

11.0 Conclusions & Recommendations

11.1 Conclusions

11.1.1 Ground and Groundwater Contamination

The environmental chemistry soil results have been compared with the Generic Assessment Criteria (GAC) for soils with respect to human health against 'Residential without Plant Home Grown Produce' thresholds.

With respect to the proposed end-use of the site GAC thresholds have not been exceeded in the Made Ground samples taken from any of the exploratory holes progressed during this investigation.

The risk presented to controlled waters was assessed as **Moderate** for groundwater and **Low** for surface water within the Phase 1 Desk Study. The ground conditions pertaining to the development site are consistent with the findings of the Phase 1 report, with no significant visual or olfactory evidence of contamination identified in site soils. As no groundwater was encountered and no chemical exceedances were recorded, the risk presented to controlled waters (groundwater and surface water) are identified as **Low** and **Very Low** respectively.

A **Low** risk rating is identified to site end-users from ground gas arising from made ground and natural soils migrating into buildings and subsequent inhalation by on-site employees. This corresponds with a Characteristic Situation 1 (CIRIA) classification requiring no gas protection measures.

11.1.2 Geotechnical Assessment

The shallow ground conditions on site comprises made ground overlying predominantly granular glacial till underlain by the Chester Formation. The made ground is not anticipated to provide a suitable founding stratum.

Due to the likely loads of the proposed development, it is considered that shallow spread foundation in the superficial deposits are unlikely to be suitable at the site. It is considered that a piled foundation solution be adopted transferring loads to the underlying Sandstone bedrock.

The carry capacity of piles depends not only on their size and the ground conditions but also on their method of installation.

Pile design and installation are continuing evolving processes; it is recommended that specialist piling contractors are contacted as to the suitability and carrying capacity of their piles in the ground conditions pertaining to the site.

Based on observations onsite together with the results of laboratory tests, it is recommended that consideration is given to a suspended ground floor slab. As piled foundations are anticipated, a suspended slab is recommended to bear on the pile caps by a network of beams which will minimize any differential settlement between the floor and the piled structure.

Based on the laboratory test results it is considered that Design Sulphate Classes and ACEC classes of DS-1 AC-1 are appropriate for the Superficial deposits, residual soils and the Helsby Formation.

11.1.3 Recommendations

Based on the findings of the ground investigation, the following recommendations are made:

- 1) Construction and maintenance workers should be provided with appropriate PPE for all groundworks with respect to the soil environmental chemistry results.
- 2) It is recommended that specialist piling contractors are to be consulted to establish suitable pile design.