

H6.0 **Mitigation and Monitoring**

Outline Remediation Strategy

- H6.1 The Outline Remediation Strategy (Wood 2019) will form the basis for an remediation strategy for the development site. It includes several elements which will mitigate potential environmental risks associated with the proposed development as part of the proposed remedial works, including:
- 1 Demolition of legacy structures and ground preparation operations including removal of relic subsurface obstructions (to ~2.5mbgl), vegetation clearance and infilling of voids. It should be noted that the demolition of existing structures within the development site has been considered within this EIA, albeit it is anticipated that these will be removed subject to existing prior approval applications (see chapter B of this ES);
 - 2 The option for selective excavation and disposal at the adjacent hazardous waste facility of limited 'hotspots' of contamination; and
 - 3 Site won and imported clean cover soils will be placed under a controlled methodology, mainly driven by geotechnical requirements, to form a 0.3m capping layer to physically break Made Ground contaminant linkages. It is assumed cut and fill balance will be neutral.
- H6.2 A clean or lined service run area will be installed to protect both future land users (maintenance) and utility assets. A no dig layer may be installed as required. This overarching approach is compatible with a phased remediation of the site and this gives flexibility regarding the phased development of the site and the future layout design, allowing development hard surfacing (e.g. associated with access roads and site building footprints) to also contribute to remediation solutions (i.e. as part of the capping layer to break direct contact and dust generation pathways).
- H6.3 An Outline Remediation Strategy is currently being progressed for the wider STDC area and this is high level at the point of submitting this outline planning application. The detailed design for each of the development plots will determine the detailed remediation approach based on the intended layout and form of development. As set out in Section 6.0 of this Chapter a Remediation Design Statement for each development plot will set out how the proposed development conforms, where possible, with the outline remediation strategy. This should be informed by additional ground investigation and/or risk assessment, where required. Because of the current nature of the outline remediation strategy it is being classified as secondary mitigation (see below) and is therefore not embedded into the design of the scheme.

During Construction

- H6.4 A Construction Environmental Management Plan (CEMP) will be prepared for the development. This document will be developed to avoid, minimise or mitigate any construction effects on the environment and the surrounding community. Those measures that should be included to reduce the impact of ground conditions include:

Measures to Protect Human Health Receptors

- 1 measures to minimise dust generation;
- 2 provision of personal protective equipment (PPE), such as gloves, barrier cream, overalls etc. to minimise direct contact with soils;
- 3 provision of adequate hygiene facilities and clean welfare facilities for all construction site workers;

- 4 monitoring of confined spaces for potential ground gas accumulations, restricting access to confined spaces, i.e. by suitably trained personnel, and use of specialist PPE, where necessary; and
- 5 preparation and adoption of a site and task specific health and safety plan.
- 6 damping of ground with water to minimise dust;
- 7 adoption of and adherence to measures to ensure no materials are trafficked onto the public highway;
- 8 processing of excavated materials and using in the works at the site where appropriate;
- 9 sheeting of lorries transporting any spoil off site and the use of dust suppression equipment on plant;
- 10 adequate fuel/chemical storage facilities e.g. bunded tanks, hard standing and associated emergency response/spillage control procedures;
- 11 routine testing of soils and materials in accordance with the Outline Remedial Strategy (Wood 2019) and any detailed remediation statements prepared for specific developments;
- 12 well maintained plant and associated emergency response/spillage control procedures; and
- 13 any temporary onsite storage of contaminated material will be stored on sheeting and covered to minimise the potential for leachate and run off from the stockpile being generated;
- 14 a significant programme of monitoring will be in place before, during and post remediation works. The monitoring programme will include as appropriate the following:
 - a ground gas monitoring;
 - b groundwater monitoring;
 - c surface water monitoring;
 - d noise and vibration monitoring;
 - e odour monitoring; and
 - f air quality monitoring.

Measures to Protect Environmental Receptors (Surface Waters and Groundwater)

- 15 All encountered perched water within the Made Ground shall be collected in a collection tank or lined lagoon prior to any treatment and discharge. The incidental water shall either be:
 - a discharged to foul sewer under a trade effluent consent agreed with the local sewerage undertaker and/or;
 - b discharged to surface water under a water discharge activity environmental permit (“WDA-EP”) from the EA.
- 16 It is envisaged that an on-site treatment plant may be required to ensure that the concentrations of key determinands in the effluent discharge are within consented discharge limits.
- 17 In order to manage the discharge of runoff water on the site and / or any perched water encountered during the works, a construction stage surface water management plan shall be developed. The following principal items shall be included:
 - a a series of temporary land drains around the development discharging to discharge point(s);

- b a monitoring and sampling point constructed at the point(s) of discharge;
- c settlement lagoons, if required, constructed upstream of the discharge point(s);
- d cut-off ditches around the perimeter of the site to prevent water discharging at any location other than the aforementioned discharge point(s).

