and Preliminary Risk Assessment (PRA) for the onshore project area is provided as Appendix 19.1 (Document Reference: 3.3.20). As illustrated on Figure 19.2 (Document Reference: 3.2.15) the onshore project area does not interact with any recorded historical landfill sites.<br><br>Details of site selection are provided in ES Chapter 4 Site Selection and Assessment of Alternatives (Document Reference: 3.1.6). |
| | | Mineral Matters - Safeguarding Mineral Resources | |

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| Essex County Council | 14/07/2023, PEIR Consultation | The total project area is 1057 hectares, of which 346.4 hectares is designated as a Mineral Safeguarding Area (MSA) for sand and gravel. As such, the application is subject to Policy S8 of the Essex Minerals Local Plan 2014 (MLP).<br>The MLP can be viewed on the County Council's website via the following link: https://www.essex.gov.uk/minerals-waste-planning-policy/minerals-local-plan<br>Policy S8 of the MLP requires that a non-mineral proposal located within an MSA which exceeds defined thresholds must be supported by a Minerals Resource Assessment to establish the existence, or otherwise, of a mineral resource capable of having economic importance. This will ascertain whether there is an opportunity for the prior extraction of that mineral to avoid the sterilisation of the resource, as required by the National Planning Policy Framework (Paragraph 210). The NPPF requires policies that encourage the prior extraction of mineral where it is practical and environmentally feasible." | Details of the mineral resources present within the onshore project area are outlined in Table 19.10 (with additional detail provided in Appendix 19.1, (Document Reference: 3.3.20). Potential impacts to identified resources during construction and operation are provided in Sections 19.6.1.4 and 19.6.2.3 respectively.<br>A Mineral Resource Assessment (originally undertaken for Five Estuaries) has been completed and will be submitted as part of the DCO application and forms Appendix 19.2 (Document Reference: 3.3.21). The Mineral Resource Assessment identifies that an area >5ha will be impacted as a result of the construction and operation of North Falls and/or Five Estuaries with specific reference made to Policy S8 in the Appendix. |
| | | The threshold set out in Policy S8 of the MLP for sand and gravel is 5ha, and the policy therefore applies if the proposed non-mineral development covers 5ha or more of land covered by a MSA designation. Policy S8 states that "… Proposals which would unnecessarily sterilise mineral resources or conflict with the effective workings of permitted minerals development or Preferred Mineral site allocation shall be opposed." | |
| | | Where non-mineral development proposals are made which intersect with 5ha or more of sand and gravel, a Minerals Resource Assessment (MRA) is required as part of the planning application to establish the practicality and environmental feasibility of the prior extraction of mineral such that the resource is not sterilised where this can be avoided. If found to be practical and environmentally feasible, prior extraction is expected to take place ahead of sterilisation by non-mineral development. | |
| | | The scope and level of detail of a Minerals Resource Assessment will be influenced by the specific characteristics of the site's location, its geology, and the nature of the development being applied for. However, several key requirements can be identified which are likely to satisfy the MWPA that the practicality and environmental feasibility of prior extraction have been suitably assessed in the MRA. The detail to be provided should be in proportion to the nature of the proposed application. The MWPA welcomes early engagement to clarify the requirements of MRA. | |

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| | | Site location, relevant boundaries, timescale for development<br>Application area in relation to MSA/MCA, Description of development including layout & phasing, Timescale for development<br>Whether there is any previous relevant site history – this could include previous consideration of site or adjacent land in preparation of Minerals Local Plan, any previous mineral assessments and market appraisals, boreholes, site investigations, technical reports and applications to the MWPA for extraction. | |
| | | Nature of the existing mineral resource<br><br>Type of mineral, Existing mineral exploration data (e.g. previous boreholes in area), Results of further intrusive investigation if undertaken, Extent of mineral – depth & variability, Overburden – depth & variability, overburden: mineral ratio. To be expressed as both actual depths and ratio of overburden to deposit, as well as variation across the site.<br>Mineral quality – including silt %/content and how processing may impact on quality. Consideration should give given to the extent to which the material available on site would meet the specifications for construction.<br>An assessment of the amount of material that would be sterilised (whole site area) and could be extracted (following application of any required buffer zones).<br>Estimated economic/market value of resource affected across whole site and that which could be extracted. | |
| | | Constraints impacting on the practicality of mineral extraction (distinct from those that would arise from the primary development)<br>Ecology designations, Landscape character, Heritage designations, Proximity to existing dwellings, Highways infrastructure, Proximal waterbodies, Hydrology, Land stability, Restoration requirements,<br>Effect on viability of non-minerals development including through delays and changes to landform and character, Utilities present etc.<br>Constraints should be assessed in light of the fact that construction of the non-minerals development would be taking place e.g. landscape issues are to be presented in light of the final landscape likely to be permanent built development. It is held that mitigation methods employed as part of | |

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| | | the construction of the non-minerals development may also facilitate prior extraction at that locality. | |
| | | Potential opportunities for mineral extraction at location<br>Ability of site to incorporate temporary mineral processing plant, Proximity to existing mineral sites or processing plant, Context of site and mineral within wider mineral resource area, Proximity to viable transport links for mineral haulage, The potential for indigenous material to be used in the construction of the proposed development, thereby reducing/removing the need for import, Potential benefits through mineral restoration e.g. land reclamation, landscape enhancement, Any opportunities for ancillary extraction as part of the primary development of the site such as foundations, footings, landscaping, sustainable drainage systems, Evidence or otherwise of interested operators/local market demand. | |
| | | An MRA is expected to be evidence based and informed by quantified information.<br>To ensure that a comprehensive assessment of the mineral resource at risk of sterilisation is undertaken, it is recommended that:<br>• Any questions regarding the scope of an MRA are discussed with the MWPA as early as possible;<br>• A draft borehole location plan is agreed prior to commencement, and preferably as part of pre-application;<br>• The borehole depths should be sufficient to prove the depth of the safeguarded deposit;<br>• Borehole analysis must note the depth of the water table;<br>• A non-stratified sampling technique is applied. An initial spacing of approximately 100m-150m centre to centre should be considered, with additional locations if required to determine the extent of deposits on site; and<br>• The MRA provides documented evidence confirming any commercial interest in working the resource at risk of sterilisation based on its quality, quantity, and viability of prior extraction. | |
| | | The MRA should be prepared using the Pan-European Standard for Reporting of Exploration Results, Mineral Resources and Reserves Standard, which was revised and published on 23 May 2013. Any application, through a MRA or otherwise, is required to be submitted with | |

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| | | sufficient information such that the issues raised through Policy S8 of the MLP can be appropriately considered. | |
| | | Mineral Infrastructure Matters<br>With regard to Mineral Consultation Areas, Policy S8 of the MLP seeks to ensure that existing and allocated mineral sites and infrastructure are protected from inappropriate neighbouring developments that may prejudice their continuing efficient operation or ability to carry out their allocated function in the future. Policy S8 of the MLP defines Mineral Consultation Areas as extending up to 250m from the boundary of an infrastructure site or allocation for the same. | |
| | | Waste Matters, Safeguarding Waste Infrastructure<br>Policy 2 of the WLP seeks to ensure that existing and allocated waste sites and infrastructure are protected from inappropriate neighbouring developments that may prejudice their continuing efficient operation or ability to carry out their allocated function in the future. Policy 2 defines Waste Consultation Areas as extending up to 250m from the boundary of existing or allocated waste infrastructure, unless they are Water Recycling Centres, where the distance increases to 400m.<br>The WLP can be viewed on the County Council's website via the following link: https://www.essex.gov.uk/minerals-waste-planning-policy/waste-local-plan<br>The application site does not pass through a Waste Consultation Area (WCA) and therefore, a Waste Infrastructure Impact Assessment (WIIA) is not required as part of the planning application. | A waste assessment for the construction phase of North Falls forms an appendix to this chapter. |
| Anglian Water | 13/07/2023, PEIR Consultation | Summary of mitigation embedded in the design: The mitigation measures outlined regarding contaminated land and groundwater references that wastewater arising from potential areas of contamination within the PRA or encountered through construction works, or groundwater from dewatering activities would be collected prior to discharge. This goes on to state that discharge of the wastewater shall either be to a foul sewer under a trade effluent agreement or to a surface water body. Anglian Water as the statutory sewerage undertaker, would welcome further discussion regarding such matters, and would seek to ensure that we are adequately consulted on any connections to our network, including through the Expert Topic Group proposed in Chapter 21. | Ongoing consultation with Anglian Water will be undertaken as part of the DCO application process to ensure the appropriate agreements are in place prior to the commencement of construction works. |

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| Environment Agency | 14/07/2023, PEIR Consultation | We agree that detailed ground investigations may be required post consent to determine the extent and source of any contamination. The range of contaminants tested should include those associated with the former land use. | Ground investigations, and laboratory testing, will be designed with reference to historical land uses to ensure the potential contaminants of concern are included within the testing suite (see also Section 19.6.1.1.4). |
| | | In addition to the proposals in this paragraph, Hydrogeological Impact assessment (HIA) should be carried out for excavations that exceed 1 meter. | The requirement for the completion of Hydrogeological Risk Assessments will be undertaken where required prior to the commencement of the construction phase. Their need will be determined based on a high level assessment of the risk posed to the underlying water resource either from potential pollution or a disruption to the existing flow paths from either HDD crossings or shallow disturbance such as dewatering during the laying of the onshore cable route. |
| Little Bromley Parish Council | July 2023, PEIR Consultation | Village Well Water - Many properties in Little Bromley have no mains water connection and are reliant on well water. There is concern on whether the North Falls development will affect the water sources in the village and affect these water supplies. Extension of the water main to these properties would seem to be the only way to guarantee continuity of supply. | Information relating to groundwater and surface water abstractions has been received from the EA and local authority, the information relevant to this chapter is included within Table 19.10 (with additional detail provided in Appendix 19.1 (Document Reference: 3.3.20). Potential impacts to identified resources during construction and operation are provided in Sections 19.6.1.2 and 19.6.2.2 respectively.<br>A high level screening exercise to identify those potable groundwater abstractions that may be impacted as a result of the construction and operation of the Project will be undertaken. Where potentially impacted potable groundwater abstractions are identified, a Hydrogeological Risk Assessment will be undertaken. The Hydrogeological Risk Assessment will be undertaken post consent and will include an assessment on potential disruption to local water supplies and outline appropriate mitigation measures to reduce the magnitude of impact. |

## 19.3 Scope

### 19.3.1 Study area

7. The study area for ground conditions and contamination has been defined on the basis of the distance over which impacts may occur and by the location of any receptors (as identified in Table 19.6) that may be affected by those potential impacts. This has been established using professional judgement and is supported by the evidence presented in Appendix 19.1 (Document Reference: 3.3.20). The study area for this assessment includes the following three buffer zones:

- A 100m buffer has been applied around the onshore project area for the purpose of reviewing of historical mapping for the presence of potential historical sources of contamination (see Figure 19.1, (Document Reference: 3.2.15)). A 100m buffer for the review of historical mapping has been deemed appropriate due to the agricultural nature of the area;
- A general 250m buffer around the onshore project area as illustrated on Figure 19.1 (Document Reference: 3.2.15). Within the 250m buffer zone, records relating to the following were reviewed (see Appendix 19.1 (Document Reference: 3.3.20)):
    - Pollution control;
    - Waste;
    - Hazardous substances and health and safety;
    - Environmentally sensitive areas and visual/cultural designations;
    - Agricultural Land Classification and Best and Most Versatile gradings;
    - Historical and current industrial land uses;
    - Built environment;
    - British Geological Survey borehole records;
    - Mining and mineral extraction; and
    - Hydrology.
- The study area is extended to 1km from the onshore project area for assessing the presence of:
    - COMAH) sites because they can pose a high risk to developments;
    - Groundwater abstraction wells and surface water abstractions due to their sensitivity related to potential small changes in the environment surrounding them.

### 19.3.2 Realistic worst case scenario

8. The final design of North Falls will be confirmed through detailed engineering design studies that would be undertaken post-consent. In order to provide a precautionary but robust impact assessment at this stage of the development process, realistic worst case scenarios have been defined in terms of the potential impacts that may arise. This approach to EIA, referred to as the

Rochdale Envelope, is common practice for developments of this nature, as set out in Planning Inspectorate Advice Note Nine (2018). The Rochdale Envelope for a project outlines the realistic worst case scenario for each individual impact, so that it can be safely assumed that all other scenarios within the design envelope would have less impact. Further details are provided in ES Chapter 6 EIA Methodology (Document Reference: 3.1.8).

9. The realistic worst case scenarios for the likely significant effects scoped into the EIA for the ground conditions and contamination assessment are summarised in Table 19.2. These are based on North Falls parameters described in ES Chapter 5 Project Description (Document Reference: 3.1.7), which provides further details regarding specific activities and their durations.

10. The main grid connection options considered in the ES are outlined below:

- Option 1: Onshore electrical connection at a national grid connection point within the Tendring peninsula of Essex, with a project alone onshore cable route and onshore substation infrastructure.
- Option 2: Onshore electrical connection at a national grid connection point within the Tendring peninsula of Essex, sharing an onshore cable route and onshore duct installation (but with separate onshore export cables) and co-locating separate project onshore substation infrastructure with Five Estuaries; or
- Option 3: Offshore electrical connection, supplied by a third party.

11. Grid connection Option 2 is considered the realistic worst case scenario for the ground conditions and contamination assessment because the build out requires four sets of cable ducts and associated joint bays to be installed, impacting upon the largest footprint of the three grid connection options.

12. Under Option 2, the Project's onshore infrastructure comprises the following elements:

- Landfall, where the offshore export cables are brought ashore;
- Onshore cable route, which includes space for temporary works for the installation of cable ducts and buried onshore export cables, including areas for temporary construction compounds (TCCs), construction and operation and maintenance accesses (including Bentley Road improvement works);
- Onshore substation, proposed to be located west of Little Bromley;
- Onshore substation works area, which includes land required for temporary construction, export cables, means of access, drainage, landscaping and environmental mitigation for the onshore substation;
- The search area for the East Anglia Connection Node (EACN) (the Project's National Grid connection point), within which will be located the Project's National Grid substation connection works.

13. Collectively, the footprint of the Project's onshore infrastructure is referred to herein as the 'onshore project area' and is shown on Figure 5.2 (Document Reference: 3.2.3). The Project's onshore infrastructure outlined above is proposed to be located entirely within the Tendring peninsula of Essex.

**Table 19.2 Realistic worst case scenarios of effects arising from development of Option 2**

| Impact | Parameter | Notes |
|---|---|---|
| **Construction** | | |
| Impacts relating to landfall | Landfall HDD (temporary works) physical parameters:<br>Landfall construction compound dimensions = 75 x 150m<br>Transition joint bay size = 4 x 15m<br>No. of transition joint bays = 2<br>Total construction land take for TJBs = 150 x 75m<br>Maximum HDD depth = 20m<br>Maximum length of HDD = 1,100m | These parameters represent the maximum footprint and duration of disturbance of works within the onshore project area. The potential impacts to ground conditions and contamination receptors, both within the onshore project area and within the buffer zones discussed in Section 19.3.1, are discussed in Section 19.6.1. |
| | Duration:<br>13 months (of which HDD = 6 months)<br>HDD to include 24 hour / 7 days working where required | |
| Impacts relating to the onshore cable route | Onshore cable route construction physical parameters:<br>Onshore cable route construction swathe = between 72 and 130m<br>Onshore cable route length = up to 24km<br>Cable trench width = 1.2m (width at base) – 3.75m (width at top) x 2m (depth)<br>No. of sets of cable ducts = 4<br>No. of trenches = 4<br>Target cable burial depth = 1.2m<br>Maximum cable burial depth = 2m<br>Minimum cable burial depth = 0.9m<br>Haul road width = 6m (up to 10m at passing places)<br>Jointing bays = 192 (approximately every 500m) buried below ground<br>Jointing bay construction footprint (per bay) = 4 x 15m<br>Jointing bay depth = 2.15m<br>Temporary construction compound footprint = 150 x 150m (main cable construction compounds) to 100 x 100m (satellite cable construction compounds).<br>No. of compounds (est.) = 11 | |
| | Trenchless crossings physical parameters: | |

| Impact | Parameter | Notes |
|---|---|---|
| | Onshore cable route construction swathe at trenchless crossings = between 90 and 130m<br>Maximum trenchless crossing depth = 20m<br>HDD compound footprint = 75 x 150m | |
| | Durations:<br>Cable route works = 18 – 27 months<br>Cable installation = 12 months<br>Major HDD (each location) = 8 months (of which HDD = 4 months)<br>Minor HDD crossings = 2 months<br>Major HDD to include 24 hour / 7 days working where required<br>Bentley Road widening = 6-9 months. | |
| Impacts relating to the onshore substation | Onshore substation physical parameters:<br>Indicative Substation construction footprint = 280 x 210m Air Insulated Switchgear (AIS) substation (5.88ha)<br>Construction compound footprint = 250 x 150m (3.75ha) | |
| | Durations:<br>Construction duration = 21 - 27 months | |
| Impacts relating to the 400kV connection to the NGET substation | 400kV cable installation:<br>Cable route length = <1km<br>No. of cable circuits = 2<br>No. crossings = 2 | |
| **Operation** | | |
| Impacts relating to the onshore cable route | Onshore cable route operational physical parameters:<br>No. of link boxes = up to 192<br>Link box footprint (per box) = 0.6 x 1 x 1.5m<br>Cross-sectional area of buried cement-bound sand = 0.6m$^2$ | These parameters represent the maximum footprint of North Falls that would interact with the baseline environment. Potential impacts to ground conditions and contamination receptors during the operational phase of North Falls are discussed in Section 19.6.2. |
| Impacts relating to the onshore substation | Onshore substation physical parameters:<br>Maximum onshore substation platform footprint = 280 x 210m (5.88ha)<br>Landscape / bunding area = 19,600m$^2$ (1.96ha) | |

| Impact | Parameter | Notes |
|---|---|---|
| **Decommissioning** | | |
| No final decision has yet been made regarding the final decommissioning policy for the onshore project infrastructure including landfall, onshore cable route, 400kV cable route and onshore substation. It is also recognised that legislation and industry best practice change over time. However, it is likely that the onshore project equipment, including the cable, would be removed, reused, or recycled where practicable and the transition bays and cable ducts being left in place. The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and would be agreed with the regulator. It is anticipated that for the purposes of a reasonable worst-case scenario, the magnitude of impacts would be no greater than those identified for the construction phase. | | |

### 19.3.3 Summary of mitigation embedded in the design

14. This section outlines the embedded mitigation relevant to the ground conditions and contamination assessment, which has been incorporated into the design of North Falls (Table 19.3). Where other additional mitigation measures are proposed, these are detailed in the impact assessment (Section 19.6); where applicable.

