The Drax Power (Generating Stations) Order

Land at, and in the vicinity of, Drax Power Station, near Selby, North Yorkshire

Environmental Statement
11 – Ground Conditions

The Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)

Drax Power Limited

Drax Repower Project

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11.1 Introduction

11.1.1. This Chapter reports the outcome of the assessment of likely significant effects arising from the Proposed Scheme upon ground conditions. The Chapter considers the potential for land to be affected by contamination, which may impose constraints on the Proposed Scheme. A Phase 1 Preliminary Risk Assessment (PRA) is followed by an assessment of likely significant effects determined on the basis of the perceived importance (sensitivity) of and the potential impacts to the identified environmental attributes and contaminated land receptors.

11.1.2. The Chapter describes the assessment methodology, the baseline conditions at the Site and in the surrounding area, any primary and tertiary mitigation adopted for the purposes of the assessment, a summary of the likely significant effects taking into account legislation and relevant guidance, the further mitigation measures required to prevent, reduce or offset any significant negative effects, and the likely residual effects after these measures have been employed.

11.1.3. This Chapter (and its associated figures and appendices) is intended to be read as part of the wider ES, with particular reference to Chapters 12 (Water Resources, Quality and Hydrology) and Chapter 13 (Waste).

11.1.4. The scope of this chapter excludes any assessment of effects on drainage and discharge which is discussed in Chapter 12 (Water Resources, Quality and Hydrology) and waste management which is discussed in Chapter 13 (Waste). Impacts to agricultural land are considered with reference to soil quality and given further consideration in Chapter 14 (Socio-Economics).

11.2 Policy, Legislation and Guidance

Policy

11.2.1. The applicable policy framework is summarised as follows:

- Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref. 11.30).
- NPS for Fossil Fuel Electricity Generating Infrastructure (En-2) (Ref. 11.31).
- NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (En-4) (Ref. 11.32).
- NPS for Electricity Networks Infrastructure (En-5) (Ref. 11.33).
- National Planning Policy Framework (NPPF) (Ref. 11.34).
- Draft revised NPPF (Ref. 11.43).
- Selby District Local Plan, Section 4: Environment (Ref. 11.35).
- Selby District Core Strategy Local Plan, Section 7: Improving the Quality of Life (Ref. 11.36).

Overarching National Policy Statement for Energy (EN-1)

11.2.2. The overarching NPS EN-1 explains the assessment principles to which the SoS will have regard in the examination of an energy NSIP (such as the Proposed Scheme) and explains the generic impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (NPS EN-2). The NPSs for Gas Supply Infrastructure and Gas Oil Pipelines (NPS EN-4) and

Electricity Networks Infrastructure (NPS EN-5) provide specific considerations potentially relevant to the Gas Pipeline, AGI and GRF and the electrical connection.

11.2.3. The relevant assessment principles in terms of generic impacts from Part 5 of NPS EN-1 ('Biodiversity and Geological Conservation', 'Land Use including Open Space, Green Infrastructure and Green Belt' and 'Waste Management') are set out below:

NPS EN-1: Generic Impacts - Biodiversity and Geological Conservation

11.2.4. Paragraphs 5.3.3. to 5.3.4:

"Where the development is subject to an EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of … geological conservation importance…The applicant should show how the project has taken advantage of the opportunities to conserve and enhance…geological conservation interests "

NPS EN-1: Generic Impacts - Land Use including Open Space, Green Infrastructure and Green Belt

11.2.5. Paragraphs 5.10.8 to 5.10.9:

"Applicants should seek to minimise impacts of the best and most versatile agricultural land (defined as defined as Grades 1, 2 and 3a of the Agricultural Land Classification (as set out in Natural England Technical Information Note TIN049) and preferably use land in area of poorer quality (Grades 3b, 4 and 5) except where this would be inconsistent with other sustainability considerations. Applicants should also identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination. "

"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 decommission has taken place. "

NPS EN-4: Gas Supply Infrastructure Gas and Oil Pipelines

11.2.6. Section 2.23 of NPS EN-4 discusses the potential impacts on soil and geology and recognises the importance of understanding the underlying soils and geology. This section states that applicants should assess the stability of ground conditions via a desktop study and, if necessary, new borehole data. It also states that the assessment should consider and weigh up impacts associated with the means of installing pipelines.

NPS EN-5: Electricity Networks Infrastructure

11.2.7. NPS EN-5 includes limited information regarding impacts on geology, although paragraph 2.8.9 recognises that an underground line is likely to have more potential impacts on geology and soils than an overhead line.

National Planning Policy Framework

11.2.8. The National Planning Policy Framework (NPPF) does not contain specific policies for nationally significant infrastructure projects, which must be determined in accordance with

The Planning Act 2008 (PA 2008) and the relevant Nationally Policy Statements. However, the NPPF may be considered and important and relevant consideration in the SoS's determination.

11.2.9. The NPPF states that the planning system should contribute to and enhance the natural and local environment by protecting and enhancing geological conservation interests and soils (paragraph 109). It also instructs the prevention of new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil or water pollution or land instability (paragraph 109).

11.2.10. The NPPF states in paragraphs 120 and 121:

"To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment and general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner."

"Planning policies and decisions should also ensure that:

- *The site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*
- *After remediation, as a minimum, land should not be capable as being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and*
- *Adequate site investigation information, prepared by a competent person, is presented."*

11.2.11. In relation to the sustainable use of minerals the NPPF states the following in paragraph 144:

"When determining planning application, local planning authorities should:

- *Not normally permit other development proposals in mineral safeguarding areas where they might constrain potential future use for these purposes".*

Draft Revised NPPF

11.2.12. In the draft revised NPPF, ground conditions and pollution is considered in Section 15: Conserving and enhancing the natural environment (refer to paragraphs 176-181). The draft revised NPPF contains similar provisions to the current NPPF with regard to ground risk, stating:

"Planning policies and decisions should ensure that:

a) A site is suitable for its proposed use taking account of ground conditions and any risks arising from land 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);

b) After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and

c) *Adequate site investigation information, prepared by a competent person, is available to inform these assessments."*

11.2.13. The draft revised NPPF differentiates between planning policies and decisions (which should focus on whether a proposed development is an acceptable use of land) and pollution control regimes (which should focus on the control of processes of emissions). The draft revised NPPF states that planning policies and decisions should assume that pollution control regimes will operate effectively.

Selby District Local Plan, Section 4: Environment (adopted February 2005);

Selby District Core Strategy Local Plan, Section 7: Improving the Quality of Life (adopted October 2013)

11.2.14. The key parts of Section 4: Environment of the Selby District Local Plan 2005 relate to contaminated land, groundwater protection, hazardous substances and ancient woodland, as follows:

Contaminated Land

11.2.15. The local plan states that it is the responsibility of developers to investigate, assess and mitigate risks associated with contaminated land, and to provide evidence of this to the Authority for the purpose of determining the application.

11.2.16. Section 4 of the Selby District Local Plan states the following in paragraph 4.43 in relation to contaminated land:

"When contamination is known or suspected, developers will be required to undertake proper investigations to assess the nature and extent of contamination and applicants will be required to provide sufficient information to enable the Authority to determine the application. Effective measures must be incorporated to protect the public, property and natural resources from potential harmful effects."

Groundwater Protection

11.2.17. The local plan states that the Sherwood Sandstone aquifer is a principal source of drinking water in the region and that, due to the area of exposed aquifer, the groundwater is particularly sensitive to contamination. Planning permission will not be granted (or will be granted subject to conditions) where the proposals may give rise to groundwater contamination or other environmental pollution.

11.2.18. Section 4 of the Selby District Local Plan states the following in paragraphs 4.44 to 4.47 in relation to groundwater protection:

"Groundwater stored in aquifers is a principal source of drinking water supply in the Plan area. Groundwater is also widely used by industry and agriculture, as well as feeding rivers and supporting wetlands which provide wildlife habitats. Both the quality and quantity of groundwater are legally protected...The Sherwood Sandstone underlying the Selby area is particularly sensitive to contamination due to the area of exposed aquifer…

ENV2

a) *Proposals for development which would give rise to, or would be affected by, unacceptable levels of noise, nuisance, contamination or other environmental pollution*

including groundwater pollution will not be permitted unless satisfactory remedial or preventative measures are incorporated as an integral element in the scheme. Such measures should be carried out before the use of the site commences.

b) Where there is a suspicion that the site might be contaminated, planning permission may be granted subject to conditions to prevent the commencement of development until a site investigation and assessment has been carried out and development has incorporated all measures shown in the assessment to be necessary."

Hazardous Substances

11.2.19. The local plan states that, as well as through the Planning (Hazardous Substances) Act 1990, it is appropriate to control risks relating to hazardous substances through the planning system. Proposals involving the storage or usage of hazardous substances will only be granted planning permission where there is no unacceptable risk to the public or natural environment and where opportunities for future development of land in the vicinity will not be severely restricted.

11.2.20. Section 4 of the Selby District Local Plan states the following in paragraphs 4.50 to 4.52 in relation to hazardous substances:

"It is…appropriate to exercise careful planning controls over development involving hazardous substances in order to ensure that installations are kept separate from housing and other sensitive land uses such as schools and hospitals with which they may be incompatible…

ENV4

Proposals involving the storage or use of hazardous substances, or developments in the vicinity of sites where hazardous substances are being stored or used, will only be permitted where the District Council is satisfied that:

1) There is no unacceptable risk to the public or the natural environment; and

2) Opportunities for the development of land in the vicinity will not be severely restricted."

Ancient Woodland

11.2.21. The local plan states that ancient woodlands, the majority of which have an area of less than 10 ha and the total area of which comprises just 1.8% of the local plan area, are of extremely high conservation value. Section 4 of the Selby District Local Plan 2005 states the following in paragraph 4.91 in relation to ancient woodland:

ENV11

"Development will not be permitted where it is likely to cause loss of, or damage to ancient woodland, unless the reasons for the development outweigh the nature conservation value of the woodland."

11.2.22. The key part of Section 7: Improving the Quality of Life of the Selby District Core Strategy Local Plan 2013, which relates to groundwater (paragraphs 7.24 to 7.26), is as follows:

"The District contains significant groundwater supplies including both the Sherwood Sandstone aquifer and the Magnesian Limestone aquifer (which provides a vital water supply for the brewing industry in and around Tadcaster). There are also a number of wells

for potable water abstraction in the southern part of the District which form part of a larger well-field for public supply. This water resource is already overcommitted.

In some areas the protective drift material is missing and therefore the public water supply is very susceptible to contamination. Consideration must be given to the protection of water quality and prevention of pollution to the ground water supply.

Climate change will lead to drier summers and wetter winters, increased flood risk in winter and a longer growing season. This will put increased pressure on related infrastructure and water resources. There is therefore a need to protect existing resources and encourage water conservation measures and encourage water efficiency to help the District adapt to climate change and ensure sufficient water resources to meet its needs."

Legislation

11.2.23. The applicable legislative framework is summarised as follows:

- Water Framework Directive (Ref. 11.37).
- Groundwater Directive (Ref. 11.38).
- Environmental Protection Act 1990 (Ref. 11.39).
- Water Resources Act 1991 (Ref. 11.40).

Water Framework Directive (2000/60/EC)

11.2.24. The overall objective of the Water Framework Directive (WFD) is to bring about the effective co-ordination of water environment policy and regulation across Europe. The main aims of the legislation are to ensure that all surface water and groundwater reaches 'good' status (in terms of ecological and chemical quality and water quantity, as appropriate), promote sustainable water use, reduce pollution and contribute to the mitigation of flood and droughts

Groundwater Directive (2006/118/EC)

11.2.25. The Groundwater Directive aims to set groundwater quality standards across Europe and introduce measures to prevent or limit pollution of groundwater, including those listed with the 'List of Priority Substances'. The Directive has been developed in response to the requirements of Article 17 of the WFD, specifically the assessment of chemical status of groundwater and objectives to achieve 'good' status.

Environmental Protection Act 1990: Part 2A Section 78

11.2.26. Part 2A of the Environmental Protection Act (EPA) 1990 (as amended) deals with contaminated land. This defines contaminated land as "any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substance in, on or under the land that;

a) Significant harm is being caused or there is significant possibility of such harm being caused; or

b) Significant pollution to controlled waters is being caused, or there is a significant possibility of such pollution being caused."

The Water Resources Act 1991 (SI57) (As Amended by the Water Act 2003)

11.2.27. Under the Water Resources Act, Controlled Waters are defined as including both surface waters and groundwater. Once a site is classified as 'contaminated land' then remediation

is required to render significant pollutant linkages (i.e. the source-pathway-receptor relationships that are associated with significant harm and/or pollution of Controlled Waters) insignificant, subject to a test of reasonableness.

Guidance

11.2.28. The following guidance documents have been used during the preparation of this Chapter:

- DMRB Volume 11, Section 2, Part 5 Assessment and Management of Environmental Effects, Highways Agency, 2008 (Ref. 11.1).
- DMRB Volume 11, Section 3, Part 11 Geology and Soils, Highways Agency, June 1993 (Ref. 11.2).
- Planning Practice Guidance for Land affected by contamination (Ref. 11.3).
- Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D Publication 66, Volume 1, Environment Agency / National House-Building Council, 2008 (Ref. 11.4).
- Contaminated Land Statutory Guidance, Department for Environment, Food and Rural Affairs, 2012 (Ref. 11.5).
- Model Procedures for the Management of Land Contamination (CLR11), Department for Environment, Food and Rural Affairs and Environment Agency, 2004 (Ref 11.6).
- CIRIA C552: Contaminated Land Risk Assessment: A guide to good practice. (London, 2001) (Ref. 11.7).

11.2.29. The DMRB guidance referenced is considered the most comprehensive guidance available for the assessment of geology and soils and its principles are applied in this context with a degree of interpretation and professional judgement given the Proposed Scheme is not a road scheme.

11.3 Scoping Opinion and Consultation

Consultation

11.3.1. This chapter has been written in consultation with the Environment Agency (EA), which has taken place since January 2018:

Table 11-1 - Summary of Consultation Undertaken to Date (Ground Conditions)

Individual / statutory body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
Environment Agency	Letter dated 19 January 2018	The EA reviewed the Soils, Geology and Hydrogeology methodology and was broadly supportive of the approach proposed. The EA raised the following points: "*1. Follow the risk management framework provided in CLR11, Model Procedures for the Management of Land Contamination, when dealing with land affected by contamination.*

Individual / statutory body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
		2. Refer to the Environment Agency Guiding principles for land contamination for the type of information that we required in order to assess risks to controlled waters from the site. The Local Authority can advise on risk to other receptors, such as human health. *3. Consider using the National Quality Mark Scheme for Land Contamination Management which involves the use of competent persons to ensure that land contamination risks are appropriately managed.* *4. Refer to the contaminated land pages on GOV.UK for more information."* The assessment methodology that we have outlined is undertaken in accordance with the guidance in CRL11 and the EA. All assessment works are undertaken by appropriately qualified and competent persons with adherence to our internal QA procedures and incorporated into the ES.
Environment Agency	Letter dated 15 February 2018	In response to a question put to the EA on 26 January 2018 on the study area for the geology, soil and hydrogeology assessment, the EA stated: "*The information provided in your email of 26 January 2018 indicates that the relevant guidance will be followed, including CLR11 and the application of the source-pathway-receptor model. As long as the relevant guidance is followed then we have no objections to the proposals as set out in your email*." As such, the EA have no objection to the study area we have proposed in our methodology.
Environment Agency	Letter dated 09 April 2018	The EA reviewed the Soils, Geology and Hydrogeology methodology and raised no objections to the proposal to report on the Phase 2 ground investigation outside of the Environmental Statement, noting that the Phase 2 ground investigation would likely be a requirement of any Development Consent Order granted. We acknowledge the above and will work on the basis that a ground investigation will be undertaken after submission of the ES likely as part of any granted DCO.

11.4 Scope of the Assessment

11.4.1. This section explains how the scope of the assessment has developed, and re-iterates the evidence base for insignificant effects (which have therefore been scoped out of the assessment), following further iterative assessment.

11.4.2. An EIA Scoping Report was submitted to the SoS in September 2017, as presented in Appendix 1.1.

11.4.3. A Scoping Opinion was received by the Applicant from the Planning Inspectorate (on behalf of the SoS) on 23 October 2017, including formal responses from statutory consultees. The responses from the Planning Inspectorate/SoS in relation to ground conditions and contamination and how those requirements should be addressed by the applicant are set out in Table 11-2.

