10 GEOLOGY, SOILS AND CONTAMINATED LAND

Summary

This chapter assesses the potential impact of the Proposed Project on the geology, soils and contaminated land within the area and to identify measures required to protect the hydrogeological and geological environment.

The geology, soils and contaminated land assessment reviewed the sensitivity of the underlying geology and potential environmental receptors informed by a baseline review, site walkover and the findings of an intrusive site investigation. The site was identified to have sensitive environmental receptors, including valuable groundwater resources relating to the underlying geology. Potential sources of contamination were identified including areas of potential infilling and areas of historical industrial land use (railway and sidings). The ground investigation identified slight exceedances of the relevant assessment criteria for specified contaminants in both soils and groundwater; asbestos was also identified.

Impacts will be minimised by the adoption of best construction practices and specified mitigation measures described below.

A Construction Environmental Management Plan will be implemented and will include reference to relevant guidance such as the Environment Agency Guidance to “Protect groundwater and prevent groundwater pollution” published 14 March 2017. The CEMP will also reference relevant Pollution Prevention Guidelines as examples of best practice and the relevant Guidance for Pollution Prevention Documents.

The assessment concluded that with the implemented of mitigation measures, no significant impacts relating human health, soils or contaminated land are predicted during the construction, operation and decommissioning phases

10.1 Introduction

10.1.1 This chapter of the Environmental Assessment Report presents an assessment of the potential effects of the Visual Impact Provision (VIP), Peak District (East) Project (here on referred to as the Proposed Project) on geology, hydrology, soils and contamination.

10.1.2 With respect to contamination, the assessment includes effects on human health, controlled waters (groundwater[1]), property and the environment from the presence or mobilisation of existing contaminants, or from accidental release of contaminants during the construction, operational or decommissioning phases of the Proposed Project.

10.1.3 This chapter outlines embedded mitigation and avoidance measures that are likely to be required during the construction, operation and decommissioning (of certain aspects) of the Proposed Project to protect the hydrogeological and geological environment. A qualitative assessment has been undertaken using a combination of professional judgement, legislative processes, planning policies and guidance.

10.1.4 Potential effects on geology, hydrology, soils and contamination are interrelated with effects on surface water and land use. This chapter should be read in conjunction with Chapter 9 Water Resource and Chapter 11 Agriculture and Land Use of this Environmental Assessment Report.

10.2 Scope and Methodology

10.2.1 For the purposes of this assessment the following terms are used:

- Site Boundary – the confined boundary of the Proposed Project during its construction and operational Phases.
- Study Area – For data collection purposes a buffer of up to 1km has been applied to the Site Boundary for environmental baseline data collection and historical mapping review. Receptors are considered within this Study Area. The Study Area buffer distance is variable for the particular environmental attribute being considered and is considered a suitable distance to incorporate the most likely potential receptors that could be impacted (including valuable environments, surface water and groundwater resources), and activities that may have an impact upon, the Proposed Project (including historical development at the site and in the surrounding area, potentially contaminative permitted activities and waste operations). The buffer distance applied to each attribute is included in the relevant paragraphs of the Baseline section. The Study Area is shown on Figure 10.1.

Methodology

10.2.2 This assessment has been carried out in general accordance with current regulations, guidance and best practice, including but not limited to:

- Contaminated Land Report (CLR) 11, Model Procedures for the Management of Land Contamination (Environment Agency, 2004);
- Design Manual for Roads and Bridges: Volume 11, Section 3 Environmental Assessment Techniques, Part 10: HD 45/09 Road Drainage and the Water Environment (Highways Agency 2009); and

[1] Note: Effects to surface water are assessed within Chapter 9 Water resources

- Design Manual for Roads and Bridges: Volume 11, Section 3 Environmental Assessment Techniques, Part 11: HD 45/09 Geology and Soils (Highways Agency 2010).

10.2.3 This assessment has involved:

- Analysis of current legislation, planning policy and guidance in relation to the effects of the Proposed Project (including any mitigation embedded into the design) on the hydrogeological, geological environment and valuable receptors;
- A desk study to establish the existing hydrogeological and geological baseline conditions, based on the collection of a wide range of baseline data and information from published material, plus consultations with statutory bodies and other stakeholders and ground investigation data from WSP | Parsons Brinckerhoff. The data and information sources used during this assessment are listed in Section 10.2.8 and referenced throughout the chapter.
- Evaluation of the potential effects of the Proposed Project on the geological and hydrogeological environment and other valuable receptors;
- Identification of embedded mitigation and avoidance measures which will be incorporated into the Proposed Project;
- Identification of measures to mitigate against potential adverse effects; and
- Assessment of the significance of residual effects following mitigation, taking into account the sensitivity (value) of receptors, magnitude of effects and the likelihood of these effects occurring.

10.2.4 A targeted site walkover was undertaken over the accessible parts of the Site Boundary on 24 November 2016, including a visual assessment of the surface water features, topography, exposed geology and exposed soils. It was not possible to carry out a walkover of the northern vehicle access route at the time due to access restrictions. The purpose of the site walkover was to:

- Note features of geological interest geomorphological and hydrogeological interest;
- Determine the hydrological characteristics;
- Note any land use which could give rise to potential contamination;
- Assess the topography of the site;
- Assess the potential for ground instability; and
- Assess the nature of potential valuable receptors (including local residents and site users) identified from available documentation and while onsite.

10.2.5 The assessment takes into consideration the sources of possible contamination risk and the presence of plausible pathways or receptors. This method is used to identify plausible contaminant linkages (if present) as outlined in Part 2A of the Environmental Protection Act 1990[2] and based on the assessment process set out in CLR11[3].

[2] DEFRA (April 2012) Environmental Protection Act 1990: Part 2A. Contaminated Land Statutory Guidance.

[3] DEFRA/Environment Agency Contaminated Land Report CLR11 'Model Procedures for the Management of Land Contamination'

Sources of Information

10.2.6 Sources of information include the following:

- Barnsley Metropolitan Borough Council (2002) Contaminated Land Strategy. Environmental Health Services. February 2002;
- Barnsley Metropolitan Borough Council Local Development Framework: Core Strategy, adopted September 2011 Available via: https://www.barnsley.gov.uk/media/3093/core-strategy.pdf (viewed October 2018);
- Barnsley Metropolitan Borough Council Planning Portal. Available via: https://www.barnsley.gov.uk/barnsley-maps/planning-explorer/ (viewed October 2018);
- Barnsley Metropolitan Borough Council Unitary Development Plan, adopted December 2000. Available via: https://www.barnsley.gov.uk/media/5077/volume-1-strategy-policy-justification.pdf (viewed October 2018);
- British Geological Survey (BGS) GeoIndex: Interactive Mapping. Available via: http://mapapps2.bgs.ac.uk/geoindex/home.html?submit=Open+the+onshore+GeoIndex (viewed October 2018);
- British Geological Survey 1:50,000 series Sheet 86 – Glossop. Available online at: http://www.largeimages.bgs.ac.uk/iip/mapsportal.html?id=1009336 (viewed October 2018);
- British Geological Survey Mineral Resources Map (1:100,000) A Summary of Mineral Resource Information for Development Plans: Peak District National Park. Accessed via: https://www.bgs.ac.uk/mineralsuk/planning/resource.html (viewed October 2018);
- DEFRA (April 2011) Safeguarding our Soils: A strategy for England. Available online at: https://www.gov.uk/government/publications/safeguarding-our-soils-a-strategy-for-england (viewed October 2018);
- Environment Agency: What's In My Backyard website available via: http://maps.environment-agency.gov.uk (viewed July 2017);
- Google Maps. Available via: https://www.google.co.uk/maps/@53.5127043,-1.7422156,13z (viewed October 2018);
- Groundsure Geo Insight Plus Report (reference GS-56_385464) dated 9 March 2016;
- Groundsure Enviro Insight Report (reference GS-5557524) dated 24 October 2018;
- Groundsure Geo Insight Report (reference GS-5557525) dated 24 October 2018;
- National Park Authority (October 2011) Peak District Local Development Framework Core Strategy. Available from: http://www.peakdistrict.gov.uk/__data/assets/pdf_file/0014/141215/LDF-CoreStrategyFinal.pdf. (Accessed online October 2018);

- Natural England / DEFRA Multi-Agency Geographic Information for the Countryside (MAGIC). Available online via: http://magic.defra.gov.uk/MagicMap.aspx (viewed October 2018);
- Natural Environment Research Council (2017) and Centre for Ecology and Hydrology (CEH). GeoIndex interactive mapping. Available online via: http://mapapps2.bgs.ac.uk/geoindex/home.html?submit=Open+the+onshore+GeoIndex (Viewed October 2018);
- Natural Environment Research Council (2017) UK Soil Observatory Soils map viewer. Available online via: http://mapapps2.bgs.ac.uk/ukso/home.html (viewed October 2018);
- WSP | Parsons Brinckerhoff (April 2016) Visual Impact Provision: Geotechnical Desktop Study. Work Package 1: Peak District National Park (Report no. 70019952/1);
- WSP | Parsons Brinckerhoff (November 2016) Visual Impact Provision: Factual Ground Investigation Report. Peak District East (Report no. 70019952/2);
- WSP | Parsons Brinckerhoff (November 2016) Visual Impact Provision: Interpretative Geoenvironmental Report. Peak District East (Report no. 70019952/4);
- WSP | Parsons Brinckerhoff (November 2018) Visual Impact Provision: Supplementary Ground Investigation Factual Report 2018. Peak District East (Report no. 62100737.2.SFR); and,
- WSP | Parsons Brinckerhoff (November 2018) Visual Impact Provision: Peak District East Visual Impact Provision: Interpretative Geo-Environmental Report (Report no. PDD-33492-REP-028).

Determining the Significance of Effects

10.2.7 The significance of the effect is formulated as a function of the value of the receptor or resource (sensitivity) and the magnitude of potential impact (change).

10.2.8 The criteria used to define the value of a receptor, magnitude of potential impact and therefore the significance of potential effect are presented in Tables 10-1, 10-2 and 10-3 below.

10.2.9 The value of a receptor ranges from High to Very Low. The criteria for determining the value of a receptor is given in Table 10-1.

10.2.10 The magnitude of impact on a receptor ranges from High to Very Low. The criteria for determining the magnitude of impact on an receptor is given in Table 10-2.

The significance of potential effect on a receptor is a product of assigned receptor value and the magnitude of potential impact (change) as presented in Table 10-3. This assessment method is detailed in the Scoping Report.