**Table 19.3 Embedded mitigation measures**

| Parameter | Mitigation measures embedded into North Falls design |
|---|---|
| **Contaminated land and groundwater** | |
| Cable crossings beneath watercourses | **Trenchless crossing techniques** |
| | Trenchless crossing techniques (e.g. HDD) have been committed to where the onshore cable route cross Main Rivers. This would minimise the potential for contamination (if present) from excavation works by limiting the potential for contaminated materials to enter surface waters via surface run off and shallow interconnected groundwater. |
| All onshore elements of North Falls | **CoCP**<br>The development of, and adherence to, a CoCP. The CoCP would be regularly reviewed and updated post consent, prior to and during the construction period. The CoCP would be informed by the findings of any pre-construction ground investigation and include an assessment of the potential risks to human health and controlled waters receptors posed by the construction of North Falls. Based on that risk assessment, appropriate working methods would be developed to avoid, minimise, or mitigate impacts relating to construction. The risk mitigation strategies incorporated into the CoCP would include:<br>• Use of appropriate Personal Protective Equipment (PPE);<br>• Provision of welfare facilities;<br>• Monitoring of works including air quality and odour; and<br>• Implementation of relevant good working practices including stockpile management and dust suppression activities to reduce the risk relating to the creation and inhalation of wind-blown dusts.<br>The CoCP would incorporate legislation requirements including the Construction Design Management (CDM) Regulations (2015), Health and Safety at Work Act (1974) and Control of Substances Hazardous to Health (COSHH) Regulations (2002).<br>In addition, a plan for dealing with unexpected contamination would be developed as part of the CoCP. This plan would also incorporate the Environment Agency best practice guidelines for pollution prevention which have been withdrawn from use but still provide a useful best practice guide and include:<br>• Environment Agency Pollution Prevention Guidance (PPG) 01 - Understanding your environmental responsibilities;<br>• Environment Agency PPG 05 - Works and maintenance near water;<br>• Environment Agency PPG 06 - Working at construction and demolition sites: preventing pollution guidance;<br>• Environment Agency PPG 08 - Safe storage and disposal of used oils;<br>• Environment Agency PPG 21 - Pollution incident response planning; and<br>• Environment Agency PPG 22 - Dealing with spills.<br>In areas that have been identified as potential areas of contamination within the PRA or encountered during construction works, perched waters within Made Ground or groundwater from dewatering activities |

| Parameter | Mitigation measures embedded into North Falls design |
|---|---|
| | would be collected within a tank or lagoon prior to any treatment or discharge. This wastewater shall either be:<br>• Discharged to foul sewer under a trade effluent consent agreed with the local water company / supplier; and / or,<br>• Discharged to surface water under an environmental permit issued by the Environment Agency.<br>On site treatment plant may be required to treat the wastewater prior to disposal in order to meet discharge limits set by either the Environment Agency or local water company.<br>The CoCP will be secured by DCO Requirement, and an outline version of the CoCP has been submitted with the DCO application (Document Reference: 7.13). |
| | **Adoption of the Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste: Code of Practice (DoW CoP)** |
| | Adoption of the DoW CoP via a Materials Management Plan (MMP) to manage the re-use and disposal of excavated soils within the onshore project area would also be incorporated as an additional mitigation measure in the CoCP, this would aid in maximising sustainability and provide an audit trail to demonstrate the appropriate use of materials.<br>An MMP would be drafted in advance of any construction works, this would include chemical screening criteria in order to ensure that imported and / or reused materials are chemically suitable for use. If materials containing asbestos or soils containing fibres are identified, then a specialist contractor would be employed to aid in its removal from the onshore project area, in line with current legislation.<br>The MMP would form part of the final CoCP to be submitted post consent. |
| | **Site Waste Management Plan** |
| | A Site Waste Management Plan will be developed post-consent to ensure the proper handling and protocols are in place to deal with any generated wastes. |
| | **Soil Management Plan (SMP)** |
| | A SMP which will form part of the CoCP, outlining the mitigation measures and good practice techniques which contractors would be obliged to comply with will be produced. Mitigation measures included within the SMP include:<br>• Consider the weather conditions and whether it is appropriate to work for each soil type;<br>• Store soil appropriately;<br>• Ensure effective drainage systems are used during construction;<br>• Reinstate drainage systems following construction; and<br>• Reinstate and plant vegetation following completion of the construction works.<br>The SMP sets out procedures for the appropriate handling of soils during the works, including:<br>• Using a competent contractor for soil handling, storage and reinstatement under Defra (2009) Construction code of practice for the Sustainable Use of Soils on Construction Sites;<br>• Storing topsoil adjacent to where it is stripped, where practicable;<br>• Seeding of topsoil bund with clover mix to fix nutrients and keep the soil live, therefore limiting soil loss and requirement for significant inputs when reinstated; |

| Parameter | Mitigation measures embedded into North Falls design |
|---|---|
| | • Storage of the excavated subsoil separately from the topsoil, with sufficient separation to ensure segregation;<br>• Handling of soils according to their characteristics;<br>• Limiting mechanised soil handling in areas where soils are highly vulnerable to compaction during wet weather;<br>• Restricting movements of heavy plant and vehicles to specified routes; and<br>• Minimise excavation footprint as much as reasonably practicable.<br>Measures set out in the MAFF (2000) Good Practice Guide for Handling Soils and Defra's (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites would be adopted. Additionally, guidance from the Institution of Environmental Sciences (IES) (2020) Sustainable, Healthy and Resilient: Practice-Based Approaches to Land and Soil Management would also be used.<br>Stockpiling of excavated materials during earthworks will be temporary in nature and will only be permitted in designated areas. These designated stockpiling areas will be located a minimum of 10m from any open watercourses where practicable. |
| | **Operation and maintenance (O&M) manual** |
| | Following the completion of construction works, the O&M manual for North Falls will be handed to the Applicant by the Principal Contractor. The folder will include information in relation to the residual risks present within the onshore project area.<br>Maintenance workers that are required to undertake ground excavations during the operation of North Falls would be provided with the information contained within the O&M manual regarding the nature of ground conditions within each area so that they can develop site and task specific risk assessments and method statements with their recommendations being implemented.<br>During cable repair / maintenance works and at the onshore substation, all fuels, oils, lubricants, and other chemicals would be stored in an impermeable bund with at least 110% of stored capacity. Spill kits would be available on site and an Emergency Response Plan (ERP) (or similar) would be developed and recorded within the O&M manual. The ERP will outline the mitigation measures to be undertaken in the event of an uncontrolled release of hazardous materials. |
| **Groundwater quality and abstractions for water supply** | |
| All onshore elements of North Falls | The onshore cable route has been developed to avoid interaction with Groundwater SPZ 1, and thereby minimising the potential impact on abstractions for public water supply. The onshore cable route has been developed to avoid interaction with Groundwaters designated as being in an SPZ 1, and thereby minimising the potential impact on abstractions for public potable water supply. |
| | The CoCP discussed above would include specific measures that are protective of controlled waters in relation to the storage of fuels, oils, lubricants, wastewater, and other chemicals during the works. This would include:<br>• Storing all fuels, oils, lubricants, wastewater, and other chemicals in impermeable bunds with at least 110% of the stored capacity, with any damaged containers being removed from the onshore project area.<br>• Refuelling would take place in a dedicated impermeable area, using a bunded bowser. Biodegradable oils will be used where practicable.<br>• Ensuring that spill kits are available on site at all times as well as sandbags and stop logs for deployment in case of emergency spillages. |

| Parameter | Mitigation measures embedded into North Falls design |
|---|---|
| | A hydrogeological risk assessment will be undertaken where earthworks / excavations are within 50m (or 250m dependent upon the volume abstracted) of private potable groundwater abstractions and pose a potential risk from either existing or potentially introduced contamination.<br>Further hydrogeological risk assessments will be undertaken where earthworks / excavations are within influencing distance of abstractions whereby they may interrupt flow pathways due to dewatering or other associated activities.<br>Additionally, hydrogeological risk assessments for HDD would be undertaken where required.<br>The risk assessment, which would be desk-based, follows a tiered approach with more detailed assessments carried out in areas considered to pose a potentially greater risk to groundwater.<br>The hydrogeological risk assessment will meet the requirements of the Environment Agency's Approach to Groundwater Protection 2018 Framework and be completed post consent. |
| | A piling risk assessment would be undertaken where piles are to be used (e.g. the onshore substation) in areas of where the potential for contamination exists, in line with the Environment Agency's Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention (Environment Agency, 2001). |

## 19.4 Assessment methodology

### 19.4.1 Legislation, guidance and policy

#### *19.4.1.1 National Policy Statements*

15. The assessment of potential impacts upon ground conditions and contamination has been made with specific reference to the relevant legislation and guidance, of which the principal policy documents with respect to the Nationally Significant Infrastructure Projects (NSIPS) are the National Policy Statements (NPS). Those relevant to the Project are:

- Overarching NPS for Energy (EN-1) (Department for Energy Security and Net Zero, 2023a);
- NPS for Renewable Energy Infrastructure (EN-3) (Department for Energy Security and Net Zero, 2023b); and,
- NPS for Electricity Networks Infrastructure (EN-5) (Department for Energy Security and Net Zero, 2023c).

16. The specific assessment requirements for ground conditions and contamination, as detailed in the NPS, are summarised in Table 19.4 together with an indication of the section of the ES chapter where each is addressed.

**Table 19.4 NPS assessment requirements**

| NPS Requirement | NPS Reference | ES Reference |
|---|---|---|
| **Overarching NPS for Energy (EN-1)** | | |
| In the 25 Year Environment Plan, the government set out its vision for a quarter of-a-century action to help the natural work regain and retain good health. A commitment to review the plan every 5 years was set into law in the Environment Act 2021. The Environmental Improvement Plan was published in 2023, which reinforces the intent of the 25 Year Environment Plan and sets out a plan to deliver on its framework and vision. The government's policy for biodiversity in England is set out in the Environmental Improvement Plan 2023, the National Pollinator Strategy and the UK Marine Strategy. The aim is to halt overall biodiversity loss in England by 2030 and then reverse loss by 2042, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people. This aim needs to be viewed in the context of the challenge presented by climate change. Healthy, naturally functioning ecosystems and coherent ecological networks will be more resilient and adaptable to climate change effects. Failure to address this challenge will result in significant adverse impact on biodiversity and the ecosystem services it provides. | Paragraph 5.4.2 | Geological designated sites and impacts relating to climate change are discussed in Table 19.10 and Section 19.5.2 respectively. No geologically designated sites, or LoGS, have been identified within the onshore project area (see Figure 19.4, (Document Reference: 3.2.15)) and so an assessment of potential impacts to these features has not been undertaken.<br>Impacts to the ecologically designated sites are set out in Section 19.6.1 and 19.6.2 with further detail provided in ES Chapter 23 Onshore Ecology (Document Reference: 3.1.25). |
| Many SSSIs are also designated as sites of international importance and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an international designation, should be given a high degree of protection. Most National Nature Reserves are notified as SSSIs. | Paragraph 5.4.7 | A review of geologically designated sites, including those listed on the GeoEssex website in relation to LoGS, within the onshore project area has been undertaken as part of the preparation of this chapter (Table 19.10, see also Figure 19.4 (Document Reference: 3.2.15) which illustrates the location of LoGS in relation to the onshore project area, and Appendix 19.1 (Document Reference: 3.3.20)). The review identified that there were no nationally or locally geologically designated sites located within the onshore project area or the 250m buffer zone.<br>As there are no geologically designated sites located within the onshore project area, or within 250m, an assessment of the potential impacts to these features has not been undertaken.<br>Ecologically designated sites are also discussed within Table 19.10, with additional details in Appendix 19.1 (Document Reference: 3.3.20). Impacts to the ecologically designated sites are set out in Section 19.6.1 and 19.6.2 with further detail provided in ES Chapter 23 Onshore Ecology (Document Reference: 3.1.25). |
| Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Wildlife Sites, are areas of substantive nature conservation value and make an important contribution to ecological networks and nature's recovery. They can also provide wider benefits including public access (where agreed), climate mitigation and helping to tackle air pollution. | Paragraph 5.4.12 | |
| Where the development is subject to EIA [Environmental Impact Assessment] the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats. | Paragraph 5.4.17 | |

| NPS Requirement | NPS Reference | ES Reference |
|---|---|---|
| The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests. | Paragraph 5.4.19 | |
| To further minimise any adverse impacts on geodiversity, where appropriate applicants are encouraged to produce and implement a Geodiversity Management Strategy to preserve and enhance access to geological interest features, as part of relevant development proposals | Paragraph 5.4.38 | |
| As a general principle, and subject to the specific policies below, development should, in line with the mitigation hierarchy, aim to avoid significant harm to biodiversity and geological conservation interests, including through consideration of reasonable alternatives (as set out in Section 4.2 above). Where significant harm cannot be avoided, impacts should be mitigated and as a last resort, appropriate compensation measures should be sought. | Paragraph 5.4.42 | |
| In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national, and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider environment. | Paragraph 5.4.48 | |
| Development of land will affect soil resources, including physical loss of and damage to soil resources, through land contamination and structural damage. Indirect impacts may also arise from changes in the local water regime, organic matter content, soil biodiversity and soil process. | Paragraph 5.11.4 | The baseline environment in relation to agricultural land is discussed in Table 19.10. Potential impacts, and mitigation measures, in relation to contamination that may occur during construction and operation are discussed in Sections 19.6.1 and 19.6.2. Impacts associated with the potential loss of agricultural land and disruption to farming practices are discussed in ES Chapter 22 Land Use and Agriculture (Document Reference: 3.1.24). |
| Where pre-existing land contamination is being considered within a development, the objective is to ensure that the site is suitable for its intended use. Risks would require consideration in accordance with the contaminated land statutory guidance as a minimum. | Paragraph 5.11.5 | The existing ground conditions and potential sources of contamination are discussed in Section 19.5.1, with further details provided in Appendix 19.1 (Document Reference: 3.3.20).<br>An assessment of the potential impacts associated with the construction and operation of North Falls is provided in Sections 19.6.1 and 19.6.2. Potential mitigation measures, for example targeted ground investigations in areas of concern, are also discussed in these sections. |

| NPS Requirement | NPS Reference | ES Reference |
|---|---|---|
| Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5). | Paragraph 5.11.12 | The baseline environment in relation to agricultural land is discussed in Table 19.10. Potential impacts, and mitigation measures, in relation to contamination, that may occur during construction and operation are discussed in Sections 19.6.1 and 19.6.2. Impacts associated with potential loss of agricultural land and disruption to farming practices are discussed in ES Chapter 22 Land Use and Agriculture (Document Reference: 3.1.24).<br>Details of the SMP which will form part of the embedded mitigation measures for the Project is provided in Table 19.3 and ES Chapter 22 Land Use and Agriculture (Document Reference: 3.1.24). |
| Applicants are encouraged to develop and implement a Soil Management Plan which could help minimise potential land contamination. The sustainable reuse of soils needs to be carefully considered in line with good practice guidance where large quantities of soils are surplus to requirements or are affected by contamination. | Paragraph 5.11.14 | |
| Developments should contribute to and enhance the natural and local environment by preventing new and existing developments from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. | Paragraph 5.11.15 | The existing ground conditions and potential sources of contamination are discussed in Section 19.5.1. The baseline environment and assessment discussed within this chapter have been informed by the Geo-Environmental Desk Study and Preliminary Risk Assessment which reviewed potential sources of contamination associated with the current and historical land uses within the study area (see Appendix 19.1 (Document Reference: 3.3.20)).<br>An assessment of the potential impacts associated with the construction and operation of North Falls is provided in Sections 19.6.1 and 19.6.2. Potential mitigation measures, for example targeted ground investigations in areas of concern, are also discussed in these sections.<br>Following completion of targeted ground investigations, if required, a generic quantitative risk assessment will be undertaken to assess the potential risks to human health and controlled water receptors from the Project. The assessment will also include recommendations for further works, including remediation, should they be deemed necessary. |
| Applicants should ensure that a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. | Paragraph 5.11.17 | |
| For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination, and where contamination is present, applicants should consider opportunities for remediation where possible. It is important to do this as early as possible as part of engagement with the relevant bodies before the official pre-application stage. | Paragraph 5.11.18 | |

| NPS Requirement | NPS Reference | ES Reference |
|---|---|---|
| Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place. | Paragraph 5.11.19 | Mineral Safeguarding Areas are discussed in Table 19.10. Potential impacts to these areas during the construction and operational phases of North Falls are discussed within Sections 19.6.1.4 and 19.6.2.3 respectively. Measures to mitigate the potential impacts during construction and operation are also discussed within these sections. |
| Where a proposed development has an impact upon a Mineral Safeguarding Area (MSA), the Secretary of State should ensure that appropriate mitigation measures have been put in place to safeguard mineral resources. | Paragraph 5.11.28 | |
| **NPS for Renewable Energy Infrastructure (EN-3)** | | |
| Applicants are encouraged to develop and implement a Soil Resources and Management Plan which could help to use and manage soils sustainably and minimise adverse impacts on soil health and potential land contamination. This should be in line with the ambition set out in the Environmental Improvement Plan to bring at least 40% of England's agricultural soils into sustainable management by 2028 and increase this up to 60% by 2030. | Paragraph 2.10.34 | The baseline environment in relation to agricultural land is discussed in Table 19.10. Potential impacts, and mitigation measures, in relation to contamination, that may occur during construction and operation are discussed in Sections 19.6.1 and 19.6.2. Impacts associated with potential loss of agricultural land and disruption to farming practices are discussed in ES Chapter 22 Land Use and Agriculture (Document Reference: 3.1.24).<br>Details of the SMP which will form part of the embedded mitigation measures for the Project is provided in Table 19.3 and ES Chapter 22 Land Use and Agriculture (Document Reference: 3.1.24). |
| **NPS for Electricity Networks Infrastructure (EN-5)** | | |
| A review of NPS EN-5 (2023c) did not identify requirements relating to ground conditions and contamination (landward of MHWS) and are therefore not considered relevant to this chapter. | | |

#### *19.4.1.2 Other legislation, policy and guidance*

17. In addition to the NPS, there are a number of overarching pieces of legislation, policy and guidance applicable to the assessment of ground conditions and contamination. These include:

##### 19.4.1.2.1 National Planning Policy Framework

18. The specific assessment requirements for ground conditions and contamination, as detailed in the National Planning Policy Framework Guidance (NPPF) (Department for Levelling Up, Housing and Communities, 2023) are detailed in Table 19.5.

**Table 19.5 National Planning Policy Framework guidance relevant to ground conditions and contamination**

| NPPF Requirement | NPPF Reference | ES Reference |
|---|---|---|
| Planning policies and decisions should contribute to and enhance the natural and local environment by:<br>a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);<br>b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;<br>c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;<br>d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;<br>e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and<br>f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate. | NPPF15-180 | In relation to ground conditions and contamination, the existing environment is discussed in Section 19.5. Table 19.10, summarises the baseline environment within the onshore project area. Potential impacts and mitigation measures aimed at minimising the potential impacts to the receptors identified, including remediation, are set out in Table 19.3 and Section 19.6.<br>Potential impacts in relation to air, water, biodiversity and noise are discussed in:<br>ES Chapter 20 Onshore Air Quality (Document Reference: 3.1.22);<br>ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23);<br>ES Chapter 23 Onshore Ecology (Document Reference: 3.1.25); and<br>ES Chapter 26 Noise and Vibration (Document Reference: 3.1.28). |
| Planning policies and decisions should ensure that:<br>a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land | NPFF15-189 | The existing ground conditions and potential sources of contamination are discussed in Section 19.5. The potential impacts of North Falls, and mitigation measures (including |

| NPPF Requirement | NPPF Reference | ES Reference |
|---|---|---|
| instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);<br>b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and<br>c) adequate site investigation information, prepared by a competent person, is available to inform these assessments. | | ground investigation works) are set out in Table 19.3 and Section 19.6.<br>Any ground investigations that may be required would be completed post consent, prior to the commencement of the construction phase.<br>Following the completion of targeted ground investigations (if required), a generic quantitative risk assessment would be undertaken with recommendations included for further works should they be deemed necessary. |
| Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.<br>Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:<br>a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;<br>b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and<br>c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation. | NPFF15-190 and NPPF15-191 | A summary of the existing ground conditions and potential sources of contamination within the onshore project area are provided in Table 19.10 and Table 19.11 respectively. Further details are provided within Appendix 19.1 (Document Reference: 3.3.20).<br>An assessment of the potential impacts associated with the construction and operation of North Falls is provided within Section 19.6. Potential mitigation measures, for example targeted ground investigations in areas of concern, are discussed within Table 19.3 and Section 19.6.<br>Potential interactions and inter-relationships between each of the identified impacts are discussed in Sections 19.10 and 19.11 respectively. |
| It is essential that there is a sufficient supply of minerals to provide the infrastructure, buildings, energy and goods that the country needs. Since minerals are a finite natural resource, and can only be worked where they are found, best use needs to be made of them to secure their long-term conservation.<br>Planning policies should:<br>…<br>c) safeguard mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas; and | NPPF17-215 and NPFF17-216 | Mineral Safeguarding Areas are discussed in Table 19.10. Potential impacts to these areas during the construction, operational and decommissioning phases of North Falls are discussed within Section 19.6.<br>Engagement with the Essex Minerals and Waste Planning Authority would be undertaken prior to construction to aid in identifying potential mitigation measures during the construction and operational phases of North Falls. Potential mitigation measures are discussed within Section 19.6. |

| NPPF Requirement | NPPF Reference | ES Reference |
|---|---|---|
| adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked);<br>d) set out policies to encourage the prior extraction of minerals, where practical and environmentally feasible, if it is necessary for non-mineral development to take place. | | |

#### 19.4.1.2.2 Tendring District Council Local Plan 2013-2033 and beyond, Section 2 (2022)

19. The Tendring District Council Local Plan has been reviewed and the following policies and objectives are considered relevant to ground conditions and contamination.