Table 11-2 - Scoping Opinion Summary Table (Ground Conditions)

Section	Applicant's proposed matter	Planning Inspectorate's Comments	Summary of response
7.7.1	Statutory designated sites	On the basis that there are no geological SSSIs and no known Regionally Important Geological Sites within the study area (see also comments below regarding the study area), the Inspectorate agrees that these do not need to be assessed within the ES. However, for completeness, it is recommended that the ES provides confirmation of their absence.	The ES chapter states that there are no geological SSSIs or known RIGS within the study area.
7.7.2	Adverse effects on the health of construction workers associated with exposure to any contaminative substances in the ground (e.g. from historical land uses)	Section 4.10 of the Scoping Report notes the potential for contamination within the application site and section 7.7.4 states that a PRA would be undertaken to establish baseline conditions. The Inspectorate notes the proposal that construction will be undertaken in accordance with all relevant legislation, guidance and best practice. However, there is no information regarding the levels of potential contaminants or any necessary remediation in relation to the site. Accordingly, the Inspectorate does not agree that this can be scoped out.	The ES chapter includes an assessment of adverse effects to the health of construction workers.
7.7.2	Sediment loading of nearby	The Inspectorate agrees that a detailed assessment can be scoped out on the basis that a CEMP will be in place to	The ES chapter includes potential impacts and

Section	Applicant's proposed matter	Planning Inspectorate's Comments	Summary of response
	surface water, resulting from soil erosion associated with ground works.	manage erosion and transport of soils potentially affected by contamination. However, it is recommended that this approach is detailed within the ES and has regard to relevant best practice and guidance in relation to construction. The Inspectorate will expect to see a draft CEMP provided with the application which controls these matters.	proposed mitigation for the outline CEMP.
7.7.2	Adverse effects to any sensitive receptor following the introduction of contaminative substances during construction (e.g. due to inappropriate storage of fuel).	The Inspectorate agrees that a detailed assessment can be scoped out on the basis that a CEMP will be in place to control storage and use of potentially contaminative substances. However, it is recommended that this approach is detailed within the ES. The Inspectorate will expect to see a draft CEMP provided with the application which controls these matters.	The ES chapter includes potential impacts and proposed mitigation for the outline CEMP.
7.7.2	Adverse effects to the built environment from the potential presence of aggressive chemical agents in the ground, which may be destructive to concrete.	It is noted that suitable construction materials will be selected for use at the detailed design stage. However, the Inspectorate does not agree that this can be scoped out because the Scoping Report states that ground investigation is required to evaluate potential risks from aggressive chemical agents. As such, there is no assurance that there will not be any significant effects arising.	The ES chapter includes assessment of adverse impacts to the built environment.
7.7.2	Physical damage to soil (e.g. sealing and compaction),	The Inspectorate agrees that a detailed assessment can be scoped out on the basis that demolition and construction works will be carried out in accordance with Defra's Construction Code of	The ES chapter includes potential impacts and proposed mitigation

Section	Applicant's proposed matter	Planning Inspectorate's Comments	Summary of response
	with potential secondary impacts to surface water run-off.	Practice and that a Materials Management Plan (forming part of the CEMP) will be in place to prevent physical damage to soil. However, it is recommended that this approach is detailed within the ES. The Inspectorate will expect to see a draft CEMP provided with the application which controls these matters.	for the Outline CEMP.
7.7.2	Adverse effects to any sensitive receptor associated with the demolition of existing infrastructure, resulting in contaminant release.	The Inspectorate notes that a CEMP will include procedures for identifying and mitigating contaminant risk during demolition of the existing infrastructure. However, there is no information regarding the likely presence of potential contaminants and therefore it is not possible to rule out the potential for significant effects. As such, the Inspectorate does not agree that this can be scoped out. The Inspectorate will expect to see a draft CEMP provided with the application which controls these matters.	The ES chapter contains assessment of this and includes potential impacts and proposed mitigation for the Outline CEMP.
7.7.2	Adverse effects to any sensitive receptor following the introduction of contaminative substances during operation of the power station and pipeline.	The Inspectorate agrees that this can be scoped out on the basis that operation will be in accordance with pollution prevention industry guidance and controls in relevant permits issued by the EA.	This is scoped out of the ES chapter.
7.7.1 and 7.7.4	Study area	Sections 7.7.1 and 7.7.4 of the Scoping Report refer to the study area, but do not indicate what this would be. The ES should clearly identify the study area to be used in the assessment. This should be discussed and agreed with relevant	The study area for this topic is defined in Section 11.4. The extent of the study area has been discussed and

Section	Applicant's proposed matter	Planning Inspectorate's Comments	Summary of response
		consultees and reflect the full extent of the likely impacts.	agreed in consultation with the EA, (EA consultation responses dated 19 January 2018 and 15 February 2018).
7.7.4	Baseline	The Scoping Report states that a walkover survey would be undertaken 'if necessary' and that the PRA will identify any requirements for further ground investigation. The Scoping Report does not explain what the walkover survey would comprise, however the Inspectorate notes that the PRA will identify any requirements for further ground investigation. The Applicant is recommended to agree the need and methodology of any on site walkover surveys and ground investigations with the relevant consultees.	Agreed. A Phase 1 walkover survey was completed on 21 November 2017. This forms the 'site reconnaissance' as set out in the CRL11 guidance on which the assessment methodology is based, as required by the EA.
7.7.4	Assessment methodology	This section of the Scoping Report states that the assessment will consider the protection of BMV agricultural land (as a proxy for soil quality). Whilst this is welcomed, it is also noted that Section 6.1.3 of the Scoping Report proposes to scope out potential impacts on BMV. The applicant's attention is drawn to the Inspectorate's previous comments regarding BMV. Table 11.3 of the Scoping Opinion states: The Scoping Report states that following construction of the pipeline, agricultural land would be reinstated to the existing ALC Grade; that a Soil Management Plan (SMP) would be implemented in order to maintain the integrity of the soil and there would not be significant loss of BMV agricultural land or other significant impact on the viability of farm practices. The	The geology and soils assessment uses BMV as a proxy for soil quality and this chapter of the ES undertakes an assessment of the potential impacts on BMV. Impacts upon agricultural land will also be considered within Chapter 14 (Socio-economics).

Section	Applicant's proposed matter	Planning Inspectorate's Comments	Summary of response
		Inspectorate does not agree that this topic can be scoped out. The Scoping Report does not provide a sufficiently detailed understanding of the area of BMV land to be temporarily affected or the detail of the proposed mitigation measures to be implemented.	

Table 11-3 - Statutory Consultation Summary Table (Ground Conditions)

Body/Organisation	Comments	Response
Consultation response provided by Environmental Consultancy by City of York Council (dated 21 February 2018).	Confirmed PIER was "*acceptable with regard to land contamination*".	No action required.
Letter received from North Yorkshire County Council (dated 27 February 2018).	NYCC states, "*the authorities would wish to see the draft CEMP and be involved in its evolution prior to NSIP submission*"	The outline CEMP has been submitted alongside the ES (document reference 6.5).
Letter received from the EA (dated 27 February 2018).	The EA states, "*overall, we remain satisfied with the characterisation of the site's geology and hydrogeology*".	No action required.
	On potentially significant effects to controlled waters, the EA states *"if the further assessment identifies potential sources of contamination, these will need to be remediated unless it can be demonstrated that there will be no resultant unacceptable environmental deterioration to controlled waters".*	The data generated by the Phase 2 ground investigation will be used to quantitatively assess risks to controlled waters and the results used as the basis for revising the conceptual site model, in line with the approach set out in CLR11: Model Procedures for the Management of Land Contamination (Ref. 11.6). If risks to controlled waters cannot be discounted then this will be clearly identified and further detailed risk assessment will be recommended.

Body/Organisation	Comments	Response
	The EA states, "*We have no objections to the principle of dividing the site into smaller areas and assessing the risk independently. However, it will be important that any potential sources of contamination are assessed appropriately and not combined with a low risk area which would result in a lower, and therefore not representative, average risk level*".	We acknowledge the importance of selecting representative averaging areas. Any division of the site into averaging areas would be based on the conceptual site model and the statistical principles set out in the Guidance on comparing soil contamination data with a critical concentration (Ref. 11.42).
	The EA states, "*the Next Steps section indicates that a CEMP will be submitted and intrusive ground investigation will take place. We look forward to receiving this information*".	The outline CEMP has been submitted alongside the ES (Document reference 6.5). The Phase 2 ground investigation will be undertaken after submission of the ES and secured via a requirement contained in Schedule 2 to the draft DCO (see Document reference 3.1).
Letter received from Public Health England (dated 27 February 2018).	PHE states that, "*The historical usage of the site means that there may be a measure of contamination within the ground, and that the defunct buildings may contain substances that may pose a risk to public health. The Planning Inspectorate has requested that these be identified and addressed within the applicant's Environmental Statement (ES), via intrusive investigations and risk assessment when appropriate…*"	We agree with this approach. A Phase 2 ground investigation will be undertaken after submission of the ES and secured via a requirement contained in Schedule 2 to the draft DCO (see Document reference 3.1). Risks during the construction phase will be managed through the implementation of a CEMP. An outline CEMP has been submitted alongside the ES (Document reference 6.5).

Insignificant Effects

11.4.4. A number of adverse potential effects will be prevented or mitigated to an acceptable level by embedded mitigation inherent in the implementation of the Proposed Scheme. As these effects will be prevented or mitigated to an acceptable level they are referred to as insignificant effects.

11.4.5. The insignificant effects and corresponding embedded mitigation (which renders the effects insignificant) are presented in Tables 11-4 (construction phase) and 5 (operational phase). These effects are not considered within the ES.

Table 11-4 - Ground Conditions Insignificant Effects (Construction Phase)

Insignificant Effect	Embedded Mitigation
Sediment loading of nearby surface waters following soil erosion associated with ground works. Contamination of nearby surface waters if soils are affected by contamination.	A CEMP will be in place to manage the erosion and transport of soils potentially affected by contamination. The outline CEMP includes the following measures: • Requirements to protect vegetation. • Provision of hardstanding/impermeable base for construction plant. • Washing of construction plant wheels. • Mitigation to prevent run-off to watercourses; and • Covering of stockpiles. The outline CEMP (Document Reference 6.5) is secured via a requirement contained in Schedule 2 to the draft DCO (Document reference 3.1).
Physical damage to soil (e.g. sealing and compaction) with potential secondary impacts to surface water runoff.	Construction phase works (including demolition of existing infrastructure) will be carried out in accordance with Defra's Construction Code of Practice (Ref. 11.41) and a Materials Management Plan (forming part of the CEMP) will be in place to prevent physical damage to soil. The outline CEMP is secured via a requirement contained in Schedule 2 to the draft DCO (Document reference 6.5).

Table 11-5 - Ground Conditions Insignificant Effects (Operational Phase)

Insignificant Effect	Mitigation
Adverse effects to any sensitive receptor following the introduction of contaminative substances during operation of the Proposed Scheme (e.g. due to the release of oils from the new transformers).	The operation of Proposed Scheme will be in accordance with pollution prevention industry guidance and controls in relevant permits issued by the EA.

Potentially Significant Effects

11.4.6. The effects that have been considered in this Chapter as potentially significant are presented in Tables 11-6 to 11-11 (construction, operational and decommissioning phase works within the Site).

11.4.7. An effect is considered to be "significant" for EIA purposes if its likely significance level is moderate or greater in the absence of secondary mitigation.

Construction Phase (including construction of Unit X, Pipeline, AGI and GRF in Stage 1 and of unit Y in Stage 2)

Table 11-6 - Likely Significant Effects (Works within the Power Station Site and the Carbon capture readiness reserve space)

Effect	Receptor
Adverse effects to the health of construction workers and end users associated with exposure to contaminative substances potentially present in the ground (e.g. from historical industrial land use).	Human health of construction workers and end users (e.g. power station operatives and users of adjacent land).
Creation of new migratory pathways between potentially contaminated soils and underlying aquifers as a result of ground works (e.g. piling, drilling and excavation). Secondary impacts to surface water.	Sherwood Sandstone Group (Principal aquifer); Breighton Sand Formation, Alluvium and Warp (Secondary A aquifers). Surface water.
Adverse effects to the built environment from the potential presence of aggressive chemical agents in the ground which may be destructive to concrete (e.g. foundations).	Concrete building foundations and water supply infrastructure within the study area
Adverse effects to any sensitive receptor (e.g. groundwater, surface water) associated with the demolition of existing infrastructure (in the construction phase) resulting in contaminant release.	Human health of construction workers and end users (e.g. power station operatives and users of adjacent land).

Table 11-7 - Likely Significant Effects (Works within Pipeline Area)

Effect	Receptor
Adverse effects to the health of construction workers and end users associated with exposure to contaminative substances potentially present in the ground (e.g. from historical industrial land use).	Human health of construction workers and end users (e.g. power station operatives and users of adjacent land).
Creation of new migratory pathways between potentially contaminated soils and underlying aquifers as a result of ground works (e.g. excavation). Secondary impacts to surface water.	Sherwood Sandstone Group (Principal aquifer); Breighton Sand Formation, Alluvium and Warp (Secondary A aquifers). Surface water.
Adverse effects to the built environment from the potential presence of aggressive chemical agents in the ground which may be destructive to concrete (e.g. foundations).	Concrete building foundations and water supply infrastructure within the study area

Operational Phase (including operation of Unit X, Pipeline, AGI and GRF in Stage 2 and Units X and Y in Stage 3)

Table 11-8 - Likely Significant Effects (Works within the Power Station Site and the Carbon capture readiness reserve space)

Effect	Receptor
Presence of migratory pathways between potentially contaminated soils and underlying aquifers as a result of ground works (e.g. piling, drilling and excavation).	Controlled waters receptors (including groundwater and surface water); human health receptors (if groundwater abstractions are present within the theoretical sphere of influence of the Proposed Scheme); the built environment (including foundations and water supply).

Table 11-9 - Likely Significant Effects (Works within Pipeline Area)

Effect	Receptor
Presence of migratory pathways between potentially contaminated soils and underlying aquifers as a result of ground works (e.g. piling, drilling and excavation).	Controlled waters receptors (including groundwater and surface water); human health receptors (if groundwater abstractions are present within the theoretical sphere of influence of the Proposed Scheme); the built environment (including foundations and water supply).

Decommissioning Phase

Table 11-10 - Likely Significant Effects (Works within the Power Station Site and the Carbon capture readiness reserve space)

Effect	Receptor
Adverse effects to any sensitive receptor associated with the decommissioning of the infrastructure at the end of its lifecycle resulting in contaminant release.	Human health of decommissioning workers and end users (e.g users of adjacent land). Controlled waters receptors (groundwater and surface water).

Table 11-11 - Likely Significant Effects (Works within Pipeline Area)

Effect	Receptor
Adverse effects to any sensitive receptor associated with the decommissioning of the infrastructure at the end of its lifecycle resulting in contaminant release.	Human health of construction workers and end users (e.g. power station operatives and users of adjacent land).

11.5 Assessment Methodology and Significance Criteria

Scenarios Assessed

11.5.1. The scenarios assessed and key assumptions about the Proposed Scheme are described in Chapter 3 (Site and Project Description). In this assessment the following scenarios are assessed:

- Stage 0 – Site Reconfiguration Works.
- Stage 1 – Construction of Unit X, Gas Pipeline, GRF and AGI.
- Stage 2 – Operation of Unit X and Construction of Unit Y.
- Stage 3 – Operation of Units X and Y.
- Decommissioning.

11.5.2. As it is not anticipated that the outcome of the ground conditions assessment will be independently determined by options relating to the electrical connection or the Selective Catalytic Reduction (SCR) scrubber unit, potential impacts relating to this infrastructure have not been assessed separately. The assessment presented should be interpreted as a reasonable worst-case scenario inclusive of these alternatives.

Embedded Mitigation

11.5.3. The majority of potential effects for geology and soils are considered insignificant effects on the basis of the embedded mitigation incorporated into the design of the Proposed Scheme.

11.5.4. The assessment assumes the following embedded mitigation:

- Phase 2 Ground Investigation – the draft DCO (Document reference 3.1) includes a requirement requiring approval of a scheme of geotechnical and geo-environmental ground investigation by the relevant planning authority, in consultation with the EA and North Yorkshire County Council (NYCC). Such approval is required prior to the commencement of development (save for permitted preliminary works). The scheme of ground investigation is required to be in accordance with this ES chapter and to inform and refine the mitigation and construction management measures contained within the CEMP. Further investigations must be carried out in accordance with the approved scheme and by a suitably qualified person or organisation. Measures identified as a result of the investigation will be approved by the relevant planning authority and implemented via approval and implementation of the CEMP.
- The design phase will select suitable construction materials, resistant to chemical degradation, which will mitigate all potential for adverse impacts the built environment.
- The construction phase will proceed in accordance will all legislation, guidance and best practice (including that which is relevant to the health and safety of construction workers).
- The construction phase will proceed in accordance with a comprehensive Construction Environmental Management Plan (CEMP), compliance with which is secured by a requirement to the draft DCO (Document reference 3.1).
- The Proposed Scheme will operate in accordance with current pollution prevention industry guidance and controls in relevant permits issued by the EA.
- The decommissioning phase will proceed in accordance with a comprehensive Decommissioning Environmental Management Plan (DEMP), required to be approved and implemented by a requirement to the draft DCO (Document reference 3.1).

Construction and Environmental Management Plan (CEMP)

11.5.5. The construction phase will proceed in accordance with a comprehensive CEMP developed and implemented by the Principal Contractor. An outline CEMP is submitted alongside this ES (document reference 6.5). The additional mitigation set out in the comprehensive CEMP is summarised in Table 11-12.