Table 10-1 Value of the Receptor

Value	Criteria	Feature / Receptor / Resource	Indicator of Quality
High	Medium national and high regional importance with limited potential for replacement	Hydrology	- Water Framework Directive Class 'Good' - Species protected under UK habitat legislation
		Hydrogeology	- Environment Agency 'Principal Aquifer' - Principal aquifer providing locally important resource or supporting river ecosystem - (SPZ) 2 – Outer protection zone
		Geomorphology	- For contaminated land this would relate to a moderate risk. - Site of local geological importance (Local Geological Site – previously Regionally Important Geological Site)
Medium	Low regional and high local importance with some potential for replacement	Hydrology	- Water Framework Directive Class 'Moderate' - Non EC Designated fishery - Sites designated by local authority as having local conservation status
		Hydrogeology	- Environment Agency 'Secondary Aquifer' - Aquifer providing water for agricultural or industrial use with limited connection to surface water - (SPZ) 3 – Source catchment protection zone
		Geomorphology	- For contaminated land this would relate to a low risk. - Mineral Safeguarding Area - Areas with soils of best and most versatile agricultural value
Low	Local importance with potential for replacement	Hydrology	- Water Framework Directive Class 'Poor' - Low grade or common habitats with no conservation status
		Hydrogeology	- Environment Agency 'Unproductive strata'
		Geomorphology	- Sites with little local geological/soils interest. - For contaminated land this would relate to a very low risk.
Very Low	Very low importance and rarity, local scale	Hydrology	- Water Framework Directive Class 'Poor' - Low grade or common habitats with no conservation status
		Hydrogeology	- Environment Agency 'Unproductive strata'
		Geomorphology	- Sites with no local geological/soils interest. - For contaminated land this would relate to a negligible risk.

Table 10-2 Magnitude of Potential Impact (Change)

Magnitude	Criteria	Aspect	Typical Examples
High (Adverse)	Results in loss of receptor and/ or quality and integrity of the receptor	Surface Water	- Fundamental change to hydrological conditions including deterioration in water quality - Loss or extensive damage to a fishery - Loss or extensive damage to a designated conservation site - High risk of pollution from surface water run-off or accidental spillages
		Groundwater	- Loss of, or extensive change to, an aquifer - Potential high risk of pollution to groundwater - Loss of, or extensive change to, groundwater supported designated wetlands
		Geology/Soils	- Loss/sterilisation of the resource and/or quality and integrity of resource; severe damage to important characteristics, features or elements.
Medium (Adverse)	Results in effect on integrity of receptor, or loss of part of receptor	Surface Water	- Detectable but non-fundamental change to hydrological conditions - Some deterioration in water quality likely to temporarily affect valuable receptors - Partial loss in productivity of a fishery - Medium risk of pollution from surface water run-off or accidental spillages
		Groundwater	- Partial loss or change to an aquifer - Potential medium risk of pollution to groundwater - Partial loss of the integrity of groundwater supported designated wetlands
		Geology/Soils	- The site's integrity will not be adversely affected, but the Proposed Project may lead to a loss of or damage to important characteristics, features or attributes or partial sterilisation.
Low (Adverse)	Results in some measurable change in receptor quality or vulnerability	Surface Water	- Detectable but minor change to hydrological conditions - Slight deterioration in water quality unlikely to affect valuable receptors - Low risk of pollution from surface water run-off or accidental spillages
		Groundwater	- No measurable impact upon an aquifer and risk of pollution from spillages - Potential low risk of pollution to groundwater - Minor effects on groundwater supported wetlands
		Geology/Soils	- A measurable minor negative impact on important characteristics, features or attributes is evident.
Very Low (Negligible)	Results in effect on receptor , but of insufficient magnitude to affect the use or integrity	Surface Water	- Undetectable change in hydrological conditions including water quality - The Proposed Project is unlikely to affect the integrity of the water environment - Very low risk of pollution from surface water run-off or accidental spillages
		Groundwater	- No measurable impact upon an aquifer and risk of pollution from spillages - No measurable impact on groundwater supported wetlands
		Geology/Soils	- Minor alteration to one or more characteristics, features or elements or no observable impact.
Low		Surface Water	- A measurable minor improvement to water quality

Magnitude	Criteria	Aspect	Typical Examples
(Beneficial)	Results in some beneficial effect on receptor or a reduced risk of negative effect occurring	Groundwater	- Calculated reduction in existing spillage risk by 50% or more to an aquifer (when existing spillage risk <1% annually)
		Geology/Soils	- A measurable minor positive impact on important characteristics, features or attributes is evident.
Medium (Beneficial)	Results in moderate improvement of receptor quality	Surface Water	- A moderate improvement to water quality
		Groundwater	- Calculated reduction in existing spillage risk by 50% or more to an aquifer (when existing spillage risk is >1% annually)
		Geology/Soils	- A moderate positive impact on important characteristics, features or attributes is evident.
High (Beneficial)	Results in major improvement of receptor quality	Surface Water	- A major improvement to water quality
		Groundwater	- Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring - Recharge of an aquifer
		Geology/Soils	- A major positive impact on important characteristics, features or attributes is evident.

Table 10-3 Classification of Significance of Potential Effects

value of receptor (from Table 10-1)		Magnitude of Potential Impact (from Table 10-2)			
		High	**Medium**	**Low**	**Very Low (Negligible)**
	High	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Negligible	Negligible
	Very Low	Minor	Negligible	Negligible	Negligible

Note: Shaded boxes indicate a 'Significant Effect'. All others are 'Not consider to be Significant'.

10.2.11 The estimation of significance of effects as displayed in Table 10-3 is further explained in Table 10-4.

10.2.12 The potential significance of effects will be reported in line with Table 10-4.

10.2.13 The potential effects on the Proposed Project from contaminated soils have been assessed. These effects have been identified by a qualitative assessment using the 'source-pathway-receptor' approach to determine the potential risks posed to receptors.

Table 10-4 Assessment Significance Criteria

Significance	Rationale for assessment of significance
Major Adverse	These may represent key factors in the decision making process. These effects are generally but not exclusively associated with sites or features of international and/ or national importance that are likely to suffer a most damaging impact and loss of resource integrity. Major effects may relate to resources or features which are unique and which, if lost, cannot be replaced or relocated and are likely to be in exceedance of legal thresholds. Where the Proposed Project would result in degradation of the geological, soil, hydrogeological or contamination setting because it results in predicted major adverse impacts on at least one receptor. More than one receptor may be affected by a single project and each should be assessed and reported separately. Examples have been provided below. Human Health: - Highly elevated concentrations likely to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs; and/or - Equivalent to a Local Authority Category 1 classification under the DEFRA (2012) Part 2A Contaminated Land Statutory Guidance. Ecology: - Major damage to aquatic or other ecosystems which is likely to result in a substantial adverse change in its functioning. Controlled Waters: - Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce; and/or - Catastrophic damage to crops, buildings or property. Geology: - Loss of sites of geological importance; and/or - Major damage to soils.
Moderate Adverse	These effects are considered to be important considerations and are likely to be material in the decision-making process. These effects are likely to be important

Significance	Rationale for assessment of significance
	at a local scale. Moderate adverse effects are likely to be in breach of planning policy. Where the proposal would result in a degradation of the environmental feature because it results in predicted highly significant adverse impacts. More than one receptor may be affected by a single project and each should be assessed and reported separately. For example: Human Health: - Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs; - Equivalent to a Local Authority Category 2 classification under the DEFRA (2012) Part 2A Contaminated Land Statutory Guidance; Ecology: - Significant damage to aquatic or other ecosystems, including soils and geology which may result in a substantial adverse change in its functioning; Controlled Waters: - Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce; and - Significant damage to crops, buildings or property.
Minor Adverse	These effects may be important but are not likely to be decision-making factors. These effects may be raised as local factors but are unlikely to be critical in the decision making process but may be important in enhancing the ultimate design of the project. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor. Human Health: - Exposure to human health unlikely to lead to "significant harm". - Equivalent to a Local Authority Category 3 classification under the DEFRA (2012) Part 2A Contaminated Land Statutory Guidance. Ecology: - Minor or short lived damage to aquatic or other ecosystems, including soils and geology which is unlikely to result in a substantial adverse change in its functioning. Controlled Waters: - Equivalent to EA Category 3 pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce. - Minor damage to crops, buildings or property.
Negligible	Human Health: - No measurable effect on humans. Ecology: - Equivalent to a Local Authority Category 4 classification under the DEFRA (2012) Part 2A Contaminated Land Statutory Guidance. - Repairable effects of damage to soils, geology, buildings, structure and services. Controlled Waters: - Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.

Significance	Rationale for assessment of significance
Minor Beneficial	Situations where the proposal provides a small positive change, but one which is not likely to be a factor in the overall balance is issues. More than one receptor may be affected by a single project and each should be assessed and reported separately. Examples have been provided below. Groundwater: - Reduction by 50% or more in existing pollution risk from spillages into an aquifer (when existing spillage risk is <1%). Flood Risk: - A reduction in peak flood level (1% annual probability) >10 mm resulting in a reduced risk of flooding to 1-100 residential properties.
Moderate Beneficial	These effects may be significant in providing an improved baseline condition where guideline targets are contributed to. More than one receptor may be affected by a single project and each should be assessed and reported separately. Examples are provided below. Groundwater - Reduction by 50% or more in existing likelihood of pollution arising from a spillage to an aquifer through retrofitting of pollution control (existing risk >1%).
Major Beneficial	These effects are considered to be very important considerations and are likely to be material in the decision-making process. Proposed Project could have a large positive impact if it is predicted that it will result in a 'very' or 'highly' significant improvement to a water receptor (s), with insignificant adverse impacts on other water attributes. This may result in new legal compliance or a major contribution to national targets. More than one receptor may be affected by a single project and each should be assessed and reported separately. Examples have been provided below. Groundwater: - Removal of an existing polluting discharge within Zone 1 and 2 of a SPZ and/or a principal aquifer; - Reduction by 50% or more in the existing likelihood of pollution arising from a spillage at discharge points within Zone 1 or 2 of a SPZ, principal aquifer and/or a site supporting a habitat protected under habitat legislation (existing risk >1%); and/or - Recharge of aquifer through provision of treated discharges to ground resulting in measurable improvements to a connected site/habitat protected under EC or UK legislation (SAC, SPA, Ramsar site, SSSI, WPZ, salmonid water).

10.2.14 The magnitude of effects for soils, geology, groundwater and contaminated land have been assessed taking embedded mitigation measures and good practice construction techniques into account. Effects that remain once embedded mitigation measures have been taken into consideration are referred to as 'residual effects'. Temporary effects are considered in the construction, operation, maintenance and decommissioning periods. Embedded and additional mitigation will be addressed in the Construction Environmental Management Plan (CEMP).

Limitation on Assessment / Uncertainties

10.2.15 A door to door Private Water Supply (PWS) / water features survey has not been conducted as part of this assessment. However, Barnsley Metropolitan Borough

Council Environmental Health Department were consulted with regards to PWS[4], this is considered sufficient.

