

Remploy, Railway Road, Wrexham

Proposed Housing-Phase I

Geo-environmental Report

Gower Homes Ltd



GroundSolve Ltd

Consulting Geotechnical, Engineering Geology and Environmental Engineers

Other Contaminants – sulphide, sulphur, water soluble sulphate, Total cyanide (Cn), pH, total organic content.

In addition, asbestos testing was carried out on all samples submitted, with no asbestos being detected. In addition, an NRA leachate test was carried out on a sample of made ground taken from TP 2.

The results of the chemical testing are summarised in Section 6 and presented in full in Appendix G.

5.3 Ground Conditions

The site investigations in the Phase I section of the site revealed the following general stratigraphy:

BH/TP No	Made Ground (m)	Clay (m)	Sand (m)	Clay (m)	Gravel (m)
WS 4	0-0.90	0.90-1.10	1.1- 2.70		2.70-4.00
WS 5	0-0.80	0.80- 1.60	1.60 – 4.0		
TP 1	0-0.40		0.40-2.70		
TP 2	0-1.0	1.0-1.95	1.95-2.70		
TP 3	0-1.90		1.90 – 2.35		
TP 4	0-0.40		0.40-2.10		
TP 5	0-1.10	1.10-1.50	1.50-2.05		
TP 6	0-1.0	1.0-1.45			
WS A	0-1.30	1.30-1.50	1.50-2.30	2.30-2.75	2.75 -3.0
WS D	0-1.70	1.70-2.60	2.60-3.0		

5.3.1 Made Ground

The window sample holes drilled during this investigation were drilled inside the existing factory, and therefore recorded a 200mm thick reinforced concrete slab, with a layer of visqueen below. The reinforcement comprised 8 to 10mm bars at 100mm centres in both directions. The slab was underlain by between 0.30m and 0.40m of hardcore in the Phase I area comprising grey, angular gravel and small cobble in a sandy matrix.

The window sample holes drilled during the previous investigation were drilled around the outside of the building and therefore recorded between 0.1m and 0.2m of asphalt surfacing.

The made ground underlying the asphalt and the sub-base was similar in both investigations. It generally comprised black/very dark grey, sandy gravel over the majority of the site, with soft to firm, gravelly clay recorded in the exploratory holes in the Phase I area.

It was proved to a maximum depth of 1.90m in TP 3; however, this is considered to be due to the pit being excavated close to an existing drain.

5.3.2 Glacial Till

The made ground was generally underlain by glacial till in all the exploratory holes, with the exception of TP 1, TP 3 and TP 4, where this strata was absent.

The glacial till generally comprised firm to stiff, brown, clayey silt/sandy clay, with a little fine to medium gravel. However, in TP 2 it was logged as soft to firm.

Exploratory hole WS5, drilled close to the location of the tank in Phase I in the previous investigation recorded a slight hydrocarbon odour between 1.1 and 1.2m depth in the glacial till. However, no elevated hydrocarbon values were recorded in the subsequent tests.

5.3.3 Glacial Sands & Gravels

The glacial sands and gravels comprised medium dense to dense, brown, sandy gravel. The 2012 investigation recorded the sands and gravels as being slightly clayey in places.

5.4 Groundwater

No groundwater was encountered in any of the window sample holes during either of the site investigations. The standpipes installed during the 2012 investigation were dipped during the 2013 investigation and they were dry even following a prolonged period of wet weather. In addition, no groundwater seepages were encountered in the trial pits.

Therefore strip foundations would be suitable for the houses, which are situated outside the footprint of the former locomotive works. The strip footings should be founded in glacial till of at least a firm consistency or sand and gravel of loose to medium dense consistency. The foundations should penetrate the natural ground by at least 300mm and an allowable bearing pressure of 100kN/m² should be used for the design of the foundations.

The depths for the foundations would generally be 750mm below final external ground levels in sand increasing to 900mm in clay. However, this will obviously have to be extended in locations where the made ground is thicker. It is possible that foundation excavations could extend across both sand and clay, in which case two scenarios need to be considered during the site works. Either ensure all of the foundations are in the same strata, which may require local deepening of footings, or alternatively keeping the footings at one level and lightly reinforce the strip foundations with mesh.

One further consideration is the presence of trees immediately north of the site boundary. These trees should be identified and the distance between these trees and Plots 1 to 4 established and the NHBC guidelines followed. However, this is unlikely to be an issue as sand and gravel is anticipated in this area. If clay was encountered, then the foundations could be extended down into the underlying sand and gravel.

Due to the thickness of made ground and in accordance with NHBC guidance, suspended floor slabs will be required.

7.3 Drainage

The site investigations have revealed that glacial sands and gravels lay at depths of between 0.40 and 1.90m beneath the Phase I area. It has also be shown that soakaways have been used successfully for draining the site in the past, which bearing in mind the fact that the site was entirely covered by buildings and hardstandings means that less water will be disposed of following redevelopment of the site.

The soakaway tests carried out in Phase 1 and other areas of the site are presented below, of which all are in the Phase I area, with the exception of TP 7 and SA 2. SA 1 and SA 2 being the tests in the existing soakaways. The actual test results are presented in Appendix F.

Test Location	Test No	Depth (m)	Strata	Permeability m/sec
TP 2	1	2.90	Sand	3.24×10^{-6}
TP 4	1	2.16	Sand	2.96×10^{-4}
	2	2.48		1.34×10^{-5}
	3	2.30		6.58×10^{-5}
TP 5	1	2.0	Sand and Gravel	3.14×10^{-4}
	2	2.05		2.42×10^{-4}
	3	2.12		2.72×10^{-4}
TP 7	1	2.80	Gravel	6.44×10^{-5}
	2	2.72		1.20×10^{-4}
	3	2.83		1.31×10^{-4}
SA 1	1	3.65	Sand & Gravel	8.21×10^{-5}
SA 2	1	3.0	Sand & gravel	9.04×10^{-6}

With the exception of the result in TP 2 the results are fairly consistent and typical for sandy gravels in the Wrexham area where the sand will largely control the permeability.

For design purposes a permeability value of 1×10^{-5} m/sec is considered appropriate. It is anticipated that the soakaways will need to penetrate at least 1.0m into the glacial sands and gravels and therefore they could be in the region of 2.5 to 3.5m deep, which would be consistent with the existing soakaways on site.

While soakaways for every plot is considered usual, the amount of excavation required may make this uneconomic. It may therefore be necessary to consider large single soakaways for all the plots that could either be positioned in car parking areas or in open space.

It is also likely that soakaways for road drainage may need to be separated and run through petrol interceptors if the road is to be adopted.

Finally, Network Rail (NR) is known to have strict requirements on how close they will allow soakaways to their assets. The placing of soakaways will therefore have to be carefully considered. However, the fact that no groundwater was encountered in any of the investigations and the site is underlain by free draining materials ensures that there will not be any flow paths beneath the NR lines. In addition, as the site is some 1m below the adjacent NR land and water will be discharged at depths of at least 3m then the risk to NR assets is considered to be negligible.

7.4 Access Road and Hardstanding

No California Bearing Ratio (CBR) tests were carried out as part of this investigation, mainly due to the lack of open space to be occupied by access roads that is currently covered by the existing building. Consequently, the following recommendations will need to be confirmed by on site testing.