Table 11-12 - Potential Impacts and Proposed Mitigation within the Comprehensive CEMP

Potential Impact	Proposed Mitigation
Physical impacts to soil (e.g. compaction, sealing, smearing, and covering with hardstanding). Erosion of soil (potentially enhanced by soil excavation and stockpiling). Subsequent contamination of nearby surface waters if soil is affected by contamination.	The outline CEMP (document reference 6.5) includes a Soil Management Plan (SMP) based on Defra's "Construction Code of Practice for the Sustainable Use of Soils on Construction Sites" (Ref 11.8). The outline CEMP (document reference 6.5) includes specific measures such as requirements for the protection of vegetation and covering of soil stockpiles.
Introduction of contaminants to the study area (for example, due to the ineffective control of fuel).	The Outline CEMP contains measures to ensure compliance with the Control of Pollution (Oil Storage) (England) Regulations 2001. The measures will include provision of bunds and emergency spill kits.
Creation of new migratory pathways through which contaminants could migrate into underlying aquifers.	On the basis of a Foundation Works Risk Assessment, the CEMP will contain specific measures minimising this potential impact.
Contamination impacts to human health relating to soil and earthworks.	The outline CEMP sets out requirements for the protection of human health from contamination impacts relating to soils and earthworks. This will include (but will not be limited to) requirement for adherence with best practice documents associated with Health & Safety legislation, storage of fuels, oil and chemicals under COSHH regulations, general requirements such as Health and Safety Plans and guidance associated with provision of site risk assessments together with general site mitigation measures (such as good construction site management measures, information on the storage and handling of soils and equipment and highway washing).
Contamination impacts to controlled waters relating to soil and earthworks.	The outline CEMP sets out requirements for the protection of controlled waters from

Potential Impact	Proposed Mitigation
	contamination impacts relating to soils and earthworks. This will set out a list of requirements and control measures to minimise risks associated with the direct and indirect contamination of the water environment. It will include (but will not be limited to) adherence with all published documents that establish the environmental issues to be addressed at all stages of construction, and will cover site management controls, management of accidental leakages and spillages and mitigation measures employed during the works to reduce potential risk.

Phase 2 Ground Investigation and Quantitative Risk Assessment

11.5.6. A ground investigation will be undertaken prior to the construction phase (note that certain permitted preliminary works as defined in the draft DCO (document reference 3.1) can be commenced without this investigation). This is likely to be led by geotechnical requirements but will include geo-environmental sampling of soil, groundwater, and surface water. The scope of the geo-environmental investigation will be underpinned by the conceptual site model (CSM) presented in the PRA. The analytical data will be screened for risks to human health and controlled waters and the results used to refine the contaminant linkages identified. The soils will also be analysed for the purposes of waste classification and to determine suitability for re-use.

11.5.7. The ground investigation will also confirm preliminary hydrogeological conditions and will obtain information associated with ground aggressivity, including sulphates, sulphides (especially in pyritic ground), water-soluble magnesium and acids (indicators are pH, chloride and nitrate ions). The results will be used to determine an appropriate concrete specification for the design stage.

11.5.8. The ground investigation will be undertaken in accordance with the following:

- BS 10175:2011+A2:2017: Investigation of Potentially Contaminated Sites. Code of Practice. British Standards Institute (March 2011).
- Model Procedures for the Management of Land Contamination (CLR11). Department for Environment, Food and Rural Affairs and Environment Agency (2004) (Ref. 11.6).

11.5.9. In cases where the assessment in the ES has determined a significance level of ‘moderate’ or greater, additional mitigation, not integral to the Proposed Scheme, has been proposed. The objective of the additional mitigation is to reduce the significance level to no greater than ‘slight’.

11.5.10. The draft DCO (Document reference 3.1) submitted with this Application includes a requirement securing the approval and carrying out of this further ground investigation, in

order to inform mitigation and construction management measures contained in the outline CEMP.

Extent of the Study Area

11.5.11. For the purposes of this assessment, the study area comprises the maximum physical extent of the Site Boundary plus a buffer zone of 250 m. This distance is referenced in best practice documents and is typical at the hazard identification stage of an assessment. Volume 11 Section 3 Part 11 of the DMRB (Ref. 11.2) does not specify a minimum study area distance for the assessment of impacts to geology and soils.

11.5.12. Consideration has been given to the study area selected and, based on the site specifics (such as the underlying geology, an appreciation of the water environment and previous land use) the study area selected is considered suitable.

11.5.13. It should be noted that whilst the study area comprises the Site Boundary plus a buffer of 250 m, all applicable pollutant pathways and identified receptors outside of the 250 m zone are included in the risk assessment. Consultation with the EA has been undertaken with respect to the suitability of the study area (in consultation responses dated 19 January 2018 and 15 February 2018). The EA have no objection to the proposed study area provided that the assessment methology follows the relevant guidance including CLR11 (Section 11.3). ’

11.5.14. The study area is presented on Figures 11.1 and 11.2.

Method of Baseline Data Collation

11.5.15. The baseline condition of the study area is provided based on a review of the following sources of information:

- Envirocheck Report dated 17 October 2017 (refer to Appendix 11.3) (Ref. 11.20).
- British Geological Survey (BGS) ‘Onshore GeoIndex’ (Ref 11.21).
- BGS ‘Geology of Britain’ viewer (Ref. 11.22).
- British Geological Survey (BGS) 1:63,360 / 1:50,000 Geological Map Series, New Series: Sheet No. 79 ‘Goole’ (Drift ed.), 1971 (Ref. 11.23).
- British Geological Survey (BGS) 1:63,360 / 1:50,000 Geological Map Series, New Series: Sheet No. 79 ‘Goole’ (Solid ed.), 1972 (Ref. 11.24).
- Natural England, 2010. Agricultural Land Classification map ‘Yorkshire & The Humber Region’ (ALC003) (Ref. 11.25).
- Environment Agency ‘What’s In Your Backyard?’ application (Ref. 11.26).
- Department for Environment, Farming and Rural Affairs online ‘Magic’ map application (Ref. 11.27).
- WSP, 2017. Drax Repower Project: Preliminary Environmental Information Report. For Drax Repower Ltd. Published. January 2018 (Ref. 11.28).
- WSP, 2017. Drax Repower Project: Environmental Impact Assessment Scoping Report. For Drax Repower Ltd. Published. September 2017 (Ref. 11.29).
- WS Atkins, 1965. Ref. 4235. Drax Power Station Main Station Site: Site Investigation Volume 2 (extract only) (factual exploratory hole logs and exploratory hole location plan supplied) (Ref. 11.10).
- National Power, Ground Condition Information Manual, Drax Power Station, Flue Gas Desulphurisation, dated September 1996 (extract only) (Ref. 11.11).
- Dames and Moore, 2000. Figures and Exploratory Hole Records associated with ground investigation carried out in January 2000. Environmental Scientifics Group (ESG), 2011.

Report No A1047-11. Drax Power Station – Project Phoenix. Desk Study. Carried out for: Drax Power Limited. June 2011 (Ref. 11.12).

- ESG, 2011. Report No A1047-11/2. Drax Power Station – Project Phoenix Report on Site Investigation, Volume 2. September 2011 (Ref. 11.14).
- Alstom Power Systems S.A., 2014. White Rose Project Oxy Fired Coal & Biomass Power Plant. CPL Document Number 120103-S-CE-002. CPL Revision 02. October 2014 (Ref. 11.16).
- ESG, 2014. Report No. A4048-14. White Rose CCS Project Site Raising, North Yorkshire. Factual Report on Ground Investigation. Carried out for Drax Power Ltd. Engineer: Parsons Brinckerhoff. October 2014 (Ref. 11.17).
- Zetica, 2018. Zetica for North Yorkshire. (Ref. 11.18).

11.5.16. A site reconnaissance (walkover) visit was undertaken by consultants from WSP on 21 November 2017. The consultants identified current land uses and potential sources of contamination within the relevant areas of the Existing Drax Power Station Complex, the Carbon capture readiness reserve space and, where permitted by land access agreements or Public Rights of Way (PRoW), the Pipeline Area. The information and photography obtained has been used to inform the PRA. A record of the photography obtained is presented in Appendix 11.4

Summary of Previous Investigations

WS Atkins, 1965. Drax Power Station Main Station Site Investigation Volume 2 (extract only) (factual exploratory hole logs and exploratory hole location plan supplied) (Ref 11.10)

11.5.17. A ground investigation was undertaken in 1965 prior to construction of Drax Power Station in 1975 and factual data was obtained (exploratory hole plan and records). The available exploratory hole logs cover the areas currently identified within Areas F and H on Figure 1.3. No information on groundwater monitoring, in-situ testing or chemical laboratory test data was included within the information received by WSP.

National Power, Ground Condition Information Manual, Drax Power Station, Flue Gas Desulphurisation, dated September 1996 (extract only) (Ref 11.11)

11.5.18. Exploratory hole records associated with the ground conditions recorded beneath the flue gas desulphurisation plant have been made available. There are two sets of exploratory hole logs; undertaken in 1988 and 1990, respectively. Unfortunately, the accompanying exploratory hole location plan, detailing the positions of each location, was not included within the package of information and therefore, a high-level and brief summary of the ground conditions recorded is presented. The area of the flue gas desulphurisation operations are outside the Power Station Site (located east of Area F on Figure 1.3). No information on groundwater monitoring, in-situ testing or chemical laboratory test data was included within the information received by WSP and as such cannot be commented on as part of the baseline assessment.

Figures and Exploratory Hole Records associated with ground investigation (GI) carried out in January 2000. Exploratory Hole Location Plan and Exploratory Hole Logs. Figures: Dames and Moore. Exploratory hole records drilled Cape Site Services in Sept 1999. Extract Only, No lab test data. (Ref 11.12)

11.5.19. A GI commissioned by AES Electric Ltd. and undertaken by Dames & Moore was completed at Drax Power Station and reported in January 2000. This study included exploratory hole logs from various areas within the Power Station Site including Area C, Area F and Area H on Figure 1.3. No other information, such as chemical laboratory data was included in the information supplied to WSP and as such cannot be commented on as part of the baseline assessment.

ESG/Soil Mechanics Drax Power Station – Project Phoenix Desk Study Report No A1047-11 dated June 2011 (Ref 11.13)

11.5.20. In June 2011, Soil Mechanics was commissioned to complete a Phase 1 desk study by Drax Power (part of Project Phoenix). The study area was limited to the coal stockpile in the west of the Existing Drax Power Station Complex (to the west of Areas H and F in Figure 1.3). Project Phoenix related to a historical redevelopment of the fuel storage area of Drax Power Station.

ESG/Soil Mechanics Drax Power Station – Project Phoenix Report on Site Investigation Volume 2: Interpretative Report, Report No A1047-11/2 dated September 2011 (Ref 11.14)

11.5.21. In September 2011, Soil Mechanics was commissioned to complete a Phase 2 GI by Drax Power (part of Project Phoenix). The study area was limited to the coal stockpile in the west of the Existing Drax Power Station Complex (to the west of Areas H and F in Figure 1.3). The GI comprised advancement by cable percussion of 13 boreholes which were installed for groundwater and ground gas monitoring.

Strata Surveys Limited SCR and Unit 1 Reheater Drum Replacement Ground Investigation Report Revision A Reference 15142 dated September 2011 and Strata Surveys Limited SCR and Unit 1 Reheater Drum Replacement Interpretative Report Reference 15142 dated September 2011 (Ref 11.15)

11.5.22. A site investigation was undertaken in connection with the SCR scrubber unit and Unit 1 Reheater Drum replacement in Area F in Figure 1.3 in order to provide information for foundation design. Three boreholes were advanced to the east of Area F and plate bearing tests undertaken in order to confirm outrigger requirements for heavy mobile cranes. Two boreholes were also undertaken within Area F to the north of the main generator buildings and around the storage tank facility. Limited chemical analysis was undertaken as part of the investigation.

11.5.23. Alstom Power Systems S.A. White Rose Project Oxy Hired Coal and Biomass Power Plant Factual Report (April 2014) and Geotechnical Interpretative Report (October 2014) (Ref 11.16)

11.5.24. A phased GI was completed to generate geotechnical and hydrogeological data to inform conception of the biomass power plant at Drax Power Station. The study area was in the north of the Existing Drax Power Station Complex within Areas C and B in Figure 1.3. The results were subject to factual and interpretive reporting by Alstom in April and October 2014.

11.5.25. Phase 1 of the GI was undertaken by Norwest Holst in 2009-2010 and comprised advancement of 10 boreholes, SPTs, mechanical excavation of 24 trial pits and completion of 10 cable percussion test (CPTs). The results were reported within the interpretive reporting

completed by Alstom in October 2014. Phase 2 of the GI was undertaken and reported by Structural Soils in 2014 and comprised advancement of 36 cable percussion boreholes (of which 11 were extended by rotary drilling), three rotary open hole boreholes, permeability testing, cone penetration testing (CPTs) and geophysical testing to aid interpolation between exploratory locations. Seven of the boreholes were installed for groundwater monitoring and subject to eight groundwater monitoring rounds between March and May 2014. A number of soil and groundwater samples were collected for geotechnical purposes. The results were factually reported by Structural Soils in May 2014 and included within the interpretive reporting completed by Alstom in October 2014.

ESG/Soil Mechanics White Rose CCS Project Site Raising, North Yorkshire, Factual Report on Ground Investigation Reference A4048-14 dated October 2014 (Ref 11.17)

11.5.26. In May 2014, Environmental Scientifics Group (ESG) was commissioned by Parsons Brinckerhoff on behalf of Drax Power Ltd. to carry out a ground investigation (GI) at Drax Power Station. The investigation sought to obtain geotechnical and geo-environmental data in the area of Hook's Fields, in the north of the study area for the Proposed Scheme.

11.5.27. The GI included mechanical excavation of eight trial pits and hand excavation of two trial pits and environmental sampling and analysis for potential contaminants.

Assessment Methodology

Assumptions

11.5.28. The assessment of effects has been completed on the basis of indicative layout drawings which are presented in Figure 3.2 and 3.3. It has been assumed that the indicative layout drawings will be representative of the final design. It has further been assumed that the information provided and reviewed in the PRA is representative of existing ground conditions. A degree of professional judgement has been used in the interpretation of this information and in its application to determining environmental sensitivity and magnitude of impact.

11.5.29. The assessment has been carried out for the Site, treating it as two separate areas: the Power Station Site (including the Carbon capture readiness reserve space adjacent to the Power Station Site) and the Pipeline Area.

11.5.30. Following the Phase 2 ground investigation, which will be undertaken at the design stage, prior to construction, it may be possible, if it is considered necessary, to divide the study area into a number of 'averaging areas' in which risks will be independently assessed. The averaging areas would be selected representatively and in line with the conceptual site model.

11.5.31. The assessment of effects relating to the construction phase is based on the anticipated potential outcomes of the construction phase, as indicated by the layout drawings in Figure 3.2 and 3.3.

Preliminary Risk Assessment

11.5.32. A Phase 1 Preliminary Risk Assessment was undertaken (May 2018) to establish the current baseline condition of the study area (defined below in the Assessment Methodology and Significance Criteria section 11.5 of this chapter) and assess potential constraints relating to land contamination relevant to the construction and operational phases of the Proposed Scheme.

11.5.33. The potential for land contamination within the study area has been assessed in accordance with the principles of the EA report CLR11: Model Procedures for the Management of Land Contamination (Ref 11.6). In accordance with current UK Government guidance, qualitative risks of land contamination are assessed using the 'source-pathway-receptor' approach, where the following definitions apply:

- Source/hazard: a substance or situation which has the potential to cause harm or pollution;
- Pathway: means by which a source/hazard can reach and impact upon a receptor; and
- Receptor: that which may be adversely affected by the presence of the source/hazard.
- Such an approach recognises that risks relating to land contamination can only exist where all three elements are present constituting a complete contaminant linkage.

11.5.34. The level of risk has been evaluated in accordance with the methodology set out in CIRIA C552: Contaminated Land Risk Assessment: A guide to good practice (Ref. 11.7). This involves classification of the consequence and probability associated with each potential contaminant linkage and thereby the corresponding level of risk (risk category).

11.5.35. The framework for classifying of consequence, presented in full in CIRIA C552, is summarised in Table 11-13. The consequence classification does not depend on the probability that the consequence will be realised. The 'severe' consequence classification describes acute risk (arising from short-term exposure). The 'medium' classification describes chronic harm (and may constitute 'significant harm' under Part 2A of the CIRIA C552 guide).

Table 11-13 - Qualitative Risk Assessment – Classification of Consequence

Classification	Definition
Severe	Severe short-term (acute) risks to human health, likely to result in significant harm. Short-term risk of pollution of sensitive water resource. A short-term risk to a particular ecosystem, or an organism forming part of such an ecosystem.
Medium	Chronic damage to human health (significant harm). Pollution of sensitive water resources. A significant change in a particular ecosystem, or an organism forming part of such an ecosystem.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or to the environment.
Minor	Harm, not necessarily significant, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health. Easily repairable effects of damage to buildings, structures and services.

Table 11-14 - Qualitative Risk Assessment – Classification of Probability

Classification	Definition
High Likelihood	There is a contaminant linkage and an event that appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	It is probable that an event will occur. Whilst not inevitable, it is possible in the short term and likely over the long term.
Low Likelihood	Circumstances are possible under which an event could occur, but it is not certain that (even over a long time period) such an event would occur.
Unlikely	It is improbable that an event would occur even in the very long term.

11.5.36. The level of risk (risk category), ranging from 'very high risk' to 'very low risk', is determined by the consequence and probability classifications using the matrix shown in Table 11-15.

Table 11-15 - Qualitative Risk Assessment - Risk Category

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

Significance Criteria

11.5.37. The assessment of potential effects includes assessment of both construction and operational phase effects associated with Stages 0-3 and decommissioning, defined in Chapter 3 (Site and Project Discription). The significance level attributed to each effect has been determined based on the sensitivity of the receptor affected and the magnitude of change to the receptor induced by the Proposed Scheme.

Sensitivity

11.5.38. Sensitivity has been assigned to each attribute or land contamination receptor in accordance with the principles established in DMRB Volume 11 Section 2 Part 5 (Ref 11.1). Definitions of terms relating to the sensitivity of soil are provided in Table 11-16 and Table 11-17.