H6.5 During the construction works, it will be necessary to fuel and maintain a fleet of mobile plant.

Impacts on Human Health Receptors

H6.6 Based on the results of the previous ground investigations as well as any further investigation undertaken, areas that pose a risk to human health as a result of identified contamination would be delineated and remediated prior to construction works. Further investigations are recommended to include, but are not limited to, the following tasks which will identify the need for further mitigation.

- Survey of asbestos in Made Ground across the entire Site including detection and, where detected, quantification of asbestos;
- Monitoring and assessment of ground gas regime across the Site, especially in the vicinity of areas of adjacent landfilling / waste disposal to inform requirements for remediation and/or gas protection measures;
- Assessment of soil quality with regard to potential Contaminants of Concern in specific areas where current data is limited e.g. Metals Recovery Area;
- Assessment of groundwater quality across the entire site within the Made Ground, superficial deposits and, if considered required, the bedrock aquifer with temporal assessment of trends should significant contaminant be identified;
- Assess of geotechnical properties of the underlying ground to inform e.g. foundation and infrastructure design.

H6.7 As asbestos contaminated Made Ground is likely to be encountered during construction works, an appropriate Health and Safety Plan would be prepared to manage delineated materials in a safe manner in accordance with the Construction (Design and Management) Regulations 2015 and the requirements of the Control of Asbestos Regulations 2012. The remediation objectives which include breaking the identified significant pollutant linkages to manage the associated risks and the provision of a capping layer and development hardstanding across the Site (as well as an additional protective layer of engineering fill as required) will break SPR linkages pathways associated with inhalation of respirable asbestos in soils and materials. Where visible Asbestos Containing Material (ACM) is identified in excavated material this is to be removed and sentenced for off-site disposal. Otherwise, soil materials with detected quantities of asbestos fibres in soil are to be placed within the development platform below the capping layer to break dust/fibre inhalation pathways. Maintain a watching brief for the presence of ACM in all excavated soils with identified ACM handpicked or segregated from the soil, wherever possible, and sentenced for off-site disposal. Any areas of the site where soils containing asbestos have been permanently placed should have this clearly indicated on the soil audit and also be included on a marked-up Site plan indicating location, depth and extent of any asbestos containing soils.

H6.8 Potential impacts specific to construction workers during site preparation, remediation and reclamation earthworks will be mitigated by the following measures and through working in accordance with CIRIA C692 Environmental Good Practice on Site. 4th Edition (2015) as outlined in Section H5.34

H6.9 The potential impacts on surrounding land use, surrounding sensitive land uses and surface water and groundwater will be addressed and mitigated through the adoption of the measures outlined in Section H5.34.

Environmental Receptors (Surface Waters and Groundwater)

H6.10 The mitigation measures would aim at ensuring the surface water run-off from the site during clearance, remediation, reclamation earthworks and construction does not have a detrimental effect on the receiving watercourse (River Tees) and the underlying groundwater. The surface water run-off would be controlled using appropriate drainage measures and infiltration into the ground would be minimised. This will be controlled through an appropriate drainage strategy.

H6.11 During the remediation and reclamation works perched water in the Made Ground materials could contain elevated concentrations, in comparison to applicable discharge consent criteria or Environmental Quality Standards (EQS) of various metals (e.g. chromium, cadmium, manganese, nickel, zinc), inorganic (e.g. ammonia, ammonium, sulphate) and organic (various PAHs) determinands and there is therefore a requirement for its collection and treatment prior to discharge.

H6.12 Where perched water encountered during the progress of the earthworks contains concentrations of determinands that would breach any consent/permit for discharge then the water shall be subject to pre-treatment. This treatment will be influenced by the nature of the exceedances and may include the use of the following treatment processes: settlement, flocculation, air stripping, aeration, chemical oxidation, granulated carbon adsorption. It is envisaged that an on-site treatment plant may be required to ensure that the concentrations of key determinands in the effluent discharge are within consented discharge limits.