10.2.16 A site walkover was undertaken on 24 November 2016. Due to access constraints it was not possible to access the eastern most part of the Site or the northern vehicle access road. It was possible, however, to access all areas of the Cable Corridor and location of the proposed Sealing End Compound (SEC), Trans Pennine Trail diversion, and new pylon. This is considered sufficient to identify potential sources of contamination for the purpose of this assessment as those areas not accessed were located downstream and therefore downgradient from the site, and also, Groundsure data is available that covers the whole study area. It has not been possible to assess the existence or importance of valuable receptors further downstream from those areas accessed during the site walkover.

10.3 Consultations Undertaken

10.3.1 As part of the scoping phase of the Environmental Assessment Report, a Scoping Report[5] was prepared. This report set out the proposed approach to undertaking the Environmental Assessment in respect of the Proposed Project, including the identification of assessment methodologies for each of the assessment topic areas. The information and advice received during the scoping process with regard to geology, soils and land contamination is summarised in Table 10-5.

10.3.2 As part of the consultation undertaken data and information requests were also included with respect to geology, soils and contamination. These are also listed in Table 10-5.

Table 10-5: Consultation Responses Relating to Geology, Soils and Contamination

Date	Consultee	Summary of Issues	Section where comment addressed
17 March 2017 (Scoping opinion)	The Coal Authority	Confirmed that the Site Boundary does not fall within the defined coalfield; there is no requirement therefore to consider coal mining issues as part of the planning application or to consult The Coal Authority.	10-5-74 to 10-5-78
25 August 2016	South Yorkshire Mining Advisory Service	Confirmation that the Site Boundary in question lies outside the western edge of the coalfield and therefore outside of any referral areas, both from our records and the Coal Authorities. No mining legacy from a coal mining aspect would be anticipated; quarrying of sandstones/gritstones may however, but this appears to have been adequately considered through the consultant's recommendations	10-5-74 to 10-5-78
10 August 2017	Barnsley Metropolitan Borough Council	Four sites within the Site Boundary are listed on the Barnsley Metropolitan Borough Council's 'Prioritised Site List' for contaminated land.	10.5.40
		Records relating to private water supplies abstraction points.	10.5.69-72 Figure 10.6
17 August 2017	Environment Agency	Recorded pollution incidents within Site Boundary.	10.5.45 Figure 10.5

[4] Barnsley Metropolitan Borough Council (2017) Contaminated Land Enquiry – Development at Trans Pennine Trail, Windle Edge. Reference RFS352984. Letter dated 10/08/2017

[5] National Grid (July 2016) Visual Impact Provision Peak District National Park (East) Overhead Line Scoping Report.

10.4 Statutory and Planning Context

Legislation

10.4.1 Legislation of relevance to this assessment includes the following (and their subsequent amendments):

- Water Framework Directive 2000/60/EC;
- Water Resources Act 1991 (as amended);
- Part 2A of the Environmental Protection Act (EPA) 1990 (amended April 2012);
- The Contaminated Land (England) Regulations (amendment) 2012;
- Town and Country Planning Act 1990;
- The Groundwater (England and Wales) Regulations 2009;
- The Environmental Permitting (England and Wales) (Amendment) Regulations 2016;
- The Environmental Damage (Prevention and Remediation) Regulations 2016;
- Building Regulations 2010;
- Control of Asbestos Regulations 2012;
- Construction Design and Management Regulations 2015;
- The Water Act 2003; and
- National Planning Policy Framework 2019.

Water Framework Directive

10.4.2 The EU Water Framework Directive 2000/60/EC provides a system to protect all water bodies including surface water and groundwater. Additionally the Directive states that measures should be implemented to *'prevent or limit inputs of pollutants into groundwater'* and *'to reverse any significant and sustained upwards trends'*.

Water Resources Act 1991 (as amended)

10.4.3 The following criteria are used in the legislation to establish whether significant pollution of controlled waters has occurred:

- Pollution equivalent to 'environmental damage' to surface water or groundwater as defined by The Environmental Damage (Prevention and Remediation) Regulations 2015;
- Inputs resulting in the deterioration of the quality of water abstracted, or intended to be used in the future;
- A breach of statutory surface water Environmental Quality Standard, either directly or via a groundwater pathway; and
- Input of a substance into groundwater resulting in a significant and sustained upward trend in concentration of contaminants.

10.4.4 In England and Wales, the Water Resources Act gives the Environment Agency powers and duties to prevent or remedy the pollution of controlled waters. Previously under the Act and now under the Environmental Permitting (England and Wales) Regulations 2016 it is a criminal offence if a person causes or knowingly permits pollution of controlled water.

Part 2A Environmental Protection Act 1990

10.4.5 The contaminated land regime in Part 2A of the Environmental Protection Act 1990 was introduced to specifically address the historical legacy of land contamination. Part 2A of the Environmental Protection Act 1990 (as amended April 2012) introduced the following statutory definition for 'contaminated land':

> *"Any land which appears to the local authority in whose area it is situated to be in such a condition by reason of substances 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 of controlled waters is being caused, or there is a significant possibility of such pollution being caused."*

10.4.6 Part 2A provides a means of dealing with unacceptable risks posed by land contamination to human health and the environment. Enforcing authorities are required to identify and deal with such land under other policy and frameworks, Part 2A is only to be used by the Enforcing Authority where no appropriate alternative solutions exists.

10.4.7 The term 'contaminant linkage' indicates that a contaminant, a pathway and a receptor have been identified. A site can only be designated as Contaminated Land if there is a contaminant linkage and the contamination meets the criteria outlined above. The contaminant/ pathway/ receptor approach is widely accepted in the industry, although it does not take into account less scientific factors such as perceived risk.

10.4.8 The Part 2A contaminated land regime is designed to address the most difficult contaminated sites, where there are no other mechanisms to remediate land and reduce unacceptable risks. The Part 2A regime should not be directly relevant to any site brought forward for development under planning, except that the National Planning Policy Framework[6] (NPPF) requires that land brought through the planning process should not subsequently be capable of being determined as contaminated land under Part 2A regime. The basis of an environmental risk assessment is detailed within CLR11[7]. This provides guidance on the processes of risk assessment and identification/ evaluation of remediation options. Additional guidance is also provided in the Contaminated Land Statutory Guidance[8] and CIRIA[9] guidance.

National Planning Policy Framework

10.4.9 National Planning Policy for England is set out in the National Planning Policy Framework (NPPF). Section 15 of the NPPF addresses conserving and enhancing the natural environment by stating that the planning system should contribute to and enhance the natural and local environment by:

10.4.10 *"protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan)";*

[6] National Planning Policy Framework (NPPF), Planning Practice Guidance (EIA, land affected by contamination) (2018)

[7] DEFRA/Environment Agency (2004) Contaminated Land Report CLR11: 'Model Procedures for the Management of Land Contamination'

[8] DEFRA (April 2012) Environmental Protection Act 1990: Part 2A. Contaminated Land Statutory Guidance

[9] CIRIA (2017) Asbestos in soil and made ground good practice site guide (C765)

10.4.11 *"recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland";*

10.4.12 *"maintaining the character of the undeveloped coast, while improving public access to it where appropriate";*

10.4.13 *"minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures";*

10.4.14 *"preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans"; and*

10.4.15 *"remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate".* The policy requires that as a minimum, after remediation, land brought forward under the planning regime should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and adequate site investigation information, prepared by a competent person, should be presented. 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 should make sure that new developments take into account the effects of pollution on health.

Local Planning Policy

10.4.16 The planning application for the Proposed Project is accompanied by a Planning Statement which considers the extent to which the proposed development complies with the following planning policy:

- Barnsley Local Plan (BMBC, January 2019);
- Peak District National Park Authority Local Development Framework Core Strategy Development Plan Document (PDNPA, 2011); and
- Peak District National Park Authority Development Management Policies: Part 2 of the Local Plan (2019).

Soils

10.4.17 Limited direct regulation currently exists with respect to the protection of soils, although they are indirectly protected by other legislation such as that covering the prevention of pollution and contamination, and for land use planning.

10.4.18 The European Union (EU) adopted a Soil Thematic Strategy and a proposal for a Soil Framework Directive with the objective of providing protection to soils across the EU in September 2006, although currently no agreement has been implemented. In response DEFRA undertook stakeholder consultation and issued the "Soil Strategy for England"[10] supporting the aims of the Soil Thematic Strategy with the subsequent publication of a code of practice[11] on the sustainable use of soils on construction sites.

[10] Defra. (2009). Safeguarding our Soils: A Strategy for England, Department for Environment, Food and Rural Affairs, London

[11] Defra (September 2009) Construction Codes of Practice for the Sustainable Use of Soils on Construction Sites, Department for Environment, Food and Rural Affairs.

10.4.19 The NPPF expects local planning authorities to take into account the economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification).

Minerals Safeguarding

10.4.20 The British Geological Survey (BGS) has published guidance on good practice in the conservation and safeguarding of non-renewable resources such as minerals in its report "Mineral safeguarding in England: Good Practice Advice[12]". This is supported by a series of reports covering the various administrative areas as part of the project "Mineral Resource Information in Support of National Regional and Local Planning".

10.4.21 The NPPF has replaced Minerals Policy Statements 1 and 2[13]. The principle parts of the policy specifically relating to minerals are detailed in Section 13- Facilitating the Sustainable use of minerals.

10.4.22 According to Barnsley Local Plan[14]:

"The main commercial interest in Barnsley is currently in clay, both for brick making and pipe making. There is also one small sandstone quarry for building stone, and sites for the extraction of coal mine methane."

"There is unlikely to be any interest in deep mined coal during the plan period, although there may be increased interest in shallow coal extraction and utilisation of the coal in situ through clean coal technologies."

10.4.23 Sandstone quarry sites that may be important for local and regional built heritage conservation and for building and roofing stone have not been identified in Barnsley. There has been very little demand for the coal measures sandstone in recent years and it is considered unlikely that the demand will increase.

10.5 Existing Environment

Location and Topography

10.5.1 The Study Area lies within the municipality of Barnsley Metropolitan Borough Council. A southwestern portion of the Study Area comes under the Peak District National Park Authority.

10.5.2 The Site Boundary encompasses land on the edge of the Peak District National Park at Dunford Bridge, including land to the south of Winscar Reservoir, and extends to the east on an approximate west-east orientation towards Whams Road. The extent of the Site Boundary includes part of Thurlstone Moors to the south and up to Bents Road and Brook Mill Lane to the north.

10.5.3 The River Don, flowing west to east, represents the lowest level of elevation across the Site Boundary with areas of low lying farmland (part of the floodplain) located adjacent to the north of the River Don, <1m above the River Don in parts.

10.5.4 The Trans Pennine Trail to the south of the River Don lies at a higher elevation than the majority of farmland to the north and remains relatively level along the length of the Site Boundary.

10.5.5 Land directly south of the Trans Pennine Trail falls within the Peak District National Park and comprises predominantly moorland. This is at a higher elevation than the

[12] NERC (2011) Mineral Safeguarding in England: good practice advice.