20. Policy SPL 3: Sustainable Design, Part C Impacts and Compatibility states that:

*"New development (including changes of use) should be compatible with surrounding uses and minimise any adverse environmental impacts. The following criteria must be met:*

a) *The development will not have a materially damaging impact on the privacy, daylight or other amenities of occupiers of nearby properties;*

b) *The development, including any additional road traffic arising, will not have unacceptable levels of pollution on: air, land, water (including ground water), amenity, health or safety through noise, smell, dust, light, heat, vibration, fumes or other forms of pollution or nuisance;*

c) *The health, safety or amenity of any occupants or users of the proposed development will not be materially harmed by any pollution from an existing or committed use;*

d) *All new development should have regard to the most up to date adopted Essex Mineral Local Plan; and*

e) *During the construction phase, developers must comply with a 'considerate constructors' scheme' which employs reasonable measures and techniques to minimise and mitigate impacts and disturbance to neighbours and the existing wider community and any damage to public and private property."*

21. Policy PPL 4: Biodiversity and Geodiversity states that:

- "*Sites designated for their international, European and national importance to nature conservation: including Ramsar sites; Special Protection Areas (SPAs); Special Areas of Conservation (SACs); Marine Conservation Zones (MCZs); National Nature Reserves (NNRs); and Sites of Special Scientific Interest (SSSIs) will be protected from development likely to have an adverse effect on their integrity*"; and

- "*Proposals for new development should be supported by an appropriate ecological assessment. Where new development would harm biodiversity or geodiversity, planning permission will only be granted in exceptional circumstances, where the benefits of the development demonstrably outweigh the harm caused and where adequate mitigation or, as a last resort, compensation measures are included, to ensure a net gain, in biodiversity.*"

22. Strategic Objective 8 (biodiversity) of the Local Plan is "*to provide a network of interconnected multi-functional natural green and blue spaces which secures a net gain in biodiversity and geodiversity; promotes healthy lifestyles; and enhances the quality of the natural and built environment*."

#### 19.4.1.2.3 Essex County Council: Essex Minerals Local Plan, July 2014

23. The Essex Minerals Local Plan is currently under review, consultation on the updated plan closed in March 2024. In the absence of an approved and updated local plan, reference is made to the adopted 2014 document.

24. The following policy within the Essex Minerals Local Plan (2014) is considered relevant to ground conditions and contamination.

25. Policy S8: Safeguarding Mineral Resources and Mineral Reserves of the Essex Minerals Local Plan states that:

*"By applying Mineral Safeguarding Areas (MSAs) and / or Mineral Consultation Areas (MCAs), the Mineral Planning Authority will safeguard mineral resources of national and local importance from surface development that would sterilise a significant economic resource or prejudice the effective working of a permitted mineral reserve, Preferred or Reserve Site allocation within the Minerals Local Plan. The Minerals Planning Authority shall be consulted, and its views taken into account, on proposed developments within MSAs and MCAs except for the excluded development identified in Appendix 5.*

*Mineral Safeguarding Areas*

*Mineral Safeguarding Areas are designated for mineral deposits of sand and gravel, silica sand, chalk, brickearth and brick clay considered to be of national and local importance, as defined on the Policies Map.*

*The Mineral Planning Authority shall be consulted on:*

*a) All planning applications for development on a site located within an MSA that is 5ha or more for sand and gravel, 3ha or more for chalk and greater than 1 dwelling for brickearth or brick clay; and*

*b) Any land-use policy, proposal or allocation relating to land within an MSA being considered by the Local Planning Authority for possible development as part of preparing a Local Plan (with regard to the above thresholds).*

*Non-mineral proposals that exceed these thresholds shall be supported by a minerals resource assessment to establish the existence or otherwise of a mineral resource of economic importance. If, in the opinion of the Local Planning Authority, surface development should be permitted, consideration shall be given to the prior extraction of existing minerals.*

*Mineral Consultation Areas*

*MCAs are designated within and up to an area of 250 metres from each safeguarded permitted minerals development and Preferred and Reserve Site allocation as shown on the Policies Map and defined on the maps in Appendix 6. The Mineral Planning Authority shall be consulted on:*

*a) Any planning application for development on a site located within an MCA except for the excluded development identified in Appendix 5,*

*b) Any land-use policy, proposal or allocation relating to land within an MCA that is being considered as part of preparing a Local Plan*

26. *Proposals which would unnecessarily sterilise mineral resources or conflict with the effective workings of permitted minerals development, Preferred or Reserve Mineral Site allocation shall be opposed.*

#### 19.4.1.2.4 Environmental Protection Act 1990 (Part 2A): Contaminated Land Statutory Guidance

27. The Environmental Protection Act 1990 makes provision for the improved control of pollution arising from certain industrial and other processes. Part 78A of the Act provides the statutory definition of contaminated land:

"*Contaminated Land is any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reasons of substances in, on or under land that:*

- *Significant harm is being caused or there is a significant possibility of such harm being caused; or*
- *Significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused*".

28. The Act also provides the regulatory basis for the identification, designation and remediation of contaminated land. The onshore project area could be located on land potentially affected by contamination. This requires assessment to ensure that the land is suitable for use prior to and following the construction of North Falls, and that the land cannot be determined as contaminated land under Part 2A of the Act.

#### 19.4.1.2.5 Environmental Permitting (England and Wales) Regulations 2016

29. The 2016 Regulations (as amended) set out an environmental permitting and compliance regime that applies to various activities and industries. The environmental permitting regime is a common framework for applying for, receiving, varying or transferring and surrendering permits, along with compliance, enforcement and appeals arrangements. It rationalises the previous permitting and compliance regimes into a common framework that is easier to understand and simpler to use. The framework introduces different levels of control, based on risk:

- Exclusions - lower risk activities which may be undertaken without any permit;
- Standard rules permit - standard requirements and conditions for the relevant activities are set out so applicants can determine in advance where the permit is applicable to their proposals; and

- Bespoke permits - permits written specifically for activities which are unique or higher risk.

30. These regulations are relevant to ground conditions and contamination as there may be the need to apply for environmental permits for activities such as discharging groundwater from dewatering activities during construction works.

#### 19.4.1.2.6 Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

31. The aim of the directive is for all water bodies to achieve Good Status by 2027 (which is comprised of scoring of both Ecological and Chemical Status) and to ensure no deterioration from current status. This legislation is relevant to ground conditions and contamination as it assists in determining the sensitivity of water bodies within the onshore project area. Water quality is assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23).

32. Following the UK's withdrawal from the European Union the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 remain in force under the Floods and Water (Amendments etc) (EU Exit) Regulations 2019.

#### 19.4.1.2.7 Groundwater (Water Framework Directive) (England) Direction 2016

33. The aim of the direction is to set out instructions and obligations for the Environment Agency to protect groundwater, including monitoring and setting threshold values for both existing and new pollutants in groundwater. This legislation is relevant to ground conditions and contamination as it assists in determining the sensitivity of groundwater resources within the onshore project area.

#### 19.4.1.2.8 The Water Resources Act 1991

34. The Act provides the definition of and regulatory controls for the protection of water resources including the quality standards expected for controlled waters. This legislation is relevant to ground conditions and contamination as it assists in determining the sensitivity of controlled waters within the onshore project area, particularly when assessing the effects during construction and operational activities.

#### 19.4.1.2.9 Environment Act 1995

35. The Act established the Environment Agency and gave it responsibility for environmental protection of controlled waters. This legislation is relevant to ground conditions and contamination as it provides the principles to assess the sensitivity and potential effects of the construction and operational phases of North Falls. It also aids in the identification of suitable mitigation measures to provide protection to the controlled waters present.

#### 19.4.1.2.10 Environmental Damage (Prevention and Remediation) (England Regulations 2015

36. The regulations transpose into domestic law the EU Directive 2004/35/EC on environmental liability with regards to the prevention and remedying of environmental damage. This legislation is relevant to ground conditions and contamination as it aids in the identification of suitable preventative measures and mitigation techniques for the construction and operational phases of North Falls.

#### 19.4.1.2.11 Construction (Design and Management) Regulations 2015

37. These regulations are the main set of regulations used to manage the health, safety and welfare of construction projects. The legislation is relevant to ground conditions and contamination as it ensures the safety of human receptors involved in the construction phase.

#### 19.4.1.2.12 Land Contamination Risk Management Framework 2023

38. The Environment Agency guidance provides an update to the former Environment Agency Model Procedures for the Management of Land Contamination, Contaminated Land Report 11 (CLR11). The guidance aims to help those assessing potentially contaminated sites to identify and assess the risks posed to sensitive receptors from potentially contaminated sites, make appropriate decisions in relation to the outcome of the assessment and identify the required actions necessary e.g., implement remediation if deemed necessary.

#### 19.4.1.2.13 Guiding Principles for Contaminated Land

39. The Guiding Principles for Contaminated Land (GPCL) comprise three documents produced by the Environment Agency. The documents include GPCL 1 – Introduction, GPCL 2 – Frequently Asked Questions, technical information, detailed advice and references, and GPCL 3 – reporting checklist. The aims of these documents are to provide guidance to those who are involved with contaminated land, encourage good practice, promote compliance with regulatory requirements and to provide reference to applicable guidance.

#### 19.4.1.2.14 The Environment Agency's Approach to Groundwater Protection Position Statements 2018 (under review)

40. These position statements provide information relating to the Environment Agency's approach to managing and protecting groundwater. They detail how the Environment Agency delivers government policy for groundwater and adopts a risk-based approach where legislation allows. The primary aim of the position statements is the prevention of pollution of groundwater and protection of it as a resource.

#### 19.4.1.2.15 Highways England LA 104 Environmental Assessment and Monitoring

41. This guidance sets out the requirements and processes that should be followed when assessing the environmental impacts of a project. It also provides a steer as to which policies and legislation should be referred to for each stage of the EIA process. The guidance aids in determining the sensitivity and magnitude bandings for receptors, including those relevant to ground conditions and contamination, along with highlighting the need to include an assessment on geology and soils within an EIA.

#### 19.4.1.2.16 Minerals Policy Statement 1: Planning and Minerals (MPS1)

42. MPS1 aims to secure adequate and steady supplies of the minerals needed by society and the economy. This publication has been withdrawn; however, in the absence of an equivalent piece of policy or guidance it is still deemed relevant in the context of this assessment.

### 19.4.2 Data sources

#### *19.4.2.1 Site specific*

43. To provide site specific and up to date information on which to base the impact assessment, a site characterisation study was conducted which consisted of reviewing available desk-based information related to ground conditions and contamination. The assessment is provided in the Geo-Environmental Desk Study and Preliminary Risk Assessment report (PRA) (Appendix 19.1 (Document Reference: 3.3.20). The PRA provides an assessment of ground conditions for North Falls and follows a risk-based approach including consideration of potential sources, pathways and receptors to identify potential pollutant linkages that may result in unacceptable risks to receptors from ground contamination.

44. The data sources used to inform the PRA include:

- Groundsure GIS data comprising environmental sensitivity data and permitting records within the onshore project area;
- British Geological Survey (BGS) Onshore Geoindex web portal (accessed December 2023);
- BGS Geological Map for Colchester and Brightlingsea, Bedrock and Drift (Sheet numbers 224 and 242), 2010, 1:50,000;
- BGS Hydrogeological Map of Southern East Anglia (Sheet number 5), 1981, 1:125,000;
- Google Earth, accessed January 2024;
- Multi Agency Government Information for the Countryside (MAGIC) map application (accessed January 2024);
- National Library of Scotland historical maps (accessed January 2024);
- UK Health Security Agency UK maps of Radon; and
- Zetica UXO Unexploded Bomb (UXB) Risk Map accessed November 2023.

### 19.4.3 Impact assessment methodology

45. ES Chapter 6 EIA Methodology (Document Reference: 3.1.8) explains the general impact assessment methodology applied to North Falls. The following sections confirm the methodology used to assess the likely significant effects on ground conditions and contamination.

#### *19.4.3.1 Definitions*

46. For each impact, the assessment identifies receptors within the study area which are sensitive to that impact and implements a systematic approach to understanding the impact pathways and the level of impacts (i.e. magnitude) on given receptors. The definitions of sensitivity and magnitude for the purpose of the ground conditions and contamination assessment are provided in Table 19.6 and Table 19.7.

#### 19.4.3.1.1 Sensitivity

47. Receptor sensitivity has been defined with reference to the adaptability, tolerance, recoverability, and value of individual receptors. Table 19.6 provides the criteria for appraisal of sensitivity for identified ground conditions and contamination receptors. Sensitivity for each receptor has been determined using professional judgement, with reference to Section 19.4.1.

48. Receptor sensitivity considers, for example, whether the receptor:

- Is rare;
- Has protected or threatened status;
- Has importance at a local, regional or national scale; or
- Has a key role in ecosystem function (in the case of biological receptors).

49. Generic receptor sensitivity examples based on the above criteria are presented below in Table 19.6.

**Table 19.6 Receptor sensitivity criteria**

| Sensitivity | Examples |
|---|---|
| **High** – has very limited or no capacity to accommodate physical or chemical changes. | **General**<br>• Receptor is internationally or nationally important / rare with limited potential for offsetting / compensation. |
| | **Land quality – human health**<br>• Construction workers involved in below ground construction works / ground breaking activities;<br>• Public and local residents / children (on and offsite within 50m); and<br>• Future end users (residential or allotment end use). |
| | **Land quality – controlled waters and ecology**<br>• Groundwater SPZ 1;<br>• Public water supplies / licensed surface water and groundwater abstractions for potable use;<br>• Private water supplies for potable use, automatic 50m SPZ1 applied (on and off-site within 50m);<br>• Supports habitats or species that are highly sensitive to change in surface hydrology or water quality; and<br>• Surface and groundwaters supporting internationally designated sites (e.g. Special Areas of Conservation (SAC) or Ramsar sites). |
| | **Land quality – geological sites and mineral resources**<br>• MSA or MCA – nationally important resource; and<br>• Designated geological sites of international importance. |
| | **Built environment**<br>• Sites of international importance, World Heritage Sites and Scheduled Monuments. |
| | **Agricultural land** |

| Sensitivity | Examples |
|---|---|
| | • Land at Agricultural Land Classification (ALC) Grades 1, 2 or 3a (agricultural land designated as Best and Most Versatile (BMV)). |
| **Medium** – has limited capacity to accommodate physical or chemical changes. | **General**<br>• Receptor is regionally important / rare with limited potential for offsetting / compensation. |
| | **Land quality – human health**<br>• Future end users (commercial / industrial end use / open space / farmers and workers on agricultural land);<br>• Public and local residents / children (off-site at distances >50m but <250m);<br>• Commercial / industrial workers (off-site within 50m); and<br>• Construction workers (above ground). |
| | **Land quality – controlled waters and ecology**<br>• Groundwater SPZ 2 and SPZ 3;<br>• Principal Aquifers;<br>• Secondary A and B Aquifers with private potable groundwater abstractions;<br>• Private water supplies for potable groundwater abstraction (off-site within 250m); and<br>• Surface and groundwaters supporting nationally designated sites (SSSI). |
| | **Land quality – geological sites and mineral resources**<br>• MSA or MCA – regionally important resources; and<br>• Designated geological site of national importance e.g. SSSI. |
| | **Built environment**<br>• Commercial or residential buildings. |
| | **Agricultural land**<br>• Land at ALC Grade 3b (non-BMV land). |
| **Low** – has moderate capacity to accommodate physical or chemical changes. | **General**<br>• Receptor is locally important / rare. |
| | **Land quality – human health**<br>• Future end users (transport end use such as car parks or highways);<br>• Public and local residents / children (off-site >250m); and<br>• Commercial / industrial workers (off-site at distances >50m but <250m). |
| | **Land quality – controlled waters and ecology**<br>• Secondary A and B Aquifers without groundwater abstractions; and<br>• Groundwater or surface waters supporting locally important sites (e.g. Local Nature Reserves (LNR)). |

| Sensitivity | Examples |
|---|---|
| | **Land quality – geological sites and mineral resources**<br>• Geological site of local importance (e.g. Local Geological Sites);<br>• Adjacent to an MSA or MCA; and<br>• Low economically viable mineral resource. |
| | **Built environment**<br>• Car parks, highways, transport infrastructure and utilities. |
| | **Agricultural land**<br>• Land at ALC Grade 4 (non-BMV land). |
| **Negligible** – is generally tolerant of physical or chemical changes. | **General**<br>• Receptor is not considered to be particularly important / rare. |
| | **Land quality – human health**<br>• Commercial / industrial workers (off-site >250m). |
| | **Land quality – controlled waters and ecology**<br>• Unproductive strata; and<br>• Supports or contributes to habitats that are not sensitive to changes in surface hydrology or water quality. |
| | **Land quality – geological sites and mineral resources**<br>• No designated geological sites; and<br>• No economically viable minerals. |
| | **Built environment**<br>• Locally important roads and footpaths. |
| | **Agricultural land**<br>• Land at ALC Grade 5 (non-BMV land). |

#### 19.4.3.1.2 Magnitude

50. Potential effects may be adverse or beneficial. The magnitude is assessed qualitatively, according to the criteria set out in Table 19.7.

51. For impacts related to human health, magnitude reflects the likely increase or decrease in exposure risk for a receptor. For controlled waters, magnitude represents the likely impact that an activity would have on resource availability or value, at the receptor. Magnitude is therefore affected by the distance and connectivity between an impact source and the receptor.

**Table 19.7 Definition of magnitude for a ground conditions and contamination receptors**

| Magnitude | Definition |
|---|---|
| **High** – permanent or large-scale change affecting usability, risk or, value over a wide area, or certain to affect regulatory compliance. | **Land quality – human health**<br>• Permanent or major change to existing risk exposure (adverse / beneficial); |

| Magnitude | Definition |
|---|---|
| | • Unacceptable risks / severe harm to one or more receptors with a long-term or permanent effect (adverse); or<br>• Remediation and complete source removal (beneficial). |
| | **Land quality – controlled waters**<br>• Permanent, long-term or wide scale effects on water quality or availability (adverse / beneficial);<br>• Permanent loss or long-term derogation of a water supply source resulting in prosecution (adverse);<br>• Change in Water Environment Regulations (WER) water body status / potential or its ability to achieve WER objectives in the future (adverse / beneficial);<br>• Permanent habitat creation or complete loss (adverse / beneficial); or<br>• Measurable habitat changes that are sustainable / recoverable over the long-term (adverse / beneficial). |
| | **Land quality – geological sites and mineral resources**<br>• Complete loss of designated sites; or<br>• Complete sterilisation of mineral resources. |
| | **Built environment**<br>• Catastrophic damage to buildings or structures. |
| | **Agricultural land**<br>• Permanent or major change to existing ALC grade as a result of contamination. |
| **Medium** – reversible change affecting usability, value, or risk over the medium-term or local area: possibly affecting regulatory compliance. | **Land quality – human health**<br>• Medium-term or moderate change to existing risk of exposure (adverse / beneficial); or<br>• Unacceptable risks to one or more of the receptors with a medium-term effect (adverse). |
| | **Land quality – controlled waters**<br>• Medium-term or local scale effects on water quality or availability (adverse / beneficial);<br>• Medium-term derogation of a water supply source, possibly resulting in prosecution (adverse);<br>• Observable habitat changes that are sustainable / recoverable over the medium-term (adverse / beneficial); or<br>• Temporary change in status / potential of a WER water body or its ability to meet objectives (adverse / beneficial). |
| | **Land quality – geological sites and mineral resources** |

| Magnitude | Definition |
|---|---|
| | • Partial loss of designated geological sites; or<br>• Medium-term or local scale loss of mineral resources. |
| | **Built environment**<br>• Damage to buildings or structures. |
| | **Agricultural land**<br>• Medium-term or local scale effects on ALC grade as a result of contamination. |
| **Low** – temporary change affecting usability, risk, or value over the short-term or within the study area; measurable permanent change with minimal effect, usability, risk, or value; no effect on regulatory compliance. | **Land quality – human health**<br>• Short-term temporary or minor change to existing risk exposure (adverse / beneficial); or<br>• Unacceptable risks to one or more receptors with a short-term effect (adverse). |
| | **Land quality – controlled waters**<br>• Short-term or very localised effects on water quality or availability (adverse / beneficial);<br>• Short-term derogation of a water supply source (adverse);<br>• Measurable permanent effects on a water supply source that does not impact on its operations (adverse);<br>• Observable habitat changes that are sustainable/recoverable over the short-term (adverse / beneficial); or<br>• No change in status / potential of a WER water body or its ability to meet objectives (neutral). |
| | **Land quality – geological sites and mineral resources**<br>• Temporary change in status of designated geological sites; or<br>• Short-term or very localised effects on mineral resources. |
| | **Built environment**<br>• Easily repairable damage to buildings or structures. |
| | **Agricultural land**<br>• Short-term or very localised effects on ALC grade as a result of contamination. |
| **Negligible** – minor permanent or temporary change, indiscernible over the medium to long-term. Short-term, with no effect on usability. | **Land quality – human health**<br>• Negligible change to existing risk exposure; or<br>• Activity is unlikely to result in unacceptable risks to receptors (neutral). |
| | **Land quality – controlled waters**<br>• Very minor or intermittent impact on local water quality or availability (adverse / beneficial); |

| Magnitude | Definition |
|---|---|
| | • Usability of a water supply source would be unaffected (neutral);<br>• Very slight local changes that have no observable impact on dependent receptors (neutral); or<br>• No change in status / potential of a WER water body or its ability to meet objectives (neutral). |
| | **Land quality – geological sites and mineral resources**<br>• No change in status of designated geological site; or<br>• Very minor impact on mineral resources. |
| | **Built environment**<br>• Very slight, non-structural damage or cosmetic harm to buildings or structures. |
| | **Agricultural land**<br>• Very minor effect on ALC grade as a result of contamination. |

#### *19.4.3.2 Significance of effect*

52. The assessment of significance of an effect is a function of the sensitivity of the receptor and the magnitude of the impact (see ES Chapter 6 EIA Methodology (Document Reference: 3.1.8) for further details). The determination of significance is guided by the use of a significance of effect matrix, as shown in Table 19.8. Definitions of each level of significance are provided in Table 19.9.

