

8. Geo-Environmental

8.1 Introduction

8.1.1 This Chapter describes the Geo Environmental impacts and effects associated with the proposed development of a Combined Heat and Power Facility ('Energy Facility') on Land off Knitsley Lane in Hownsghill Industrial Estate Consett, Durham. The assessment has been carried out by Steve Rhodes on behalf of Enzygo Ltd.

8.1.2 This chapter is supported by the following technical Appendices to the Environmental Statement (ES):

-) Phase I Preliminary Risk Assessment (Appendix 8.1):
-) Ground Investigation Interpretative Report (Appendix 8.2):

8.2 Aims and Objectives

8.2.1 The aims of this assessment was to utilise existing desk study information and previous ground investigation reports made available to assess the nature and significance of potential impacts against baseline conditions for the site and proposed development.

8.3 Legislation and Policy Context

National Policy and Legislation

8.3.1 Contaminated land is addressed through the following key Acts of Parliament:

-) Environmental Protection Act, 1990, requiring the identification and remediation of Contaminated Land ⁽¹⁾.
-) Water Resources Act, 1991, governing the control of pollution of groundwater and surface water including that from contaminated land ⁽²⁾.
-) Town and Country Planning Act, 1991, which requires contamination to be assessed and addressed as part of development ⁽³⁾.
-) The Environment Act, 1995, which clarifies the role of the above legislation in assessing and implementing remediation ⁽⁴⁾.

8.3.2 The key Acts of Parliament are supported by subordinate Regulations.

8.3.3 The National Planning Policy Framework (NPPF), 2019⁽⁵⁾ provides the following requirements in relation to Contamination and Pollution:

- 8.3.4 Paragraph 117 requires that: “Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses; whilst safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much as possible of previously-developed or “brownfield land”.”
- 8.3.5 Paragraph 118 (c) requires: “ give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land.”
- 8.3.6 Paragraph 119 requires that: “Local planning authorities and other plan-making bodies, should take a proactive role in identifying and helping to bring forward land that may be suitable for meeting development needs, including suitable sites on brownfield registers or held in public ownership, using full range of powers available to them.”
- 8.3.7 Paragraph 178 requires that Planning policies and decisions should ensure that:
- “a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);
- b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and
- c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.”
- 8.3.8 Paragraph 179 requires: “Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.”
- 8.3.9 The NPPF advises that due weight should be given to Local Plans particularly where there is no conflict with the NPPF.

County Durham Local Plan

- 8.3.10 The County Durham Plan was adopted in October 2020 and includes the following pertinent policies:
- 8.3.11 Policy 32 relates to Despoiled, Degraded, Derelict, Contaminated and states that development will not be permitted unless the developer can demonstrate that:

“a. any existing despoiled, degraded, derelict, contaminated or unstable land issues can be satisfactorily addressed by appropriate mitigation measures prior to the construction or occupation of the proposed development;

b. the site is suitable for the proposed use, and does not result in unacceptable risks which would adversely impact on the environment, human health and the amenity of local communities; and

c. all investigations and risk assessments have been undertaken by an appropriately qualified person”.

8.4 Assessment Methodology

Relevant Guidance

8.4.1 “Contaminated Land” is defined under the Environmental Protection Act as “any land which appears to the local authority in whose area it is situated to be in such condition, by reason of substances in, on or under the land, that:

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

) Pollution of Controlled Waters is being, or is likely to be caused.

8.4.2 Assessment of contamination uses a risk based approach to determine risk of harm or pollution of controlled waters and is based on a pollutant linkage being present. This requires the presence of:

- Source of Contamination
- Pathway for the contaminant source to move to the receptor; and
- Receptor affected by the contaminant, such as human beings, controlled waters, ecology or the built environment.

8.4.3 Ground instability is assessed using professional judgement and reference to Codes of Practice and guidance documents including, but not limited to:

) Eurocode 7: Geotechnical Design (1997) ⁽⁷⁾;

) British Standards BS8004 Code of Practice for Foundations ⁽⁸⁾;

) British Standards BS6031 Code of Practice for Earthworks ⁽⁹⁾; and

8.4.4 The site conditions have been assessed based on a desk study and previous site investigations. Impacts of the development are based on the details of the proposed development.