[13] NPPF Minerals Policy

[14] Barnsley Local Plan (adopted January2019)

Trans Pennine Trail and River Don and the food plain on farmland to the north of the River Don.

Site Walkover

10.5.6 A geo-environmental site walkover was carried out on 24 November 2016 based on the design at the time along all accessible parts of the Proposed Project including: the Cable Corridor; the proposed Trans Pennine Trail diversion; and the location of the proposed SEC. A targeted search was also undertaken of:

- The Upper River Don including tributaries and floodplain;
- Groundwater springs;
- Wogden Foot Local Wildlife Site;
- Existing pylon bases; and,
- Access routes (where possible).

10.5.7 The Proposed Project Site Boundary was accessed via the public car park which services users of the Trans Pennine Trail off Windle Edge at NGR 415822,402402. It was not possible to access the easternmost part of the Site Boundary due to access restrictions. An existing farmers track runs to the north of and parallel to the Trans Pennine Trail, this was used to access the proposed temporary diversion of the Trans Pennine Trail.

10.5.8 Land to the north of the River Don appeared to be mostly used for sheep farming and land to the south appeared to be unfarmed moorland.

10.5.9 A public car park and public picnic area were present to the east of Windle Edge with a good quality tarmac hardstanding surface cover. A tarmac roadway leading to an area with potential underground chambers in the south including two vent pipes.

10.5.10 Several raised areas of likely tipped tunnel arisings were observed to the north of the River Don (NGR 416544, 402487) on areas of farmland.

10.5.11 A river monitoring point was observed at NGR 416330, 402405 with a remote monitoring station.

10.5.12 A groundwater spring was noted on the floodplain to the north of the River Don (at approximately NGR 417184, 402706) with a sinkhole and culvert appearing to drain from this location to the River Don.

10.5.13 A small stream was observed running beneath Pylon 4ZO159 from the northwest towards the River Don.

10.5.14 The Trans Pennine Trail was walked in a west to east direction and was observed to have a compacted gravel surface. A stone wall was observed to the south of the Trans Pennine Trail at the base of a slope which rose steeply to the south. A number of small waterfalls were observed flowing down the slope to the south and draining to a drainage ditch which ran directly adjacent to the south of the Trans Pennine Trail.

10.5.15 A number of rocky outcrops could be observed from the slope to the south including one outcrop which had been supported with a brick structure.

10.5.16 Wogden Foot Local Wildlife Site (LWS) was accessed via a gate to the north of the Trans Pennine Trail. This area generally comprised grassland including densely vegetated parts with several mounds of unknown material in the east. Some evidence of slip was observed on the slopes of the mounds revealing a dark brown sandy material at the surface. All mounds were covered with grasses.

10.5.17 Natural England[15] has provided the following information about Wogden Foot:

- *"Wogden Foot is an area of disused railway tracks, the last of which were closed in the 1980's. The site extends between the River Don to the north and the fenced moorland boundary to the south. The site is approximately 1km in length and 100 metres wide.*
- *It comprises a flattish area with mounds of tipped material and a very steep embankment descending to the River Don. Developing broadleaved semi-natural woodland covers the embankment and the flatter areas comprise rough grassland with a dominant herb component and scattered scrub. Some areas of bare ground exist amongst the vegetation cover. Many of the plants found at Wogden Foot are rare or uncommon throughout the district. Many are calcicoles; their preferred habitat is in base-rich or calcareous soils.*
- *There are no natural outcrops of calcareous rock in the district, the band of magnesium Limestone [Magnesian Limestone] in South Yorkshire is to the east of Barnsley. Calcareous flora is therefore uncommon in the district. The site contains Polemonium caeruleum a Red Data Book species. With the unusual juxtaposition of plant colonies influenced by the sites industrial past, the site has fantastic potential for environmental education."*

Soils

10.5.18 The following information has been obtained from the UK Soil Observatory's (UKSO) online maps Soilscapes data layer[16]. A Study Area buffer of 500m has been considered.

10.5.19 There are four soil types present within the Study Area as follows;

- Slowly permeable seasonally wet acidic loamy and clayey soils in the north of the Study Area;
- Slowly permeable wet very acid upland soils with a peaty surface in the eastern and western extents of the Study Area which also underlies the Site Boundary;
- Very acid loamy upland soils with a wet peaty surface underlying the approximate central section of the Study Area as well as the majority of the Site Boundary; and
- Blanket bog peat soils in the southern section of the Study Area.

10.5.20 In addition areas of peat have been identified by the BGS in the Study Area to the North West on Sandy Ridge Moss and south on Thurlstone Moors. No peat has been identified within the Site Boundary.

Made Ground

10.5.21 The Groundsure Enviro Insight and Geo Insight Reports have identified a number of areas of Made Ground and potentially infilled land across the Study Area (1km buffer) including quarries from sandstone and ganister mining.

10.5.22 During the ground investigations, Made Ground was generally encountered overlying natural superficial strata and varied significantly across the Site Boundary. This was expected given the historical development of the site.

[15] Barnsley Biodiversity Trust: Wogden Foot. Accessed October 2018. Available online at: http://barnsleybiodiversity.org.uk/

[16] Natural Environment Research Council (2017) UK Soil Observatory Soils map viewer. Available online via: http://mapapps2.bgs.ac.uk/ukso/home.html (viewed October 2018)

Drift (Superficial) Geology

10.5.23 According to the available published data, no superficial deposits are recorded across the majority of the Study Area (1km buffer). Superficial deposits are limited to alluvium comprising alluvium (silty clay) in close proximity to the River Don and alluvial fan deposits (clay, sand and gravel) in a small section to the south of Wogden Foot where a small tributary approaches the Upper River Don.

10.5.24 Given the proximity of the Site Boundary to the Upper River Don and large moorland drainage features, the majority of superficial deposits encountered during the ground investigations comprised alluvial deposits including silts, clays, sands and gravels of depths of up to 7.05m below ground level.

10.5.25 Head deposits were encountered during the ground investigations on land to the north of the Upper River Don. It is considered likely that Head deposits have been disrupted and removed in areas close to the Upper River Don.

10.5.26 A map of the location of superficial deposits can be found in Figure 10.2.

Solid (Bedrock) Geology

10.5.27 According to available published data, the bedrock underlying the Study Area (1km) comprises alternating sandstones, mudstones and siltstones of the Huddersfield White Rock Sandstone, Rough Rock Sandstone and the Marsden and Rossendale Formations. In addition, an outcrop of the Pennine Lower Coal Measures Formation is mapped approximately 250m north of the Site Boundary (Proposed Northern Access Road).

10.5.28 Underlying the Site Boundary along the majority of the Trans Pennine Trail and River Don, the bedrock comprises Marsden Formation (mudstone and siltstone) and discreet bands of Huddersfield White Rock (sandstone). The northern and eastern extents of theSite Boundary are underlain by Rough Rock (sandstone), Rossendale Formation (mudstone and siltstone) and the Pennine Middle Coal Measures Formation (mudstone and siltstone).

10.5.29 According to the BGS, the Marsden Formation comprises very fine to very coarse mudstone, siltstone and sandstone with seatearth beds, thin coal seams and marine bands of black shale. A map of the location of bedrock deposits can be found in Figure 10.3.

10.5.30 The ground investigation confirmed the presence of the Marsden Formation and Huddersfield White Rock Formation. The Marsden Formation was encountered at all locations except within the existing SEC. This formation was generally overlain by Made Ground and Alluvial deposits.

10.5.31 BGS GeoIndex records[17] and the Coal Authority mapping[18] indicate that surface Coal Mining has taken place within the Study Area and a large portion of the Site Boundary above the River Don lies within a Surface Coal Resource Area. There is therefore potential for these workings to have been infilled. Coal seams are not shown on the geological mapping but marine bands of siltstone are shown at the crest of slopes.

10.5.32 The general area is heavily faulted and the north to south trending Mickledean Fault crosses the Search Area just east of Townhead; with the Hepworth-Ewden Fault to the east of the Site Boundary at the boundary of the Marsden Formation and the Rough Rock. The down-throw of both faults is to the east. A north-east to south-west trending fault runs across the Site Boundary from Townhead to just south of

[17] British Geological Survey online geological maps - http://www.bgs.ac.uk/ (December 2016)
[18] The Coal Authority Gazetteer - http://mapapps2.bgs.ac.uk/coalauthority/home.html (December 2016)

Dunford Bridge. An inferred normal fault runs southwest to northeast in the western portion of the Site Boundary.

Ground Instability

10.5.33 The Groundsure Geo Insight Report[19] identified the potential for a number of ground stability hazards. The National Ground Subsidence rating is obtained through the six natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS). The risk level indicated below reflects the maximum recorded risk across the Study Area (50m buffer).

- Shrink Swell – Low risk;
- Landslides - High risk;
- Soluble Rocks – Negligible risk;
- Compressible Ground – Moderate risk;
- Collapsible Rocks – Very Low risk; and,
- Running Sand – Very Low risk.

Radon

10.5.34 The Proposed Project Site Boundary (no buffer considered necessary) is located within a Radon Affected Area where 3-5% of properties are above the action level for Radon.

Land Use History

10.5.35 A review of historical industrial features within the Study Area (up to 750m buffer) from Enviro Insight data and historical maps (provided in March 2016 and updated in October 2018), dated from 1854, show a former railway line and associated sidings have been present since at least 1854 until c.1987, with some areas of sidings being removed by c.1962. Dunford Bridge Station was located in the west of the site boundary and Hazelhead Bridge Station was located in the east of the site boundary. Tanks are labelled adjacent to the north of the disused railway line, outside of the Site Boundary, approximately 200m north east of the former Dunford Bridge railway station until at least 1993. It has not been possible to confirm the capacity or contents of these tanks.

10.5.36 A large number of old quarries and associated heaps and tips are shown within the Study Area and several have been identified in close proximity to the Cable Corridor and across the centre, west, north and east of the Site Boundary since at least 1893. Many have been labelled as disused by 1893. The most relevant areas of former quarries, pits or potentially infilled land are provided on Figure 10.5.

10.5.37 Following consultations with Barnsley Metropolitan Borough Council, four areas within the Study Area (1km buffer) were identified on the 'Prioritised Site List' which were assessed as part of the council's Contaminated Land Inspection Strategy[20]. These areas have been summarised below:

- Quarry off Soughley Lane 1 (assessed July 2015) located between Trans Pennine Trail and River Don approximately 200m East from the site boundary;

[19] Groundsure Geo Insight Report (reference GS-5557525) dated 24 October 2018

[20] Barnsley Metropolitan Borough Council (2002) Contaminated Land Strategy. Environmental Health Services. February 2002

- Quarry off Soughley Lane 2 (assessed May 2016) located north of the River Don, 175m SW of Soughley Farm and approximately 275m east from the site boundary;
- Brick Works (assessed Sept 2013) located adjacent to Pennine Cottage, south of the Trans Pennine Trail approximately 200m east from the site boundary; and
- Railway land (Various) located along the length of the Trans Pennine Trial (on site).