Table 11-16 - Definition of Terms Relating to Sensitivity of Soils and Geology (Attributes)

		Definition	
		Geology and Geomorphology	**Soils**
Sensitivity	**High**	Geological or geomorphological features of national importance such as a Site of Special Scientific Interest.	Good to excellent quality agricultural land; for example, best and most versatile agricultural land. Peatlands (active or inactive).
	Medium	Regionally Important Geological Sites.	Poor to moderate quality agricultural land.
	Low	No features of importance within the theoretical sphere of influence of the Proposed Scheme.	Very poor quality agricultural land. Made Ground, with little potential for agricultural use.

Table 11-17 - Definition of Terms Relating to Sensitivity of Soils and Geology (Receptors)

		Definition		
		Controlled Waters	**Built Environment**	**Human Health**
Sensitivity	**High**	Principal Aquifer beneath site or major surface water within the theoretical sphere of influence of the Proposed Scheme.	Buildings of high historical value or other high sensitivity.	Residential development, allotments, play areas and construction workers employed during the construction-phase works only.
	Medium	Secondary Aquifer beneath site or minor surface water within the theoretical sphere of influence of the Proposed Scheme.	Buildings, including services and foundations.	Landscaping or public open space.
	Low	Aquitard beneath site or no surface water body within the theoretical sphere of influence of the Proposed Scheme.	Not applicable.	A ‘hard’ end use (for example industrial use, road, car park), end users of a commercial development.

Magnitude of Impact

11.5.39. The expected magnitude of impact to each identified attribute and receptor has been assigned in accordance with the principles established in DMRB Volume 11 Section 2 Part 5. The terms used to describe magnitude of impact are defined in Table 11-18.

Table 11-18 - Definition of Terms Relating to Magnitude of Impacts to Geology and Soils

Magnitude of Impact		Definition
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements. Less than 20 ha of BMV agricultural land.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. Between 20 and ≤50 ha of BMV agricultural land.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduce risk of negative impact occurring.
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements; short-term exposure to contaminants with chronic (long-term) toxicity. Between 50 and ≤100 ha of BMV land.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements; exposure to acutely toxic contaminants. Greater than 100 ha of BMV agricultural land.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.

Significance of Effect

11.5.40. The sensitivity and magnitude of impact are then compared using the matrix shown in Table 11-19 to determine a significance category ranging from ‘neutral’ to ‘large or very large’.

Table 11-19 - Matrix Used for Assessment of Significance of Effects

		Magnitude of Impact				
		No Change	**Negligible**	**Minor**	**Moderate**	**Major**
Sensitivity	**High**	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate

11.6 Current Baseline

Geology

11.6.1. The geology of the study area has been reviewed with reference to Envirocheck® Report: 143154578_1_1 (available on request), geological mapping published by the BGS, a number of historical borehole records published by the BGS and previous site investigations as summarised in paragraphs 11.4.15 – 11.4.22 . The historical borehole records referred to are summarised in Table 11-20.

Table 11-20 - Historical Borehole Records

Borehole Reference	NGR	Area
SE62NE30	466597 427501	Area F
SE62NE138	469860 426653	Pipeline Area

Artificial Ground

11.6.2. Made Ground is anticipated to be present beneath large areas of the study area, chiefly associated with construction of Drax Power Station and subsequent demolition/construction activities. The log from borehole ref. SE62NE30 describes ‘top soil’ and ‘made up ground’ to a depth of 2 m b.g.l. The study area contains rural and agricultural land and may therefore contain localised areas of artificial ground; for example, where depressions have been infilled to aid farming. No known artificial ground is, however, identified within the study area in the BGS ‘Onshore GeoIndex’.

11.6.3. According to the WS Atkins (1965) (Ref 11.10) information, the available records indicate that, within Drax Power Station (Area F in Figure 1.3) prior to construction, the ground conditions comprised an initial thickness of topsoil (between 0.5 m and 1 m). Within Area H, the information indicates that the ground conditions comprised an initial thickness of topsoil (circa 0.5 m in thickness) underlain by firm brown sandy clay to between 1 m and 5 m depth.

11.6.4. The ground conditions associated with the area of the flue gas treatment plant (east of Area F) as reported by National Power (1996) indicate Made Ground to be present to between 0.4 m and 4.1 m b.g.l. The Made Ground encountered was visually distinctive and either comprised ash/ashy material, pulverised fuel ash (PFA), clinker and coal or, brown, fine to medium sands, in turn underlain by dark grey silty sand with gravel.

11.6.5. The Dames and Moore/Cape Site Services data (2000) (Ref 11.12) records Made Ground within Area C (to the north of the main generator building). One of the logs describes the deposits as tarmac overlying soft, grey very clayey sand to at least 5 m depth (the maximum depth of the hole). Another nearby record indicates the artificial ground to comprise limestone fill to 0.6 m and red sand (classified as Made Ground on the log) to 1.7 m. The on-site observations indicate that no evidence of visual or olfactory contamination was noted within the Made Ground. Within Area F, on the eastern boundary of the 400 kV substation, Made Ground was recorded as 'fill' to 0.6 m and then "loose dense red brown medium to coarse sand" to depths of approximately 2.5 m. The data from a record located at the northern end of Area F (close to the proposed location of the turbine outage store building) indicates the Made Ground deposits to comprise both "limestone and coarse sandy gravel" and "red brown sand and gravel" to depths of circa 2.5 m b.g.l. No visual or olfactory evidence of contamination was recorded within Area F. Within Area H, the Made Ground recorded typically comprises limestone gravel.

11.6.6. The logs from the ESG data (Ref 11.14) (note that the exploratory locations were targeted at known deposits of fill material) typically describe sandy gravelly silty clay containing cobbles, fragments of metal, plastic and geotextile (the gravel typically comprises brick, sandstone. limestone and concrete) underlain in places by sandy gravel of clinker (sand is ash). The interface between the Made Ground and the underlying clay was measured at 0.8-2 m b.g.l.

11.6.7. The Strata Surveys information, obtained in 2011 (Ref 11.15) indicates up to 3 m thickness of Made Ground (fill) to exist east and north of the main generator building although one borehole shows Made Ground (fill) to be present to at least 7.25 m depth.

11.6.8. Alstom (2014) (Ref 11.16) describes the Made Ground in the north of the Existing Drax Power Station Complex (within Areas C and B) as "material placed without engineering control" comprising "limestone gravel fill, overlying yellowish or reddish brown sand or sandy clay with gravel of limestone and sandstone" with a recorded thickness of 0.2-4.5 m b.g.l.

Superficial Deposits

11.6.9. In 1:50,000 scale geological mapping published by the BGS, the majority of the study area (including Areas A-F and H) is underlain by the Hemingbrough Glaciolacustrine Formation (glacigenic silty clay) and the Breighton Sand Formation (fluvial and aeolian sands). These units were formed up to two million years ago in the Quaternary Period in a local environment characterised by ice age conditions. Stratigraphical information published by the BGS indicates the Hemingbrough Glaciolacustrine Formation is older than and therefore underlies the Breighton Sand Formation where it is present.

11.6.10. The northern part of the business park and old wood yard (Area C), located in the north of the study area, is underlain by alluvium (clay, silt, sand and gravel) associated with a minor tributary of the River Ouse. The jetty (Area G) is underlain by warp (clay and silt). These units

were formed up to two million years ago in the Quaternary Period in a local environment characterised by rivers.

11.6.11. The log from borehole ref. SE62NE30, located within Area F, underlain by the Hemingbrough Glaciolacustrine Formation in BGS mapping, describes superficial 'solid grey/blue clay' from 2 m b.g.l. to 16 m b.g.l. The log from borehole ref. SE62NE138, located near the River Ouse, underlain by warp in BGS mapping, describes various silty clays from 0. 3m b.g.l. to 15.24 m b.g.l. (as well as 'firm brown fibrous clayey peat' from 2.29 m b.g.l. to 4.27 m b.g.l.) and sand, potentially derived from the underlying bedrock, from 15.24 m b.g.l. 20.12 m b.g.l.

11.6.12. The WS Atkins (1965) (Ref 11.10) information indicates that, prior to construction of Drax Power Station, beneath the Made Ground within Area F, the ground conditions comprised stiff brown/grey mottled silty clays with pockets of silt to between 1.8 m and 3.8 m and then firm brown, laminated silty clays containing silt partings to between approximately 15.5 m and 20 m depth. Within Area H, the superficial deposits comprised stiff brown/grey sandy clays to between 1 m and 5 m depth. Underlying the stiff clays, the ground conditions typically comprised firm, brown, laminated silty clays with silt partings. Lenses of brown sand and some cobbles bands were recorded within the superficial deposits, which were recorded within Area H to between approximately 15 m and 20 m depth.

11.6.13. The ground conditions associated with the area of the flue gas treatment plant (east of Area F) as reported by National Power (1996) (Ref 11.11) indicate the superficial deposits to comprise loose to dense grey clayey sands and soft to firm sandy clays. Although, at one location, almost 4 m of Peat was recorded. The superficial deposits (which are recorded as alluvium on the logs dated 1990) were recorded to the base of each hole undertaken (3.3 m depth). The logs dated 1988 were progressed to greater depths and confirmed the superficial deposits, which graded into firm to stiff orange brown clays with fissures and laminations, to be present to between 10 m and 14.5 m depth.

11.6.14. The Dames and Moore data (2000) (Ref 11.12) records "stiff, red brown sandy clays" to be present at 1.7 m beneath deposits of Made Ground within Area C (to the north of the main generator building). These were recorded to at least 4 m depth. The exploratory hole information associated with the northern extent of Area F, indicates the superficial deposits to comprise "soft to firm brown clays with laminations" to at least 5 m b.g.l. Within Area H, the superficial deposits are recorded as "stiff brown clays" to at least 3 m and at one location, these deposits were reported to include a "slight chemical odour".

11.6.15. The Strata Surveys information, obtained in 2011 (Ref 11.15) describes the superficial deposits encountered beneath Area F to comprise "firm brown mottled grey fissured and laminated gravelly clays" to depths of approximately 20 m.

11.6.16. The logs from the ESG (2014) (Ref 11.14) data typically describe organic clay. The clay is frequently containing gravel of sandstone and mudstone and is considered likely therefore to be reworked ground.

11.6.17. The Alstom (2014) (Ref 11.16) data indicates "firm thinly laminated locally fissured reddish or brown clays with silt partings" from depths of 0.2-4.5 m b.g.l. underlying Made Ground in the majority of exploratory locations (located with Areas C and B). The clay was underlain by

a layer of “medium brown sand” (of thickness 0.3-1 m) and the sand, in turn, was underlain by a layer of “laminated clay and silt with occasional pockets of fine silty sand” (of thickness 12.6-18.7 m). The superficial geology was recorded to a maximum depth of 14.3-19 m b.g.l.

11.6.18. In 1:50,000 scale geological mapping published by the BGS, the Pipeline Area is underlain by the Hemingbrough Glaciolacustrine Formation and the Breighton Sand Formation in the west. The proposed pipeline approaches the River Ouse to the east and is underlain by alluvium and warp.

Bedrock Geology

11.6.19. The study area is located on the East Midlands Shelf. On 1:50,000 geological mapping published by the BGS, the study area is shown underlain by the Sherwood Sandstone Group (SSG). This is sedimentary bedrock formed approximately 229 to 271 million years ago in the Triassic and Permian Periods in a local environment previously dominated by rivers.

11.6.20. The log from borehole ref. SE62NE30, located within Area F, describes ‘sand’, which may represent weathered sandstone, from 16m b.g.l. to 20 m b.g.l, and sandstone from 20 m b.g.l. Beneath this bedrock comprises layers of sandstone and layers of marl. The log from borehole ref. SE62NE138, located adjacent to the River Ouse “near the GVC (sic)”, describes “very dense red fine to medium sand with fragments of sandstone” from 19.81 m b.g.l. and “weathered sandstone” comprising “very dense red weakly cemented micaceous fine to medium sand” from 20.12 m b.g.l.

11.6.21. The WS Atkins (1965) (Ref 11.10) data indicates “red brown sand” to be present at the base of the superficial deposits. Within Area F, weathered sandstone, recorded as “red brown sand“ was identified at the base of the superficial deposits and above “soft red brown sandstone” which was reported to the base of each hole; the maximum depth of hole in Area F was 21.9 m b.g.l (pre-construction level). Within Area H “soft, red-brown sandstone recorded as rock-sand” was logged below approximately 20 m depth). The sandstone strata was noted contain ‘harder bands’ and was recorded to the base of each exploratory hole, the maximum depth of hole advanced within Area H was 21.9 m b.g.l.

11.6.22. The ground conditions associated with the area of the flue gas treatment plant (east of Area F) as reported by National Power (1996) (Ref 11.11) indicate medium dense reddish brown sand (sandstone) to be present from 16.5 m b.g.l to at least 30 m b.g.l.

11.6.23. The Strata Surveys (2011) (Ref 11.15) information described “brown fine to medium sand” to exist at depths of below 20 m to the base of each borehole (at least 24.3 m).

11.6.24. The sandstone strata is reported by Alstom (2014) (Ref 11.16) as a layer of “reddish/orangish brown clayey/silty fine to medium sand” (of thickness 1-6.5 m) from 14.3-19 m b.g.l. This layer is shown to be underlain by “a very weak locally laminated reddish/orange fine to coarse grained sandstone” from 18-23 m b.g.l.

Soil Quality

Agricultural Land Classification

11.6.25. The Agricultural Land Classification (ALC) map for the ‘Yorkshire & The Humber Region’ (ALC003) published by Natural England in August 2010 (based on data obtained between 1967 and 1974) shows agricultural land within the Study Area of ALC Grade 3 ‘Good to

Moderate', Grade 2 'Very Good' and Grade 1 'Excellent'. However, the majority of the study area is non-agricultural land.

11.6.26. It is acknowledged that this map is not of sufficient accuracy for the assessment of individual sites and forms part of a series at 1:250,000 scale intended for strategic use only.

11.6.27. Some parts of the study area have been resurveyed post-1988. The agricultural land to the south of the Existing Drax Power Station Complex was assigned ALC Grades 2-3b, and the agricultural land to the north of the Existing Drax Power Station Complex was assigned ALC Grades 1-4. Land of ALC Grades 1, 2, and 3a is defined as BMV agricultural land by the NPPF.

11.6.28. It is not the objective of the geology and soils assessment to consider any potential adverse effects to agricultural land (measured as change to ALC grade) or to the agricultural industry (e.g. due to severance). However, impacts to agricultural land are given further consideration in Chapter 14 (Socio-Economics).

11.6.29. Indicative soil mapping provided by Soilscape identifies the following soil types within the study area:

- 18 Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.
- 15 Naturally wet very acid sandy and loamy soils.
- 21 Loamy and clayey soils of coastal flats with naturally high groundwater.
- 20 Loamy and clayey floodplain soils with naturally high groundwater.

Leaching Potential

11.6.30. Soil leaching potential within the study area is high (H1) and intermediate (I1). Generic descriptions of these soil classes are provided as follows:

- H1- Soils that readily transmit liquid discharges because they are either shallow, or susceptible to rapid by-pass flow directly to rock, gravel or groundwater.
- I1- Soils which can possibly transmit a wide range of pollutants.

11.6.31. Soils with a higher leaching potential may form part of a potential contaminant linkage as a migratory pathway for a contaminative substance or as a contaminative substance source to which end users may be exposed.

Hydrogeology

11.6.32. The geological units within the study area are assigned the following aquifer classifications by the EA:

- The Hemingbrough Glaciolacustrine Formation is an aquiclude.
- The Breighton Sand Formation is a Secondary A aquifer.
- The Alluvium is a Secondary A aquifer.
- The Warp is a Secondary A aquifer.
- The Sherwood Sandstone Group is a Principal aquifer.

11.6.33. Groundwater was encountered in warp within borehole ref. SE62NE138, located adjacent to the River Ouse, at 2.3 m b.g.l. The direction of groundwater flow is likely to be to the east and northeast towards the River Ouse.

11.6.34. The WS Atkins (1965) data identifies groundwater strikes to have occurred at depths of between 6 m and 8 m (rising to between 7.5 m and 2.5 m) in Area F in Figure 1.3. After at least four weeks, the data states that standing water levels of around 2m – 3m b.g.l were recorded (note these relate to pre-construction levels). Within Area H, groundwater was struck at depths of between 6 m and 8 m and then rose to between 7 m and 2 m. After at least four weeks, standing water levels of around 2 m – 3 m b.g.l were recorded.

11.6.35. The Strata Surveys (2011) information indicates groundwater levels beneath Area F to rest at approximately 3 m depth.

11.6.36. Groundwater abstractions located within the study area are summarised in Table 11-21.

Table 11-21 - Groundwater Abstractions

Licence No.	NGR	Source	Details
2/27/24/197	465770 426230	Sherwood Sandstone Group	General Agriculture: Spray Irrigation

11.6.37. The majority of the study area is located within a groundwater Source Protection Zone (SPZ) 3 (total catchment). The protected groundwater sources are located to the south at Carlton. In groundwater flood susceptibility mapping published by the BGS, the majority of the study area has a 'limited potential for groundwater flooding to occur'. Some areas in the south of the study area, primarily those areas underlain by the Breighton Sand Formation, have a 'potential for groundwater flooding of property situated below ground level' to occur.

11.6.38. In the groundwater monitoring undertaken after the Phase 2 GI reported by ESG/Soil Mechanics in September 2011, for which the study area was the coal stockpile area to the west of Areas H and F, the groundwater table was detected at 6.6-13.5 m b.g.l. (-0.57 to 10.1 m AOD). The groundwater monitoring was undertaken at seven borehole locations in July and August 2011.