53. Likely significant effects identified within the assessment as major or moderate are regarded within this chapter as significant.

54. Where the need for additional mitigation has been identified specifically to reduce or eliminate any predicted likely significant effects, this has been proposed in consultation with the appropriate regulatory authorities and relevant stakeholders. The aim of additional mitigation measures is to avoid or reduce the overall significance of effect to determine a residual effect upon a given receptor. Residual effects are summarised in Table 19.21.

55. In addition, whilst minor effects are not significant in their own right, it is important to distinguish these from other negligible effects as they may contribute to significant impacts cumulatively or through interactions.

56. Should major or moderate effects be identified within the assessment, these would be regarded within this chapter as significant. Should the assessment indicate any likely significant effect, additional mitigation measures would be identified, where possible, in consultation with the regulatory authorities and relevant stakeholders. The aim of mitigation measures is to avoid or reduce the overall significance of effect to determine a residual effect upon a given receptor.

**Table 19.8 Significance of effect matrix**

| Sensitivity | Adverse magnitude | | | Beneficial magnitude | | | | |
|---|---|---|---|---|---|---|---|---|
| | High | Medium | Low | Negligible | Negligible | Low | Medium | High |
| High | *Major* | *Major* | *Moderate* | *Minor* | *Minor* | *Moderate* | *Major* | *Major* |
| Medium | *Major* | *Moderate* | *Minor* | *Minor* | *Minor* | *Minor* | *Moderate* | *Major* |
| Low | *Moderate* | *Minor* | *Negligible* | *Negligible* | *Negligible* | *Minor* | *Minor* | *Moderate* |
| Negligible | *Minor* | *Negligible* | *Negligible* | *Negligible* | *Negligible* | *Negligible* | *Negligible* | *Minor* |

**Table 19.9 Definition of effect significance**

| Significance | Definition |
|---|---|
| **Major** | Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and / or breaches of legislation. |
| **Moderate** | Intermediate change in receptor condition, which are likely to be important considerations at a local level. |
| **Minor** | Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process. |
| **Negligible** | No discernible change in receptor condition. |
| **No change** | No impact, therefore, no change in receptor condition. |

### 19.4.4 Cumulative effects assessment methodology

57. The cumulative effects assessment (CEA) considers other plans, projects and activities that may result in cumulative effects with North Falls. ES Chapter 6 EIA Methodology (Document Reference: 3.1.8) provides further details of the general framework and approach to the CEA.

58. For ground conditions and contamination, these activities include the onshore elements of other offshore wind farm projects, construction projects (commercial, residential and transport developments) and remediation projects.

### 19.4.5 Assumptions and limitations

59. The desk-based PRA (Appendix 19.1 (Document Reference: 3.3.20)) is based on a range of publicly available information. No ground investigation data from within the onshore project area has been used to inform the PRA or the impact assessment presented in this chapter. The assessments therefore adopt a precautionary approach i.e., if a potential pollutant linkage has been identified it is assumed to be present until further site-specific information is available to clarify whether the linkage exists.

60. An MRA has been undertaken by Five Estuaries Offshore Wind Farm Limited for both the onshore cable route for North Falls and the onshore export cable corridor of the Five Estuaries projects. The results of this assessment have been used to inform this EIA. It should however be noted that at the time of writing the quality and usability of the mineral resources is unknown due to an absence of published information on the nature of the resources (see Appendix 19.2 (Document Reference: 3.3.21)).

## 19.5 Existing environment

### 19.5.1 Baseline environment

61. The baseline environment for the ground conditions and contamination study area is discussed below in Table 19.10, with potential sources of contamination discussed in Table 19.11. Full details are provided within Appendix 19.1 (Document Reference: 3.3.20) and shown in Figures 19.2 – 19.6 (Document Reference: 3.2.15).

**Table 19.10 Summary of baseline environment**

| Parameter | Landfall | Onshore cable route (inclusive of construction compounds, accesses and widening etc.) | Onshore substation (inclusive of wider works area and national grid substation connection works) |
|---|---|---|---|
| Geology | Although not identified on British Geological Survey (BGS) mapping, localised areas of Made Ground associated with historical land uses may be present within the onshore project area.<br>Superficial deposits are present within the onshore project area, however there are isolated areas where these deposits are absent.<br>Bedrock geology of the Thames Group is present throughout the onshore project area. | | |
| | Infilled Ground: not likely to be present. If present, it will be localised and not shown on geological mapping. | Infilled ground: located north of Little Clacton Road, likely to be associated with historic quarrying activities. There is the potential for localised areas of infill which are not shown on geological mapping. | Infilled Ground: not likely to be present. If present, it will be localised and not shown on geological mapping. |
| | Superficial deposits:<br>• Storm Beach Deposits: located along the southern edge of landfall;<br>• Alluvium: located throughout;<br>• Cover Sand: not present; and<br>• Kesgrave Catchment Subgroup: not present. | Superficial deposits:<br>• Storm Beach Deposits: not present;<br>• Alluvium: present in isolated areas (associated with surface water features);<br>• Cover Sand: located throughout with the exception of an area between Thorpe Cross and Lodge Lane; and<br>• Kesgrave Catchment Subgroup: present as isolated pockets. | Superficial deposits:<br>• Storm Beach Deposits: not present;<br>• Alluvium: not present;<br>• Cover Sand: present throughout; and<br>• Kesgrave Catchment Subgroup: not present. |
| Hydrogeology | Secondary A Aquifers: Alluvium and Kesgrave Catchment Subgroup<br>Secondary B Aquifer: Cover Sand<br>Unproductive Strata: Thames Group<br>The area of the onshore cable route to the north of Tendring Green up to and including the onshore substation is located within a SPZ 3 (see Figure 19.6, (Document Reference: 3.2.15). The area of the onshore cable route to the north of Tendring Green up to and including the onshore substation is located within a SPZ 3 (see Figure 19.6, (Document Reference: 3.2.15)).<br>The Essex Gravels WER is present as isolated areas within the onshore cable route from the south of Clacton Road to Stones Green Road. The WER groundwater body, with the exception of an area surrounding Holland Brook, occupies the entirety of the onshore cable route and onshore substation north and west of Stones Green Road.<br>There are no potable groundwater abstractions under the jurisdiction of the EA or local authority located within the onshore project area. There are, however, 23 domestic and one commercial potable abstraction wells under the jurisdiction of the local authority located within 1km of the onshore project area. There is one potable apparent private abstraction well under the jurisdiction of the EA which is additionally used for general farming purposes located within 1km of the onshore project area. Four potentially unregulated private potable abstraction wells were also identified within 1km of the onshore project area during a survey by the Applicant. | | |

| Parameter | Landfall | Onshore cable route (inclusive of construction compounds, accesses and widening etc.) | Onshore substation (inclusive of wider works area and national grid substation connection works) |
|---|---|---|---|
| | In relation to abstraction wells related to farming, irrigation and commercial usage under the jurisdiction of the EA, there is one abstraction well (spray irrigation) located within the onshore cable route. An additional 13 abstraction wells related to farming, irrigation and commercial usage under the jurisdiction of the EA are located within 1km of the onshore project area. | | |
| Hydrology and surface drainage (Additional details on the hydrology of the onshore project area are provided in Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23). | Streams and ditches associated with agriculture are present throughout the onshore project area. Additional surface water features are located within 250m of the onshore project area. | | |
| | Named surface water features: Kirby Brook and Holland Brook.<br>The following WER surface water body catchments are located at landfall: Holland Brook. | Named surface water features: Holland Brook and Tendring Brook.<br>The following WER surface water body catchments are located within the onshore cable route: Holland Brook, Wrabness Brook and Tenpenny Brook.<br>The following WER surface water body is located within the onshore cable route: Holland Brook. | Named surface water features: not present.<br>The following WER surface water body catchments are located within the onshore substation: Tenpenny Brook. |
| | There is one record for a surface water abstraction located within the onshore cable route, the abstraction relates to spray irrigation for agricultural purposes. A further 15 surface water abstractions are located within 1km of the onshore project area, all records indicate that the water is used for spray irrigation. | | |
| Sensitive land use[1] | The following sensitive land uses are located at landfall:<br>• Holland Haven Marshes SSSI;<br>• Holland Haven LNR;<br>• Sandlings and Chelmsford Nitrate Vulnerable Zone (NVZ); and | The following sensitive land uses are located within the onshore cable route:<br>• Sandlings and Chelmsford NVZ; and<br>• Priority Habitat Inventory: deciduous woodland located west of Park Lane, south west of Thorpe Road, north of Frinton Road and south east of Lodge Lane. | The following sensitive land uses are located within the onshore substation:<br>• Sandlings and Chelmsford NVZ. |

[1] There are no direct overlaps between the study area and any designated geological sites (inclusive of LoGs). As such, no impacts to designated geological sites are anticipated as a result of North Falls and are not considered further in the impact assessment.

| Parameter | Landfall | Onshore cable route (inclusive of construction compounds, accesses and widening etc.) | Onshore substation (inclusive of wider works area and national grid substation connection works) |
|---|---|---|---|
| | • Priority Habitat Inventory: lowland fens, maritime cliff and slope, coastal and floodplain grazing marsh. | | |
| Mineral Safeguarding Areas (MSA) | Land within the onshore project area is designated as being located within a MSA. The minerals associated with the designation are sands and gravels. The safeguarded areas are not present as continuous features, but as localised areas throughout the onshore project area.<br>A MCA is also present within the onshore cable route, located to the west of the settlement of Great Holland. | | |
| Human health | The Project's onshore infrastructure comprises landfall works, onshore cable route and onshore substation as set out in ES Chapter 5 Project Description (Document Reference: 3.1.7). Haul and access roads would also be required during the construction period as would construction compounds.<br>During the installation of onshore infrastructure, the critical human health receptors would be those involved with construction activities, adjacent off-site residents, nearby workers (e.g. agricultural workers) and visitors (e.g. where Public Rights of Way (PRoW) might be in use). During the operational phase of North Falls, the human health receptors would be site users and workers at the onshore substation. | | |
| Agricultural land (additional information in relation to the agricultural baseline environment is provided in Chapter 22 Land Use and Agriculture (Document Reference: 3.1.24). | ALC Grade 4 is present at landfall. | ALC Grades 1, 2 and 3 are present within the onshore cable route. It should be noted that the dataset used to identify the presence of ALC land (Natural England's Provisional Agricultural Land Classification) does not differentiate between Grade 3a (land considered Best and Most Versatile (BMV)) and Grade 3b (non-BMV land). As such, all Grade 3 land is conservatively assessed as Grade 3a. | ALC Grade 1 is present throughout the onshore substation. |
| Potentially contaminative land uses | Potentially contaminative land uses at landfall include (but not limited to):<br>• Agricultural land;<br>• Potentially infilled pits and ponds;<br>• Tanks; and<br>• Unspecified heaps. | Potentially contaminative land uses within the onshore cable route include (but not limited to):<br>• Agricultural land;<br>• Potentially infilled pits and ponds; and<br>• Railway land. | Potentially contaminative land uses within the onshore substation include (but not limited to):<br>• Agricultural land. |

**Table 19.11 Potential sources of contamination (✓ present, X absent)**

| Parameter | Potential contaminant of concern | Landfall | Onshore cable route* | Onshore substation** |
|---|---|---|---|---|
| **Onsite – within the onshore project area** | | | | |
| Agricultural land / practices for fertilisers, pesticides and herbicides. | Herbicides, pesticides and fertilisers, in addition it is not uncommon for discarded material to be buried on farmland which could potentially contain a range of contaminants including asbestos. | ✓ | ✓ | ✓ |
| Potentially infilled pits and ponds. | Localised Made Ground may be present in areas associated with the backfilling of former pits and/or ponds should this have been undertaken within the onshore project area. Potential contaminants include, but are not limited to, asbestos, metals and metalloids, polycyclic aromatic hydrocarbons (PAHs), fuel and oil hydrocarbons, volatile and semi-volatile organic compounds (VOCs and SVOCs), inorganic and organic contaminants, herbicides, polychlorinated biphenyls (PCBs) and ground gas. | ✓ | ✓ | X |
| Made Ground (including potentially demolished infrastructure and cuttings). | Asbestos containing materials and associated fibres are commonly identified in Made Ground deposits, particularly localised to where building demolition has occurred, and material has been buried/used. Other contaminants of concern that may be present are dependent on the nature of the Made Ground materials present within the onshore project area. | ✓ | ✓ | ✓ |
| Railway land. | Railway land is a potential source of contamination and Made Ground. Contaminants associated with railway land includes herbicides, metals and metalloids, fuel and oil hydrocarbons, PAHs, PCBs, glycols and sulphates. Asbestos can also be associated with the materials used within the track bedding material, fill used in the formation of embankments and within the trains themselves. | X | ✓ | X |
| Tanks. | The contents of the tank are not recorded, therefore a range of potential contaminants of concern may be associated with this area. These may include, but are not limited to, fuel and oil hydrocarbons, PAHs, VOCs and SVOCs. Vapour risks may also be present if they are below ground or from potential spillages. | ✓ | X | X |
| Unspecified heap. | The contaminants of concern are dependent on the materials deposited within the heap. Potential contaminants include, but are not limited to, asbestos, metals and metalloids, PAHs, fuel and oil hydrocarbons, VOCs and SVOCs, inorganic and organic contaminants, PCBs, polyfluoroalkyl substances (PFAS). | ✓ | X | X |

| Parameter | Potential contaminant of concern | Landfall | Onshore cable route* | Onshore substation** |
|---|---|---|---|---|
| **Offsite – located within 250m buffer zone of the onshore project area** | | | | |
| Agricultural land and historical practices. | Herbicides, pesticides and fertilisers, in addition it is not uncommon for discarded material to be buried on farmland which could potentially contain a range of contaminants. | ✓ | ✓ | ✓ |
| Potentially infilled pits/ponds. | Asbestos, metals and metalloids, PAHs, fuel and oil hydrocarbons, VOCs and SVOCs, inorganic and organic contaminants, PCBs vapours and ground gas. | ✓ | ✓ | X |
| Made Ground. | | ✓ | ✓ | ✓ |
| Landfill/unspecified heap. | Potential contaminants include, but are not limited to, asbestos, metals and metalloids, PAHs, fuel and oil hydrocarbons, VOCs and SVOCs, inorganic and organic contaminants, PCBs, PFAS, landfill leachate and ground gas. | X | ✓ | X |
| Railway land. | Contaminants associated with railway land includes herbicides, metals and metalloids, fuel and oil hydrocarbons, PAHs, PCBs, glycols and sulphates. Asbestos can also be associated with the materials used within the track bedding material, fill used in the formation of embankments and within the trains themselves. | X | ✓ | X |
| Smithy. | Metals and metalloids, cyanides, sulphates, phosphates, PAHs, fuel and oil hydrocarbons, solvents, and asbestos. There is the potential for vapours to be generated within the area of the former smithy which have the potential to migrate into the onshore project area. | X | ✓ | X |
| Electricity substation. | Asbestos, metals and metalloids, PAHs, fuel and oil hydrocarbons and PCBs. | X | ✓ | ✓ |
| Tanks. | A number of unspecified tanks have been recorded within 250m of the onshore project area, therefore a range of potential contaminants of concern may be associated with these areas. These may include, but are not limited to, fuel and oil hydrocarbons, PAHs, VOCs and SVOCs. Vapour risks may also be present. | X | ✓ | X |

### 19.5.2 Future trends in baseline conditions

62. In the event that the Project is not developed, a description of the anticipated changes in future baseline conditions for ground conditions and contamination has been carried out and is described within this section.

63. The onshore project area is located within an area identified as containing sand and gravel resources. Should extraction of these materials take place, the baseline conditions for the area would be altered. The potential changes not only relate to the geology of the area, but also the hydrogeology and hydrology. Removal of the superficial deposits has the potential to impact on groundwater flow patterns, for example by removing more permeable strata, and discharges into surface water bodies. The removal of the deposits also has the potential to expose pre-existing contamination which then may be mobilised.

64. Climate change is causing more extreme weather in the UK resulting in wetter winters and drier summers. This change in climate conditions has the potential to mobilise pre-existing contamination through, for example, increased rates of infiltration due to heavier rainfalls, increased surface run off due to heavy rainfall following a period of drought/dry weather, dust generation through drier summers, and the creation of fissures (either via drier summers or periods of cold weather) within soils allowing infiltration into deeper layers where contamination may be present (Society of Brownfield Risk Assessment, 2022).

65. There is also the potential for groundwater levels to rise as a result of increased rainfall. A rise in groundwater levels into the unsaturated zone has the potential to mobilise pre-existing contaminants resulting in potential migration and adversely impacting controlled waters.

66. It should also be noted that natural degradation of contaminants over time may result in a general improvement in ground conditions.

67. Climate change has the potential to impact on the hydrology of surface drainage networks, with higher winter flows, lower summer flows and a greater number of storm related flood flows. The risk of flooding would also be amplified as a result of the predicted increase in rainfall which may result in an increase in peak river flows and an increase in the magnitude of surface water flooding.

68. The changes in weather patterns as a result of climate change also has the potential to increase the rate of erosion observed along the UK coastline. Future trends associated with coastal erosion are covered in more detail in ES Chapter 8 Marine Geology Oceanography and Physical Processes (Document Reference: 3.1.10).

69. An increase in population, increasing urbanisation and improvement in living standards may lead to a reduction in land available for agriculture. For land that is retained for agricultural use, pressures for more productive practices may increase to feed the increased population. As such, there may be an increase in the use of agricultural chemicals and industrial fertiliser to ensure continued high crop yields.

70. Although there is the potential for increased usage of agricultural chemicals to maintain crop yields, ongoing measures, such as the regulation of agricultural chemicals and catchment wide initiatives, as part of the implementation of the

WER are likely to improve the baseline environment by reducing the existing pressures on groundwater bodies. Also, as with the degradation of contaminants within soils, the baseline for groundwater quality is likely to improve over time through the natural breakdown of chemicals that may currently be present.

71. Increasing demand from population growth may also drive the expansion of urban areas into new areas, including land that has been previously developed (i.e. brownfield land). This expansion could result in an increase in the number of potential receptors to pre-existing sources of contamination. The expansion could also result in the introduction of new sources of contamination (e.g. fuel spills) and new pathways (e.g. piled foundations).

## 19.6 Assessment of significance

### 19.6.1 Likely significant effects during construction

#### *19.6.1.1 Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts*

72. The excavation of cable trenches, earthworks, and piling (if required for the onshore substation), as well as the movement and stockpiling of soils, have the potential to mobilise existing ground contamination (where present). This could result in impacts to human health through dermal contact, inhalation, and ingestion of contaminants.

73. A PRA (Appendix 19.1 (Document Reference: 3.3.20)) has been undertaken for the study area to identify plausible contaminant linkages as a result of the potential presence of contaminants within the soils and groundwater. The PRA identified that the majority of land within the study area has an agricultural use where unacceptable risks from contamination are not anticipated.

74. The PRA also identified localised areas within the study area with potential contaminative uses. These areas have the potential to act as sources of contamination. The sources are summarised in Table 19.10.