10.5.38 All of the above were deemed suitable for the current use and therefore do not require remediation. The railway land has not been inspected as Barnsley Metropolitan Borough Council do not regard the risk posed to human health or the environment from former railway land featuring non-residential development as significant. There are also several farms within the Study Area (1km) however these are not felt to pose a significant risk to human health or the environment. There are no plans to inspect these sites again under Part 2A of the Environmental Protection Act 1990 as to whether it is 'contaminated land' as no 'Significant Pollutant Linkages' have been identified on this site at this time.

10.5.39 Similarly there is one site within the Study Area which appears on the Council's Prioritised Site List. This refers to a former clay pit (assessed September 2015) associated with the Wavin Clay Pipe Works approximately 990m North from the site boundary.

10.5.40 There are no records of contamination or pollution issues associated with the Proposed Development site or nearby land held by Barnsley Metropolitan Borough Council at this time[21].

10.5.41 The Groundsure Enviro Insight Report does not identify any Category 1 or 2 (significant) pollution Incidents within the Study Area (500m buffer). Additionally, no pollution incidents have been recorded within the Site Boundary.

10.5.42 The Environment Agency provided details of six pollution incidents recorded within the Study Area (1km buffer). All incidents caused a category 3 or 4 impact on land and water (minor and no impact). Any residual contamination as a result of these incidents is therefore not considered to be significant.

Ground Investigation

10.5.43 Interpretative geo-environmental reports produced by WSP | Parsons Brinckerhoff[22,23,24,25,26] have been reviewed to inform the following section. The findings have been summarised in Table 10-6. It was not possible to excavate directly beneath the Trans Pennine Trail so ground conditions have been inferred based on encountered ground adjacent to the Trans Pennine Trail.

[21] Barnsley MBC Consultation response dated August 2017
[22] WSP | Parsons Brinckerhoff (April 2016) Visual Impact Provision: Geotechnical Desktop Study. Work Package 1: Peak District National Park (Report no. 70019952/1).
[23] WSP | Parsons Brinckerhoff (November 2016) Visual Impact Provision: Factual Ground Investigation Report. Peak District East (Report no. 70019952/2).
[24] WSP | Parsons Brinckerhoff (November 2016) Visual Impact Provision: Interpretative Geoenvironmental Report. Peak District East (Report no. 70019952/4).
[25] WSP | Parsons Brinckerhoff (November 2018) Visual Impact Provision: Supplementary Ground Investigation Factual Report 2018. Peak District East (Report no. 62100737.2.SFR).
[26] WSP | Parsons Brinckerhoff (November 2018) Visual Impact Provision: Peak District East Visual Impact Provision: Interpretative Geo-Environmental Report (Report no. PDD-33492-REP-028).

Table 10-6 Summary of Ground Investigations undertaken by WSP | Parsons Brinckerhoff

Borehole / Trial Pit	Summary of Ground Investigation in 2016	Summary of Ground Investigation in 2018
Dates of work	8 August - 26 September 2016	8 August - 24 September 2018
Rationale	The ground investigation locations were chosen to provide a general coverage of the Study Area and also to target identified areas of potential concern including: an electrical substation, areas of historical quarrying and potential infilling; areas of historic railway sidings including a cluster of tanks to the north of the former railway line (now the Trans Pennine Trail).	Obtain further data on the presence of Asbestos Containing Soils (ACS) along the proposed route of the buried cables, the proposed SEC location and the route of the temporary Trans Pennine Trail diversion, as per the recommendations of the 2016 Interpretative Geoenvironmental Report (WSP, 2016); Assess three culverts (Clough Beck, Long Grain and Twin) and the Windle Edge Road Bridge; Complete a soil liquid recipe feasibility assessment, along the proposed route of the buried cables
Field Works	22 No. boreholes using dynamic sampling followed by rotary core where solid geology was encountered. A total of 29 No. trial pits (TP) were excavated by a mechanical excavator.	Utility and topographical surveys of all exploratory locations; Vacuum excavation of seven trial holes; Manual excavation of 13 no. hand dug inspection pits; Machine excavation of 13 no. trial pits; Surface soil sampling at 33 no. locations for chemical analysis;
Zones	To aid the risk assessment process land area covered during the ground investigation was split in to two zones (see Figures 10.4a-d): - Zone 1: Trans-Pennine Trail Public Open Space (POS) & Farm Land - Zone 2: National Grid SEC	To aid the risk assessment process land area covered during the ground investigation was split in to three zones (see Figures 10.4a-d): - Zone 1: Trans-Pennine Trail Public Open Space (POS) & Farm Land - Zone 2: Wogden Foot - Zone 3: Alternate Trail
Visual / olfactory evidence of contamination in Made Ground	Ash, clinker, coal, slag and oily material and odours in Made Ground across the site. Potential asbestos containing material was encountered within one sample at TP125.	Ashy granular Made Ground, occasional clinker and slag. Black oily sheen and moderate organic odour at TP403. Mild sulphurous odour at TP412A-TP415A. Sheen on water ingress within pit at TP416SR. Mild creosote odour and railway sleeper at TP420.

10.5.44 A borehole location plan from the ground investigations can be found in Figures 10.4a-d showing borehole locations.

10.5.45 Made Ground was encountered along the entire length of the ground investigations. This is consistent with the sites historical use as a railway line. The nature and depth of the Made Ground varies significantly.

10.5.46 Alluvium was encountered underlying a thin layer of topsoil or Made Ground to depths of up to 7.05m below ground level. The material varied from soft to firm grey silty Clay with fibrous root remains to silty sandy Gravel with cobbles reflecting the varying depositional environment events and subsequent reworking. Alluvium was found at some locations on land to the north of the Upper River Don.

10.5.47 The Marsden Formation was found across the entire Cable Corridor with the exception of the existing SEC. Depth to the Marsden Formation varied between 3.75m and 10.10m below ground level and was overlain by Alluvium and Made Ground where no superficial deposits were encountered.

10.5.48 The top of the Huddersfield White Rock Formation was encountered in all exploratory hole locations within the existing SEC at depths of 0.40-0.50m below ground level. The top of the solid geology ranged between 0.50m and 4.10m below ground level across the entirety of the Cable Corridor. The Huddersfield White Rock Formation is described by the BGS as medium to coarse-grained massive to flaggy, cross-bedded, micaceous sandstone. The borehole logs recorded the bedrock beneath the site as interbedded fine to medium grained light to dark grey often carbonaceous sandstones with thin bands of siltstone.

10.5.49 Asbestos in Zone 1 (Trans-Pennine Trail Public Open Space (POS) & Farm Land): Asbestos fibres were confirmed within 14 No. of the 115 No. samples collected in Zone 1 from both ground investigations. The majority were encountered in the top 200m of soils. Of these 14 No. samples, four reported asbestos concentrations that exceeded the analytical limit of detection of 0.001% wt/wt. Two samples contained asbestos concentrations in excess of the selected Generic Assessment Criteria (GAC).

10.5.50 Asbestos in Zone 2 (Wogden Foot): Asbestos fibres were confirmed within three of the 64 No. samples collected within Wogden Foot during both ground investigations. Two were reported within 200mm of ground level, however PCOM quantification confirmed that asbestos concentrations were below the analytical limit of detection (0.001% wt/wt).

10.5.51 Asbestos in Zone 3 (Alternate Trail): Asbestos fibres were confirmed within three of the 40 No. samples collected within this part of the site, across the two phases of ground investigation. However, PCOM quantification confirmed that fibre concentrations within all three samples did not exceed the analytical limit of detection (0.001 % wt/wt). During the bulk sampling works two fragments of suspected asbestos samples were confirmed as being asbestos cement, containing chrysotile fibres north of the River Don (near the Twin culvert).

10.5.52 Information obtained was used by WSP PB to undertake a conservative Human Health Generic Quantitative Risk Assessment to assess the suitability of the Study Area for use as residential public open space zone 1 (POS Z1). Concentrations of lead and benzo(a)pyrene were identified to exceed the GAC in ten locations. Table 10-7 below provides a summary of those locations where GAC was exceeded, in order from west to east.

Table 10-7 Summary of POS Zone 1 GAC Exceedances in Soils

Borehole / Trial Pit	Sample depth (mbgl) & Stratum	Contaminant	GAC (mg/kg)	Concentration (mg/kg)	Borehole / Trial Pit Location (see Figures 10.4a-10.4d)
Zone 1 (Trans Pennine Trail)					
TP112	0.10-0.25 Made Ground	Lead	808	1,270	Beneath Trans Pennine Trail (west)
BH204	0.05-0.15	Lead	808	889	Beneath Trans Pennine Trail (west)
TP116	0.10-0.20 Made Ground	Lead	808	1,830	Beneath Trans Pennine Trail (centre)
BH111	1.80-2.20 Made Ground	Benzo(a)pyrene	9.43	13.4	Wogden Foot

Borehole / Trial Pit	Sample depth (mbgl) & Stratum	Contaminant	GAC (mg/kg)	Concentration (mg/kg)	Borehole / Trial Pit Location (see Figures 10.4a-10.4d)
BH112	1.50-1.60 Made Ground	Benzo(a)pyrene	9.43	23.2	Wogden Foot
BH114	1.70-1.80 Made Ground	Lead	808	2,300	Farmland to the northeast of Wogden Foot
HP413	0.20-0.25 Made Ground	Benzo(a)pyrene	9.43	137	Windle Edge Road Bridge beneath a layer of asphalt
TP418SR	0.2-0.3 Made Ground	Lead	808	2,060	Adjacent to Trans Pennine Trail
Zone 2 (existing Sealing End Compound)					
TP102	0.45 Made Ground	Lead	808	2,140	Existing SEC
Zone 2 (Wogden Foot)					
HP410A	0.5-1.0 Made Ground	Lead	808	2,580	Wogden Foot

10.5.53 The above assessment, according to DEFRA (2014) guidance was undertaken using assessment criteria designed for 'public open space within / close to a residential area which is likely to be used regularly by young children'. Given the Proposed Project, this is considered to be an extremely conservative approach. It is likely more appropriate to assess the risk to the general public throughout the lifetime of the Proposed Project using the POS(park) assessment criteria. The assessment criteria for POS(park) for lead and benzo(a)pyrene is 1,300mg/kg and 21mg/kg respectively (DEFRA C4SL 12/2014).

10.5.54 Following completion of the intrusive works in 2016, two rounds of groundwater monitoring were undertaken. The groundwater monitoring network comprised nine monitoring wells. No free product[27] was encountered during the monitoring programme.