11.6.39. The results of the groundwater monitoring reported by Alstom (2014) describe a stable groundwater table measured at -1 to -5 m AOD between March and May 2014 across seven borehole locations in the north of the Existing Drax Power Station Complex (circa Areas C and B).

11.6.40. The GI completed by Dames & Moore in January 2000 encountered "shallow" groundwater at 1.9 m to 4.57 m AOD (and inferred that "shallow" groundwater flowed east and southeast) and "deep" groundwater at -3.3 to -10.8 m AOD (and inferred that "deep" groundwater flowed from southeast to northwest.

11.6.41. A further discussion of groundwater sources and abstraction points is found in Chapter 12 (Water Resource, Quality and Hydrology).

Hydrology

11.6.42. The nearest major surface water feature is the River Ouse, located approximately 1.5 km northeast of the Existing Drax Power Station Complex. This flows eastwards into the Humber Estuary. The River Ouse is a 'main river' as defined by the EA (a river for which the EA has powers to carry out maintenance, improvement or construction work to manage flood risk).

There are a number of field drains and other minor river channels within the study area, including Carr Dyke drain in the north of the study area, a pond associated with Drax Abbey Farm, and a pond to the east of the Existing Drax Power Station Complex approximately 0.2 km east of New Road.

11.6.43. Surface water abstractions located within the study area are summarised in Table 11-22. The Existing Drax Power Station Complex also abstracts surface water from and discharges surface water to the River Ouse.

Table 11-22 - Surface Water Abstractions

Licence No.	NGR	Source	Details
2/27/24/194	466300 428000	Carr Dyke / Lendall Drain (Tidal)	General Agriculture: Spray Irrigation
2/27/24/195	467000 428200	Drax Abbey Fish Pond (Tidal)	-

11.6.44. It is noted that the northwest of the study area, near Carr Dyke, is identified as 'subject to floods' or 'liable to floods' in 1:10,560 scale historical mapping published between 1851 and 1909. The south of the study area, to the south of the Existing Drax Power Station Complex, is a flood zone 3 (flooding from rivers or sea without defences).

11.6.45. For further information on surface water features refer to Chapter 12 (Water Resource, Quality and Hydrology).

Environmental Designations

11.6.46. There are no geological Sites of Special Scientific Interest (SSSIs) within the study area. There are no known regionally important geological sites (RIGS) within the study area.

11.6.47. The study area does not contain Ancient Woodland.

Historical Land Use

11.6.48. A summary of historical land use within the study area based on a review of published historical mapping is provided in Table 11-23.

Table 11-23 - Summary of Historical Land Use

Historical Map	Detail
Yorkshire 1851-1854 1:10,560	In the earliest available historical mapping, the study area is rural and agricultural. There are some minor areas of woodland including Barlow Hagg in the northwest and Ormerley Carr in the south; and occasional farm dwellings including Wood House, located within the boundary of the Existing Drax Power Station Complex. Drax Abbey and the historical Priory of Drax (Augustinian, founded AD 1130-39, dissolved AD 1535) are located in the north of the Study Area adjacent to the farming land now leased by Drax (Area A).

Historical Map	Detail
Yorkshire 1891-1892 1:10,560	Barnsley & West Riding Junction Railway first appears in historical mapping published in 1891-1892. This is located adjacent north of the jetty. An engine house is present, which would likely have contained pumps and hydraulic accumulators for the operation of Ouse Bridge (swing).
Yorkshire 1938-1953 1:10,560	Barlow Hagg was felled by 1938 to facilitate construction of a 'depot' in the west of the Study Area. This is a former airship factory operational during WWI1 and Royal Ordnance plc. munitions depot[2] and prisoner of war camp (Stable Road Camp, Barlow) constructed in the 1930s and operational throughout WWII.[3]
Ordnance Survey Plan 1974-1975 1:10,000	The Existing Drax Power Station Complex first appears in historical mapping published in 1974-1975. Construction of the Existing Drax Power Station Complex included felling of Ormerley Carr for southern cooling towers (adjacent to Area H). A Sewage Works was constructed in the west of the study area by 1974-1975. Barnsley & West Riding Junction Railway is dismantled and Ouse Bridge is disused by 1974-1975. It is likely that the jetty became operational at this time.
Ordnance Survey Plan 1984-1989 1:10,000	Further construction, including construction of the northern cooling towers (adjacent to Areas C, E and F), was undertaken at the Existing Drax Power Station Complex by 1989. The 'depot' had been removed by 1984-1989. A Sewage Works was constructed adjacent west of the jetty by 1984-1989.
10k Raster Mapping 1999 1:10,000.	The Selby-Goole railway line, which closed in the 1960s became part of the northwest-southeast orientated stretch of the A645 in the south of the Study Area, southeast of the Existing Drax Power Station Complex.
VectorMap Local 2017 1:10,000	The Existing Drax Power Station Complex is present and operational in mapping from 2017. Rusholme Wind Farm, located in the southeast of the study area, first appears in mapping published in 2017. The historical depot has become the site of the Skylark Centre and Nature Reserve. The Sewage Works adjacent to the jetty remains present and operational.

Current Land Use

11.6.49. The major feature within the study area is the Existing Drax Power Station Complex, which remains operational in 2018. Drax Power Station is a large power station comprising originally six coal-fired units. Three of the original six coal-fired units are now converted to biomass. By the latter half of 2018, four units will run on biomass. The River Ouse is located approximately

[1] http://www.airshipsonline.com/airships/r33/
[2] http://www.airfields-in-yorkshire.co.uk/yorkshireatwar/barlow/
[3] https://www.theguardian.com/news/datablog/2010/nov/08/prisoner-of-war-camps-uk

1.5 km north east of the Existing Drax Power Station Complex. The site is 'lower tier' classified under Control of Major Accident Hazards (COMAH).

11.6.50. The study area is otherwise predominantly rural and agricultural, with the villages of Long Drax, Camblesforth and Drax located within 1 km of the Existing Drax Power Station Complex. The Skylark Centre and Nature Reserve is located adjacently to the west, on Barlow Mound—an anthropogenic feature containing PFA and furnace bottom ash (FBA) as well as other deposits. The village of Barlow is located a little more than 1 km to the northeast.

11.6.51. The Existing Drax Power Station Complex is served by a railway line which connects with the Pontefract line to the south. The major roadway infrastructure is the A645, located in the south of the study area on the southern perimeter of the power station. There are no known fuel retail sites within the study area. For further information, please refer to Chapter 3 (Site and Project Discription).

Registered Landfills

11.6.52. The following registered landfills are present within the study area:

- Camblesforth By-Pass Tipping Site, located in the south of the study area adjacent to Area H (licence ref. NYCC/076, operational between 1978 and 1982) (see Figure 11.2). There is no known restriction on the source of the waste accepted during the operational period. Deposited waste included inert and industrial waste. The landfill categorisation was 'landfills taking non-biodegradable waste (not construction). Camblesforth By-Pass Tipping Site has since been redeveloped to contain two electricity distribution sites.
- New Road Landfill Site, located in the north of the study area within Area B (license ref. NYCC/075, operational between 1978 and 1982). There is no known restriction on the source of the waste accepted during the operational period. Deposited waste included inert waste. The landfill categorisation was 'landfills taking non-biodegradable waste (not construction).
- Barlow Mound Ash Disposal Site, located in the northwest of the study area within 250 m of Area C (license ref. NYCC/040B). This is a 'very large' landfill (maximum input rate ≥250,000 tonnes per year) operational since 1977. Authorised waste includes construction and demolition waste, flue gas desulphurisation (FGD) gypsum, FGD plant wastewater and sludge, furnace bottom ash and pulverised fuel ash.

Potential Sources of Contamination

11.6.53. Following a review of land use in current and historical mapping and, based on the information obtained during the site walkover, the following potential sources of contamination have been identified within the study area:

- Made Ground (associated with any current or historical development).
- Agriculture (diffuse source).
- The highways network (diffuse source).
- The 'Barnsley & West Riding Junction Railway' and Selby-Goole (historical) railway lines.
- The engine house for the historical operation of Ouse Bridge (swing).
- Historical airship factory (WWI).
- Historical munitions depot operated by Royal Ordnance plc. and Stable Road Camp (WWII).
- Sewage works (in the west of the Study Area).

- Sewage works (in the east of the Study Area adjacent to the jetty).
- The historical Camblesforth By-Pass Tipping Site (south of Study Area, now electricity distribution sites).
- The historical New Road Landfill Site (north of Study Area, now woodland).
- The operational Barlow Mound Ash Disposal Site (northwest of Study Area).
- The Existing Drax Power Station Complex.

Potentially Contaminative Substance

11.6.54. It is assumed that Made Ground present within the study area is associated with all current and historical buildings/development (e.g. residential developments, commercial and industrial developments, highways, railways, etc.). Made Ground is a potential source of a wide range of contaminants including metals, hydrocarbons and asbestos. Area B particularly comprises scrubland and is described in mapping provided by Drax as a potential 'old asbestos site'.

11.6.55. Agriculture is a potential source of diffuse contaminants associated with the use of fertilisers, pesticides and herbicides. The highways network, particularly the A645 roadway, is a potential diffuse source of contaminative substances which are likely to be hydrocarbon based associated with discharges from vehicles. There is potential for discharges to have impacted drainage routes which may not be wholly competent.

11.6.56. The historical railways (identified in Table 11.23 and on Figure 11.2) are a potential source of contaminants including hydrocarbons, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), solvents, ethylene glycol, creosote, herbicides, metal fines, ferrous residues, asbestos, ash and fill potentially containing metals, phenols, sulphates, and asbestos.

11.6.57. The depot (identified in Table 11-23 and on Figure 11-2), historically used for the manufacture of airships and munitions, and currently an operational landfill site (Barlow Mound Ash Disposal Site), may have released metals, free cyanide, nitrates, sulphates, chlorides, aromatic hydrocarbons, chlorinated aliphatic hydrocarbons, PCBs and asbestos; and is now authorised as a landfill for disposal of FGD plant gypsum, wastewater and sludge, furnace bottom ash and pulverised fuel ash.

11.6.58. The two sewage works (identified in Table 11-23 and on Figure 11-2) in the west and east of the study area are considered potential sources of metals, free cyanide, nitrates, sulphates, sulphides, oil and fuel hydrocarbons, chlorinated aliphatic and aromatic hydrocarbons, PCBs and asbestos.

11.6.59. This historical tipping sites (Camblesforth By-Pass Tipping Site and New Road Landfill Site and on Figure 11-2) are presumed to be potential sources of landfill gases (including methane and carbon dioxide), with possible traces of hydrogen sulphide, organosulphur compounds, and ethene; and leachate containing ammonia, organics including phenols and PAHs, and inorganics such as cyanides, sulphates, and metals. The electricity distribution sites now present within the boundary of Camblesforth By-Pass Tipping Site are a potential source of PCBs and oils associated with possible electrical equipment, plant, interceptors, and oil storage tanks.

11.6.60. The Existing Drax Power Station Complex is considered a potential source of metals, metalloids and their compounds, coal, fuel oils, lubricating oils, water and timber treatment chemicals, solvents, PCBs and other transformer oils, and asbestos. In the GI completed by Dames & Moore in January 2000 a hydrocarbon odour was noted from 0.5-1 m b.g.l., as well as “some black flecks of possible staining” within Made Ground at WS118 (located near the southern cooling towers within Area H).

11.6.61. The Strata Surveys (2011) (Ref. 11.15) information associated with Area F included chemical analysis of soils and the results did not indicate significant concentrations of toxic metals, polycyclic aromatic hydrocarbons or total petroleum hydrocarbons to be present. Whilst low concentrations of polychlorinated biphenyls (PCBs) were recorded at one location, the report states that such concentrations do not suggest significant contamination issues for site staff during construction.

11.6.62. A pollution incident to controlled waters occurred in the north of the study area in April 1989 (ref. 5985). This was a release of oils and was classified as Category 2 (significant incident). No further details are available.

11.6.63. The study area is not assigned a risk level in regional unexploded bomb risk mapping provided by Zetica for North Yorkshire (Ref 11.18).

Conceptual Site Model

11.6.64. On the basis of the Preliminary Risk Assessment, a preliminary conceptual site model has been developed. The preliminary conceptual site model is presented in Table 11-24.

Table 11-24 - Conceptual Site Model

Sources	Contaminative Substances	Pathways	Receptors	Consequence	Probability	Risk
Agriculture	Diffuse contaminants associated with the use of fertilisers, pesticides and herbicides.	Ingestion, inhalation and dermal contact with contaminated soil or dust. Inhalation of asbestos fibres. Ingestion of contaminated water.	Human Health (e.g. of construction workers, local residents or users of adjacent land).	Medium	Low Likelihood	Moderate/ Low Risk
		Lateral migration of aqueous and dissolved contaminants via groundwater flow or preferential pathways.	Surface water (e.g. River Ouse).	Medium	Low Likelihood	Moderate/ Low Risk
		Vertical migration of aqueous and dissolved contaminants through Made Ground strata or via preferential pathways.	Groundwater: Breighton Sand Formation and the alluvium and warp (Secondary A aquifers).	Medium	Low Likelihood	Moderate/ Low Risk
Highways network	Primarily hydrocarbon based associated with discharges from vehicles	Ingestion, inhalation and dermal contact with contaminated soil or dust. Inhalation of asbestos fibres. Ingestion of contaminated water.	Human Health (e.g. of construction workers, local residents or users of adjacent land).	Medium	Low Likelihood	Moderate/ Low Risk

Sources	Contaminative Substances	Pathways	Receptors	Consequence	Probability	Risk
		Lateral migration of aqueous and dissolved contaminants via groundwater flow or preferential pathways.	Surface water (e.g. River Ouse).	Medium	Low Likelihood	Moderate/ Low Risk
		Vertical migration of aqueous and dissolved contaminants through Made Ground strata or via preferential pathways.	Groundwater: Breighton Sand Formation and the alluvium and warp (Secondary A aquifers).	Medium	Low Likelihood	Moderate/ Low Risk
The 'Barnsley & West Riding Junction Railway' and Selby-Goole railway lines; The engine house for the historical operation of Ouse Bridge (swing).	Hydrocarbons, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), solvents, ethylene glycol, creosote, herbicides, metal fines, ferrous residues, asbestos, ash and fill potentially containing metals, phenols, sulphates, and asbestos.	Ingestion, inhalation and dermal contact with contaminated soil or dust. Inhalation of asbestos fibres. Ingestion of contaminated water.	Human Health (e.g. of construction workers, local residents or users of adjacent land).	Medium	Low Likelihood	Moderate/ Low Risk
		Lateral migration of aqueous and dissolved contaminants via groundwater flow or preferential pathways.	Surface water (e.g. River Ouse).	Medium	Low Likelihood	Moderate/ Low Risk
		Vertical migration of aqueous and dissolved contaminants through Made Ground strata or via preferential pathways.	Groundwater: Breighton Sand Formation and the alluvium and warp	Medium	Low Likelihood	Moderate/ Low Risk

Sources	Contaminative Substances	Pathways	Receptors	Consequence	Probability	Risk
			(Secondary A aquifers).			
Historical airship factory (WWI); and Historical munitions depot operated by Royal Ordnance plc. and Stable Road Camp (WWII); Barlow Mound Ash Disposal Site	Metals, free cyanide, nitrates, sulphates, chlorides, aromatic hydrocarbons, chlorinated aliphatic hydrocarbons, PCBs and asbestos; and is now authorised as a landfill for disposal of FGD plant gypsum, wastewater and sludge, furnace bottom ash and pulverised fuel ash.	Ingestion, inhalation and dermal contact with contaminated soil or dust. Inhalation of asbestos fibres. Ingestion of contaminated water.	Human Health (e.g. of construction workers, local residents or users of adjacent land).	Medium	Low Likelihood	Moderate/ Low Risk
		Lateral migration of aqueous and dissolved contaminants via groundwater flow or preferential pathways.	Surface water (e.g. River Ouse).	Medium	Low Likelihood	Moderate/ Low Risk
		Vertical migration of aqueous and dissolved contaminants through Made Ground strata or via preferential pathways.	Groundwater: Breighton Sand Formation and the alluvium and warp (Secondary A aquifers).	Medium	Low Likelihood	Moderate/ Low Risk
Sewage works (in the west of the study area); and Sewage works (in the east of the study area	Metals, free cyanide, nitrates, sulphates, sulphides, oil and fuel hydrocarbons, chlorinated aliphatic and aromatic	Ingestion, inhalation and dermal contact with contaminated soil or dust. Inhalation of asbestos fibres. Ingestion of contaminated water.	Human Health (e.g. of construction workers, local residents or users of adjacent land).	Medium	Low Likelihood	Moderate/ Low Risk

Sources	Contaminative Substances	Pathways	Receptors	Consequence	Probability	Risk
adjacent to the jetty.	hydrocarbons, PCBs and asbestos.	Lateral migration of aqueous and dissolved contaminants via groundwater flow or preferential pathways.	Surface water (e.g. River Ouse).	Medium	Low Likelihood	Moderate/ Low Risk
		Vertical migration of aqueous and dissolved contaminants through Made Ground strata or via preferential pathways.	Groundwater: Breighton Sand Formation and the alluvium and warp (Secondary A aquifers).	Medium	Low Likelihood	Moderate/ Low Risk
Drax Power Station	Metals, metalloids and their compounds, coal, fuel oils, lubricating oils, water and timber treatment chemicals, solvents, PCBs and other transformer oils, and asbestos.	Ingestion, inhalation and dermal contact with contaminated soil or dust. Inhalation of asbestos fibres. Ingestion of contaminated water.	Human Health (e.g. of construction workers, local residents or users of adjacent land).	Medium	Low Likelihood	Moderate/ Low Risk
		Lateral migration of aqueous and dissolved contaminants via groundwater flow or preferential pathways.	Surface water (e.g. River Ouse).	Medium	Low Likelihood	Moderate/ Low Risk
		Vertical migration of aqueous and dissolved contaminants through Made Ground strata or via preferential pathways.	Groundwater: Breighton Sand Formation and the alluvium and warp	Medium	Low Likelihood	Moderate/ Low Risk