H6.13 A construction stage surface water management plan shall be prepared in conjunction with the programme of works and reviewed regularly during the works to ensure that it meets the objectives above.

H6.14 During the construction works, it will be necessary to fuel and maintain a fleet of mobile plant.

H6.15 In addition, the prevention of pollution of groundwater will comply with the requirements of the following EA and DEFRA Guidance documents:

- 1 EA, Protect groundwater and prevent groundwater pollution, 2017 (ref 9.44);
- 2 EA, Groundwater protection technical guidance, 2017 (ref 9.45);
- 3 EA, The Environment Agency's approach to groundwater protection, 2018 (ref 9.46);
- 4 DEFRA Guidance, Pollution Prevention for Businesses, July 2016 (Updated May 2019) (ref 9.58).

H6.16 Consideration will also be needed to providing temporary drainage throughout the reclamation and remediation of the site, to minimise the risk of impacts on both the water quality and discharge rate on adjacent properties. A Surface Water Management Plan should be prepared to minimise risk of impacts on water quality.

Impacts on Waste Management Facilities

H6.17 The disposal of solid waste, contaminated or otherwise to landfill sites will be best mitigated by prevention or minimisation of the overall quantities of waste generated during construction and by ensuring that excavated material consigned to landfill is deposited within the existing adjacent Highfield Landfill. The Outline Remedial strategy (Wood 2019) sets compliance targets

for materials to be used within the capping layer of the development. The Strategy has been developed with the intention to minimise off-site disposal of materials.

- H6.18 A Materials Management Plan will be prepared which will detail the procedures and measures that will be taken to classify, track, remediate, store, use and if necessary, dispose of materials that will be encountered during the remediation works.
- H6.19 As part of the plan the records of all materials movements on-site and off-site will be kept by the Reclamation / Earthworks Contractor in paper and electronic format for a minimum period of 2 years following completion of the works and production of the Validation / Verification Report. To allow auditing of the Materials Management Plan; data will be stored electronically in a specifically designed database on site. Daily data uploads would be undertaken. All data would be geo-referenced, and all stockpile sample nomenclature would ensure individual identification.

During Operation

Impacts on Human Health Receptors

- H6.20 No ground gas monitoring has been undertaken within the proposed development area to date which represents a significant data gap and therefore future development proposals, particularly those located in close proximity to former landfill sites, should be supported by further investigation and an associated Gas Risk Assessment and should incorporate any necessary protection measures appropriate to protect buildings and future site users from landfill gas migration. This will be considered at the reserved matters stage of development.
- H6.21 Site buildings will be designed with adequate ground gas mitigation measures to prevent the accumulation of ground gas in confined spaces. The ground gas protection measures would be implemented in accordance with CIRIA C665 (Assessing Risks Posed by Hazardous Ground Gases to Buildings) and the NHBC Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present Report Edition No 4 (2007).
- H6.22 Maintenance workers that are required to undertake ground excavations during the operational life of development will be provided with sufficient information on the nature of each sub-area, upon which to base site and task specific risk assessments.
- H6.23 A clean service run area will be installed, as required, to protect future land users (maintenance).

Environmental Receptors (Surface Waters and Groundwater)

- H6.24 Areas of hardstanding would be designed to avoid uncontrolled discharges to the drains.
- H6.25 The NPPF, Local Plan and water management guidance detailed in Chapter G: Water Management and Flooding highlights the need for suitable management of water and drainage, where appropriate through use of natural flood management. There is an aspiration for blue green networks to provide treatment and management of surface water run-off (and these may be provided where achievable and possible). This will not include infiltration SuDS such as soakaways in order to limit mobilisation of contamination. In addition, surface drainage and networks will be lined with a geomembrane (impervious to water) so there is no interaction with contaminated land. Direct discharges to the Tees are not required to be attenuated but all drainage on site that is not directly discharge to the Tees watercourse is proposed to be attenuated.

Built Environment

- H6.26 Materials used in infrastructure will be designed and specified accordingly taking due account of the potential for aggressive ground conditions such as those related to the possible presence of elevated sulphate or the presence of ground gas. The assessment methodology set out in BRE Special Digest 1 (2015) will be adopted to determine the appropriate concrete classification in relation to the protection of buried concrete against sulphate attack.
- H6.27 A clean or lined service run area will be installed to protect utility assets.