10.5.55 Depth to groundwater varied depending on location; in Wogden Foot LWS the groundwater was encountered below the thick layer of Made Ground, and towards the west of the Cable Corridor groundwater was encountered at shallower depths. The depth to groundwater ranged from 0.97m to 7.38m below ground level.

10.5.56 A total of 16 No. groundwater samples were collected over the two rounds of monitoring and scheduled for: Contaminated Land Exposure Assessment (CLEA) metals; dissolved organic carbon; Polycyclic Aromatic Hydrocarbons (PAH) (speciated 16); pH; Benzene, Toluene, Ethylbenzene and Xylenes (BTEX); Meth – Tert-Butyl Ether (MTBE); and Total Petroleum Hydrocarbon Criteria Working Group (TPH CWG).

10.5.57 The following regulatory standards were used as GAC to assess the groundwater analytical results:

[27] Free product or free phase describes hydrocarbon contamination which is present as a discrete substance rather than mixed with water or soil.

- Water Supply (Water Quality) Regulations 2010 – UK Drinking Water Standards (DWS);
- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 – UK Environmental Quality Standards (EQS);
- International Standards (European Council Directive, WHO, USEPA, Surface Water Abstraction Directive) – appropriate for the receptor and in line with UK approach; and
- Laboratory limits of detection for selected hazardous substances where no other standard is available.

10.5.58 A summary of the exceedances in groundwater samples are included below, ordered west to east:

Table 10-8 Summary of GAC Exceedances in Groundwater (2016)

Borehole / Trial Pit	Dates of exceedance	Sample depth & Stratum	Concentration (µg/l)	GAC (µg/l) (source)	Borehole / Trial Pit Location
BH106	18/10/2016	Aliphatic hydrocarbons >C21-C35	26	10 (Analytical LOD)	Beneath the Trans Pennine Trail (west)
	18/10/2016	Fluoranthene	0.18	0.0063 (Freshwater EQS)	
	18/10/2016	Benzo(a)pyrene	0.117	0.00017 (Freshwater EQS)	
	18/10/2016	PAH sum of 4	0.4408	0.1 (UK DWS)	
BH113	02/11/2016	Cadmium	0.539	0.08 (Freshwater EQS)	Farmland to the northeast of Wogden Foot
	18/10/2016	Lead	1.91	1.2 (Freshwater EQS)	
	02/11/2016	Aliphatic hydrocarbons >C21-C35	16	10 (Analytical LOD)	

10.5.59 Whilst minor exceedances of the selected GAC were reported, the Generic Quantitative Risk Assessment (GQRA) concluded that they did not present an unacceptable risk to controlled waters.

10.5.60 Following completion of the intrusive works six rounds of gas monitoring were undertaken. The ground gas monitoring network comprises five monitoring wells. Maximum Methane concentrations of 0.1% were encountered at three locations during the monitoring period. Maximum Carbon Dioxide concentration of 4.40% was encountered at one location with a maximum flow rate of 0.8 l/h. The Gas Screening Value calculated for the Study Area is Characteristic Situation 1 (CS1) indicative of a very low risk, in accordance with CIRIA C665 – should enclosed spaces be incorporated in the development.

Hydrogeology

General Characteristics

10.5.61 There are likely to be many areas of Made Ground beneath the topsoil profile/ upper ground surface as a result of previous land uses (including railway tracks) and

potential for infilling of historical quarries. The nature of the Made Ground is likely to be highly varied in nature and permeability providing little protection to the underlying superficial or bedrock geology from any contamination sources at the surface.

10.5.62 Superficial deposits beneath the Study Area (where present) comprise Alluvium with some areas of Head Deposits. These have been classified as Secondary A Aquifers by the Environment Agency. Secondary A Aquifers comprise a wide range of permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

10.5.63 The bedrock underlying the majority of the Site Boundary has been identified as the Marsden Formation comprising sandstones, interbedded with grey siltstone and mudstone and subordinate black shales, thin coals and seatearths. The bedrock beneath the Site Boundary and wider Study Area (1km buffer) has been classified as a Secondary A Aquifer.

10.5.64 No groundwater Source Protection Zones (SPZs) or designated sites for geological protection have been identified within the Study Area.

Groundwater Abstractions

10.5.65 Environment Agency records within the Groundsure Enviro Insight Report indicate that there are at least two active licensed groundwater abstraction points within the Study Area (1km buffer), listed below in Table 10-9 and on Figure 10.6. However, none have been identified within the Site Boundary.

Table 10-9 Active Groundwater Abstraction Licenses

Name	Use	Source	Distance	Direction
Yorkshire Water Services Ltd	Potable Water Supply - Storage	Surface Water	103m	Southeast
Yorkshire Water Services Ltd	Potable Water Supply - Storage	Surface Water	779m	South

10.5.66 Information regarding Private Water Supplies was provided by Barnsley Metropolitan Borough Council. These have been summarised in Table 10-10 and Figure 10.6.

Table 10-10 Nearby Private Water Supplies

Location	PWS Type	Depth	Water Treatment
Pennine Cottage	Spring (Domestic)	Unknown	Unknown
Stoneygate House	Spring (Domestic)	Unknown	Unknown
Hazelhead Hall Farm	Borehole (Spring)	Unknown	Unknown

10.5.67 According to the Groundsure Enviro Insight Report, groundwater flooding susceptibility areas lie within 50m of the Site Boundary. This is in relation to the potential at Surface for Clearwater Flooding meaning that given the geological conditions in the area, the groundwater flooding hazard from unconfined aquifers should be considered.

10.5.68 The Environment Agency has confirmed that there are no licensed abstraction points which will be impacted by the Proposed Project.

Vulnerability of Groundwater Resources

10.5.69 Laboratory analysis of 16 No. groundwater samples were undertaken as part of the groundwater monitoring programme in 2016. Marginally elevated concentrations of cadmium, lead, high molecular weight hydrocarbon fractions and PAH compounds were identified within the groundwater beneath the site (see Table 10-8). It was concluded within the risk assessment that the GAC exceedances were not considered to represent a significant risk to controlled waters.

Hydrology

10.5.70 Surface water features include the Upper River Don (classed as a Secondary River within the Groundsure Enviro Insight report) which runs through the centre of the Site Boundary from west to east. The sections of the Upper River Don within the Site Boundary have been classified within the Groundsure Enviro Insight report as being of 'Good' Biological Quality and 'Very Good' Chemical Quality.

10.5.71 Five tributaries lead into the Upper River Don from the south within the Site Boundary. Two of these have been classed as secondary rivers, one of which is named Clough Brook, and three as tertiary rivers (drains). Information from the Groundsure Enviro Insight report indicates that the two secondary tributaries and the western tertiary tributary are culverted at the point of confluence with the Upper River Don.

10.5.72 The Winscar Reservoir is also located c. 100m to the northwest of the Site Boundary.

10.5.73 A number of potable surface water abstraction points have also been identified within the Study Area (1km buffer).

10.5.74 The assessment of surface water features is included within Chapter 9 Water Resources.

Mineral Exploitation Sites

10.5.75 Coal Outcrops have been identified within the Study Area (1km buffer) on land to the south of the B6106 and to the west of Soughley. An area of past shallow coal mine working and a Mine Entry point (adit / mine level) is potentially located c.100m west of Soughley according to the Coal Authority Mapping.

10.5.76 BGS GeoIndex records and the Coal Authority mapping indicate that part of the Site Boundary to the east lies within a Coal Mining Reporting Area. With a large portion of the Site Boundary above the River Don being within a Surface Coal Resource Area.

10.5.77 The Groundsure Geo Insight report identifies Historical Coal and Non-Coal Mining (including Non-Coal Mining cavities) within the Study Area (1km buffer). Several historical underground working features have been identified within the Study Area including disused tunnels and air shafts and within the Site Boundary (tunnel) (the status of infilling is unknown).

10.5.78 Within the Site Boundary, land in the vicinity of Soughley and land to the south of the B6106 have been classified as being a Development High Risk Area. However, given that no development is proposed within these areas, this does not affect the Proposed Project.

10.5.79 The initial scoping opinion response from The Coal Authority states that as Site Boundary does not fall within the defined coalfield, there is no requirement therefore to consider coal mining issues as part of the planning application or to consult The Coal Authority.

10.5.80 Records of Non-Coal Mining activity within the Site Boundary include mining of vein minerals. The majority of the identified land associated with Non-Coal mining activity is likely to have been associated with sporadic underground mining of restricted

extent. Some areas to the north of the existing Trans Pennine Trail may have been subject to localised small scale underground mining. However, according to the Groundsure Geo Insight report, the potential for difficult ground conditions across the Study Area is unlikely and localised and is at a level where they need not be considered. One area of Non-Coal mining cavities associated with the mining of Fireclay has been identified at the point where Wogden Clough flows beneath the Trans Pennine Trail in the east of the Study Area.

Statutory and Non-Designated Sites

10.5.81 A review of the MAGIC Maps[28] have identified the following sensitive land uses in the Site Boundary or within close proximity. These are discussed in further detail in Chapter 7 Ecology:

- Dark Peak SSSI
- South Pennine Moors Special Area of Conservation and South Pennine Moors Phase 1 Special Protection Area
- Peak District Moors National Park

Unexploded Ordnance

10.5.82 The regional unexploded bomb risk for South Yorkshire suggests that the Study Area lies within an area of 'low' bomb risk[29].

10.6 Key Parameters for Assessment

10.6.1 Best Practice Pollution Prevention techniques will be used onsite during construction and will be embedded into the design of the project. Best practice pollution prevention will be detailed in the Construction Environmental Management Plan (CEMP)[30]. This will include reference to relevant guidance such as the Environment Agency Guidance[31] to "Protect groundwater and prevent groundwater pollution" and the relevant Pollution Prevention Guidelines (PPGs)[32] and Guidance for Pollution Prevention (GPP)[33] Documents. GPP documents are based on relevant legislation and reflect current good practice. The GPP documents have replaced the withdrawn PPGs, however where no GPP is yet available the information provided within the relevant PPGs is still considered as best practice.