Sources	Contaminative Substances	Pathways	Receptors	Consequence	Probability	Risk
			(Secondary A aquifers).			
Lateral migration of aqueous and dissolved contaminants via groundwater flow or preferential pathways.	Landfills – Landfill gases (including methane and carbon dioxide), with possible traces of hydrogen sulphide, organosulphur compounds, and ethene; and leachate containing ammonia, organics including phenols and PAHs, and inorganics such as cyanides, sulphates, and metals. Electrical substances – PCBs and oils associated with possible electrical equipment, plant, interceptors, and oil storage tanks.	Ingestion, inhalation and dermal contact with contaminated soil or dust. Inhalation of asbestos fibres. Ingestion of contaminated water.	Human Health (e.g. of construction workers, local residents or users of adjacent land).	Medium	Low Likelihood	Moderate/ Low Risk
		Inhalation of hazardous ground gases or vapours.	Human Health (e.g. of construction workers, local residents or users of adjacent land).	Medium	Unlikely	Low Risk
			Surface water (e.g. River Ouse).	Medium	Low Likelihood	Moderate/ Low Risk
		Vertical migration of aqueous and dissolved contaminants through made ground strata or via preferential pathways.	Groundwater: Breighton Sand Formation and the alluvium and warp (Secondary A aquifers).	Medium	Low Likelihood	Moderate/ Low Risk

Sources	Contaminative Substances	Pathways	Receptors	Consequence	Probability	Risk
Made Ground	Wide ranging contaminants including metals, hydrocarbons and asbestos. Area B particularly comprises scrubland and is described in mapping provided by Drax as a potential 'old asbestos site'.	Ingestion, inhalation and dermal contact with contaminated soil or dust. Inhalation of asbestos fibres. Ingestion of contaminated water.	Human Health (e.g. of construction workers, local residents or users of adjacent land).	Medium	Low Likelihood	Moderate/ Low Risk
		Lateral migration of aqueous and dissolved contaminants via groundwater flow or preferential pathways.	Surface water (e.g. River Ouse).	Medium	Low Likelihood	Moderate/ Low Risk
		Vertical migration of aqueous and dissolved contaminants through Made Ground strata or via preferential pathways.	Groundwater: Breighton Sand Formation and the alluvium and warp (Secondary A aquifers).	Medium	Low Likelihood	Moderate/ Low Risk
		Chemical attack and degradation (buried concrete structures).	Below-ground structures (e.g. foundations and utility services).	Mild	Low Likelihood	Low Risk

Future Baseline

11.6.65. The future baseline scenarios, as defined in Chapter 3, are not expected to have impacts relevant to geology and soils. From the perspective of this Chapter, therefore, no change associated with future baseline conditions is anticipated. The assessment provided should therefore be interpreted as representing a reasonable worst-case scenario inclusive of the potential additional biomass unit.

11.7 Assessment of Likely Sufficient Impacts and Effects

11.7.1. This section describes potentially significant effects in the absence of additional mitigation associated with the implementation of the Proposed Scheme.

11.7.2. In general, effects on environmental attributes—geology, geomorphology and soil—are highly likely or certain to occur (for example, loss, due to direct land take, of BMV agricultural land) while for effects on contaminated land receptors—groundwater, surface water, human health and the built environment—there is an uncertain probability of occurrence (for example, there is an uncertain probability that construction phase activity will result in aquifer contamination). For the purposes of this assessment, and to ensure a realistic worst case is considered, significance of effect is provided on the assumption that the effect will occur (in the absence of additional mitigation). The probability of occurrence informs the risk identified in the conceptual site model presented in Table 11-4.

Attribute Importance (Sensitivity)

11.7.3. The attribute importance (sensitivity) assigned to environmental attributes and contaminated land receptors is shown in Table 11-25.

Table 11-25 - Attribute Importance (Sensitivity)

Attribute / Receptor	Justification	Attribute Importance (Sensitivity)
Geology and geomorphology	There are no geological Sites of Special Scientific Interest or Regionally Important Geological Sites within the study area.	Low
Soil (on Existing Power Station Complex)	The existing power station is situated on developed land where the quality of the underlying soils are not anticipated to be of good quality, including Made Ground.	Low
Soil (Outside Existing Power Station Complex e.g. Pipeline Area)	The study area contains rural and agricultural land, a proportion of which is likely to be best and most versatile agricultural land, as defined in the NPPF. No other soil receptors, such as peat deposits or soils associated with Ancient Woodland have been identified.	High
Hemingbrough Glaciolacustrine Formation	The Hemingbrough Glaciolacustrine Formation is an aquiclude. However it is underlain by the Sherwood Sandstone Group (Principal aquifer). The majority of the study area is located within a groundwater SPZ 3 (total	High

Attribute / Receptor	Justification	Attribute Importance (Sensitivity)
	catchment). The leaching potential of overlying soils is intermediate or high.	
Breighton Sand Formation	The Breighton Sand Formation is a Secondary A aquifer. However it is underlain by The Sherwood Sandstone Group (Principal aquifer). The majority of the study area is located within a groundwater SPZ 3 (total catchment). The leaching potential of overlying soils is intermediate or high.	High
Alluvium and warp	The alluvium and warp are Secondary A aquifers. However they are underlain by The Sherwood Sandstone Group (Principal aquifer). The majority of the study area is located within a groundwater SPZ 3 (total catchment). The leaching potential of overlying soils is intermediate or high.	High
Sherwood Sandstone Group	The Sherwood Sandstone Group is a Principal aquifer. Groundwater stored in aquifers is a principal source of drinking water in the area. The majority of the study area is located within a groundwater SPZ 3 (total catchment). The leaching potential of overlying soils is intermediate or high.	High
River Ouse (Main River)	The River Ouse is a ‘main river’ as defined by the EA.	High
Ordinary Watercourses	There are a number of field drains and other minor watercourses within the study area including Carr Dyke. However, the River Ouse is a ‘main river’ as defined by the EA. The importance of this attribute is therefore ‘high’.	High
Existing Drax Power Station Complex	The built environment within the study area includes the Existing Drax Power Station Complex.	Medium
Proposed gas pipelines	The built environment within the study area includes proposed gas pipelines.	Medium
Other buildings (not part of the Existing Drax Power Station Complex)	The built environment within the study area includes other buildings	Medium
Utility services	The built environment within the study area includes utility services	Medium
Built Environment	This includes the Existing Drax Power Station Complex and other buildings, services and foundations.	Medium

Attribute / Receptor	Justification	Attribute Importance (Sensitivity)
End Users	It is assumed that the Existing Drax Power Station Complex is operated in accordance with all relevant legislation, guidance and best practice, which will mitigate occupational risks to power station personnel. The Pipeline Area has a greater potential to expose end users to (e.g. local residents or users of adjacent land) to contaminants.	Low (Power Station Site); Medium (Pipeline Area)
Construction Workers	It is assumed that the construction phase will be undertaken in accordance with all relevant legislation, guidance and best practice, which will mitigate occupational risks to construction workers during works on the Power Station Site and works in the Pipeline Area.	Low

Stage 0 – Site Reconfiguration Works

Geology and Geomorphology

11.7.4. As there are no geological SSSIs or RIGS within the study area, there will be no adverse or beneficial impacts to this receptor.

11.7.5. The sensitivity of geology and geomorphology is considered to be low, and the magnitude of change prior to mitigation is considered to be no change. Therefore, there is likely to be an effect on geology and geomorphology of neutral significance.

Soil

11.7.6. The NPPF promotes safeguarding of the long-term potential of BMV agricultural land. Although there is BMV agricultural land within the study area, identified in post-1988 detailed surveys carried out to the north of the Existing Drax Power Station Complex and to the south of the Pipeline Area, this will not be directly impacted by the Proposed Scheme as it is not located within the Site Boundary.

11.7.7. Any loss or degradation of BMV agricultural land not resurveyed post-1988, due, for example, to the demolition and relocation of facilities including car parking, the turbine outage stores, and compounds and welfare facilities used by contractors is not expected to exceed 20 ha.

11.7.8. It is understood that soil quality will be maintained or restored to pre-development conditions (as measured by ALC grade) through provision of a Soil Management Plan, which will be secured as part of the CEMP by a requirement in the draft DCO (Document reference 6.5)).

11.7.9. There is a potential for physical adverse impacts to soil to occur during the construction phase. This includes compaction, sealing, smearing, and covering with hardstanding.

11.7.10. Site reconfiguration works undertaken in Stage 0 on the existing power station will be undertaken on land which is previously developed and soils which are likely be of poor quality including made ground.

11.7.11. The sensitivity of soil within the existing power station is considered to be low, and the magnitude of change prior to mitigation, is not expected to exceed negligible adverse. Therefore, there is likely to be a direct, permanent, long-term effect on soil of neutral or slight adverse significance prior to the implementation of mitigation measures.

11.7.12. The sensitivity of soil outside the existing power station is considered to be high, and the magnitude of change prior to mitigation, is not expected to exceed negligible adverse. Therefore, there is likely to be a direct, permanent, long-term effect on soil of slight adverse significance prior to the implementation of mitigation measures.

Groundwater

11.7.13. There is a theoretical potential for Site Reconfiguration Works (such as the demolition and reconstruction of car parking, turbine outage stores; and the construction of a cooling water spray screen between relocated facilities and the southern cooling towers) to create new migratory pathways through which contaminants could migrate into underlying aquifers. This could result in adverse impacts to groundwater during the Site Reconfiguration Works.

11.7.14. For adverse impacts to occur, there must exist a complete contaminant linkage, including a potential source of contamination. The PRA has identified a number of potential sources of contamination within the study area and qualitatively assigned a risk category to groundwater of moderate to low in the CSM. Further assessment of risks to groundwater associated with potential sources of contamination will be undertaken after the Phase 2 ground investigation.

11.7.15. There is also a potential for the Site Reconfiguration Works to introduce contaminants to the study area (for example, due to ineffective control of fuel). This could result in adverse impacts to groundwater during the construction phase, particularly if new migratory pathways have been created, but these impacts are less likely to persist beyond the construction phase.

11.7.16. It is assumed that the construction phase of the Site Reconfiguration Works will proceed in accordance with a CEMP informed by the findings of the Phase 2 ground investigation.

11.7.17. The sensitivity of groundwater is considered to be high, and the magnitude of change prior to mitigation is considered unlikely to exceed negligible adverse. Therefore, there is a potential for there to be a direct, temporary, long-term effect on groundwater of slight adverse significance prior to the implementation of mitigation measures.

Surface Water

11.7.18. Any adverse impacts to groundwater have a secondary potential to adversely impact surface waters via baseflow. The potential for lateral migration of aqueous or dissolved-phase contaminants via groundwater flow or preferential pathways was qualitatively assessed in the PRA and assigned a risk category of moderate to low in the CSM.

11.7.19. There is a theoretical potential for the Site Reconfiguration Works (such as excavation and stockpiling of soil) to result in increased erosion and sediment loading of nearby surface water. There is a potential for soil compaction and devegetation associated with new hardstanding to result in decreased infiltration and increased surface water runoff. If soils contain contaminants, there would be a potential for adverse impacts to surface water.

11.7.20. There is also a potential for the Site Reconfiguration Works to introduce contaminants to the study area (for example, due to ineffective control of fuel). This has the potential to adversely impact surface water.

11.7.21. It is assumed that the Site Reconfiguration Works will proceed in accordance with a CEMP which will set out various control plans that will include measures to reduce potential contamination during the works.

11.7.22. The sensitivity of surface water is considered to be high and the magnitude of change prior to mitigation is considered to be negligible adverse. Therefore, there is a potential for there to be a direct, temporary, long-term effect on surface water of slight adverse significance prior to the implementation of mitigation measures.

Built Environment

11.7.23. There is a potential for chemicals that are destructive to concrete (such as sulphates and sulphides) to exist in the ground as a result of historical industrial activity or from naturally occurring strata. The presence of such substances within the study area could adversely impact building foundations and water supply infrastructure and therefore act as a constraint at the detailed design stage of the development.

11.7.24. This potential contaminant linkage was qualitatively assessed and assigned in the PRA and assigned a risk category of low in the CSM. It is assumed that suitable construction materials, resistant to chemical attack, will be selected at the detailed design stage. This is expected to prevent adverse effects to the built environment.

11.7.25. The sensitivity of the built environment is considered to be medium and the magnitude of change prior to mitigation is expected to be no change. Therefore, there is likely to be an effect on the built environment of neutral significance.

Construction Worker and End Users

Construction Workers

11.7.26. There is a potential for workers to be exposed to hazardous substances during the Site Reconfiguration Works. Hazardous substances include construction dust, cement, lead solvents, isocyanates, harmful micro-organisms and carbon monoxide. Exposure to hazardous substances, occurring as a result of ingestion, inhalation and dermal contact, has the potential to adversely impact the health of workers. Adverse impacts include acute effects (e.g. dizziness, headaches, nausea, and burns) and chronic effects (e.g. lung disease).

11.7.27. However, in the UK, the construction industry is regulated by the Construction (Design and Management) Regulations 2015 (CDM 2015) (Ref 11.19), enforced by the Health and Safety Executive (HSE). It is assumed that the Site Reconfiguration Works will be undertaken in accordance with the requirements of CDM 2015 and all other relevant legislation, guidance and best practice managing occupational exposure to hazardous substances, including:

- Health and Safety in Construction (HSG150) (HSE, 2006).
- A Guide to Safe Working on Contaminated Sites, R132, CIRIA, 1996.

11.7.28. The appointed Principal Contractor (as defined in the CDM 2015) will be responsible for the completion of Control of Substances Hazardous to Health (COSHH) assessments identifying

hazards from and methods preventing or controlling exposure to hazardous substances (for example, through mandatory use of Personal Protective Equipment (PPE)).

11.7.29. The sensitivity of construction workers is considered to be low and the magnitude of change is considered to be no change. Therefore, there is likely to be an effect on construction workers of neutral significance.

End Users

11.7.30. The end users considered in this assessment comprise personnel employed at the Existing Drax Power Station Complex. There is a theoretical potential for end users to be exposed to hazardous substances as a result of the construction, operational and decommissioning phases of the Proposed Scheme.

11.7.31. The potential for adverse impacts to employed personnel during the Site Reconfiguration Works is considered to be negligible. It is assumed that it is (and will continue to be) a primary objective of the Applicant to ensure the health and safety of personnel employed at the Existing Drax Power Station Complex and that through adherence to all relevant legislation (including the Health and Safety at Work Act 1974), guidance and best practice, will mitigate the potential for adverse impacts during all phases of the Proposed Scheme.

11.7.32. On this basis, it is assumed that there will be no adverse impact to the health of end users during Stage 0 within the Existing Drax Power Station Complex ("no change"). The effect on end users will therefore be neutral.

11.7.33. On the basis that the Site Reconfiguration Works will proceed in accordance with a CEMP, informed by the findings of the Phase 2 ground investigation, any adverse impacts to end users occurring during the construction, operational or decommissioning phases are considered unlikely to exceed negligible adverse. The significance of effect on groundwater is therefore unlikely to exceed neutral or slight adverse.

11.7.34. The sensitivity of end users is considered to be low to medium and the magnitude of change is considered to be no change. Therefore, there is likely to be an effect on end users of neutral significance.

Stage 1 – Construction of Unit X, Gas Pipeline, GRF and AGI

Geology and Geomorphology

11.7.35. As there are no geological SSSIs or RIGS within the study area, there will be no adverse or beneficial impacts to this receptor.

11.7.36. The sensitivity of geology and geomorphology is considered to be low, and the magnitude of change prior to mitigation is considered to be no change. Therefore, there is likely to be an effect on geology and geomorphology of neutral significance.

Soil

11.7.37. The NPPF promotes safeguarding of the long-term potential of BMV agricultural land. Although there is BMV agricultural land within the study area, identified in post-1988 detailed surveys carried out to the north of the Existing Drax Power Station Complex and to the south of the Pipeline Area, this will not be directly impacted by the construction of Stage 1.

11.7.38. It is understood that soil quality will be maintained or restored to pre-development conditions (as measured by ALC grade) through provision of a Soil Management Plan, which will be secured by a requirement in the draft DCO (document reference 3.1)).

11.7.39. Construction phase of Stage 1 on the existing power station will be undertaken on land which is previously developed and soils which are likely be of poor quality including made ground.

11.7.40. The sensitivity of soil in the existing power station complex is considered to be low, and the magnitude of change prior to mitigation, is not expected to exceed negligible adverse. Therefore, there is likely to be a direct, permanent, long-term effect on soil of neutral or slight adverse significance prior to the implementation of mitigation measures.

11.7.41. Whilst the sensitivity of soil associated with the Pipeline Area is considered to be high, the magnitude of change, prior to mitigation, is not expected to exceed negligible adverse. Therefore, there is likely to be a direct, permanent, long-term effect on soil of slight adverse significance prior to the implementation of mitigation measures.