75. The PRA identified Potential Contaminants of Concern (PCoC) that could be present in the study area and could represent a risk to construction workers, landowners, land users and neighbouring land users if exposed during construction activities. Construction activities, particularly earthworks, could disturb and expose construction workers and other site users to localised Made Ground soils and potential soil and / or groundwater contamination associated with historical and current land uses. Construction activities could create pollutant linkages through ingestion, inhalation, and direct dermal contact pathways.

76. In the event of exposing soils and stockpiling construction waste (including excavated soils), dust could be generated during dry and windy conditions. Under these conditions, construction workers and landowners, land users and neighbouring land users could temporarily be exposed to contamination via the inhalation of potentially contaminated dusts.

77. Additionally, the risk associated with soil contamination sources to human health could be altered by a change in the migration pathways as a result of construction activities. A specific risk of concern is ground gases. Excavation of the onshore cable route and piling work (if required) for the onshore substation has the potential to create a preferential pathway for any gases or vapours to migrate and accumulate in confined spaces. The ground gas and vapour risk for the proposed onshore project area is unknown. The potential risk from ground gas and vapours, could represent a risk to human health through asphyxiation and explosion.

#### 19.6.1.1.1 Magnitude of impact

78. During the construction phase of North Falls there would be the requirement for materials to be excavated to construct the onshore cable route, temporary haul roads, joint bays, link boxes and temporary construction compounds. Excavation and movement of material would also be required at landfall and the onshore substation.

79. The maximum construction period for North Falls is anticipated to be 27 months. However, earthworks would not be taking place continuously or at the same location during the whole construction phase. At the time of writing the anticipated onshore cable route construction rate and extent of open cut trenches per work front are yet to be determined.

80. The impacts are predicted to be of local spatial extent (localised to the work areas and areas where contamination may be present), of short-term duration, of intermittent occurrence and high reversibility (occurring only during the works). The magnitude of impact is therefore considered to be low.

81. In relation to risks associated with the migration of ground gases and / or vapours along the onshore cable route, the impacts could be present over the length of the onshore cable route for the duration of the works and represent both acute and chronic health risks. The magnitude of impact is considered to be high in relation to ground gas and vapours. It should, however, be noted that this is subject to the plausibility of a ground gas / vapour source of contamination being present and a pathway between the potential source and human health receptors.

#### 19.6.1.1.2 Sensitivity of receptor

82. The sensitivity of construction workers, landowners, land users and neighbouring land users is considered high.

83. Construction workers are considered to be the most sensitive receptors as the activities they are engaged in constitute more direct exposure routes over longer period of times.

#### 19.6.1.1.3 Significance of effect

84. With the implementation of the embedded mitigation measures included in Table 19.3, the potential magnitude of impacts associated with the excavation works required for the construction of North Falls is low on a high sensitivity receptor. Therefore, the significance of effect is considered moderate adverse. This is significant in EIA terms.

85. In relation to the migration of ground gases and / or vapours, the likely significant effects to human health during construction works are considered to

be high on a high sensitivity receptor. Therefore, the likely significant effect is considered major adverse in the absence of additional mitigation. This is significant in EIA terms.

#### 19.6.1.1.4 Additional mitigation

86. Where areas of potential contamination cannot be avoided, such as areas that cross the entire width of the onshore cable route (e.g. active rail lines), targeted ground investigations may be required post consent to determine the extent and source of any contamination. The ground investigation may include, but is not limited to, the collection of soil, soil-leachate, groundwater and surface water samples for laboratory analysis. The range of contaminants tested for may vary between locations and sample type, examples of contaminants that may be tested for include, but is not limited to, metals, PAHs, PCBs and PFAS. Ground gas monitoring wells would be installed in areas identified as potentially containing ground gas generating materials. Groundwater monitoring wells would also be required as part of the ground investigation works in order to establish the groundwater regime and to identify, for example, whether contamination is from onsite or offsite sources.

87. This would characterise the conditions within the onshore project area, identify unacceptable risks and determine whether remediation is required. If areas of potential concern are identified, then a remediation strategy would be developed and agreed with the relevant bodies prior to the commencement of remedial works and construction activity. The ground investigation, risk assessment and remediation would follow guidance provided within the 2023 Environment Agency Land Contamination Risk Management Framework.

88. Risks associated with the creation of a preferential pathway for ground gas and vapours via the onshore cable route can be mitigated via re-instating excavated materials following the installation of the onshore cables. If, however, a different source of material is required to backfill excavations (i.e. because the excavated material was deemed to pose an unacceptable risk), the risks associated with the creation of preferential pathways can be mitigated via ensuring that the material has the same porosity as that of the excavated material. This would help reduce the risks posed to human health receptors as it would provide continuity with the surrounding environment and not introduce areas of higher porosity soils which could act as preferential pathways.

89. If a significant source of ground gas / vapour generating material is encountered during construction further consideration would be required. Consideration would include, but is not limited to, determination of the source of ground gas / vapour, its location relative to the Project and whether accumulation of gases/vapours in possible. If accumulation is considered possible, an assessment should be undertaken to establish the potential risks to human health receptors and potential mitigation measures that may be required. Mitigation measures vary according to the permanence of the construction works, i.e. temporary short-term risks can be managed according to the Health and Safety at Work Act and monitoring maybe required. It is noted that accumulation is unlikely in open excavations which are vented to atmosphere. With respect to the design of a permanent structure, assessment with respect to the incorporation of ground gas / vapour membranes or venting may be

required. It is noted ground gas / vapour sources are not noted in the area of proposed building construction.

90. Full details of the approach to investigating and managing contamination sources would be captured through a contaminated land and groundwater scheme. This scheme would be developed post-consent once detailed design has confirmed whether the project will need to interact with potentially contaminated land and groundwater. Further details of this scheme are detailed in the OCoCP (Document Reverence: 7.13).

#### 19.6.1.1.5 Residual significance effect

91. Following the incorporation of additional mitigation measures, the risk to human health from exposure to potentially contaminated soils, ground gas and vapours during construction, would be minimised as far as is reasonably practicable. This would effectively reduce the magnitude of impact from high to negligible on a high sensitivity receptor. Therefore, the residual significance of effect would be reduced to minor adverse. This is not significant in EIA terms.

### 19.6.1.2 Impact 2: Direct impacts on groundwater quality and groundwater resources

92. Direct impacts to the SPZ may occur from deep ground workings related to trenchless crossing (e.g. HDD) operations for cable installation beneath surface infrastructure (e.g. roads) and watercourses. There is the potential for creating preferential pathways and for drilling mud / other contaminants to leak along the drill path, which could cause contamination of groundwater. The volume of drilling fluid that could be released during HDD works is dependent on a number of factors, including the size of the fracture, the permeability of the geological material, the viscosity of the drilling fluid and the pressure of the hydraulic drilling system. Piling may be required for the foundations of the onshore substation, which is located within an SPZ 3. Piling activities (dependent on the method of piling chosen) have the potential to create preferential pathways through a low permeability layer, allowing potential contamination to migrate and impact upon water quality and associated groundwater abstractions.

93. Direct impacts to the Secondary A and Secondary B Aquifers within the superficial deposits may occur due to the intrusive nature of trenching. The significance of the disturbance would be dependent on the depth of the aquifer unit in relation to the proposed depth of the excavations, with superficial aquifers present at the surface at greater risk of direct impacts.

94. During construction, surface layers would be excavated, which would allow increased infiltration of rainwater and surface run-off to the subsurface. This could potentially mobilise any residual contamination already present in the overlying strata which could potentially migrate into the underlying superficial aquifers impacting groundwater quality and associated groundwater abstractions. Whilst significant areas of contamination are not expected across the majority of the onshore project area, there are localised areas where crossing potentially contaminated land may be unavoidable.

95. If required, dewatering of perched water or groundwater within excavations could also affect groundwater flow and water quality, resulting in impacts to base flow of local watercourses or impact on groundwater abstractions.

96. In addition, during construction there is the potential for the accidental release of lubricants, fuels, and oils from construction machinery. This can occur as a result of spillages, leakage, or storage. These can enter into the ground and subsequently into groundwater affecting groundwater quality and associated groundwater abstractions.

#### 19.6.1.2.1 Magnitude of impact

97. During the construction phase of North Falls there would be the requirement for materials to be excavated to construct the onshore cable route, temporary haul roads, joint bays, link boxes and temporary compounds. Excavation of material would also be required at landfall and within the onshore substation.

98. The maximum construction period for North Falls is anticipated to be 27 months. However, earthworks would not be operating continuously during the whole construction period.

99. Any changes to infiltration rates, surface runoff or dewatering that may occur as a direct result of earthwork activities and direct effects on the underlying superficial aquifers are predicted to be of local spatial extent within each aquifer unit, of short-term duration (related to the working areas only), of intermittent occurrence and high reversibility (occurring only during the works and returning to baseline conditions following completion of the works). The magnitude of impact associated with earthworks is therefore considered to be low.

100. Trenchless crossings (e.g. HDD) will be required as part of the construction works, e.g., where the onshore cable route intersects a Main River. The foundation design of the onshore substation, i.e. whether piling is required, is yet to be determined. The onshore substation is underlain by bedrock of the Thames Group which is classified as unproductive strata and so risks to groundwater resources associated with piling in this area are not anticipated. Therefore, the magnitude of impact is considered to be negligible.

101. Dependent on the depth and thickness of the superficial aquifer units, there is the potential for them to also be affected by trenchless crossing techniques and piling (if required). As mentioned previously, the potential impacts are predicted to be of local spatial extent (occurring only at trenchless crossings, or where piling may be required) and of intermittent occurrence. Therefore, in relation to the impacts to superficial aquifers from these activities, the magnitude of impact is considered to be low.

#### 19.6.1.2.2 Sensitivity of receptor

102. There are no potable groundwater abstractions under the jurisdiction of the EA or local authority located within the onshore project area. There are, however, domestic potable abstraction wells within 250m of the onshore project area. Although the strata from which the potable groundwater is abstracted from is not recorded, it is conservatively assumed that they abstract from the shallow superficial Secondary Aquifers (A and B). Due to the presence of abstractions for potable use located within 250m of the onshore project area, the sensitivity of the superficial Secondary Aquifers (A and B) is considered to be high.

103. The SPZ 3 which is present within the onshore cable route north of Tendring Green up to and including the onshore substation is considered medium sensitivity.

#### 19.6.1.2.3 Significance of effect

104. Prior to the implementation of additional mitigation measures discussed below, the significance of effect associated with construction works on groundwater quality or the resource potential of the Secondary Aquifers is considered minor to moderate adverse. This ranges from not significant to significant in EIA terms. The significance of effect is inclusive of the likely significant effects associated with trenchless crossings and piling (if required).

105. With regards to the SPZ 3, the significance of effect associated construction works is considered to be minor adverse which is not significant in EIA terms. The significance of effect is inclusive of the likely significant effects associated with trenchless crossings and piling (if required).

#### 19.6.1.2.4 Additional mitigation

As discussed in Section 19.6.1.1.4, additional mitigation includes measures such as investigations to characterise ground conditions. Should contamination be encountered that is considered to pose an unacceptable risk to groundwater and groundwater resources, a remediation strategy proportionate to the level of risk would be developed and agreed with the relevant bodies. Once agreed, any required remediation works, which would be dependent on the type and level of contamination encountered, would be undertaken to mitigate the potential risks posed. This scheme would be developed post-consent once detailed design has confirmed whether the project will need to interact with potentially contaminated land and groundwater. Further details of this scheme are detailed in the OCoCP (Document Reverence: 7.13).

#### 19.6.1.2.5 Residual significance of effect

106. Following the implementation of the additional mitigation measures described, the overall risk to groundwater within the SPZ 3 and Secondary Aquifers during construction would be minimised as far as is reasonably practicable. This would effectively reduce the magnitude of impact to negligible for both the Secondary Aquifers and SPZ 3. Therefore, the residual significance of effect would be minor adverse which is not significant in EIA terms.

### *19.6.1.3 Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination*

107. The study area crosses three Main Rivers: Holland Brook, Kirby Brook and Tendring Brook.

108. In addition to these larger rivers, there are unnamed watercourses and ditches that are located either wholly or partially within the study area.

109. As described in Table 19.11 and the PRA (Appendix 19.1 (Document Reference: 3.3.20)), potential sources of contamination have been identified within the study area. Installation of the onshore export cables and construction of the onshore substation would require substantial earthworks, as well as the potential for piling. These activities have the potential to disturb pre-existing contamination which could migrate and be released into surface water via the following pathways:

- Mobilisation and migration of free phase hydrocarbons, soil contaminants or dissolved phase contaminants in groundwater by construction activities with subsequent release into surface waters;

- Surface water runoff from contaminated Made Ground soils brought to the surface during construction works;
- Runoff from stockpiles of potentially contaminated soils;
- Migration of soil or groundwater contaminants into surface water drains during construction activities which then enter surface water;
- Accidental spillage whilst handling, storing or treating contaminated water or fuels or other chemicals used during construction; and
- The hydraulic regime of the local area could also be affected by the construction of North Falls, for example, by backfilling excavated areas with less compacted soil / material could potentially create preferential flow paths into surface water receptors.

#### 19.6.1.3.1 Magnitude of impact

110. There is the potential for pre-existing contamination (where present) to be mobilised and enter into and therefore potentially impacting upon the surface water features located within the onshore project area. There is also the potential for additional sources of contamination to be present within the wider river catchment for North Falls (extending beyond the buffer zones described in Section 19.3.1) which discharges into surface water features.

111. With the implementation of the embedded mitigation measures described in Table 19.3, the magnitude of impact is considered to be negligible.

#### 19.6.1.3.2 Sensitivity of receptor

112. Any migration and discharge of contaminants into surface waters could lead to a reduction in surface water quality and impact on the ecological habitats that they support. As the study area crosses Holland Brook which flows through Holland Haven Marshes (also within the study area), which is a statutory designated site (SSSI), the sensitivity of surface waters of considered to be high.

113. Additional effects relating to surface water quality and the ecological habitats they support are provided in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23) and ES Chapter 23 Onshore Ecology (Document Reference: 3.1.25).

#### 19.6.1.3.3 Significance of effect

114. With the implementation of embedded mitigation measures, the significance of effect on surface water bodies during the construction phase is considered minor adverse. This is not significant in EIA terms.

### *19.6.1.4 Impact 4: Sterilisation of future mineral resources*

115. As described in Table 19.10, there are a number of MSAs, and a MCA located within the onshore project area. Construction activities and installation of cables within these areas would prevent the extraction of sands and gravels across the whole construction area.

116. A MRA has been undertaken for the onshore project area (noting the MRA was originally undertaken for the Five Estuaries project which spatially overlaps with the onshore project area and has been shared with North Falls to inform this EIA).

117. The MRA has been undertaken to provide an indication of the likely quality and extent of the mineral resource, the commercial viability of extraction and environmental impact.

#### 19.6.1.4.1 Magnitude of impact

118. The installation of up to four trenches as part of the construction of the onshore cable route running the length of 24km at a construction width of up 80m (increasing up to 130m at trenchless crossings), has the potential to sterilise the resources present within the linear route of the onshore cable route during construction. In all cases, where the onshore cable route intersects a MSA or MCA, only part of each area would be impacted and not the whole protected area.

119. The maximum footprint of the onshore substation platform would be 5.88ha (plus a 3.75ha temporary construction compound) and has the potential to temporarily sterilise mineral resources within its footprint during construction works.

120. The total area of MSAs impacted during the construction phase of North Falls is 1.94km$^2$, which represents 50.45% of the onshore project area.

121. The footprint required for construction works will be greater than that required for permanent infrastructure during the operational phase. Therefore, the potential impacts during the construction phase will temporarily sterilise a larger area than that which would be permanently sterilised during operation (see Section 19.6.2.3).

122. Following completion of construction works, infrastructure associated with temporary haul roads, construction compounds etc., that have effectively sterilised mineral resources present in MSAs or MCAs will be removed. This would then allow for mineral resources to be available for extraction. Therefore, the magnitude of impact during construction is considered to be low.

#### 19.6.1.4.2 Sensitivity of receptor

MSAs and MCAs are considered to be of regional importance and therefore the sensitivity of the receptor is considered to be medium.

#### 19.6.1.4.3 Significance of effect

123. The significance of effect on mineral resources associated with the construction of North Falls is low magnitude on a medium sensitivity receptor, resulting in a minor adverse significance of effect. This is not significant in EIA terms.

### *19.6.1.5 Impact 5: Built environment*

124. The construction phase has the potential to impact the existing built environment. This may be through creating new preferential pathways for contaminants or gases / vapours to migrate that may lead to degradation of utilities and concrete from aggressive attack. This could potentially compromise the integrity of buildings or utilities, or the migration of ground gases / vapours into buildings which, in extreme cases, could cause explosion.

125. Potential impacts associated with the construction of North Falls on existing utilities, in relation to electricity cables, telecommunications etc, are discussed in ES Chapter 22 Land Use and Agriculture (Document Reference: 3.1.24).

#### 19.6.1.5.1 Magnitude of impact

126. Commercial, residential and holiday properties, churches and a care home are located within 250m of the onshore project area. These features are not present along the entirety of the onshore project area boundary but as isolated areas. The greatest concentration of buildings within 250m of the onshore project area is around the settlement of Thorpe-le-Soken.

127. The onshore cable route also crosses multiple roads and other transport infrastructure.

128. Potential impacts to the built environment are considered to be localised to work areas and areas of contamination, the magnitude of impact is therefore considered to be low.

#### 19.6.1.5.2 Sensitivity of receptor

129. With reference to Table 19.6, due to the presence of commercial and residential infrastructure within 250m of the onshore project area the sensitivity of the built environment is considered to be medium.

#### 19.6.1.5.3 Significance of effect

130. The potential significance of effect to the built environment associated with the construction of North Falls is considered minor adverse. This is not significant in EIA terms.

### *19.6.1.6 Impact 6: Impacts on agricultural land*

131. The majority of the construction footprint is located within areas currently associated with agricultural production, with ALC Grades 1, 2 and 3 present throughout the onshore project area. For the purposes of assessment, Grade 3 land is assumed Grade 3a in the absence of site surveys.

132. Due to the nature of the land use within the onshore project area, it would not be possible to avoid agricultural land. As mentioned in Section 19.6.1.1, the PRA identified localised areas within the onshore project area with a history of potentially contaminative uses which could represent a contamination risk to agricultural land.

133. Construction activities therefore have the potential to mobilise pre-existing sources of contamination in identified areas or, due to the invasive nature of earthworks create new preferential pathways. There is also the potential for new sources of contamination to be introduced to the area which may have adverse impacts on agricultural land.

134. Discussions in relation to potential impacts associated with construction on agricultural land beyond the impacts related to contaminated land can be found in ES Chapter 22 Land Use and Agriculture (Document Reference: 3.1.24).

#### 19.6.1.6.1 Magnitude of impact

135. During the construction phase of North Falls, there will be the requirement for materials to be excavated to construct the onshore elements of the Project, inclusive of temporary haul roads and temporary construction compounds.

136. Potential impacts to agricultural land during the construction phase are predicted to be of local spatial extent (localised to the work areas and areas where contamination may be present). Potential impacts are also anticipated to

be of short-term duration, of intermittent occurrence and high reversibility (occurring only during the works).

137. The magnitude of impact is therefore considered to be low.

#### 19.6.1.6.2 Sensitivity of receptor

138. Due to the presence of ALC Grade 1,2 and 3a land, the sensitivity of the receptor is considered to be high.

#### 19.6.1.6.3 Significance of effect

139. The significance of effect on agricultural land during construction from a risk of contamination is considered to be moderate adverse. This is significant in EIA terms.

#### 19.6.1.6.4 Additional mitigation

140. Mitigation measures discussed in Sections 19.6.1.1.4 and 19.6.1.2.4 would also serve to reduce the magnitude of impact on agricultural land as a result of construction activities. Implementation of the measures previously discussed would reduce the magnitude of impact to negligible.

#### 19.6.1.6.5 Residual significance of effect

141. Following the implementation of the mitigation measures described, the overall risk to agricultural land from a contamination perspective would be minimised as far as reasonably practicable. Therefore, the residual significance of effect would be minor adverse, which is not significant in EIA terms.

### 19.6.2 Likely significant effects during operation

142. During operation, it is expected that there will be no further requirement for land to be disturbed or excavated, except in the event that onshore cables require repair or maintenance or the onshore substation access works needing to be reinstated. However, these activities would not extend beyond the construction footprint assessed above, and for the former would be relatively rare and localised in occurrence. For the latter, the haul road required to access the onshore substation, required in the unlikely event of transformer failure, would potentially be in place for up to 7 months, and its location would be over land already disturbed during construction. As such, effects arising from these activities are likely to be no worse than that assessed during construction.

