

13.0 GROUND CONDITIONS

13.1 Introduction

- 13.2 This investigation has been undertaken, in addition to the original ES submission, in order to provide further information in order to assess the ground conditions and any soil, water or land gas contamination at the site. The Environment Agency and Mid Kent Water have raised concerns regarding the lack of intrusive investigation provided with the original ES submission, and as such both the Environment Agency and Mid Kent Water were consulted regarding the scope of the ground investigation.
- 13.3 The full Site Investigation & Risk Assessment Report (STL Project Reference 19015, dated 24 November 2006) can be found in Appendix 5.
- 13.4 Further consultation has been undertaken with the Environment Agency and a remediation strategy has been produced. The site investigation was adequate for the preparation of the remediation strategy at this time and additional monthly borehole monitoring is currently being undertaken. This strategy has been prepared following consultation with the Environment Agency and considering the intended end use. The Remediation Strategy can be found in Appendix 5.

Methodology

- 13.5 A single phase of intrusive investigation was carried out comprising eleven boreholes and eleven trial pits. Three gas and water monitoring visits were also undertaken at fortnightly intervals.
- 13.6 Contamination testing of soils and groundwater has been undertaken as part of this investigation.

Results and Implications

- 13.7 Geological records indicate the site to be underlain by Alluvium with Gault Clay outcropping to the north, west and east with Folkestone Beds outcropping to the south. In the north of the site, the soils are classified as Non Aquifer whereas in the centre of the site the soils are classified as Minor Aquifer. A Major Aquifer is indicated in the southeast of the application site. The site is not located on a groundwater Source Protection Zone (SPZ).

- 13.9 A historical Ordnance Survey map search and desk study was carried out in 2004 (and submitted as part of the Original ES) which indicated that the site has a history of use as farmland up until the 1970s when the site is shown as being used for quarrying sand. It is understood that the mineral extraction ceased in the late 1980s and the pit was subsequently backfilled.
- 13.10 The Envirocheck dataset highlights the site as a landfill, however, there are no additional details available from Envirocheck. Records held by the Environment Agency and Local Authority do not contain any information relating to the backfilling of the pit.
- 13.11 Recent correspondence with H+H Celcon has indicated that the pit has, in the past, been licensed to be backfilled with 'inert, non-toxic, non-putrescible material'. The backfilling operation is reported to have commenced in the late 1980s and was completed by 2001 after a further application for an extension. Limited correspondence with Kent County Council (KCC) regarding the authorisation of this infilling is attached in the main report (STL ref: J9015), Appendix 5.
- 13.12 The soils encountered comprised Made Ground to a significant depth (maximum depth of Made Ground was 12.4m in BH3) over Sands characteristic of the Folkestone Beds. Groundwater levels were found perched within the Made Ground, and at between 63-75m AOD.
- 13.13 The sulphate content of the fill and natural soil was found to fall within BRE Class DS-2.
- 13.14 There is evidence of soil, groundwater and land gas contamination across the site. Made Ground appears largely uncontaminated with respect to heavy metals, semi-metals, Poly Aromatic Hydrocarbons (PAHs) and asbestos (STL Key Contaminant Suite). Slightly elevated Volatile and Semi Volatile Organic Compounds were identified, along with leachable PAHs and ammoniacal nitrogen. Significantly elevated levels of Petroleum Hydrocarbons (EPH) (>1000mg/kg) were identified in approximately one third of soil samples tested. Natural soils appeared uncontaminated with respect to the parameters tested.
- 13.15 Groundwater contamination in the form of heavy metals, semi-metals and organic contaminants. Of greatest concern are the elevated PAHs and Petroleum Hydrocarbons (EPH) which have been identified in all boreholes, and appear to be widespread across the site.

- 13.16 In addition, elevated methane, carbon dioxide and a corresponding depletion of oxygen has been detected in the majority of boreholes across the site. On the basis of the results to date, the site would be classified as Gas Regime D, necessitating specific protection measures to buildings and services on the site.
- 13.17 Consultation with the Environment Agency regarding the characterisation of the site has been undertaken and it was determined the data was adequate to produce a remediation strategy for the development at this stage considering the intended end use. Further stages of site investigation will be required as part of the development works assessment. It is intended to undertake the works as part of an integrated environment and geo-technical solution. The remediation solution will be site based using sustainable technology – passive permeable reactive barrier with gates and bio-remediation and will be protective of both ground water and human health.
- 13.18 Given the depth of Made Ground and the likely uncontrolled nature of placement, it is considered that piled foundations will be required under the building footprint. The effects of settlement must also be taken into consideration. Suspended floor slabs (with land gas protective measures including passive ventilation, and incorporation of a hydrocarbon vapour resistant membrane) are advised.
- 13.19 The Environment Agency has requested a monthly round of monitoring to the boreholes on the boundary of the site (January to June). The data collected will be used in the final modelling when the end use has been determined.
- 13.20 There is no requirement at this stage to undertaken further soil sampling.
- 13.21 Consultation with the Environment Agency is ongoing, the remediation strategy has been agreed verbally and we await a formal reply to the strategy submission.