Groundwater

11.7.42. There is a theoretical potential for construction phase activity (such as drilling, piling and excavation) to create new migratory pathways through which contaminants could migrate into underlying aquifers. This could result in adverse impacts to groundwater during the Stage 1 construction phase.

11.7.43. For adverse impacts to occur, there must be a complete contaminant linkage, including a potential source of contamination. The PRA has identified a number of potential sources of contamination within the study area and qualitatively assigned risks to groundwater as being “moderate to low” in the CSM. Further assessment of risks to groundwater associated with potential sources of contamination will be undertaken after the Phase 2 ground investigation.

11.7.44. There is also a potential for construction phase activity to introduce contaminants to the study area (for example, due to ineffective control of fuel). This could result in adverse impacts to groundwater during the construction phase, particularly if new migratory pathways have been created, but these impacts are less likely to persist beyond the construction phase.

11.7.45. It is assumed that the construction phase will proceed in accordance with a CEMP which will set out various control plans that will include measures to reduce potential contamination during the construction works.

11.7.46. The sensitivity of groundwater is considered to be high, and the magnitude of change prior to mitigation is considered unlikely to exceed negligible adverse. Therefore, there is a potential for there to be a direct, temporary, long-term effect on groundwater of slight adverse significance prior to the implementation of mitigation measures.

Surface Water

11.7.47. Any adverse impacts to groundwater have a secondary potential to adversely impact surface waters via baseflow. The potential for lateral migration of aqueous or dissolved-phase contaminants via groundwater flow or preferential pathways was qualitatively assessed in the PRA and assigned the risks to surface waters were considered to be “moderate to low” in the

CSM. Further assessment of risks to surface water will be undertaken after the Phase 2 ground investigation.

11.7.48. There is a theoretical potential for Stage 1 construction phase activity (such as excavation and stockpiling of soil) to result in increased erosion and sediment loading of nearby surface water. There is a potential for soil compaction associated with new hardstanding to result in decreased infiltration and increased surface water runoff. If soils contain contaminants, there would be a potential for adverse impacts to surface water.

11.7.49. There is also a potential for the Stage 1 construction phase activity to introduce contaminants to the study area (for example, due to ineffective control of fuel). This has the potential to adversely impact surface water.

11.7.50. It is assumed that the construction phase will proceed in accordance with a CEMP which will set out various control plans that will include measures to reduce potential contamination during the construction works.

11.7.51. The sensitivity of surface water is considered to be high and the magnitude of change prior to mitigation is considered to be negligible adverse. Therefore, there is a potential for there to be a direct, temporary, long-term effect on surface water of slight adverse significance prior to the implementation of mitigation measures.

Built Environment

11.7.52. There is a potential for chemicals that are destructive to concrete (such as sulphates and sulphides) to exist in the ground as a result of historical industrial activity. The presence of such substances within the study area could adversely impact building foundations and water supply infrastructure and therefore act as a constraint at the detailed design stage of the development.

11.7.53. This potential contaminant linkage was qualitatively assessed and assigned in the PRA and assigned a risk category of 'low' in the CSM. It is assumed that suitable construction materials, resistant to chemical attack, will be selected at the detailed design stage. This is expected to prevent adverse effects to the built environment.

11.7.54. The sensitivity of the built environment (including all above- and below-ground structures within the study area) is considered to be medium and the magnitude of change prior to mitigation is expected to be no change. Therefore, there is likely to be an effect on the built environment of neutral significance.

Construction Worker and End Users

<u>Construction Workers</u>

11.7.55. There is a potential for construction workers to be exposed to hazardous substances during the Stage 1 construction phase. Hazardous substances include construction dust, cement, lead solvents, isocyanates, harmful micro-organisms and carbon monoxide. Exposure to hazardous substances, occurring as a result of ingestion, inhalation and dermal contact, has the potential to adversely impact the health of construction workers. Adverse impacts include acute effects (e.g. dizziness, headaches, nausea, and burns) and chronic effects (e.g. lung disease).

11.7.56. However, in the UK, the construction industry is regulated by the CDM Regulations 2015 (CDM 2015), enforced by the Health and Safety Executive (HSE). It is assumed that the construction phase will be undertaken in accordance with the requirements of CDM 2015 and all other relevant legislation, guidance and best practice managing occupational exposure to hazardous substances, including:

- Health and Safety in Construction (HSG150) (HSE, 2006); and
- A Guide to Safe Working on Contaminated Sites, R132, CIRIA, 1996.

11.7.57. The appointed Principal Contractor (as defined in the CDM 2015) will be responsible for the completion of Control of Substances Hazardous to Health (COSHH) assessments identifying hazards from and methods preventing or controlling exposure to hazardous substances (for example, through mandatory use of Personal Protective Equipment (PPE)).

11.7.58. The sensitivity of construction workers in Stage 1 is considered to be low and the magnitude of change is considered to be no change. Therefore, there is likely to be an effect on construction workers of neutral significance.

End Users

11.7.59. There is a theoretical potential for end users to be exposed to hazardous substances as a result of the construction of the Proposed Scheme.

11.7.60. As there is no public access to the Existing Drax Power Station Complex, the potential for adverse impacts to members of the public during Stage 1 is considered to be negligible. It is assumed that it is (and will continue to be) a primary objective of Drax Group plc. to ensure the health and safety of personnel employed at the Existing Drax Power Station Complex and that through adherence to all relevant legislation (including the Health and Safety at Work Act 1974), guidance and best practice, will mitigate the potential for adverse impacts during all phases of the Power Station Works.

11.7.61. On this basis, it is assumed that there will be no adverse impact to the health of end users during Stage 1 within the Existing Drax Power Station Complex (“no change”). The effect on end users will therefore be neutral.

11.7.62. There is a greater theoretical potential for adverse impacts to end users during Stage 1 of the Proposed Scheme in the Pipeline Area as there is existing public access. The regulation of the construction industry by CDM 2015 is expected (through, for example, the prevention of unauthorised access to work areas) to prevent many potential adverse impacts to end users during the construction phase.

11.7.63. For adverse impacts to occur to end users in the Pipeline Area there must be a complete contaminant linkage, including a potential source of contamination. The PRA has identified a number of potential sources of contamination within the study area (i.e., within 250 m of the Pipeline construction). There is also a potential for construction phase activity to introduce contaminants to the study area (for example, release of fuel to potable groundwater due to ineffective control). This could result in adverse impacts to end users. This potential contaminant linkage was qualitatively assessed in the PRA and assigned a risk category of “moderate to low” in the CSM. If warranted, appropriate measures will be designed to mitigate

the identified contaminant linkage (i.e. break the pathway) following the quantitative risk assessments undertaken as part of the Phase 2 ground investigation.

11.7.64. The sensitivity of end users in the Pipeline Area is considered to be medium and on the basis that the construction phase will proceed in accordance with a CEMP, informed by the findings of the Phase 2 ground investigation. The magnitude of change is considered to be "no change". Therefore, there is likely to be an effect on end users of neutral significance.

Stage 2 – Operation of Unit X, Pipeline, AGI and GRF and Construction of Unit Y

Geology and Geomorphology

11.7.65. As there are no geological SSSIs or RIGS within the study area, there will be no adverse or beneficial impacts to this receptor.

11.7.66. The sensitivity of geology and geomorphology is considered to be low, and the magnitude of change prior to mitigation is considered to be "no change". Therefore, there is likely to be an effect on geology and geomorphology of neutral significance.

Soil

11.7.67. The NPPF promotes safeguarding of the long-term potential of BMV agricultural land. Although there is BMV agricultural land within the study area, identified in post-1988 detailed surveys carried out to the north of the Existing Drax Power Station Complex and to the south of the Pipeline Area, this will not be directly impacted by Stage 2 which refers to the operation of Unit X and the Gas Pipeline and construction of Unit Y. The Pipeline Area construction will be completed by Stage 2 and reinstated.

11.7.68. The construction of Unit Y will be over previously developed land where the soil sensitivity is considered to be low. However, the laydown area (on the Carbon capture readiness reserve area) is on existing agricultural land which is of higher sensitivity.

11.7.69. It is understood that soil quality will be maintained or restored to pre-development conditions (as measured by ALC grade) through provision of a Soil Management Plan, which will be secured by a requirement in the draft DCO (document reference 3.1)). Stage 2 will include the reinstatement of the laydown areas associated with the pipeline and AGI.

11.7.70. There is a potential for physical adverse impacts to soil to occur during the Stage 2 construction phase (including the use of the Carbon capture readiness reserve space as a laydown area of Unit Y). This includes compaction, sealing, smearing, and covering with hardstanding.

11.7.71. The sensitivity of soil in the existing power station complex is considered to be low, and the magnitude of change prior to mitigation, is not expected to exceed negligible adverse. Therefore, there is likely to be a direct, permanent, long-term effect on soil of neutral or slight adverse significance prior to the implementation of mitigation measures.

11.7.72. Whilst the sensitivity of soil associated with the laydown area (on the Carbon capture readiness reserve area) is considered to be high. The magnitude of change prior to mitigation, is not expected to exceed negligible adverse. Therefore, there is likely to be a direct, permanent, long-term effect on soil of slight adverse significance prior to the implementation of mitigation measures.

11.7.73. The magnitude of change in the operational phase for Unit X and the Pipeline Area is expected to be “no change”. Therefore, there is likely to be no further effect on soil in the operational phase and of neutral significance.

Groundwater

11.7.74. There is a theoretical potential for construction phase activity (such as drilling, piling and excavation) to create new migratory pathways through which contaminants could migrate into underlying aquifers. This could result in adverse impacts to groundwater during the construction phase (including the Stage 2 construction of Unit Y).

11.7.75. For adverse impacts to occur, there must exist a complete contaminant linkage, including a potential source of contamination. The PRA has identified a number of potential sources of contamination within the study area and qualitatively assigned a risk category to groundwater of ‘moderate to low’ in the CSM. Further assessment of risks to groundwater associated with potential sources of contamination will be undertaken after the Phase 2 ground investigation.

11.7.76. There is also a potential for construction phase activity to introduce contaminants to the study area (for example, due to ineffective control of fuel). This could result in adverse impacts to groundwater during the construction phase, particularly if new migratory pathways have been created, but these impacts are less likely to persist beyond the construction phase.

11.7.77. It is assumed that the construction phase will proceed in accordance with a CEMP which will set out various control plans that will include measures to reduce potential contamination during the construction works.

11.7.78. The sensitivity of groundwater is considered to be high, and the magnitude of change prior to mitigation is considered unlikely to exceed “negligible adverse”. Therefore, there is a potential for there to be a direct, temporary, long-term effect on groundwater of slight adverse significance prior to the implementation of mitigation measures during the construction phase of Unit Y (and laydown area). There are no further effect on soil in the operational phase of Unit X and Pipeline Area (neutral significance).

Surface Water

11.7.79. Any adverse impacts to groundwater have a secondary potential to adversely impact surface waters via baseflow. The potential for lateral migration of aqueous or dissolved-phase contaminants via groundwater flow or preferential pathways was qualitatively assessed in the PRA and assigned a risk category of “moderate to low” in the CSM. Further assessment of risks to surface water will be undertaken after the Phase 2 ground investigation.

11.7.80. There is a theoretical potential for construction phase activity (such as excavation and stockpiling of soil) to result in increased erosion and sediment loading of nearby surface water. There is a potential for soil compaction and devegetation associated with new hardstanding to result in decreased infiltration and increased surface water runoff. If soils contain contaminants, there would be a potential for adverse impacts to surface water.

11.7.81. There is also a potential for construction phase activity to introduce contaminants to the study area (for example, due to ineffective control of fuel). This has the potential to adversely impact surface water.

11.7.82. It is assumed that the construction phase Stage 2 will proceed in accordance with a CEMP which will set out various control plans that will include measures to reduce potential contamination during the construction works.

11.7.83. The sensitivity of surface water is considered to be high and the magnitude of change prior to mitigation is considered to be “negligible adverse”. Therefore, there is a potential for there to be a direct, temporary, long-term effect on surface water of slight adverse significance prior to the implementation of mitigation measures during construction of Unit Y (and laydown area). There are no further effect on soil in the operational phase of Unit X and Pipeline Area (neutral significance).

Built Environment

11.7.84. There is a potential for chemicals that are destructive to concrete (such as sulphates and sulphides) to exist in the ground as a result of historical industrial activity. The presence of such substances within the study area could adversely impact building foundations and water supply infrastructure and therefore act as a constraint at the detailed design stage of the development.

11.7.85. This potential contaminant linkage was qualitatively assessed and assigned in the PRA and assigned a risk category of ‘low’ in the CSM. It is assumed that suitable construction materials, resistant to chemical attack, will be selected at the detailed design stage. This is expected to prevent adverse effects to the built environment.

11.7.86. The sensitivity of the built environment is considered to be medium and the magnitude of change prior to mitigation is expected to be “no change”. Therefore, there is likely to be an effect on the built environment of neutral significance.

Construction Worker and End Users

Construction Workers

11.7.87. There is a potential for construction workers to be exposed to hazardous substances during the construction phase. Hazardous substances include construction dust, cement, lead solvents, isocyanates, harmful micro-organisms and carbon monoxide. Exposure to hazardous substances, occurring as a result of ingestion, inhalation and dermal contact, has the potential to adversely impact the health of construction workers. Adverse impacts include acute effects (e.g. dizziness, headaches, nausea, and burns) and chronic effects (e.g. lung disease).

11.7.88. However, in the UK, the construction industry is regulated by the Construction (Design and Management) Regulations 2015 (CDM 2015), enforced by the Health and Safety Executive (HSE). It is assumed that the construction phase will be undertaken in accordance with the requirements of CDM 2015 and all other relevant legislation, guidance and best practice managing occupational exposure to hazardous substances, including:

- Health and Safety in Construction (HSG150) (HSE, 2006).
- A Guide to Safe Working on Contaminated Sites, R132, CIRIA, 1996.

11.7.89. The appointed Principal Contractor (as defined in the CDM 2015) will be responsible for the completion of COSHH assessments identifying hazards from and methods preventing or

controlling exposure to hazardous substances (for example, through mandatory use of Personal Protective Equipment (PPE)).

11.7.90. The sensitivity of construction workers is considered to be low. The magnitude of change in the construction phase is considered to be “no change”. As no further change is expected in the operational phase, the magnitude of change in the operational phase is considered to be “no change”. Therefore, there is likely to be an effect on construction workers in the construction and operational phases of neutral significance.

End Users

11.7.91. There is a theoretical potential for end users to be exposed to hazardous substances as a result of the construction of Unit 1 and operation of Unit X, pipeline, AGI and GRF of the Proposed Scheme.

11.7.92. As there is no public access to the Existing Drax Power Station Complex, the potential for adverse impacts to members of the public during Construction of Unit Y is considered to be largely negligible. Risks to personnel working at the Existing Drax Power Station Complex will be managed through the controls outlined in Paragraph 11.6.55.

11.7.93. There is a greater theoretical potential for adverse impacts to end users in the laydown area for Unit Y, which is outside the Existing Drax Power Station Complex. The regulation of the construction industry by CDM 2015 is expected (through, for example, the prevention of unauthorised access to work areas) to prevent many potential adverse impacts to end users during the construction phase.

11.7.94. For adverse impacts to occur to end users in the laydown area there must be a complete contaminant linkage. It is assumed that risks associated with laydown area will be managed through the implementation of standard operating procedures and compliance with relevant legislation and best practice.

11.7.95. The sensitivity of end users is considered to be low to medium. The magnitude of change in the construction phase of Stage 2 is considered to be “no change” on the basis that the construction phase will proceed in accordance with a CEMP, informed by the findings of the Phase 2 ground investigation. On this basis, it is assumed that there will be no adverse impact to the health of end users during construction of Unit Y within the Power Station Site or laydown area (“no change”). The effect on end users will therefore be neutral. As no further change is expected in the operational phase, the magnitude of change in the operational phase of Unit X, pipeline, AGI and GRF is considered to be “no change”. Therefore, there is likely to be an effect on end users in the construction and operational phases of Stage 2 of neutral significance.

Stage 3 – Operation of Units X and Y, Pipeline, AGI and GRF

Geology and Geomorphology

11.7.96. As there are no geological SSSIs or RIGS within the study area, there will be no adverse or beneficial impacts to this receptor.

11.7.97. The sensitivity of geology and geomorphology is considered to be low, and the magnitude of change prior to mitigation is considered to be “no change”. Therefore, there is likely to be an effect on geology and geomorphology of neutral significance.

Soil

11.7.98. The NPPF promotes safeguarding of the long-term potential of BMV agricultural land. Although there is BMV agricultural land within the study area, identified in post-1988 detailed surveys carried out to the north of the Existing Drax Power Station Complex and to the south of the Pipeline Area, this will not be directly impacted by the Proposed Scheme as it is not located within the Site Boundary.

11.7.99. The Stage 2 laydown area for the construction of Unit Y in the Carbon capture readiness area will have been restored to its pre-existing condition in accordance with the Soil Management Plan by Stage 3.

11.7.100. The sensitivity of soil is considered to be low to high. The magnitude of change in the operational phase is expected to be “no change”. Therefore, there is likely expected to be no effect on soil in the construction phase (neutral significance).

Groundwater

11.7.101. There is a theoretical potential impact associated with migratory pathways to underlying aquifers created during construction to persist into the operational phase of Units X, Y, Pipeline, AGI and GRF. It is assumed that it is (and will continue to be) a primary objective of the Applicant to comply will all relevant environmental legislation, guidance and best practice during the operational phase. It is assumed that environmental risks associated with operational phase of the Proposed Scheme will be managed through the implementation and ongoing use of standard operating procedures.