#### *19.6.2.1 Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts*

143. During the operation of North Falls there would be no planned maintenance along the onshore cable route which would require the excavation of soils. In the unlikely event of cable failure, a stretch of cable between two joint bays may need to be replaced. This would require excavation at the two joint locations to expose the joint bays and allow the cable to be pulled out and replaced. Maintenance works associated with the onshore substation are anticipated to be undertaken during the operational life of North Falls, which may include the need for soils to be excavated.

144. If contaminated materials are brought to the surface through excavation during the operational phase and no mitigation measures are implemented, these materials would permanently be exposed at the surface. This creates the

potential for maintenance workers, landowners, land users and neighbouring land users to come into direct contact with contaminated soils left in-situ via direct contact pathways.

145. Materials excavated during the installation of the onshore cables and construction of the onshore substation would be re-instated following completion where practicable. Reinstatement of materials with a similar porosity as the surrounding environment would help mitigate the potential for preferential pathways to be created. However, if a different source of material is used to backfill excavations that is not of a similar porosity as the surrounding environment (e.g. a more porous material such as coarse hardcore is used) there is the potential for ground gases and / or vapours to migrate along the length of the onshore cable route or from beneath the onshore substation area. This may lead to the accumulation of ground gases and vapours within the onshore substation accessed by maintenance workers during the operational phase and represents risks associated with asphyxia and explosion.

146. If however, during site characterisation works areas considered to represent an unacceptable risk to human health are identified, remedial works proportionate to the level of risk would be undertaken. In addition, should areas of unexpected contamination be encountered during construction works, appropriate mitigation measures (including potential remediation) would also be undertaken to reduce the significance of effect to human health receptors.

147. In relation to risks posed by ground gases and vapours, should potential sources of ground gas / vapour generating materials be identified as part of site characterisation works or encountered unexpectedly during construction, appropriate mitigation measures, including removal of the source material would be implemented prior to construction. Impacts associated with ground gas / vapours to the built environment are discussed in Section 19.6.2.4).

#### 19.6.2.1.1 Magnitude of impact

148. There may be a need for ground excavations to be undertaken at joint bay locations or at the onshore substation as part of the maintenance for North Falls. The impacts are predicted to be of local spatial extent (localised areas where contamination may be present and to areas where excavation works are required), of short-term duration, of intermittent occurrence and high reversibility (occurring only during the maintenance works). The magnitude of impact is therefore considered to be low.

149. In areas where there is the potential for ground gases and / or vapours to accumulate (e.g. within the onshore substation building) mitigation measures implemented during the construction phase would form the embedded mitigation measures during operation. The incorporation of the embedded mitigation measures would reduce the magnitude of impact during operation. Therefore, the magnitude of impact is considered to be negligible.

#### 19.6.2.1.2 Sensitivity of receptor

150. The sensitivity of maintenance workers, landowners, land users and neighbouring land users located within 50m of North Falls is considered high (see Table 19.6).

#### 19.6.2.1.3 Significance of effect

151. The significance of effect is considered to be minor adverse, which is not considered significant in EIA terms.

### *19.6.2.2 Impact 2: Impact on controlled waters (groundwater and surface waters)*

152. Maintenance activities at landfall, along the onshore cable route and at the onshore substation have the potential to mobilise pre-existing contamination or create new contamination through the leakage or spillage of fuels, oils or other chemicals from machinery, vehicles, or operational equipment. This could affect water quality within the aquifers underlying the onshore project area, surface water receptors and the water abstractions they support (if present).

#### 19.6.2.2.1 Magnitude of impact

153. Although excavation works will not form part of planned maintenance activities during the operational phase of North Falls, there is the potential for excavations to be undertaken to conduct unplanned repairs. Should excavation works be required as part of unplanned works, these would be at joint bay locations for cable repairs or at the onshore substation and not involve the entirety of the North Falls infrastructure.

154. During cable repair / maintenance works and at the onshore substation, all fuels, oils, lubricants, and other chemicals would be stored in an impermeable bund with at least 110% of stored capacity. Spill kits would be available on site and an Emergency Response Plan (ERP) (or similar) would be developed and recorded within the O&M manual. The ERP will outline the mitigation measures to be undertaken in the event of an uncontrolled release of hazardous materials.

155. The impacts are predicted to be of local spatial extent (localised to areas of excavation / maintenance and where contamination may be present). With the relevant embedded mitigation measures in place (see Table 19.3), the magnitude of impact is considered to be negligible during operation.

#### 19.6.2.2.2 Sensitivity of receptor

156. Any migration and discharge of contamination into surface waters through direct or indirect pathways (e.g. surface run-off, discharge of groundwater into surface water bodies) could lead to a reduction in surface water quality and impact on the ecological habitat they support. Although Holland Haven Marshes SSSI is located within the landfall area, surface water features (e.g., Holland Brook) from other areas of the onshore project area may flow and discharge into the protected area. Therefore, the sensitivity of controlled waters is considered to be high.

#### 19.6.2.2.3 Significance of effect

157. The potential significance of effect to controlled waters resulting from the operation of North Falls is considered minor adverse. This is not considered to be significant in EIA terms.

### *19.6.2.3 Impact 3: Sterilisation of future mineral resources*

158. Future extraction of resources from within MSAs would be prevented within the permanent footprint of the onshore export cables and the onshore substation, as well as areas required for permanent access routes. This would prevent extraction within these areas for the duration of the operational period.

159. The impacts are predicted to be permanent and could affect the receptor directly. When reviewing the Essex Minerals and Waste Planning Policy map (Essex County Council, 2014), the proportion of the total MSA that would be effectively sterilised appears to be a small proportion. The total area of MSAs impacted during the operational phase of North Falls is >20ha.

#### 19.6.2.3.1 Magnitude of impact

160. Although the operational footprint of North Falls will be smaller than that of the construction footprint, provided that the mineral resources have not been removed prior to construction, the impacts would be permanent during the lifetime of the Project rather than temporary. However, following decommissioning of North Falls, these areas may become available for mineral extraction once more and so the impacts are considered to be ultimately reversible. Therefore, the magnitude of impact is considered to be low.

#### 19.6.2.3.2 Sensitivity of receptor

161. MSAs and MCAs are considered to be of regional importance and therefore the sensitivity of future mineral resources is considered medium.

#### 19.6.2.3.3 Significance of effect

162. The likely significant effects to mineral resources resulting from the operation of North Falls is low magnitude on a medium sensitivity receptor, representing a minor adverse significance of effect. This is not considered to be significant in EIA terms.

### *19.6.2.4 Impact 4: Built environment*

163. Materials such as concrete used in the infrastructure associated with North Falls have the potential to undergo degradation, such as chemical attack, from aggressive ground conditions due to the presence of acids or sulphates. This has the potential to compromise the integrity of structures associated with the transition joint bays, link boxes and the onshore substation.

164. In addition, the presence of contaminants in soils could also result in a risk of corrosion and permeation of utilities such as plastic water supply pipes that may be installed at the onshore substation. If utilities corridors are within land affected by contamination, construction of clean or lined service corridors would be installed to protect land users and utilities. This would include, for example, the use of soils deemed not to contain contamination above human health generic assessment criteria appropriate for the end use within the onshore project area.

165. Buildings built on or near sources of ground gas (such as infilled land) could also be at risk from the accumulation of gases potentially causing explosion. Should unexpected sources of ground gas be identified prior to or during construction works, a ground investigation would be undertaken to characterise ground conditions and assess potential risks. Depending on the outcome of the assessment, mitigation measures such as the use of gas protection measures within the onshore substation design would be implemented.

166. The above measures would be implemented during the construction phase and form part of the embedded mitigation measures for the operational phase of North Falls.

#### 19.6.2.4.1 Magnitude of impact

167. The PRA (Appendix 19.1 (Document Reference: 3.3.20)) indicates that the onshore substation is not situated on or near potential sources of ground gases, such as infilled land.

168. Depending on the location of jointing bays and link boxes in relation to potential sources of ground gas generating contamination, there is the potential for the gases to migrate and accumulate in these underground structures at landfall and along the onshore cable route. However, mitigation measures implemented at the construction phase, such as the use of gas protection measures within the onshore substation design, would reduce the potential magnitude of impact during operation to negligible.

#### 19.6.2.4.2 Sensitivity of receptor

169. Due to the presence of the onshore substation and ancillary structures, as well as commercial and residential properties within 250m of the onshore project area, the sensitivity of the built environment is considered to be medium.

#### 19.6.2.4.3 Significance of effect

170. With the implementation of additional mitigation measures during the construction phase, the risk to the built environment during the operation of North Falls would be reduced as far as practicable. The significance of effect during operation is therefore considered minor adverse, which is not considered significant in EIA terms.

### *19.6.2.5 Impact 5: Impacts on agricultural land*

171. As mentioned previously, maintenance activities within the operational footprint of North Falls have the potential to mobilise pre-existing contamination or create new contamination through the leakage or spillage of fuels, oils or other chemicals from machinery, vehicles or operational equipment. This could impact on agricultural land quality.

#### 19.6.2.5.1 Magnitude of impact

172. Although excavation works will not form part of any planned maintenance activities during the operational phase of North Falls, there is the potential for excavations to be undertaken to conduct unplanned repairs. Should excavation works be required as part of unplanned works, these would be at joint bay locations for cable repairs or at the onshore substation and not involve the entire North Falls infrastructure.

173. The impacts are predicted to be of local spatial extent (localised to areas of excavation/maintenance and where contamination may be present). With the implementation of the embedded mitigation measures outlined in Table 19.3, the magnitude of impact is considered to be negligible during the operational phase.

#### 19.6.2.5.2 Sensitivity of receptor

174. Due to the presence of ALC Grade 1, 2 and 3 land, the sensitivity of the receptor is considered to be high.

#### 19.6.2.5.3 Significance of effect

175. The potential significance of effect to agricultural land from contamination resulting from the operation of North Falls is considered minor adverse. This is not considered significant in EIA terms.

### 19.6.3 Likely significant effects during decommissioning

176. No decision has been made regarding the final decommissioning policy for the onshore export cables, as it is recognised that industry best practice, rules and legislation change over time. It is likely that the cables would be pulled through the ducts and removed, with the ducts themselves left in situ.

177. In relation to the onshore substation, the programme for decommissioning is expected to be similar in duration to the construction phase. The detailed activities and methodology would be determined and agreed with the relevant planning authority later within the lifetime of North Falls, but are expected to include:

- Dismantling and removal of outside electrical equipment from the onshore project area located outside the substation building;
- Removal of cabling from onshore project area;
- Dismantling and removal of electrical equipment from within the substation building;
- Removal of main substation building and minor services equipment;
- Demolition of support buildings and removal of fencing;
- Landscaping and reinstatement of the onshore project area (including land drainage); and
- Removal of areas of hard standing.

178. Whilst details regarding the decommissioning of the substation are currently unknown, considering a worst-case scenario, which would be the removal and reinstatement of the current land use, it is anticipated that the impacts would be similar or less than those during construction. This is because areas of identified contamination would have been remediated during the construction phase.

179. The decommissioning methodology would need to be finalised nearer to the end of the lifetime of North Falls to be in line with current guidance, policy, and legislation at that point. Any such methodology would be agreed with the relevant authorities and statutory consultees.

## 19.7 Potential monitoring requirements

180. Groundwater and ground gas monitoring may be required as part of any pre-construction targeted ground investigations that may be required in order to determine the site characteristics of the onshore project area and if they pose a potential risk to human health, groundwater and surface water receptors identified within this chapter.

## 19.8 Cumulative effects

### 19.8.1 Identification of potential cumulative effects

181. The first step in the CEA process is the identification of which residual effects assessed for North Falls on their own have the potential for a cumulative effect with other plans, projects, and activities. This information is set out in Table 19.12.

**Table 19.12 Potential cumulative effects**

| Impact | Potential for cumulative effect | Rationale |
|---|---|---|
| **Construction** | | |
| Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Yes | The residual effects to construction workers would be confined to the onshore project area.<br>Effects on landowners, land users and neighbouring land users may be exacerbated by other projects. |
| Impact 2: Direct impacts on groundwater quality and groundwater resources | Yes | Residual effects on Secondary Aquifers may be exacerbated by other projects which are located within the same aquifer and / or SPZ. |
| Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination | Yes | Residual effects on surface water and the ecological habitats they support may be exacerbated by other projects that are located within the same river catchment. |
| Impact 4: Sterilisation of future mineral resources | Yes | Residual effects on MSAs and MCAs may be exacerbated by other projects if located within the same safeguarding area. |
| Impact 5: Built environment | Yes | Residual effects on the built environment may be exacerbated by other projects if located near to the same structures. |
| Impact 6: Impacts on agricultural land | Yes | Residual effects on agricultural land may be exacerbated by other projects. |
| **Operation** | | |
| Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Yes | The residual effects to maintenance workers would be confined to the onshore project area.<br>Residual effects on landowners, land users and neighbouring land users may be exacerbated by other projects. |
| Impact 2: Impact on controlled waters (groundwater and surface waters) | Yes | Residual effects on Secondary Aquifers may be exacerbated by other projects which are located within the same aquifer and / or SPZ. |
| Impact 3: Sterilisation of future mineral resources | Yes | Residual effects on MSAs and MCAs may be exacerbated by other projects if they are located within the same safeguarding area. |
| Impact 4: Built environment | Yes | Residual effects on the built environment may be exacerbated by other projects if located near the same buildings. |
| Impact 5: Impacts on agricultural land | Yes | Residual effects on agricultural land may be exacerbated by other projects if located near the same parcel of agricultural land. |

### 19.8.2 Other plans, projects and activities

182. The second step in the cumulative assessment is the identification of other plans, projects and activities that may result in cumulative effects for inclusion in the CEA (described as 'project screening'). This information is set out in Table 19.13 below, together with a consideration of the relevant details of each, including current status (e.g., under construction), planned construction period, closest distance to North Falls, status of available data and rationale for including or excluding from the assessment.

183. The Project screening has been informed by the development of a CEA project list which forms an exhaustive list of plans, projects and activities within the study area (Section 19.3.1). The list has been appraised, based on the confidence in being able to undertake an assessment from the information and data available, enabling individual plans, projects and activities to be screened in or out.

184. Only projects within a 1km Zone of Influence (ZoI) for ground conditions and contamination have been included in the CEA as it is considered unlikely that projects at distances greater than this will result in cumulative effects between projects.

**Table 19.13 Summary of projects considered for the CEA in relation to ground conditions and contamination (project screening)**

| Project | Status | Construction Period | Closest Distance from the onshore project area (km) | Confidence in Data | Included in the CEA (Y/N) | Rationale |
|---|---|---|---|---|---|---|
| Five Estuaries Offshore Wind Farm<br><br>EN010115 | Pre-application | 2028-2030 | 0 | High | Y | There is a spatial overlap between the onshore project area for North Falls and Five Estuaries. There is also the potential for there to be a temporal overlap during construction and operational phases of both Five Estuaries and North Falls. Therefore, cumulative effects may occur. |
| Norwich to Tilbury<br><br>EN020027 | Pre-application | 2027-2031 | 0 | High | Y | The proposed Norwich to Tilbury project seeks to reinforce the high voltage power network in East Anglia between existing substations (Norwich Main, Bramford in Suffolk and Tilbury in Essex) as well as connect the Five Estuaries and North Fall Offshore Wind Farm developments to the network. There is a spatial overlap between the proposed location of the Norwich to Tilbury substation and the North Falls substation compound, the cables which will connect North Falls into the Norwich to Tilbury substation and any additional works required to facilitate the connection, therefore there is the potential for cumulative effects to occur. |
| Land adjacent to Lawford Grid Substation Ardleigh Road Little Bromley Essex CO11 2QB | Approved | Information unavailable | 0.3km | Low | N | The project involves the construction and operation of a 50MW Battery Energy Storage System (BESS), and related infrastructure with associated access, landscaping and drainage. The proposed location of the BESS is adjacent to North Falls onshore substation works area.<br>However, due to the nature of the development and the assumption that appropriate mitigation measures will be implemented to protect the surrounding environment, it is considered that there is no potential for cumulative effects to occur.<br>It is also anticipated that, as the application has been approved, construction would be completed prior to the start of the construction works for North Falls. Therefore, no cumulative effects on shared receptors are anticipated. |

### 19.8.3 Assessment of cumulative effects

185. Five Estuaries is also in its application phase, having submitted a DCO to the Planning Inspectorate for the project which was accepted in April 2024. Although subject to a separate DCO, Five Estuaries shares the same landfall location and onshore cable route (including Bentley Road improvement works) as North Falls, with the two projects also having co-located onshore substations within the same onshore substation works area. The two projects also have the same national grid connection point.

186. Five Estuaries Offshore Wind Farm Limited and NFOW have sought to collaborate and coordinate where practicable, which has led to collaborative design of the projects' onshore infrastructure, and also to sharing of detailed project design information onshore. As a result, a detailed CEA for effects arising from the development of the Five Estuaries can be undertaken. The CEA section of this chapter is therefore split into two sections:

- the first describing a detailed CEA covering effects predicted to arise from development of Five Estuaries and North Falls;
- the second, detailing effects predicted to arise from the development of Five Estuaries, North Falls and other projects.

187. The latter section will be based on the project information available for each scheme in the public domain, and by definition is therefore less detailed than the Five Estuaries and North Falls CEA section.

188. Full details on the approach to CEA used within this chapter are set out in ES Chapter 6 EIA Methodology (Document Reference: 3.1.8).

#### *19.8.3.1 Five Estuaries*

##### 19.8.3.1.1 Realistic worst case scenario

189. Using the design information provided by Five Estuaries Offshore Wind Farm Limited and checked/updated against the submission of the Five Estuaries ES, a realistic worst case cumulative scenario has been developed for the purpose of this chapter.

190. This considers three potential cumulative build-out scenarios, as outlined in ES Chapter 5 Project Description (Document Reference: 3.1.7):

- **Scenario 1:** North Falls 'Option 2' build out is progressed, and Five Estuaries Offshore Wind Farm Limited undertakes landfall, onshore substation construction and cable pull which overlaps with North Falls equivalent works. In this scenario, onshore cable route associated works, including temporary construction compounds, accesses and haul road, all remain in place and are used by the second project during its construction.
- **Scenario 2:** North Falls 'Option 1' build out is progressed, and Five Estuaries Offshore Wind Farm Limited undertakes landfall, onshore substation and onshore cable route construction and cable pull, all of which does not overlap with North Falls' equivalent works. There would be a gap of between 1 and 3 years between each Projects' construction. In this scenario, onshore cable route associated works, including temporary

construction compounds, accesses and haul road, all remain in place and are used by the second project during its construction.

- **Scenario 3:** North Falls 'Option 1' build out is progressed, and Five Estuaries Offshore Wind Farm Limited undertakes a separate landfall, onshore substation and onshore cable route construction and cable pull with a multi-year (i.e. >3 year) gap between the two construction activities. In this scenario, there is no reuse in onshore temporary works between the two projects, and all onshore cable route associated works are rebuilt and reinstated in full by the second project.

191. Full details on the build out scenarios considered within this assessment are detailed in ES Chapter 5 Project Description (Document Reference: 3.1.7) and ES Chapter 6 EIA Methodology (Document Reference: 3.1.8).

192. The realistic worst case scenario for likely cumulative effects scoped into the EIA for the ground conditions and contamination assessment are summarised in Table 19.14. These are based on project parameters for Five Estuaries described in ES Chapter 5 Project Description (Document Reference: 3.1.7), which provides further details regarding specific activities and their durations.

