

10. Conclusions and Risk Evaluation

10.1 Environmental Assessment

Following the implementation of the ground investigation, the contaminant linkages identified during the Preliminary Environmental Risk Assessment have been re-evaluated and reclassified in relation to the additional information obtained. The results of the reassessment are summarised in Table 19 below:

Table 19: Estimation of environmental risks associated with the subject site

Receptor	Potential sources	Pathway	Risk	Justification/Mitigation
Human Health				
Future Site Users	Potential contamination in Made Ground and shallow soils from land uses surrounding the Site.	<p>Dermal contact and inhalation of dust from contaminated soils during works</p> <p>Contact with potential contamination in shallow soils in areas of soft landscaping.</p>	Low	<p>Elevated contaminant concentrations are present in the Made Ground on-site as beryllium and PAH exceeded the GAC.</p> <p>In areas of proposed hardstanding the direct pathway to future Site users will be removed breaking the contaminant linkage. In areas of hard and soft landscaping potential remains for future Site users to come into contact with Made Ground. In these areas a cover layer of suitable thickness and of suitable for use material will be installed. The thickness of the clean cover layer will be dependent on the type and magnitude of the contaminants recorded and will be established in the Remediation Strategy.</p> <p>Upon implementation of the cover layer in areas of soft landscaping the risk to future Site users will be mitigated and no further remedial measures will be required.</p>
Worked Coal Seams (Ground gas and vapours)	Worked Coal Seams (Ground gas and vapours)	Accumulation in confined spaces, leading to inhalation.	Medium	<p>A significant ground gas or vapour regime is absent on-site. However, ground gas and vapour monitoring will confirm the Sites' ground gas regime.</p> <p>Further monitoring will confirm if ground gas or vapour protection measures would be required in the completed Development.</p>
Off-Site Users and nearby residents	Potential contamination in Made Ground and shallow soils.	<p>Windborne, potentially contaminated construction dust.</p> <p>Runoff from stockpiled soils.</p>	Medium	<p>Elevated contaminant concentrations have been recorded in the Made Ground in two locations. During construction, these contaminants may become mobilised by wind entrainment and migrate off-site.</p> <p>Residential and public land uses are present in the surrounding area. During construction good working practices for</p>

Receptor	Potential sources	Pathway	Risk	Justification/Mitigation
				dust suppression should be employed to limit dust creation and migration as far as practically possible. Where suitable dust suppression is employed the risk to off-site users would be mitigated.
Construction Workers	Potential contamination in Made Ground, shallow soils, and shallow groundwater.	<p>Dermal contact and ingestion.</p> <p>Dust inhalation.</p> <p>Ground gas and vapour accumulation in trenches and confined spaces, leading to inhalation followed by asphyxiation and risk of explosion.</p>	Medium	<p>The ground investigation has recorded elevated contaminant concentrations. To mitigate the risk construction workers should wear appropriate Personal Protective Equipment (PPE) during any below ground works in order to mitigate potential effects from direct contact, dermal absorption, inhalation, and ingestion of any residual contaminants in soils and groundwater.</p> <p>All construction workers should be subject to mandatory health and safety requirements under the Construction, Design and Management (CDM) Regulations 2018 and Control of Substances Hazardous to Health (COSHH) Regulations 2002, the Confined Space Regulations 1997, and Control of Asbestos Regulations 2012 (CAR 2012).</p>
Construction workers and nearby residents.	Unexploded Ordnance	Direct contact	Low	No UXO was encountered during the ground investigation. However, an UXO Risk Management Plan will be prepared for the Site. Site Specific UXO Awareness Briefings will be provided to all personnel conducting works.
Property				
Site structures and services	Contamination in Made Ground, shallow soils, and shallow groundwater.	Direct contact with building foundations and buried services leading to chemical attack.	Medium	Foundations and building at the new development will be designed to resist any contamination identified by the ground investigation, which will mitigate the risk to future structures.
Off-Site Structures	Contamination in Made Ground, shallow soils, and shallow groundwater.	Direct contact with building foundations and buried services leading to chemical attack.	Low	<p>Elevated contaminant concentrations are present in the Made Ground on-site as beryllium and PAH exceeded the GAC in two locations.</p> <p>The ground investigation has identified the lateral migration of contaminants has being limited. The risk to off-site structures is low.</p>
Controlled Waters				
Surface watercourse	Contamination in Made Ground,	Migration through Glacial Till to	Low	Groundwater sampling will confirm the status of the groundwater on-site and

Receptor	Potential sources	Pathway	Risk	Justification/Mitigation
26m south of the Site	shallow soils, and shallow groundwater.	nearby watercourses. Runoff from stockpiled soils.		the magnitude of its impact relative to the surrounding environment.
Surface watercourse 26m south of the Site	Construction materials stored on-Site as part of development works.	Spills to ground, and the nearby watercourse.	Medium	Groundwater sampling will confirm the status of the groundwater on-site and the magnitude of its impact relative to the surrounding environment. A CEMP should be prepared for the demolition and construction works on-Site, detailing measures to minimise the potential risk to controlled waters.

The potential contaminant linkages described above require further ground investigation and assessment, which would be undertaken as a Detailed Quantitative Risk Assessment.

The potential contaminant linkages described above can be managed by design of appropriate mitigation measures during the redevelopment of the site.

10.2 Ground Gas

Based on the available and limited monitoring data, at this stage the site is considered to be: Characteristic Situation 1 (No Special Gas Measures). Given the presence of a potential source of ground gas beneath the Site (shallow mine workings), it may be prudent to allow for the installation of gas protection measures in accordance with Characteristic Situation 2 at this stage.

The Preliminary Environmental Risk Assessment identifies the Site to be partially within an area of elevated radon levels (between 1% and 3%). Correspondingly, basic protective measures may be required in the proposed development. The approach should be confirmed with the Building Control Officer.

Any recommendations relating to gas protective measures in foundations should be considered provisional until issue of our hazardous gas risk assessment at the end of the monitoring period.

10.3 Geotechnical Assessment

10.4 Proposed Development

It is proposed to demolish all structures within the site boundary, to facilitate the construction of Trinity Academy, Barnsley. The development will include a new three storey school building in the north east, hard landscaping car park in the centre of the site and both soft and hard landscaping sport fields in the surrounding area. No basements are proposed. Lift access will be provided to upper storeys.

A proposed site layout (Watson Batty Architects Drawing Ref: TRNTY-WBA-EX-ZZ-DR-A-X-001 P2) is included in Appendix A.

If development proposals change, it may be necessary to revise the conclusions and recommendations made in this report and Waterman should be contacted to provide further advice.