Consultation

8.4.5 In carrying out the Geo Environmental assessment, consultation has included:

-) The formal scoping process;

The Study Area

8.4.6 The study area for Geo Environmental effects are the site, neighbouring site users and controlled waters.

Baseline Assessment

8.4.7 The baseline assessment consists of:

-) Potential impacts on the development from contamination in the ground and groundwater;
-) Potential impacts from the development on land and water quality; and
-) Potential for creation of new pathways which could cause existing contamination to impact an existing receptor.

Assessment of Impact

8.4.8 The method outlined below is designed to lead to an assessment of the significance of effect of the proposed development on the ground. The approach followed during the assessment considered the degree (of the “significance”) of the potential impacts on the geological, hydrogeological and hydrological characteristics of the Site.

8.4.9 The significance has been defined taking into account the sensitivity of the receiving environment or structure and the potential magnitude of the impact.

8.4.10 The sensitivity of the receiving environment, i.e. its ability to absorb the impact without perceptible change is defined in Table 8.1 below.

Sensitivity	Definition
Major	High quality and rarity, regional or national scale and limited potential for substitution/replacement. End users who are more vulnerable. Structures which are easily damaged and cannot be repaired. <ul style="list-style-type: none">) Residential development.) Site of Special Scientific Interest (SSSI) or Special Area of Conservation (SAC).) Buildings which can accept no movement.
Moderate	Receptor with a high quality and rarity, local scale and limited potential for substitution/replacement or receptor with a medium quality and rarity, regional or national scale and limited potential for substitution/replacement. End users who are vulnerable. Structures which are easily damaged but can be repaired. <ul style="list-style-type: none">) Play Areas.

	<ul style="list-style-type: none">) Areas of ecological interest.) Buildings which can be repaired
Minor	<p>Receptor with a medium quality and rarity, local scale and limited potential for substitution/replacement or receptor with a medium quality and rarity, regional or national scale and limited potential for substitution/replacement. End users who are vulnerable. Structures which are easily to repair.</p> <ul style="list-style-type: none">) Landscape Areas.) Areas of limited ecological interest.) Roadways.
Neutral	<p>Low quality and rarity, regional or national scale and limited potential for substitution/replacement. End users who are less vulnerable and. Structures which are difficult to damaged and easy to repair.</p> <ul style="list-style-type: none">) Commercial Development.) Areas of no ecological interest.) Earthworks

Table 8.1 Degree of Sensitivity

8.4.11 The magnitude of the effect includes the timing, scale, size and duration of the potential effect. For the purpose of this assessment the magnitude criteria defined in Table 8.2 are used:

Magnitude	Significance Scale
Major	Severe detrimental effect on human health. Permanent detrimental effects on animal or plant populations. Permanent detrimental effect to nationally or regional important geological feature. Catastrophic failure of structures.
Moderate	Moderate detrimental effect on human health. Severe temporary detrimental effects on animal or plant populations. Severe detrimental effect to nationally or regional important geological feature. Significant damage to structures requiring substantial repair.
Minor	Temporary and minor detrimental effect to human health. Reversible detrimental effect on animal or plant populations. Reversible detrimental effects to nationally or regionally important geological feature. Small damage to structures requiring minor repair.
Neutral	No appreciable impact on human, animal or plant health, or geological feature of importance. Any minor adverse effects are reversible. No damage to structures requiring repair.

Table 8.2 Magnitude of Effect

8.4.12 The sensitivity of the receiving environment together with the magnitude of the effect defines the significance of the effect prior to application of mitigation measures as outlined in Table 8.3.