11.7.102. The sensitivity of groundwater is considered to be high and the magnitude of change prior to mitigation is considered unlikely to exceed “negligible adverse”. Therefore, there is a potential for there to be an indirect, temporary, long-term effect on groundwater of slight adverse significance prior to the implementation of mitigation measures.

Surface Water

11.7.103. The potential for adverse impacts to surface water is primarily associated with construction phase activities. However, there is a theoretical potential for persistent groundwater impacts to adversely impact surface water via baseflow. It is assumed that it is (and will continue to be) a primary objective of the Applicant. to comply will all relevant environmental legislation, guidance and best practice during the operational phase of Units X, Y, Pipeline, AGI and GRF. It is assumed that environmental risks associated with operational phase of the Proposed Scheme will be managed through the implementation and ongoing use of standard operating procedures.

11.7.104. The sensitivity of surface water is considered to be high and the magnitude of change prior to mitigation is considered to be “negligible adverse”. Therefore, there is a potential for there to be an indirect, temporary, long-term effect on surface water of slight adverse significance prior to the implementation of mitigation measures.

Built Environment

11.7.105. There is a potential for chemicals that are destructive to concrete (such as sulphates and sulphides) to exist in the ground as a result of historical industrial activity. However, the selection of appropriate construction materials at the detailed design stage is expected to have

prevented adverse effects to the built environment. No further adverse impacts are expected to occur at the operational phase.

11.7.106. The sensitivity of the built environment is considered to be medium and the magnitude of change prior to mitigation is expected to be “no change”. Therefore, there is likely to be an effect on the built environment of neutral significance.

End Users

11.7.107. There is a theoretical potential for end users to be exposed to hazardous substances as a result of the operation of the Proposed Scheme.

11.7.108. As there is no public access to the Existing Drax Power Station Complex, the potential for adverse impacts to members of the public during stage 3 is considered to be negligible. Risks to personnel working at the Existing Drax Power Station Complex will be managed through the controls outlined in Paragraph 11.6.55.

11.7.109. On this basis, it is assumed that there will be no adverse impact to the health of end users during Stage 3 of the Proposed Scheme on the Power Station Site (“no change”). The effect on end users will therefore be neutral.

11.7.110. For adverse impacts to occur to end users in the Pipeline Area (i.e where there is public access), there must be a complete contaminant linkage, including a potential source of contamination. The PRA has identified a number of potential sources of contamination within the study area that could remain present in the operational phase of the pipeline, AGI and GRF, There is potential that a linkage between these sources and end uses in the Pipeline Area may exist. However the risks to end users would be considered to be very low. Mitigation measures will be implemented prior to Stage 3, as warranted, as part of Stage 1 and 2.

11.7.111. It is therefore assumed that there will be no adverse impact to the health of end users during Stage 3 of the Proposed Scheme on the Power Station Site and Pipeline Area (“no change”). The effect on end users will therefore be neutral.

Decommissioning

Geology and Geomorphology

11.7.112. As there are no geological SSSIs or RIGS within the study area, there will be no adverse or beneficial impacts to this receptor.

11.7.113. The sensitivity of geology and geomorphology is considered to be low, and the magnitude of change prior to mitigation is considered to be “no change”. Therefore, there is likely to be an effect on geology and geomorphology of neutral significance.

Soil

11.7.114. The NPPF promotes safeguarding of the long-term potential of BMV agricultural land. Although there is BMV agricultural land within the study area, identified in post-1988 detailed surveys carried out to the north of the Existing Drax Power Station Complex and to the south of the Pipeline Area, this will not be directly impacted by the Proposed Scheme as it is not located within the Site Boundary.

11.7.115. Plant that may be decommissioned on the Existing Drax Power Station Complex is located on developed land where soils are considered to be of low sensitivity.

11.7.116. There is a potential for physical adverse impacts to soil to occur during decommissioning of the AGI and GRF where the soils are considered to be of high sensitivity. These include compaction, sealing, smearing, and covering with hardstanding.

11.7.117. The sensitivity of soil in the existing power station complex is considered to be low, and the magnitude of change prior to mitigation, is not expected to exceed negligible adverse. Therefore, there is likely to be a direct, permanent, long-term effect on soil of neutral or slight adverse significance prior to the implementation of mitigation measures.

11.7.118. Whilst the sensitivity of soil associated with the laydown area (on the Carbon capture readiness reserve area) is considered to be high. The magnitude of change prior to mitigation, is not expected to exceed negligible adverse. Therefore, there is likely to be a direct, permanent, long-term effect on soil of slight adverse significance prior to the implementation of mitigation measures.

Groundwater

11.7.119. There is a potential for decommissioning phase activity to introduce contaminants to the study area (for example, due to ineffective control of fuel). This could result in adverse impacts to groundwater during the decommissioning phase.

11.7.120. For adverse impacts to occur there needs to exist, a complete contaminant linkage, including a potential source of contamination. The PRA has identified a number of potential sources of contamination within the study area and qualitatively assigned a risk category to groundwater of 'moderate to low' in the CSM. Further assessment of risks to groundwater associated with potential sources of contamination will be undertaken after the Phase 2 ground investigation.

11.7.121. It is assumed that the decommissioning phase will proceed in accordance with a DEMP informed by the findings of the Phase 2 ground investigation.

11.7.122. The sensitivity of groundwater is considered to be high and the magnitude of change prior to mitigation is considered unlikely to exceed "negligible adverse". Therefore, there is a potential for there to be an indirect, temporary, long-term effect on groundwater of slight adverse significance prior to the implementation of mitigation measures.

Surface Water

11.7.123. There is a potential for decommissioning phase activity to introduce contaminants to the study area (for example, due to ineffective control of fuel). This has the potential to adversely impact surface water. It is assumed that the decommissioning phase will proceed in accordance with a DEMP informed by the findings of the Phase 2 ground investigation.

11.7.124. The sensitivity of surface water is considered to be high and the magnitude of change prior to mitigation is considered to be "negligible adverse". Therefore, there is a potential for there to be a direct, temporary, long-term effect on surface water of slight adverse significance prior to the implementation of mitigation measures.

Built Environment

11.7.125. There is a potential for chemicals that are destructive to concrete (such as sulphates and sulphides) to exist in the ground as a result of historical industrial activity. However, the selection of appropriate construction materials at the detailed design stage is expected to have

prevented adverse effects to the built environment. No further adverse impacts are expected to occur at the decommissioning phase.

11.7.126. The sensitivity of the built environment is considered to be medium and the magnitude of change prior to mitigation is expected to be “no change”. Therefore, there is likely to be an effect on the built environment of neutral significance.

Construction Worker and End Users

Construction Workers

11.7.127. There is a potential for construction workers to be exposed to hazardous substances during the decommissioning phase. Hazardous substances include construction dust, cement, lead solvents, isocyanates, harmful micro-organisms and carbon monoxide. Exposure to hazardous substances, occurring as a result of ingestion, inhalation and dermal contact, has the potential to adversely impact the health of construction workers. Adverse impacts include acute effects (e.g. dizziness, headaches, nausea, and burns) and chronic effects (e.g. lung disease).

11.7.128. However, in the UK, the construction industry is regulated by the Construction (Design and Management) Regulations 2015 (CDM 2015), enforced by the Health and Safety Executive (HSE). It is assumed that the decommissioning phase will be undertaken in accordance with the requirements of CDM 2015 and all other relevant legislation, guidance and best practice managing occupational exposure to hazardous substances, including:

- Health and Safety in Construction (HSG150) (HSE, 2006).
- A Guide to Safe Working on Contaminated Sites, R132, CIRIA, 1996.

11.7.129. The appointed Principal Contractor (as defined in the CDM 2015) will be responsible for the completion of Control of Substances Hazardous to Health (COSHH) assessments identifying hazards from and methods preventing or controlling exposure to hazardous substances (for example, through mandatory use of Personal Protective Equipment (PPE)).

11.7.130. The sensitivity of construction workers (decommissioning phase) is considered to be low and the magnitude of change is considered to be “no change”. Therefore, there is likely to be an effect on construction workers of neutral significance.

End Users

11.7.131. There is a theoretical potential for end users to be exposed to hazardous substances as a result of the decommissioning of the Proposed Scheme.

11.7.132. As there will be no public access to the Existing Drax Power Station Complex, the potential for adverse impacts to members of the public during the decommissioning phase is considered to be negligible. Risks to personnel working at the Existing Drax Power Station Complex will be managed through the controls outlined in Paragraph 11.6.55.

11.7.133. On this basis, it is assumed that there will be no adverse impact to the health of end users during the decommissioning within the Existing Drax Power Station Complex (“no change”). The effect on end users will therefore be neutral.

11.7.134. For adverse impacts to occur to end users in the Pipeline Area there must be a complete contaminant linkage. It is understood that the pipeline will be left in-situ. It is assumed that risks

associated with decommissioning will be assessed and managed through the compliance with relevant legislation and best practice including a DEMP.

11.7.135. The sensitivity of end users is considered to be low to medium and the magnitude of change is considered to be “no change”. Therefore, there is likely to be an effect on end users of neutral significance.

11.8 Mitigation and Enhancement Measures

11.8.1. The objective of additional secondary mitigation is to reduce the significance level of adverse effects with a significance level of moderate or greater to no greater than slight. As there are no identified likely significant adverse effects with a significance level of moderate or greater, no secondary mitigation is proposed.

11.9 Residual Effects

11.9.1. As no secondary mitigation is proposed the residual effects comprise the effects identified in Section 11.6. A summary of these in provided in Table 11-26.

11.10 Summary of Significance of Effect

Table 11-26 - Summary of Residual Effects

Aspect	Sensitivity	Impact					Effect				
		Stage 0	Stage 1	Stage 2	Stage 3	Decommissioning	Stage 0	Stage 1	Stage 2	Stage 3	Decommissioning
Geology and Geomorphology	Low	No change	No change	No change	No change	No change	Neutral	Neutral	Neutral	Neutral	Neutral
Soil (within Existing Power station)	High	Negligible adverse	Negligible adverse	Negligible adverse (construction) and No change (operation)	No change	Negligible adverse	Slight adverse	Slight adverse	Slight adverse	Neutral	Slight adverse
Soil (outside Existing Power Station)	Low	Negligible adverse	Negligible adverse	Negligible adverse (construction) and No change (operation)	No change	Negligible adverse	Neutral to Slight adverse	Neutral to Slight adverse	Neutral to Slight adverse	Neutral	Neutral to Slight adverse
Groundwater	High	Negligible adverse	Negligible adverse	Negligible adverse	Negligible adverse	Negligible adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse
Surface Water	High	Negligible adverse	Negligible adverse	Negligible adverse	Negligible adverse	Negligible adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse

Aspect	Sensitivity	Impact					Effect				
		Stage 0	Stage 1	Stage 2	Stage 3	Decommissioning	Stage 0	Stage 1	Stage 2	Stage 3	Decommissioning
Built Environment	Medium	No change	No change	No change	No change	No change	Neutral	Neutral	Neutral	Neutral	Neutral
Construction Workers	Low	No change	No change	No change	N/A	No change	Neutral	Neutral	Neutral	N/A	Neutral
End Users (Existing Power Station)	Low	No change	No change	No change	No change	No Change	Neutral	Neutral	Neutral	Neutral	Neutral
End Users (Pipeline Area)	Medium	No change	No change	No change	No change	No Change	Neutral	Neutral	Neutral	Neutral	Neutral

11.11 Limitations and Assumptions

11.11.1. The PRA and wider assessment geology and soils is predicated on a desk-based review and synthesis of the informational sources referenced. The assessment of significance is provided on the basis of the Phase 1 PRA, the assumptions stated at the beginning of this chapter and professional judgement. The assessment is based on indicative scheme layout drawings which are subject to this consultation and final approval.

11.11.2. The study area has not been subject to a detailed agricultural land survey. The impact of the Proposed Scheme on agricultural land is discussed further in Chapter 14 (Socio-Economics)

11.11.3. At this stage, it is considered that the qualitative assessment completed is sufficiently robust to enable an assessment of the potential risks to identified receptors and significance of the effects on these receptors based on the conceptual site model The risks associated with the potential contaminant linkages identified in the CSM will be further investigated by means of the Phase 2 ground investigation to enable mitigation measures to be designed and implemented, if warranted, during detailed design.

11.12 Summary

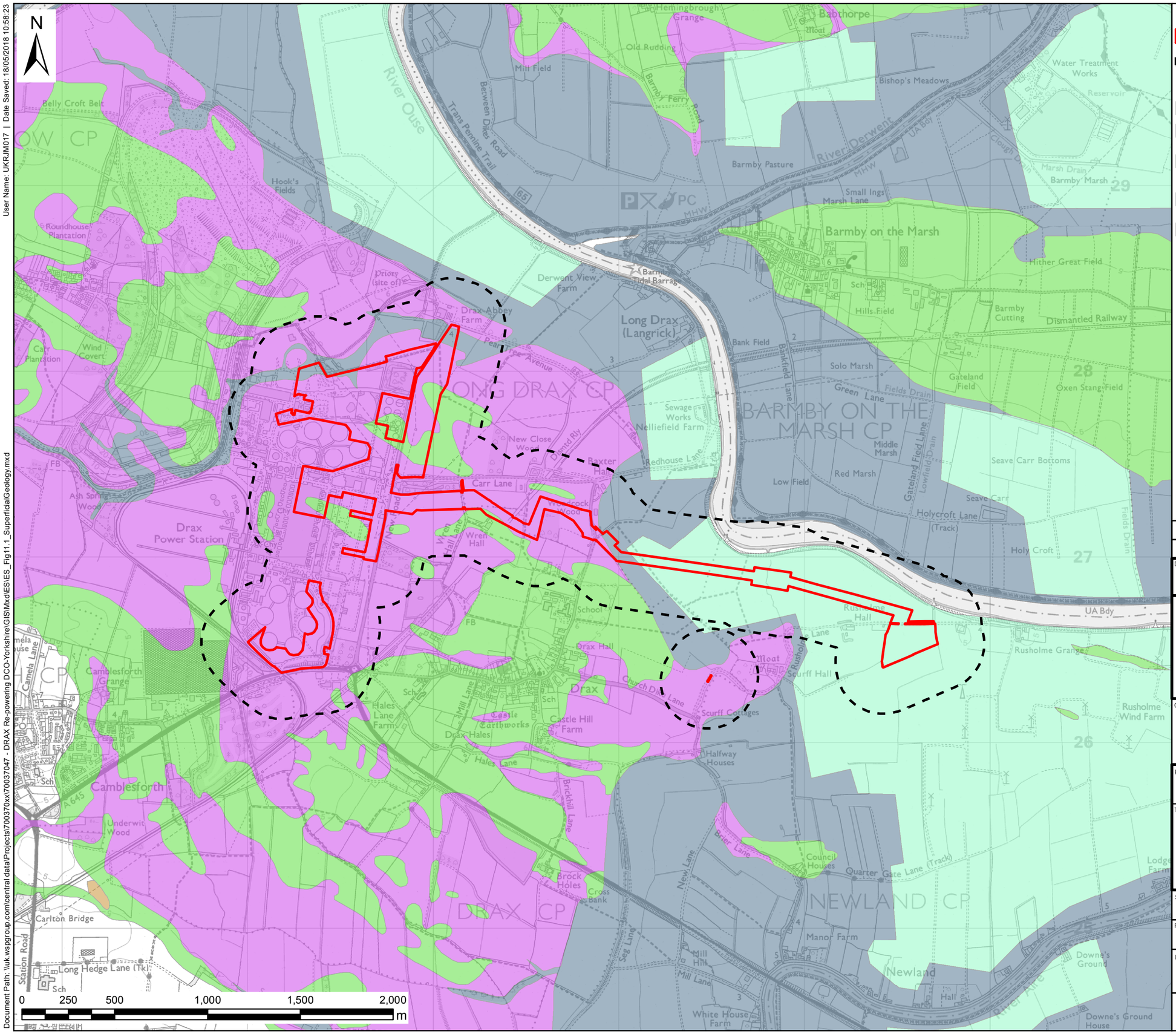
11.12.1. No significant effects have been identified for ground conditions.

Table 11-27 - Summary of Effects Table for Ground Conditions

Description of Effects	Receptor	Significance and Nature of Effects Prior to Mitigation / Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
N/A	N/A	N/A	N/A	N/A

NB: Aspects of the proposed scheme considered as part of the pre-mitigation scenario are summarised above in Section 1.6, and within Chapter X: Summary of Environmental Statement.

Key to table: + / - = Positive or Negative P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term N/A = Not Applicable



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CLIENT: drax

PROJECT: The Drax Power (Generating Stations) Order

TITLE: Figure 11.1 Superficial Geology

SCALE @ A3:	CHECKED:	APPROVED:
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N

Depot

Barlow Mound Ash Disposal Site

New Road Landfill (Historical)

Sewage Works (Historical)

Drax Power Station Complex

Camblesforth By-Pass Tipping Site (Historical)

Electricity Distribution Sites

Engine House (Historical)

Sewage Works

Electrical Substation

0 250 500 750 1,000 m

Key

- Site Boundary
- 250m Buffer of Site Boundary
- Contamination Source
- Railway

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TITLE: Figure 11.2 Potential Sources of Contamination

SCALE @ A3:	CHECKED:		APPROVED:
17,000 @ A3	SM		CT
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DRAWING No:			REV:
70037047-11.2			A

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