10.6.2 All relevant guidance documents have been listed in Table 10-11:

[28] Natural England / DEFRA Multi-Agency Geographic Information for the Countryside (MAGIC). Available online via: http://magic.defra.gov.uk/MagicMap.aspx (viewed October 2018)

[29]Zetica (2018) UXO risk maps. Available online http://zeticauxo.com/downloads-and-resources/risk-maps/. Accessed 27 March 2018

[30] Peak District East Construction Environmental Management Plan

[31] Environment Agency Guidance to "Protect ground water and prevent ground water pollution" published 14 March 2017

[32] Pollution Prevention Guidelines. Accessed October 2018. Available online at : https://www.gov.uk/government/collections/ground water-protection

[33] Guidance for Pollution Prevention. Accessed October 2018. Available online at : https://www.gov.uk/government/collections/ground water-protection

Table 10-11 Summary of Guidance Documents

Title	Details
PPG1: Understanding your environmental responsibilities	An introduction to pollution prevention including containment, waste and emergency planning.
GPP2: Above ground oil storage tanks.	This will advise the correct storage of oils across the Areas for permanent and temporary works, particularly within the proposed SEC and contractor compounds to minimise the risk of causing pollution.
GPP5: Works and maintenance in or near water.	Given the proximity of several streams and ponds to the proposed areas of temporary and permanent works there is the potential to cause pollution, transfer non-native species and can impact on the bed and banks of a watercourse.
PPG 6: Working at construction and demolition sites.	An overarching document providing best practise principles and examples to be used as guidance on how to prevent pollution.
PPG 7: Safe Storage – the safe operation of refuelling facilities	Including guidance on small scale liquid refuelling of plant and machinery on site to prevent damage to surface waters, groundwater, land and air.
GPP8: Safe storage and disposal of used oils.	The correct handling of waste during the construction period and during ongoing maintenance, including waste oils, must be safe and secure. Waste minimisation is the preferred option. Waste is regulated under the Duty of Care Regulations. Oil storage is regulated under the Oil Storage Regulations (see GPP2).
GPP13: Vehicle washing and cleaning.	Effluent and run-off from vehicle washing and cleaning can damage the environment and pollute rivers, streams, burns and groundwater. It may be a legal requirement to arrange the collection and disposal of effluent and run off. If vehicle wash areas are required on site these should be managed appropriately.
GPP19: Vehicles: Service and Repair.	The repair and maintenance of machinery and plant must be conducted in an appropriate location and properly managed.
PPG 20: Dewatering underground ducts and chambers	Protection of controlled waters during any dewatering works to avoid pollution.
GPP21: Pollution incident response planning.	Production of a plan will help to prevent or reduce environmental damage of such an incident occurs. A template is available to assist the production.
PPG 26: Safe Storage – drums and intermediate bulk containers (IBCs)	Good practice guidance for the safe storing and handling of small containers and IBCs to reduce the risk of pollution from sites to land, surface waters and ground water.

10.6.3 Mitigation measures that have been adopted as part of the evolution of the Proposed Project design (embedded into the project design) and that are relevant to this chapter are listed below.

10.6.4 During Construction/Reinstatement:

- A CEMP will be prepared and used to manage environmental impacts during construction; this will include measures for controlling dust and general pollution from construction operations to the surface and groundwater

environments and details of the approach to soil management to ensure protection, conservation and reinstatement of soil material, its physical and chemical properties and functional capacity for its intended end use.

- Appropriate industry best practice and published guidelines will be followed to reduce pollutant and sediment movement during construction.
- All fuel and chemical storage will comply with relevant storage regulations.
- Suitable precautions will be taken to prevent spillages from equipment containing small quantities of hazardous substances.
- Deep excavations may require de-watering. Water pumped or removed from excavations will be passed through a silt-separator tank or equivalent, and discharge to ground. If there was a requirement to discharge to surface water a permit would be sought from the Environment Agency prior to undertaking such operations.
- Environment Agency guidance on the assessment of risks from potentially contaminated land will be followed in line with CLR11.
- Work will stop if any previously unidentified contamination is encountered until the nature and concentration of the contaminant(s) are determined and appropriate risk control measures implemented.
- Clay bungs or other vertical barriers will be constructed within trench excavations where deemed necessary to prevent the creation of preferential drainage pathways or to prevent the creation of preferential migration pathways for contaminants (where suspected).
- A Construction Traffic Management Plan will be prepared to secure appropriate routing and management of construction traffic.
- In accordance with the Soil Management Plan (SMP) all soils will be stored as far away from watercourses as practical and any potentially contaminated soil will be stored on an impermeable surface and covered to reduce leachate generation and potential migration to surface waters.
- Stabilised backfill will be packed around cables in order to aid heat dissipation.
- Measures contained in relevant DEFRA and Environment Agency best practice guidance on the control and removal of invasive weed species will be implemented.
- The main works contractor will cease work and advise the Animal Health Regional Office should animal bones be discovered which indicate a potential burial site.
- Following completion of construction operations all agricultural land will be restored to its previous condition unless specified otherwise in the LEMP. Topsoil will be prepared and seeded using an appropriate seed mix or returned to previous cultivation. A LEMP has been prepared to detail restoration objectives in key sensitive areas such as Wogden Foot LWS.
- Following the completion of all cable installation construction works, the land within the working width will be fully reinstated as near as practically possible

to its former condition, or as agreed with landowners and stakeholders in advance (this will include the reinstatement of most stretches of drainage ditches and existing culverts).

- In relation to temporary land take requirements or access limitations National Grid will liaise with landowners to agree commercial terms with affected parties including any loss of ongoing payments or fines relating to agri-environmental stewardship schemes. In addition, in discussion with landowners, temporary water supplies and troughs will be provided for livestock as necessary.
- All construction equipment will be maintained in good working order and any associated noise attenuation measures such as engine casings and exhaust silencers shall remain fitted at all times.
- Construction will not be undertaken during extreme wet weather where erosion of sediments and risk from flooding may increase and where there is a risk of structural damage to soils during handling.

10.6.5 During Operation:

- Use of appropriate measures to prevent spillage of potentially polluting substances.
- Fuels, lubricants, solvents etc. will be stored in appropriately bunded areas and a range of other pollution prevention measures taken.

10.6.6 For areas of permanent land take or any permanent restriction of certain activities above the cables, these will be discussed with affected landowners and secured in the commercial terms.

10.6.7 During Decommissioning:

- To prevent further disruption to the Trans Pennine Trail the cable will be left in situ if it is no longer required when it reached the end of its life expectancy.

10.7 Predicted Impacts

Assessment of Impacts During Construction

10.7.1 The significance of potential effects that could arise during the construction phase of the Proposed Project (as defined in Tables 10-1, 10-2 and 10-3) are discussed below.

Trans Pennine Trail Diversion – Subject to Planning Application

10.7.2 Trans Pennine Trail Diversion shall require the disturbance of ground including a degree of cut and fill work along its length and the works to install Permanent Bridge 1 and Temporary Bridge 2 as well as associated temporary works and laydown areas. The impacts of the construction phase of the Trans Pennine Trail Diversion are considered below.

Impact on Soils or Controlled Waters through Spillages

10.7.3 Chemical, fuel and oil spillages during the construction phase could result in the contamination of soils and controlled waters though leakage or leaching of chemicals such as fuels, lubricants and solvents. Spills could occur from routine plant maintenance, improper storage and accidental spillages of potentially hazardous substances both stored and used on site, presenting a hazard to the soils and controlled waters.

10.7.4 A number of chemicals, fuel and oil, will be stored in the temporary laydown areas and used on-site during the installation / construction, although overall quantities are considered likely to be very small. Stationary plant, such as generators, dewatering pumps, compressors and cranes, may be sources of hydrocarbon spills, which could occur through leaks or spills during refuelling, and tracks and compounds where vehicles are re-fuelled or on stand-by, are additional potential sources of contamination. The CEMP will address the potential contamination risks resulting from spillages during the construction.

10.7.5 The groundwater beneath the Study Area is classified as a Secondary A Aquifer but the Study Area is not located within a groundwater SPZ. A number of private water supplies have been identified within the Study Area however the Environment Agency stated that there are no licensed abstractions that will be impacted by the Proposed Project. With the implementation of the embedded mitigation outlined, specifically the CEMP, there would be a **Negligible** impact on a receptor of **Medium** sensitivity, resulting in a **Negligible** effect which is **Not Significant**.

10.7.6 The majority of the nearby land use to the Trans Pennine Trail Diversion is as agricultural land. The underlying soils of these lands are considered to have a Low value. With the implementation of the embedded mitigation outlined above, specifically the CEMP, there would be a **Negligible** magnitude of potential impact on a receptor of **Low** sensitivity, resulting in a **Negligible** effect which is **Not Significant**.

Impact on Soils or Controlled Waters from Existing Made Ground

10.7.7 A ground investigation was undertaken within the Study Area as outlined in section 10. to assess ground conditions. Made Ground was encountered at all locations. Concentrations of lead and benzo(a)pyrene were identified to exceed the HH GAC in eight locations. Quantifiable amounts of asbestos fibres were identified in four of the 219 No. soil samples. Fragments of asbestos cement containing chrysotile fibres were identified at ground level on land to the north of the River Don (near the Twin culvert). Soils should be stored separately to avoid the mixing of Made Ground with natural soils.

10.7.8 Whilst minor exceedances of the selected GAC were reported at two locations, the GQRA concluded that they did not present a significant risk to controlled waters and the potential effect has therefore not been assessed further.

10.7.9 The land at the locations of the proposed temporary works and laydown areas for the project comprise predominantly agricultural land with a paved recreational public trail, the existing Trans Pennine Trail, running from west to east. These soils are considered to have a Medium significance. With the diversion works rerouting the existing Trans Pennine Trail and the implementation of the embedded mitigation outlined above, specifically the CEMP, there would be a **Negligible** impact on a receptor of **Medium** sensitivity, resulting in a **Negligible** effect which is **Not Significant**.

Impacts on Human Health

10.7.10 Ground investigations undertaken for the Proposed Project in 2016 and 2018 indicated that some sources of land contamination may be present. It is considered that this has the potential to affect construction staff and members of the public during the construction phase. These are considered to have **High** receptor sensitivity. With the implementation of the embedded mitigation outlined above, specifically use of the CEMP, which states that asbestos removal works will be carried out as applicable along the route of the Trans Pennine Trail Diversion and within Wogden foot whilst the Diversion is closed to Trans Pennine Trial users, there

would be a **Negligible** impact on a receptor of **High** sensitivity resulting in a **Minor** effect which is **Not Significant**.

10.7.11 No risk from ground gases (methane and carbon dioxide) to human health was identified during the ground investigation works and the potential effect has therefore not been assessed further.

10.7.12 The potential effect from radon is considered during the operational phase.

Impact on Structure of Soils

10.7.13 There is the potential for the Proposed Project to impact soils from activities such as the development of temporary haul roads and laydown areas, tracking over soils and excavating/stockpiling/backfilling across the route, and during excavation works from unstable excavations and erosion of soils from potential groundwater ingress, especially if groundwater is high. Groundwater has been found to be seasonally variable and may be higher in some areas. For example, where the stream routes or spring-lines cross the Trans Pennine Trail diversion or within dissolution features.

10.7.14 Relevant embedded mitigation measures, including dewatering and limiting of excavation works in periods of adverse weather, will result in a **Negligible** impact on a **Medium** sensitivity receptor. This would cause a **Negligible** effect on soils.