Magnitude	Significance of Receptor			
	Major	Moderate	Minor	Neutral
Major	Major	Major	Moderate	Neutral
Moderate	Major	Moderate	Minor to Moderate	Neutral
Minor	Moderate	Minor to Moderate	Minor	Neutral

Neutral	Neutral	Neutral	Neutral	Neutral
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Table 8.3: Significance

8.4.13 Potential effects are therefore considered to be of major, moderate, minor or negligible. Effects are considered Beneficial where they provide positive enhancement or Adverse where the impact is negative.

8.4.14 This assessment considers whether the residual significance of the resultant impacts of the restoration of the Application Site will be major, moderate, minor, and negligible, once appropriate mitigation measures have been implemented. This assessment relies on professional judgment to ensure that the impacts are appropriately assessed. Impacts of moderate significance or greater are considered significant in terms of the EIA regulations and should be taken into account during the decision making process.

8.4.15 Assessment considers both construction and operational phase of development.

Cumulative

8.4.16 Due to the localised nature of Geo Environmental impacts it is considered that there are no cumulative impacts.

Limitations

8.4.17 The study is limited to the Phase I Preliminary Assessment undertaken together with site investigation documents provided.

8.5 Baseline Conditions

8.5.1 The Application Site comprises an area of grass covered land with a earth bund noted along the south eastern site boundary. Surrounding land uses comprise commercial developments and fields.

8.5.2 The desk study identified that the site comprised fields with earthworks identified, including a railway embankment prior to development of the site as a Works building by 1961. The works building was demolished by 1987. Site shown as open land within the Hownsgill Industrial Park by 2003. Surrounding land uses include a disused quarry, mineral railway and washing shed.

8.5.3 Published geological records show the site to be underlain by Glacial Till over Pennine Lower Coal Measures. Risk from mine working was identified from the desk study.

8.5.4 The site is not shown as being within an area affected by Radon.

- 8.5.5 A ground investigation undertaken by Shadbolt Environmental confirmed ground conditions as comprising Made Ground over sandstone which is underlain by sandstone and mudstone associated with the Coal Measures. The Glacial Till appears to have been excavated as part of the historic works. Obstructions in the form of concrete boulders were encountered within the Made Ground.
- 8.5.6 Chemical testing of soil samples identified no exceedance of screening values for commercial use. No risk to controlled waters has been identified.
- 8.5.7 No significant ground was identified from monitoring and so no remediation is required.
- 8.5.8 No significant risk from coal mining was identified from the ground investigation.
- 8.5.9 Foundation design will be undertaken once detailed loadings are known but will comprise either piles or deep mass concrete foundations on to the underlying rock for heavily loaded structures or shallow foundations for more lightly loaded structures.

8.6 Identification and Evaluation of Key Impacts

- 8.6.1 Potential significant impacts have been identified using a source-pathway-receptor model and taking account of the low sensitivity industrial use of the current site and of the future development.
- 8.6.2 Risks to current site users from contaminants in the ground have been dismissed based on the ground investigation undertaken by Shadbolt Environmental using GAC values for commercial use. Risk from ground gas has also been dismissed. No risks to construction workers have been identified.
- 8.6.3 Risks to off site occupants is also dismissed based on the findings of the existing ground investigation.
- 8.6.4 No significant risks to controlled waters have been identified.
- 8.6.5 There is a risk of unforeseen contamination being encountered during site development works.

8.7 Design Response and Mitigation

- 8.7.1 The proposed development comprises an area of hardstanding including vehicle parking, loading areas and tanks. Associated plant and equipment will be housed within one and two story buildings.
- 8.7.2 The areas of hardstanding which will be constructed using bound pavement construction and incorporate dedicated drainage. The design, construction and operation of the

proposed development will provide environmental enhancement measures, which are discussed below:

- 8.7.3 As part of the site preparation works a site strip will be undertaken along with removal of any existing obstructions. This will remove potential unforeseen contamination sources leading to environmental betterment. Unforeseen contaminated soils are considered to have Minor magnitude whilst the significance of the controlled waters is considered Minor. Based on this impact without mitigation is considered to be Minor Adverse. Impact following design mitigation will be Minor Beneficial.
- 8.7.4 Unforeseen contaminated soils are considered to have Minor magnitude whilst the significance of end users is considered Minor based on the commercial end use. Based on this impact without mitigation is considered to be Minor Adverse. Impact following design mitigation will be Minor Beneficial
- 8.7.5 Potential risk to construction workers will be managed through the use of normal management and hygiene practices together with appropriate personal protective equipment. This will follow the normal health and safety hierarchy of protection. Unforeseen contamination is considered to have Minor magnitude whilst the significance of the construction workers considered Major. Based on this impact without mitigation is considered to be Major Adverse. Impact following design mitigation will be Neutral.
- 8.7.6 The use of bound pavement construction and solid building floor slabs will provide greater encapsulation of the site and contribute to breaking the potential pollutant linkage with future site users. No contamination has been identified and so impact is Neutral.
- 8.7.7 Where deep foundations are proposed the risks of creating a preferential flow path will be addressed through the use of a piling risk assessment. As no contamination risk has been identified impact to controlled waters is considered Neutral.
- 8.7.8 During the operational stage risks from potential release of fuels and chemicals will be mitigated through the use of containment bunds to storage areas in accordance with Environment Agency guidance.
- 8.7.9 Fuels and chemicals will not be stored near to water courses.
- 8.7.10 Spill response kits will be available on site and will be used should localised spillage or leakage occur. The site will be subject to regular inspections and any localised spillage identified and removed.

8.7.11 As operational activities will be undertaken in accordance with appropriate practices. Impact following implementation of the design mitigation measures will be Neutral.

8.7.12 Foundations will be designed to transfer loads through Made Ground and in to competent soils and rock. It is considered the to have Minor magnitude whilst the significance to the structures is considered Moderate. Based on this impact without mitigation is considered to be Minor/Moderate Adverse. Impact following design mitigation will be Neutral.

8.7.13 No significant risk from coal mining activities have been identified and so impact is considered Neutral.

8.8 Residual Impact

8.8.1 Following implementation of design enhancement measures no adverse impacts are identified.

8.9 Conclusions

8.9.1 Residual risks following implementation of mitigation measures are considered negligible to minor positive. It is therefore considered that the Proposed Development at the Application Site can be undertaken with no significant adverse effect.

8.9.2 Table 8.4 below contains a summary of the likely impacts of the proposed development.

Phase	Nature of Effect	Significance of Impact	Magnitude of Impact	Duration	Mitigation	Residual	Level
Preparation.	Unforeseen contamination on end users.	Minor.	Minor.	Permanent.	Site Strip and removal.	Minor Beneficial.	Local.
Preparation.	Unforeseen contamination on controlled waters.	Minor.	Minor.	Permanent.	Site Strip and removal.	Minor Beneficial.	Regional.
Preparation.	Unforeseen contamination on construction workers.	Major.	Minor.	Temporary.	Management procedures.	Neutral.	Local.
Construction	Contamination.	Neutral.	Neutral.	Permanent.	Not Required.	Neutral.	Local.

Construction	Creation of new pathway.	Neutral.	Neutral.	Permanent.	Not Required.	Neutral.	Local.
Construction	Settlement of buildings.	Moderate.	Minor.	Permanent.	Appropriate foundation design.	Neutral.	Local.
Construction.	Mining subsidence.	Neutral.	Neutral.	Permanent.	Not Required.	Neutral.	Local.
Operation.	Oil and chemical release to controlled waters.	Moderate.	Minor.	Temporary.	Use of bunded storage and management practices.	Neutral.	Local.

Table 8.4 Summary of Impacts

References

- 1) Environmental Protection Act 1990.
- 2) Water Resources Act (1991)
- 3) Town and Country Planning Act 1990
- 4) Environment Act (1995)
- 5) National Planning Policy Framework, Ministry of Housing Communities & Local Government, February 2019.
- 6) County Durham Plan, 2020.
- 7) Eurocode 7: Geotechnical Design, 2006.
- 8) British Standards BS8004:2015 Code of Practice for Foundations.
- 9) British Standards BS6031:2009 Code of Practice for Earthworks.