**Table 19.14 Realistic worst-case scenario of cumulative effects arising from development of North Falls and Five Estuaries – (Scenario 3) (independent build).**

| Potential impact | Parameter | Notes |
|---|---|---|
| **Construction** | | |
| Impacts relating to the landfall | Landfall (temporary works) physical parameters:<br>• HDD indicative depth = up to 20m<br>• HDD temporary works area = 150 x 300m<br>• Indicative maximum length of HDD = 1,100m<br>• Number of TJBs = 4<br>• TJB dimensions = 4 x 15 for the Project, 5 x 20m for Five Estuaries<br>• Total construction land take for TJBs = 150 x 75m for both projects | These parameters represent the maximum footprint and duration of disturbance under Scenario 3, in which potential impacts on ground conditions and contamination receptors could occur. |
| | Duration<br>• 13 months (of which HDD = 6 months) per project<br>• HDD to include 24 hour / 7 days working where required. | |
| Impacts relating to the onshore cable route | Onshore cable route construction physical parameters:<br>• Onshore cable route length = 24km<br>• Onshore cable route construction swathe = 80m<br>• Number of trenches = 4<br>• Cable trench dimensions = 3.75 to 1.2 (tapered top to bottom) x 2m<br>• Maximum cable trench depth = 2m<br>• Minimum cable burial depth = 0.9m<br>• Target cable burial depth = 1.2m<br>• Jointing bays = up to 192 (approximately every 500m)<br>• Jointing bay dimensions = 4 x 15m<br>• Haul road width = 6m (up to 10m at passing places) | |

| Potential impact | Parameter | Notes |
|---|---|---|
| | • Temporary construction compound footprint = 150 x 150m for main compounds, 100 x 100m for satellite compounds | |
| | Trenchless crossings physical parameters:<br>• Onshore cable route construction swathe = 90m, 65m + 130m at complex trenchless crossings<br>• Maximum trenchless crossing depth = 20m<br>• Maximum width of buried cable = 130m<br>• HDD compound footprint = 75 x 100m | |
| | Duration<br>• Bentley road widening = 6 – 9 months<br>• Cable route works = 18 – 27 months (per project)<br>• Cable installation = 12 months (per project)<br>• Major HDD (each location) = 8 months (of which HDD = 4 months) (per project)<br>• Minor HDD crossings = 2 months (per project)<br>• Major HDD crossings to include 24 hour / 7 days working where required. | |
| Impacts relating to the onshore substation and unlicensed works | Onshore substation (temporary works) physical parameters:<br>• Indicative area of the substations = 280 x 210m (North Falls) + 280 x 210m (Five Estuaries)<br>• Landscaping / bunding area = 19,600m$^2$ (North Falls) + 19,600m$^2$ (Five Est)<br>• Number of buildings = 6 (North Falls) + 8 (Five Estuaries)<br>• Construction compound footprint = 250 x 150m (North Falls) + 250 x 150m (Five Estuaries)<br>• Unlicensed works physical parameters (for two projects):<br>• All enabling works / platform constructed by national grid. | |

| Potential impact | Parameter | Notes |
|---|---|---|
| | • Cable installation works as described above<br>• Equipment may include:<br>  ○ cable sealing ends, surge arrestors, earth switch, disconnectors, circuit breakers, current transformers, voltage transformers, busbars | |
| | Duration:<br>• Substation construction duration = 21 – 27 months (per project) | |
| **Operation** | | |
| Impacts relating to the onshore cable route | Onshore cable route operational physical parameters:<br>• Number of link boxes = up to 192<br>• Link box footprint (per box) = 0.6 x 1 x 1.5m<br>• Cross-sectional area of buried cement-bound sand = 0.6m$^2$ | These parameters represent the maximum footprint of Scenario 3 that would interact with the baseline environment. |
| Impacts relating to the onshore substation | Onshore substation physical parameters:<br>• Indicative Area of site Air Insulated Substation = 58,800m$^2$<br>• Indicative Area of site Gas Insulated Substation = 45,000m$^2$<br>• Landscaping/bunding area = 19,600m$^2$ | |
| **Decommissioning** | | |
| No final decision has yet been made regarding the final decommissioning policy for the onshore project infrastructure including landfall, onshore cable route 400kV cable route and onshore substation. It is also recognised that legislation and industry best practice change over time. However, it is likely that the onshore project equipment, including the cable, will be removed, reused, or recycled where practicable and the transition bays and cable ducts being left in place. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that for the purposes of a worst case scenario, the likely significant effects will be no greater than those identified for the construction phase. | | |

#### 19.8.3.1.2 During construction

##### Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts

193. The impact assessment within the Ground Conditions and Land Use chapter for Five Estuaries splits the assessment of potential impacts to construction workers and offsite human health receptors.

194. The impact assessment for Five Estuaries identified that short term risks to construction workers would be managed through the use of appropriate working practices and the use of PPE. In addition to these measures, the CoCP will outline the procedures that would be followed should unexpected contamination be encountered during construction works. A Site Waste Management Plan (SWMP) would also form part of the embedded mitigation measures for Five Estuaries. The embedded mitigation measures would also serve to protect offsite human health receptors. The significance of effect is considered to be minor adverse for construction workers and negligible adverse for offsite human health receptors. Both effects are deemed not significant in EIA terms.

195. For the North Falls project, the embedded mitigation measures protective of human health receptors during construction are similar in nature to those of Five Estuaries with the significance of effect considered to be minor adverse (not significant). As such, due to the mitigation measures that have been committed to by both projects, it is considered unlikely that cumulative effects could occur during the construction of both projects. Therefore, the significance of effect to human health is not considered to increase from the minor adverse impact (not significant) predicted for North Falls alone.

##### Impact 2: Direct impacts on groundwater quality and groundwater resources

196. The potential cumulative effects to superficial aquifers are likely to occur as a result of accidental spillages of fuels or chemicals during construction, and the potential mobilisation of pre-existing contamination (if present). Given the spatial overlap between the Project and Five Estuaries, there is the potential for the same aquifers to be impacted.

197. Impacts to the underlying aquifers as part of the construction phase of Five Estuaries would be managed through identified mitigation measures. These measures include, for example, following good environmental practices based on guidance such as CIRIA C532 Control of Water Pollution from Construction – Guidance for Consultants and Contractors (CIRIA, 2001). Where there is the potential for impacts to groundwater resources as a result of trenchless crossing techniques, this will be managed through the implementation of the CoCP which will include procedures to be followed to manage the storage and use of materials and chemicals. The significance of effect is considered to be negligible to minor adverse with the implementation of embedded mitigation measures. This is not significant in EIA terms.

198. For the North Falls project, the embedded mitigation measures protective of groundwater quality and groundwater resources during construction are again similar in nature to those of Five Estuaries with the significance of effect considered to be minor adverse. As such, due to the mitigation measures that have been committed to by both projects, it is considered unlikely that

cumulative effects could occur during the construction of both projects. Therefore, the significance of effect to groundwater receptors is not considered to increase from the minor adverse impact (not significant) predicted for North Falls alone.

### Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination

199. There is the potential for both direct and indirect cumulative effects on surface waters and the ecological habitats they support through, for example, accidental discharge of fuels or chemicals, as well as the mobilisation of existing contamination via large scale excavations (and piling if required) during construction.

200. Although not discussed in the context of impacts on surface water supported ecological habitats, embedded mitigation measures protective of surface water quality for the Five Estuaries project are similar in nature to those of North Falls. For example, the requirement for refuelling machinery in designated areas and provision of spill kits. The significance of effect on surface water quality for Five Estuaries are considered to be negligible to minor adverse (not significant). As such, due to the mitigation measures that have been committed to by both projects, it is considered unlikely that cumulative effects could occur during the construction of both projects. Therefore, the significance of effect to surface water quality and the ecological habitats they support from contamination is not considered to increase from the minor adverse impact predicted for North Falls alone. This is not significant in EIA terms).

### Impact 4: Sterilisation of future mineral resources

201. The construction works required for both North Falls and Five Estuaries have the potential to lead to increased cumulative impacts on strategic mineral resources. Areas designated as MSAs would be impacted during the separate construction phases of the projects. The linear nature of the projects and the areas impacted are spread along narrow linear routes rather than sterilising large areas, i.e. only a small portion of each MSA is potentially at risk of sterilisation. The residual significance of effect to MSAs may be exacerbated by other projects within the same safeguarding area and therefore potential exists to increase from the minor adverse impact (not significant) which is predicted for North Falls alone.

### Impact 5: Built environment

202. Potential impacts to the built environment during the construction phase of Five Estuaries has not been assessed. However, given the embedded mitigation measures proposed for both projects, and considering that any alteration to ground conditions would be highly localised, it is considered unlikely that there would be cumulative effects during construction. Therefore, the significance of effect is not considered to increase from the minor adverse impact (not significant) predicted for North Falls alone.

### Impact 6: Impacts on agricultural land

203. Potential impacts to agricultural land from contamination are only assessed in relation to trenchless crossing techniques for the Five Estuaries project. Potential impacts associated with the release of drilling and / or hydraulic fluids

would be mitigated against through embedded mitigation measures, for example pollution prevention measures within the CoCP. For Five Estuaries, the significance of effect on agricultural land from trenchless crossing techniques is considered to be minor adverse. This is not significant in EIA terms.

204. Embedded mitigation measures associated with the protection of human health, groundwater and surface water receptors for the Five Estuaries project are similar in nature to those discussed in the assessment of impacts on agricultural land from contamination for the North Falls project. As such, due to the mitigation measures that have been committed to by both projects, it is considered unlikely that cumulative effects could occur during the construction of both projects. Therefore, the significance of effect to agricultural land from contamination is not considered to increase from the minor adverse impact (not significant) predicted for North Falls alone.

#### 19.8.3.1.3 During operation

##### Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts

205. The potential impacts on human health receptors are not assessed as a single impact within the Five Estuaries Ground Conditions and Land Use chapter. With regards to the potential impacts associated with the migration and accumulation of ground gases, the significance of effect is considered to be minor adverse (not significant). This is due to the Five Estuaries project taking into consideration the location of potential areas of contamination during the design stage.

206. It is anticipated that, as with the North Falls project, the mitigation measures protective of human health receptors during construction would form part of the embedded mitigation measures for the operational phase. As such, it is considered that no cumulative effects are likely to occur during the operational phase of both projects. Therefore, the significance of effect to human health is not considered to increase from the minor adverse impact predicted for North Falls alone. This is not significant in EIA terms.

##### Impact 2: Impact on controlled waters (groundwater and surface waters)

207. Although not explicitly stated, it is anticipated that the mitigation measures protective of controlled waters during the construction of Five Estuaries would form part of the embedded mitigation measures for the operational phase. This is the approach taken for the assessment of operational impacts for North Falls. With this assumption in place, it is considered that no cumulative effects are likely to occur during the operational phase of both projects. Therefore, the significance of effect to controlled waters is not considered to increase from the minor adverse impact predicted for North Falls alone. This is not significant in EIA terms.

##### Impact 3: Sterilisation of future mineral resources

208. The permanent easements, access roads and onshore substations required for both North Falls and Five Estuaries have the potential to lead to increased cumulative impacts on strategic mineral resources. However, when compared to the overall county mineral resources, the area of MSAs that could potentially

be permanently sterilised is considered to be small. Therefore, the significance of effect to MSAs is not considered to increase from the minor adverse impact predicted for North Falls alone. This is not significant in EIA terms.

#### Impact 4: Built environment

209. Materials protective of utilities and infrastructure from potentially contaminated soils and groundwater may be required as part of both the North Falls and Five Estuaries projects should their presence be identified prior to construction. The potential for aggressive ground conditions to be present will be assessed as part of any ground investigations required for the design of concrete infrastructure. This will form part of the embedded mitigation measures for the operational phase for both projects. As such, it is considered that no cumulative effects are likely to occur during the operational phase of both projects. Therefore, the significance of effect on the built environment is not considered to increase from the minor adverse impact predicted for North Falls alone. This is not significant in EIA terms.

#### Impact 5: Impacts on agricultural land

210. Potential impacts to agricultural land from contamination is not assessed for the operational phase of Five Estuaries. It is, however, anticipated that as with North Falls, the mitigation measures protective of human health, groundwater and surface water receptors during construction would form part of the embedded mitigation measures for the operational phase. As such, it is considered that no cumulative effects are likely to occur during the operational phase of both projects. Therefore, the significance of effect to agricultural land from contamination is not considered to increase from the minor adverse impact predicted for North Falls alone. This is not significant in EIA terms.

##### 19.8.3.1.4 During decommissioning

211. Decommissioning strategies have not yet been finalised for North Falls or Five Estuaries; however, the cumulative effects are expected to be the same as or less than those of the initial construction phase.

##### 19.8.3.1.5 Summary

212. Table 19.15 Ground conditions interactions below provides a summary of the assessment of likely significant cumulative effects identified during the ground conditions and contamination CEA in relation to Five Estuaries.

**Table 19.15 Ground conditions interactions**

| Potential impact | Cumulative effect | Additional mitigation |
|---|---|---|
| **Construction** | | |
| Cumulative impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Minor adverse, therefore not significant in EIA terms (no change from North Falls assessment) | No additional mitigation measures necessary |
| Cumulative impact 2: Direct impacts on groundwater quality and groundwater resources | Minor adverse, therefore not significant in EIA terms (no change from North Falls assessment) | No additional mitigation measures necessary |
| Cumulative impact 3: Impacts on surface water quality and the ecological | Minor adverse, therefore not significant in EIA | No additional mitigation measures necessary |

| Potential impact | Cumulative effect | Additional mitigation |
|---|---|---|
| habitats they support from contamination | terms (no change from North Falls assessment) | |
| Cumulative impact 4: Sterilisation of future mineral resources | Minor adverse, therefore not significant in EIA terms (no change from North Falls assessment) | No additional mitigation measures necessary |
| Cumulative impact 5: Built environment | Minor adverse, therefore not significant in EIA terms (no change from North Falls assessment) | No additional mitigation measures necessary |
| Cumulative impact 6: Impacts on agricultural land | Minor adverse, therefore not significant in EIA terms (no change from North Falls assessment) | No additional mitigation measures necessary |
| **Operation** | | |
| Cumulative impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Minor adverse, therefore not significant in EIA terms (no change from North Falls assessment) | No additional mitigation measures necessary |
| Cumulative impact 2: Impact on controlled waters (groundwater and surface waters) | Minor adverse, therefore not significant in EIA terms (no change from North Falls assessment) | No additional mitigation measures necessary |
| Cumulative impact 3: Sterilisation of future mineral resources | Minor adverse, therefore not significant in EIA terms (no change from North Falls assessment) | No additional mitigation measures necessary |
| Cumulative impact 4: Built environment | Minor adverse, therefore not significant in EIA terms (no change from North Falls assessment) | No additional mitigation measures necessary |
| Cumulative impact 5: Impacts on agricultural land | Minor adverse, therefore not significant in EIA terms (no change from North Falls assessment) | No additional mitigation measures necessary |

#### *19.8.3.2 North Falls, Five Estuaries and other projects*

213. Based on the project screening in Table 19.13, in addition to Five Estuaries Offshore Wind Farm, one of the other listed projects will be included in the CEA for further assessment: Norwich to Tilbury.

##### 19.8.3.2.1 During construction

214. Cumulative effects from other projects during construction are shown in Table 19.16.

##### 19.8.3.2.2 During operation

215. Cumulative effects from other projects during operation are shown in Table 19.17.

**Table 19.16 Cumulative effects from other projects on ground conditions and contamination during construction**

| Cumulative effect 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Cumulative effect 2: Impacts on groundwater quality and groundwater resources | Cumulative effect 3: Impacts on surface water quality and the ecological habitats they support from contamination | Cumulative effect 4: Sterilisation of future mineral resources | Cumulative effect 5: Built environment | Cumulative effect 6: Impacts on agricultural land |
|---|---|---|---|---|---|
| A new onshore substation is proposed to be built as part of Norwich to Tilbury proposals by National Grid Electricity Transmission (NGET), which spatially overlaps with the North Falls and Five Estuaries onshore substation area (including onward connection, associated works to facilitate the connection and the national grid connection point). The Norwich to Tilbury PEIR details measures that would be adopted as part of Norwich to Tilbury. In relation to the potential impacts to human health, mitigation measures highlighted include:<br>• Use of appropriate personal protective equipment for the tasks being undertaken;<br>• Implementation of a CoCP and adoption of appropriate safe working practices;<br>• Development of a protocol for dealing with unexpected contamination; and<br>• Control of earthworks and materials movement in accordance with relevant best practice and guidance.<br>Given the proposed mitigation measures that would be adopted by Norwich to Tilbury and considering that any alteration in ground conditions would be highly localised it is considered that no cumulative effects would occur during the construction phase with North Falls and Five Estuaries. Therefore, the residual effect on human health is not considered to increase from what is predicted for North Falls and Five Estuaries, which are deemed not significant in EIA terms. | The potential cumulative effects upon superficial aquifers are likely to occur as a result of accidental spillages of fuels or chemicals during construction and mobilisation of existing contamination (if present). Given the spatial overlap of Norwich to Tilbury, North Falls and Five Estuaries there is the potential for the projects to be overlapping the same aquifers.<br>Mitigation measures highlighted in the Norwich to Tilbury PEIR include:<br>• Adoption of appropriate piling techniques (if required) to reduce the risk of creating new preferential pathways between aquifer units;<br>• Provision of a Foundation Works Risk Assessment within the CoCP; and<br>• Undertaking dewatering activities in accordance with Environment Agency guidance and permits (if required).<br>Due to the localised nature of potential effects, the residual significance of effect is considered minor adverse and therefore does not represent an increase in the predicted impacts of North Falls and Five Estuaries during construction.<br>Given the anticipated mitigation measures of Norwich to Tilbury, it is not considered likely that the significance of effect would increase from what is predicted for North Falls and Five Estuaries, which are deemed not significant in EIA terms. | Direct cumulative effects on surface waters are likely to occur in areas where there are spatial or temporal overlaps between Norwich to Tilbury, North Falls and Five Estuaries. The direct cumulative effects to surface waters from accidental discharge would be likely to occur as a result of accidental spillages of fuel or chemicals, as well as the mobilisation of existing contamination via large scale excavations (and piling if required) during construction.<br>Given the proposed mitigation measures outlined within the Norwich to Tilbury PEIR, it is considered unlikely that there would be a cumulative change to the magnitude of impact to surface waters from that described for North Falls and Five Estuaries.<br>The indirect cumulative effects to groundwater, and subsequent surface water discharge, are likely to be highly localised and would be unlikely to have long term impacts on groundwater discharge to surface water in areas of spatial overlap. Therefore, the residual cumulative effect is not considered to increase from what is predicted for North Falls and Five Estuaries, which are deemed not significant in EIA terms. | Norwich to Tilbury, North Falls and Five Estuaries have the potential to lead to increased cumulative impacts on strategic mineral resources. Additional areas designated as MSA would be impacted and represents the potential for additional losses of strata resources through mineral sterilisation.<br>Mitigation measures associated with mineral resources have been included in a qualitative MSA prepared for the Norwich to Tilbury PEIR. With mitigation measures for this project, residual cumulative effects are not considered to increase from what is predicted for North Falls and Five Estuaries, which are deemed not significant in EIA terms. | Potential impacts to the built environment are likely to occur in areas of spatial overlap between Norwich to Tilbury, North Falls and Five Estuaries. The construction phases of the projects have the potential to create new preferential pathways for contaminants or gases to migrate leading to the potential degradation of utilities and concrete from aggressive attack.<br>Mitigation measures associated with Norwich to Tilbury include pre-construction geotechnical ground investigation to inform geotechnical design in relation to site specific conditions including adverse ground conditions.<br>Additional mitigation measures associated with the built environment specifically are not included within the Norwich to Tilbury PEIR. It is however, anticipated that mitigation measures for Norwich to Tilbury would be similar to those of North Falls and Five Estuaries given the nature of the project. Should this be the case, residual cumulative effects are not considered to increase from what is predicted for North Falls and Five Estuaries, which are deemed not significant in EIA terms. | Potential impacts to agricultural land from contamination are likely to occur in areas of spatial overlap between Norwich to Tilbury, North Falls and Five Estuaries. The construction phases of the projects have the potential to mobilise pre-existing sources of contamination, as well as introduce new sources as a result of, for example, accidental spillages.<br>Although not specifically mentioned, mitigation measures protective of human health and controlled waters are also applicable to the potential impacts to agricultural land from contamination. Given the proposed mitigation measures outlined within the Norwich to Tilbury PEIR, it is considered unlikely that there would be a cumulative change to the magnitude of impact on agricultural land from that described for North Falls and Five Estuaries, which are deemed not significant in EIA terms. |

**Table 19.17 Cumulative effects from other projects on ground conditions and contamination during operation**

| Cumulative effect 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Cumulative effect 2: Impact on controlled waters (groundwater and surface waters) | Cumulative effect 3: Sterilisation of future mineral resources | Cumulative effect 4: Built environment | Cumulative effect 5: Impacts on agricultural land |
|---|---|---|---|---|
| Following the completion of construction works, a O&M manual for North Falls and Five Estuaries will be handed over to the Applicant. The folder would contain information in relation to the residual risks present within the onshore project area. It is anticipated that following the completion of the construction works associated with Norwich to Tilbury a O&M manual will be handed over from the Principal Contractor.<br>The information in these folders will enable the development of site and task specific risk assessments during the operational phases of both North Falls and Five Estuaries and Norwich to Tilbury. Given the anticipated mitigation measures of Norwich to Tilbury, it is not considered likely that the significance of effect would increase from what is predicted for North Falls and Five Estuaries, which are deemed not significant in EIA terms. | The O&M manual that will be handed to the Applicant following completion of construction works will enable task and site specific risk assessments to be developed for any required maintenance works during the operational phase of North Falls and Five Estuaries. Included within the folder would be an ERP which will outline the mitigation measures to be undertaken in the event of an uncontrolled release of hazardous materials. It is anticipated that the same information and an ERP will be available for the Norwich to Tilbury project.<br>Given the anticipated mitigation measures of Norwich to Tilbury, it is not considered likely that the significance of effect would increase from what is predicted for North Falls and Five Estuaries, which are deemed not significant in EIA terms. | Norwich to Tilbury, North Falls and Five Estuaries have the potential to lead to increased cumulative impacts on strategic mineral resources due to the spatial and temporal overlap between the projects. However, cumulative effects are not considered to increase from what is predicted for North Falls and Five Estuaries, which are deemed not significant in EIA terms. | Potential impacts to the built environment are likely to occur during the operational phase in areas of spatial overlap between Norwich to Tilbury North Falls and Five Estuaries.<br>Mitigation measures associated with the built environment specifically are not included within the Norwich to Tilbury PEIR. It is however, anticipated that mitigation measures for Norwich to Tilbury would be similar to those of North Falls and Five Estuaries given the nature of the project. Should this be the case, residual cumulative effects are not considered to increase from what is predicted for North Falls and Five Estuaries which are deemed not significant in EIA terms. | The O&M manual that will be handed to the Applicant following completion of construction works will enable task and site specific risk assessments to be developed for any required maintenance works during the operational phase of North Falls and Five Estuaries.<br>Included within the folder would be an ERP which will outline the mitigation measures to be undertaken in the event of an uncontrolled release of hazardous materials. It is anticipated that the same information and an ERP will be available for the Norwich to Tilbury project.<br>Given the anticipated mitigation measures of Norwich to Tilbury, it is not considered likely that the significance of effect would increase from what is predicted for North Falls and Five Estuaries, which are deemed not significant in EIA terms. |

#### 19.8.3.2.3 During decommissioning

216. Decommissioning strategies have not yet been finalised for North Falls and Five Estuaries or Norwich to Tilbury; however, the cumulative likely significant effects are expected to be the same as or less than those of the initial construction phase.