Impact on Geology

10.7.15 The site geology is considered to have a **Low** sensitivity. The Groundsure report identified a moderate to high risk of landslides and compressible ground as a result of earthworks and the construction of permanent structure (Assessed as a potentially **Medium** magnitude of effect. This results in a **Minor** potential effect which is **Not Significant**.

Sealing End Compound – Subject to Planning Application

10.7.16 Both the Trans Pennine Trail Diversion and the SEC require disturbance of ground and the impacts are considered the same as those assessed for the Trans Pennine Trail Diversion, please refer to paragraphs 10.7.2 to 10.7.15.

10.7.17 In addition, regarding the Impact on Soils or Controlled Waters through Spillages, the SEC will be located within Wogden Foot Local Wildlife Site. This land use is considered to have a high significance. With the rerouting of the existing route of the Trans Pennine Trail and the implementation of the embedded mitigation outlined above, specifically the CEMP, there would be a **negligible** impact on a receptor of **High** sensitivity, resulting in a **Minor** effect which is **Not Significant**.

Access Point 7 and Northern Access Road – Subject to Planning Application

10.7.18 As the construction of the temporary Access Road and Access Point 7 shall require, all be it limited, ground works, in relation to this assessment the impacts are considered the same as those assessed for the Trans Pennine Trail Diversion, please refer to paragraphs 10.7.2 to 10.7.15.

400kV Cables (Undergrounding)

10.7.19 Both the Trans Pennine Trail Diversion and the 400kV Cables (Undergrounding) require disturbance of ground and the impacts are considered the same as those assessed for the Trans Pennine Trail Diversion, please refer to paragraphs 10.7.2 to 10.7.15.

10.7.20 Regarding the Impact on Soils or Controlled Waters through Spillages, the majority of the cable undergrounding route comprises a car park and a paved recreational public trail, the existing Trans Pennine Trail. Other nearby land uses are predominantly agricultural land. These underlying soils are considered to have a Low value. With the rerouting of the existing route of the Trans Pennine Trail and

the implementation of the embedded mitigation outlined above, specifically the CEMP, there would be a **Negligible** magnitude of potential impact on a receptor of **Low** sensitivity, resulting in a **Negligible** effect which is **Not Significant**.

Removal of Existing Infrastructure (VIP subsection)

Impact on Soils or Controlled Waters through Spillages

10.7.21 Removal of existing concrete foundations will include excavation of surrounding soils. The assessment included in the Trans Pennine Trail Diversion Section (paragraphs 10.7.2 to 10.7.15) will therefore also apply for infrastructure removal works.

Impact on Human Health

10.7.22 Quantifiable concentrations of asbestos fibres or ACMs were not identified within soils sampled in Wogden Foot. The CEMP should be followed in order to protect human health.

10.7.23 As the 400kV OHL would be removed, no operational or decommissioning phases would be relevant for this component of the Proposed Project.

10.7.24 Land in the vicinity of the existing infrastructure comprises predominantly agricultural land with a paved recreational public trail, the Trans Pennine Trail, running from west to east. These soils are considered to have a Medium sensitivity. With the rerouting of the existing route of the Trans Pennine Trail and the implementation of the embedded mitigation outlined above, there would be a **Negligible** impact on a receptor of **Medium** sensitivity, resulting in a **Negligible** effect which is **Not Significant**.

Construction of Replacement Pylon 4ZO 157R

10.7.25 The construction phases of the Trans Pennine Trail Diversion Section and Pylon 4ZO157R both require the disturbance of ground and the impacts are considered the same as those assessed for the Trans Pennine Trail Diversion Section (paragraphs 10.7.2 to 10.7.15)

Assessment of Impacts During Operation

Sealing End Compound – Subject to Planning Application

Impact on Soils or Controlled Waters through Spillages

10.7.26 On-site activities will be limited to maintenance works. Use, storage, emissions and accidental spillages during these operations are likely to be limited and infrequent.

10.7.27 With the implementation of the embedded mitigation outlined above, specifically relating to the use of appropriate measures to prevent spillage of potentially polluting substances and the use of appropriately bunded areas for the storage of fuels, lubricants solvents, other pollution prevention measures taken where appropriate, there would be a **Negligible** impact on a receptor of **Medium** sensitivity, resulting in a **Negligible** effect which is **Not Significant**.

Impact on Soils or Controlled Waters from Existing Made Ground

10.7.28 The groundwater beneath the majority of the operational works is classified as a Secondary Aquifer. No groundwater SPZs have been identified on or within 500m of the site. Private potable water supplies have been identified within the Site Boundary which are considered to have a High sensitivity. With the implementation of the embedded mitigation outlined above, specifically relating to the use of appropriate measures to prevent spillage of potentially polluting substances and the use of appropriately bunded areas for the storage of fuels, lubricants solvents, there

would be a **Negligible** impact on a receptor of **High** sensitivity, resulting in a **Minor** effect which is **Not Significant**.

Impact on Geology

10.7.29 Areas of Sandstone and Brick Clay bedrock have been identified on the South Yorkshire Mineral Resources Map. Sterilisation of local mineral resources will occur for the lifetime of the development in the vicinity of the Cable Corridor. The site is not located in a mineral safe guarding zone.

10.7.30 Given the above, the geology at the site is considered to have a Low significance. There would be a **Negligible** impact on a receptor of **Low** sensitivity, resulting in a **Negligible** effect which is **Not Significant**.

Impacts to Human Health

10.7.31 Radon may build up in confined spaces such as manholes and any permanent structures on site, however, these are not likely to be considered "occupied" spaces (i.e. more than 50 hours per year) with presumed sporadic maintenance visits only and then under confined space working procedures. Protective measures are not considered necessary. If any confined spaces are to be occupied for more than 50 hours per year during operation then basic protection measures would be required within buildings or other enclosed spaces.

400kV Cable (Undergrounding)

10.7.32 Both the operational phases of the 400kV Cable and the SEC will be limited to maintenance works and as such the impacts of the 400kV Cable (Undergrounding) are considered the same as those assessed for the SEC, please refer to paragraphs 10.7.26 to 10.7.30.

Replacement Pylon 4ZO 157R

10.7.33 The operational phase of Pylon 4ZO157R will be limited to maintenance works and as such the impacts are considered the same as those assessed for the Sealing End Compound, please refer to paragraphs 10.7.26 to 10.7.30.

Assessment of Impacts During Decommissioning

Sealing End Compound

10.7.34 This Environmental Assessment Report assumes that the SEC would be removed if no longer required, with the foundations removed to a depth of approximately 1m. Potential impacts are therefore likely to be similar but on a smaller scale than the construction phase. These impacts can be managed as per measures during the construction phase and with reference with any new guidance and legislation that may be in place at the time of decommissioning.

There would therefore be a **Negligible** magnitude of potential impact on a receptor of **Low** sensitivity, resulting in a **Negligible** effect which is **Not Significant**.

400kV Cable (Undergrounding)

Impact on Soils and Geology

10.7.35 Potential impacts arising from decommissioning activities are likely to be similar but on a much smaller scale than the construction phase, as the cable is to remain in-situ. These impacts can be managed as per measures during the construction phase and with reference to any new guidance and legislation that may be in place at the time of decommissioning. The site geology is considered to have a **Low** sensitivity and the potential magnitude would be **Low** resulting in a **Negligible** effect which is therefore considered to be **Not Significant**.

10.7.36 The Trans Pennine Trail diversion during the course of the construction works will be decommissioned following its intended use. Reinstatement will require any temporary tracks and access tracks to be removed. Any effects are therefore considered to be temporary and **Not Significant**.

10.7.37 Following completion of decommissioning operations all agricultural land will be restored to its previous condition with the exception of the access track from the Dunford Bridge car park to the YM monitoring station which will remain for limited use by YW and local landowners. Topsoil will be prepared and seeded using an appropriate seed mix or returned to previous cultivation. Any imported material or soils shall be subject to a waste assessment to determine suitability for use.

10.7.38 There would therefore be a **Negligible** magnitude of potential impact on a receptor of **Low** sensitivity, resulting in a **Negligible** effect which is **Not Significant**.

Impacts to Human Health

10.7.39 Access tracks left in situ will not be accessible by the general public and so no potential contaminant linkage will be present. The CEMP should be updated as appropriate and implemented in order to protect health of construction workers.

The decommissioning of the SEC and the replacement Pylon 4ZO157R would both include the disturbance of soils during the removal of foundations and, as with the SEC assessment, impacts can be managed as per measures during the construction phase and with reference with any new guidance and legislation that may be in place at the time of decommissioning.

There would therefore be a **Negligible** magnitude of potential impact on a receptor of **Low** sensitivity, resulting in a **Negligible** effect which is **Not Significant**.

10.8 Mitigation

10.8.1 The embedded mitigation measures to address the potential effects over the lifetime of the development from construction, operation and decommissioning are detailed in 10.6.

10.8.2 In view of information gathered throughout this assessment, it is considered that suitable PPE and good hygiene practices will be sufficient to reduce the risk to human health during the construction works. However, if previously unidentified contamination is observed then this should be assessed prior to continuation of works in that area. This is particularly relevant in areas where no detailed ground investigation information is available.

10.8.3 As included in the CEMP, land to the north of the River Don (near the Twin culvert) should not be used as an alternate trail by the general public until asbestos removal works have been undertaken.

10.8.4 The impacts with respect to soils, geology and contaminated land were assessed with **no significant** (moderate or above) impacts identified.

10.8.5 Therefore, no further additional applied mitigation measures are considered necessary in respect to soils, geology and contaminated land

10.9 Cumulative Effects

10.9.1 No significant cumulative impacts are anticipated. Impacts to ground conditions are to be localised to the Proposed Project.

10.10 Summary of Residual Effects

10.10.1 The potential effects during the construction, operation and decommissioning stages of the Proposed Project have been considered. This section takes into account the mitigation measures described in the previous section and hence effectively forms an assessment of residual effects.

Summary of Residual Effects During Construction

10.10.2 During construction the principal impacts relate to the potential for contamination of soils or controlled waters through spillages during construction and damage to soils through construction activities and excavation works. There is the potential for human health impacts to construction workers and the general public given the presence of asbestos fibres and ACMs at ground level. However these risks can be mitigated through additional measures and implementation of health and safety requirements detailed in CEMP.

10.10.3 The assessment identified that there would be **no significant** effects relating to contaminated land or geology.

10.10.4 The assessment has identified that the residual effects to soils, geology and contaminated land are **Negligible** with **no significant** effects identified.

Summary of Residual Effects During Operation

10.10.5 During operation the principal impacts relate to the potential for contamination of soils or controlled waters through accidental spillages.

10.10.6 The assessment has identified that the residual effects to soils, geology and contaminated land are **Negligible** with **no significant** effects identified.

Summary of Residual Effects During Decommissioning

10.10.7 The assessment has identified that the residual effects to soils, geology and contaminated land during decommissioning are **Negligible** to Minor Adverse with **no significant** (moderate of above) effects identified.