## 19.9 Transboundary effects

217. There are no transboundary effects with regards to ground conditions and contamination as the onshore project area would not be sited in proximity to any international boundaries. Transboundary effects are therefore scoped out of this assessment and are not considered further.

## 19.10 Interactions

218. The receptors identified within this chapter (including human health, controlled waters, the built environment, mineral resources, and ecological habitats) are intrinsically linked to:

- Water resources (including surface waters and groundwaters), which are influenced by ground conditions and contamination through the quality of groundwater, groundwater flow within the subsurface strata and interactions with surface waters.
- Ecology, which is influenced by ground conditions and contamination through the chemical quality of groundwater, surface waters and soils.
- Human health which is potentially impacted by the presence of contaminated soils and groundwater.

219. A summary of the potential interactions between ground conditions and contamination receptors, water resources and onshore ecology is provided in Table 19.18.

**Table 19.18 Ground conditions and contamination interactions**

| Topic and description | Related chapter (Volume 3.1) | Where addressed in this chapter | Rationale |
|---|---|---|---|
| **Construction** | | | |
| Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | N/A | Section 19.6.1.1 | No additional effects on human health have been identified for these receptors during construction which would increase the standalone assessment from minor adverse. |
| Impact 2: Direct impacts on groundwater quality and groundwater resources | ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23) | Section 19.6.1.2 | Any project related changes to ground conditions (both physically and chemically) during construction could impact the quality and quantity of groundwater resources and any hydraulically connected surface water receptors. This is assessed within Section 19.6.1.2. |

| Topic and description | Related chapter (Volume 3.1) | Where addressed in this chapter | Rationale |
|---|---|---|---|
| Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination | ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23)<br>ES Chapter 23 Onshore Ecology (Document Reference: 3.1.25) | Section 19.6.1.3 | Potential changes to the quality and quantity of groundwater resources and any hydraulically connected surface waters during construction could impact upon water dependent biological features, inclusive of designated sites. This assessed within Section 19.6.1.3. |
| Impact 4: Sterilisation of future mineral resources | N/A | Section 19.6.1.4 | No additional effects on mineral resources have been identified. |
| Impact 5: Built environment | N/A | Section 19.6.1.5 | No additional effects on the existing built environment have been identified. |
| Impact 6: Impacts on agricultural land | ES Chapter 22 Land Use and Agriculture (Document Reference: 3.1.24) | Section 19.6.1.6 | Potential contamination of agricultural land during the construction phase could impact on the ALC grade and productivity of agricultural land. This is assessed in Section 19.6.1.6.<br>The loss of agricultural land due to the presence of infrastructure is discussed separately in ES Chapter 22 Land Use and Agriculture. |
| **Operation** | | | |
| Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | N/A | Section 142 | No additional effects on human health have been identified for these receptors during operation, which would increase the standalone assessment from minor adverse. |
| Impact 2: Impact on controlled waters (groundwater and surface waters) | ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23)<br>ES Chapter 23 Onshore Ecology (Document Reference: 3.1.25) | Section 19.6.2.2 | Potential changes to the quality of groundwater or hydraulically connected surface water bodies have the potential to also impact on water dependent biological features. However, no additional effects on controlled waters have been identified. |
| Impact 3: Sterilisation of future mineral resources | N/A | Section 19.6.2.3 | No additional effects on mineral resources have been identified. |
| Impact 4: Built environment | N/A | Section 19.6.2.4 | No additional effects on the built environment have been identified. |
| Impact 5: Impacts on agricultural land | ES Chapter 22 Land Use and Agriculture (Document | Section 19.6.2.5 | Potential contamination of agricultural land during the operational phase could impact on the ALC grade and productivity of agricultural land. |

| Topic and description | Related chapter (Volume 3.1) | Where addressed in this chapter | Rationale |
|---|---|---|---|
| | Reference: 3.1.24) | | This is assessed in Section 19.6.2.5. |
| **Decommissioning** | | | |
| Effects associated with the decommissioning phase would be no greater than those identified for the construction phase. | | | |

## 19.11 Inter-relationships

220. The impacts identified and assessed in this chapter have the potential to interrelate with each other. The areas of potential inter-relationships between impacts are presented in Table 19.19. This provides a screening tool for which impacts have the potential to interrelate.

221. Table 19.20 provides an assessment for each receptor (or receptor group) as related to these impacts.

222. Within Table 19.20 the impacts are assessed relative to each development phase (i.e. construction, operation, or decommissioning) to see if (for example) multiple construction impacts affecting the same receptor could increase the significance of effect upon that receptor. Following this, a lifetime assessment is undertaken which considers the potential for impacts to affect receptors across all development phases.

**Table 19.19 Inter-relationships between impacts - screening**

| Potential interactions between impacts | | | | | | |
|---|---|---|---|---|---|---|
| **Construction** | | | | | | |
| | Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Impact 2: Direct impacts on groundwater quality and groundwater resources | Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination | Impact 4: Sterilisation of future mineral resources | Impact 5: Built environment | Impact 6: Impacts on agricultural land |
| Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | | Yes | No | No | No | Yes |
| Impact 2: Direct impacts on groundwater quality and groundwater resources | Yes | | Yes | No | No | Yes |
| Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination | No | Yes | | No | No | Yes |
| Impact 4: Sterilisation of future mineral resources | No | No | No | | No | No |
| Impact 5: Built environment | No | No | No | No | | No |
| Impact 6: Impacts on agricultural land | Yes | Yes | Yes | No | No | |
| **Operation** | | | | | | |
| | Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Impact 2: Impact on controlled waters (groundwater and surface waters) | Impact 3: Sterilisation of future mineral resources | Impact 4: Built environment | Impact 5: Impacts on agricultural land | |
| Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | | Yes | No | No | Yes | |
| Impact 2: Impact on controlled waters (groundwater and surface waters) | Yes | | No | No | Yes | |
| Impact 3: Sterilisation of future mineral resources | No | No | | No | No | |
| Impact 4: Built environment | No | No | No | | No | |
| Impact 5: Impacts on agricultural land | Yes | Yes | No | No | | |

**Table 19.20 Inter-relationship between impacts – phase and lifetime assessment**

| Receptor | Highest significance level | | | | |
|---|---|---|---|---|---|
| | Construction | Operation | Decommissioning | Phase Assessment | Lifetime Assessment |
| Human health | Minor adverse | Minor adverse | Minor adverse | **No greater than individually assessed impact**<br>The impacts to human health are assessed as of minor adverse significance on receptors deemed to be of high sensitivity, with the most sensitive receptors identified as construction workers. Impacts to human health during construction, operation and decommissioning phases of North Falls would be managed through standard and good practice methodologies. Given the proposed mitigation measures and the minor adverse significance, it is considered that there would either be no interactions between impacts during the construction, operational and decommissioning phases of North Falls, or that interactions would be no greater than when assessed individually. | **No greater than individually assessed impact**<br>The impacts to human health are considered a potential risk during the construction, operation and decommissioning of North Falls. Risk associated with each of the phases would be managed through good practices and adoption of appropriate mitigation measures discussed within this chapter. |
| Groundwater | Minor adverse | Minor adverse | Minor adverse | **No greater than individually assessed impact**<br>The impacts to groundwater are assessed as minor adverse significance on receptors of high sensitivity. Impacts to groundwater during the construction, operational and decommissioning phases of North Falls would be managed through standard and best practice methodologies. Given the proposed mitigation measures and the minor adverse significance, it is considered that there would either be no interactions between impacts during the construction, operational and decommissioning phases of North Falls, or that interactions would be no greater than when assessed individually. | **No greater than individually assessed impact**<br>The impacts to groundwater quality in the superficial aquifers during earthworks are only considered a potential risk during the construction and operational phases of North Falls. It is considered unlikely that earthworks would be required during the operational phase of North Falls, however, should they be required they are anticipated to be managed in line with best practice with appropriate risk assessments conducted and submitted to the relevant agency. |
| Surface water | Minor adverse | Minor adverse | Minor adverse | **No greater than individually assessed impact**<br>The impacts to surface waters are assessed as of minor adverse significance on receptors of a high sensitivity. Impacts to surface waters during the construction, operational and decommissioning phases of North Falls would be managed through standard and best practice methodologies. Given the proposed mitigation measures and the minor adverse significance, it is considered that there would either be no interactions between impacts during the construction, operational and decommissioning phases of North Falls, or that interactions would be no greater than when assessed individually. | **No greater than individually assessed impact**<br>The impacts to surface water quality from contamination of groundwater are only considered to be a potential risk during the construction and decommissioning phases of North Falls. Risks associated with the operational phase would be managed by following best practice. Therefore, no lifetime effects for receptor are anticipated. |
| Mineral resources | Minor adverse | Minor adverse | Minor adverse | **No greater than individually assessed impact**<br>The impacts to mineral resources are assessed as minor adverse significance on receptors of medium sensitivity. Given the minor adverse significance, it is considered that there would either be no interactions between impacts during the construction, operational and decommissioning phases of North Falls, or that interactions would be no greater than when assessed individually. | **No greater than individually assessed impact**<br>Impacts to MSAs and MCAs are considered a potential risk during the construction, operational and decommissioning phases of North Falls. Risks associated with each of the phases would be managed through adoption of appropriate mitigation measures discussed within this chapter. Therefore, no lifetime effects for receptor are anticipated. |
| Built environment | Minor adverse | Minor adverse | Minor adverse | **No greater than individually assessed impact**<br>The impacts to the built environment are assessed as minor adverse significance on receptors of medium sensitivity. Impacts to the built environment during the construction, operational and decommissioning phases of North Falls would be managed through standard and best practice methodologies. Given the proposed mitigation measures and the minor adverse significance, it is considered that there would either be no interactions between impacts during the construction, operational and decommissioning phases of North Falls, or that interactions would be no greater than when assessed individually. | **No greater than individually assessed impact**<br>The impacts to the built environment are considered a potential risk during the construction, operational and decommissioning phases of North Falls. Risks associated with each of the phases would be managed through best practice thereby reducing the potential impacts to the built environment. Therefore, no lifetime effects for receptor are anticipated. |
| Agricultural land | Minor adverse | Minor adverse | Minor adverse | **No greater than individually assessed impact**<br>The potential impacts to agricultural land are assessed as minor adverse significance on receptors of high sensitivity, with the most sensitive receptor identified as ALC Grade 1 land. Impacts to agricultural land during the construction, operation and decommissioning phases will be managed through standard and best practice methodologies. Given the proposed mitigation measures, and the minor adverse significance, it is considered that there would either be no interactions during each of the phases, or that interactions would be no greater than when assessed individually. | **No greater than individually assessed impact**<br>The impacts to agricultural land are considered a potential risk during the construction, operation and decommissioning phases. Risks associated with each of the phases of North Falls will be managed through best practice and adoption of appropriate mitigation measures discussed within this chapter. Therefore, no lifetime effects for receptors are anticipated. |

## 19.12 Summary

223. This chapter has provided a characterisation of the existing environment for ground conditions and contamination based on existing data (e.g. historical mapping and BGS data).

224. The assessment has established that ground conditions and contamination receptors could be affected as a result of direct disturbance and mobilisation of existing contamination, introduction of new sources of contamination and mineral sterilisation during the construction, operation, and decommissioning phases could occur. However, the residual impacts on the receptors identified following implementation of mitigation measures would be minor adverse and therefore not significant in EIA terms.

225. There are no transboundary effects with regards to ground conditions and contamination.

226. Cumulative effects associated with the construction and operation of Five Estuaries, or any other projects, are not anticipated to occur.

227. A summary of the results of this assessment is provided in Table 19.21 and Table 19.22.

**Table 19.21 Summary of likely significant effects on ground conditions and contamination**

| Potential impact | Receptor | Sensitivity | Magnitude of impact | Significance of effect | Additional mitigation measures proposed | Residual effect |
|---|---|---|---|---|---|---|
| **Construction** | | | | | | |
| Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Human health | High | High | Major adverse. significant | A pre-construction targeted ground investigation would be undertaken in areas identified as potential sources of contamination in order to assess site characteristics of the onshore project area. This would then allow for the assessment of contaminated areas and appropriate remediation strategies to be produced should the identified contamination be deemed to represent an unacceptable risk to human health. The strategy would be implemented following approval by the local authorities.<br>The use of materials with a similar porosity, e.g. re-instatement of excavated materials, as the surrounding environment would mitigate the ground gas / vapour risks associated with creating a preferential pathway along the length of the onshore cable route. | Minor adverse, not significant |
| Impact 2: Direct impacts on groundwater quality and groundwater resources | Secondary A and B Aquifers | High | Low | Moderate adverse. significant | A pre-construction targeted ground investigation would be undertaken in areas identified as potential sources of contamination in order to assess site characteristics of the onshore project area. This would then allow for the identification of contaminated areas and appropriate remediation strategies to be produced should the identified contamination be deemed to represent an unacceptable risk to controlled waters. The strategy would be implemented following approval by the local authorities. | Minor adverse, not significant |
| Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination | Controlled waters | High | Negligible | Minor adverse, not significant | No additional mitigation is required as the significance of effect is not considered to be significant under EIA regulations. | Minor adverse, not significant |
| Impact 4: Sterilisation of future mineral resources | Mineral Safeguarding Areas and Mineral Consultation Areas | Medium | Low | Minor adverse, not significant | No additional mitigation is required as the significance of effect is not considered to be significant under EIA regulations. | Minor adverse, not significant |
| Impact 5: Built environment | Buildings and utilities | Medium | Low | Minor adverse, not significant | No additional mitigation is required as the significance of effect is not considered to be significant under EIA regulations. | Minor adverse, not significant |
| Impact 6: Impacts on agricultural land | Agricultural land | High | Low | Moderate adverse. significant | A pre-construction targeted ground investigation would be undertaken in areas identified as potential sources of contamination in order to assess site characteristics of the onshore project area. This would then allow for the identification of contaminated areas and appropriate remediation strategies to be produced should unacceptable risks be identified in relation to contamination present. The strategy would be implemented following approval by the local authorities. | Minor adverse, not significant |
| **Operation** | | | | | | |
| Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Human health | High | Negligible | Minor adverse, not significant | No additional mitigation is required as the significance of effect is not considered to be significant under EIA regulations. | Minor adverse, not significant |
| Impact 2: Impact on controlled waters (groundwater and surface waters) | Controlled waters | High | Negligible | Minor adverse, not significant | Maintenance workers that are required to undertake ground excavation or maintenance works during the operation of North Falls would be provided with information regarding the nature of ground conditions within each area so that they can develop and implement site and task specific risk assessments and method statements, thereby protecting controlled waters.<br>At the onshore substation, all fuels, oils, lubricants and other chemicals would be stored in an impermeable bund with at least 110% of stored capacity. Spill kits would be available on site at all times and an ERP would be developed which outlines mitigation measures to be undertaken in the event of an uncontrolled release of hazardous materials. | Minor adverse, not significant |
| Impact 3: Sterilisation of future mineral resources | Mineral Safeguarding Areas and Mineral Consultation Areas | Medium | Low | Minor adverse, not significant | It is anticipated that additional mitigation measures would not be required. | Minor adverse, not significant |
| Impact 4: Built environment | Buildings and utilities | Medium | Negligible | Minor adverse, not significant | It is anticipated that additional mitigation measures would not be required. | Minor adverse, not significant |
| Impact 5: Impacts on agricultural land | Agricultural land | High | Negligible | Minor adverse, not significant | It is anticipated that additional mitigation measures would not be required. | Minor adverse, not significant |
| **Decommissioning** | | | | | | |
| No decision has been made regarding the final decommissioning policies for North Falls as it is recognised that industry best practice, rules and legislation change over time. The detail and scope of decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and would be agreed with the regulator with a Decommissioning Programme provided. | | | | | | |

| Potential impact | Receptor | Sensitivity | Magnitude of impact | Significance of effect | Additional mitigation measures proposed | Residual effect |
|---|---|---|---|---|---|---|
| However, it is considered likely that the proposed onshore substation would be removed and would be reused or recycled and that the onshore cables would be removed and recycled, with the landfall transition joint bays and cable ducts (where used) left in situ. For the purposes of a worst-case scenario, it is considered that the impacts associated with the decommissioning phase would be no greater than those identified for the construction phase. | | | | | | |

**Table 19.22 Summary of potential cumulative effects on ground conditions and contamination**

| Potential impact | Cumulative effect | Additional mitigation |
|---|---|---|
| **Construction** | | |
| Cumulative Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Minor adverse, therefore not significant in EIA terms | N/A |
| Cumulative Impact 2: Direct impacts on groundwater quality and groundwater resources | Minor adverse, therefore not significant in EIA terms | N/A |
| Cumulative Impact 3: Impacts on surface water quality and the ecological habitats they support from contamination | Minor adverse, therefore not significant in EIA terms | N/A |
| Cumulative Impact 4: Sterilisation of future mineral resources | Minor adverse, therefore not significant in EIA terms | N/A |
| Cumulative Impact 5: Built environment | Minor adverse, therefore not significant in EIA terms | N/A |
| Cumulative Impact 6: Impacts on agricultural land | Minor adverse, therefore not significant in EIA terms | N/A |
| **Operation** | | |
| Cumulative Impact 1: Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts | Minor adverse, therefore not significant in EIA terms | N/A |
| Cumulative Impact 2: Impact on controlled waters (groundwater and surface waters) | Minor adverse, therefore not significant in EIA terms | N/A |
| Cumulative Impact 3: Sterilisation of future mineral resources | Minor adverse, therefore not significant in EIA terms | N/A |
| Cumulative Impact 4: Built environment | Minor adverse, therefore not significant in EIA terms | N/A |
| Cumulative Impact 5: Impacts on agricultural land | Minor adverse, therefore not significant in EIA terms | N/A |
| **Decommissioning** | | |
| Decommissioning strategies have not yet been finalised for North Falls, Five Estuaries or Norwich to Tilbury; however, the cumulative effects are expected to be the same as those of the initial construction phase. | | |

## 19.13 References


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|---|
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