



Report Ref: ENV-JPG-S++-ALL-REP-FON-0002-R02

ENVIROPARKS
HIRWAUN INDUSTRIAL ESTATE
FOUNDATION PROPOSAL

Project Description

The project comprises an existing Fuel Preparation Building and the service road constructed in Phase 1 approximately 15 months ago and the proposed Phase 2 development consisting the construction of a fuel storage hall, a gasification hall with associated internal control rooms, offices and stores, external plants, service yard and a visitor centre.

Site Location

The site is located to the north-west of Hirwaun on the edge of Hirwaun Industrial Estate. The approximate centre of the site is located at National Grid Reference 293880E 206790N. The development area boundary is defined by a track at the lower edge of the Penderyn Reservoir embankment to the north, Ninth Avenue to the east, Fifth Avenue to the south and a stream to the west. It straddles between two planning authorities, Brecon Beacons National Park Authority (BBNPA) to the North West, and Rhondda Cynon Taf (RCT) to the South East. The entrance to the site is from Ninth Avenue.

Current Planning Application & Original Planning Approval

Current Planning Application References: 17/0249/10 and 17/14587/FUL.

Planning permission was granted in 2010 by BBNPA and RCT for development at the Enviroparks site for a sustainable waste resource recovery and energy production park (the Original Planning Permissions). A number of conditions, including pre-commencement conditions were attached to the Original Planning Permissions. Details were submitted and approved by BBNPA and RCT in respect of the pre-commencement conditions and development of Phase 1 of the scheme started in May 2015.

The purpose of this technical note is to provide information to satisfy the planning authority with regard to the proposed foundation solution.

Site History

The site was once occupied by an Ordnance Factory which was thought to have been demolished some time before 1971. After the demolition of the Ordnance Factory, the site was left for a period as mainly waste ground until the late 1990s when the Welsh Government Agency (WDA) re-profiled the site creating an approximately level ground as a development platform. The site is believed to have been levelled with natural materials.

Previous Investigations

1. Wallace Evans & Partners (for Welsh Industrial Estate Corporation): Proposed Development of the Northern Section of the Hirwaun Industrial Estate. Report on a Ground Investigation. Ref S/8731, January 1972.
2. Exploration Associates (for Thomas Morgan & Associates): 17 Acre Site at the Hirwaun Industrial Estate, Interpretative Report on Ground Investigation. Ref 155102, July 1992.
3. Thomas Morgan & Associates (for Welsh Development Agency): Report on a 17 Acre Site at the Hirwaun Industrial Estate Site Investigation Data. Ref P329.02, September 1995.
4. Soil Mechanics (for Enviroparks, via Pell Frischmann): Hirwaun Industrial Estate Development, Interpretative Report on Site Investigation. Ref H8076, January 2009.
5. Pell Frischmann (for Enviroparks (Hirwaun) Limited): Letter Report – Enviroparks Hirwaun Ground Conditions Review. Ref E57006/MWJ/001, July 2011.
6. Quantum Geotechnical Limited (for Dawnus Construction Limited): Enviroparks, Hirwaun – Supplementary Geotechnical & Geo-Environmental Report. Ref G345 Enviroparks_LR01, October 2013.
7. Pell Frischmann (for Enviroparks (Wales) Limited): Phase 2 Development Enviroparks, Hirwaun – Geo-Environmental Assessment Report RQ80023G001B, February 2017.
8. Pell Frischmann (for Enviroparks (Wales) Limited): Letter Report - Phase 2 Development Enviroparks, Hirwaun – Supplementary Soil Sampling Ref LQ80023/G001, February 2017.
9. Pell Frischmann (for Enviroparks (Wales) Limited): Letter Report - Phase 2 Development Enviroparks, Hirwaun – Supplementary Groundwater Sampling Ref LQ80023/G002, March 2017.

Succession of Underlying Strata

From reviewing the previous investigations, the successions of near surface soils and bedrock is deduced to be as follow.

Made Ground: comprising generally very compact sandy clayey gravel and sandstone cobbles with packets of cohesive material to a depth of around 3.2m.

Alluvial Deposits: comprising generally brown grey silty sandy gravelly clay with occasional woody relics between 1.70m and 6.10m below ground level. Black clayey stratum occurred directly under Made Ground in some areas that contained decomposed plant material. This was suspected to be a relic grassed surface which had subsequently been buried by imported fill material.

Glacial Deposits: Glacial boulder clay comprising stiff grey silty sandy clay with some gravel and cobbles of sandstone. Sand and gravel were encountered over the site and comprised generally brown very sandy angular to sub-angular fine to coarse gravels of mudstone and sandstone. Predominantly granular glacial deposits were found over the site to depths of between 8.5m and 12.0 m below ground level.

Bedrock: Sandstone bedrock was encountered at between 8.5m and 12.0m below ground level. The bedrock comprised moderately strong to very strong sandstone/siltstone with rare mudstone bands. Rotary coring concluded that upper layers of bedrock (up to 5.2m thick) is either weathered or fractured.

Groundwater

Groundwater depths were recorded at 0.1m below ground level immediately after field test to 2.3m to 6.5m below ground level after some time. The latter depths appears to correspond with the sand and gravel layers.

Investigation of the contamination hotspot in 2013 & further sampling carried out by Pell Frischmann in 2017

The purpose of the investigation was to take additional samples to provide information as to whether the contamination found in TP2 of the original Soil Mechanics investigation was of a wider extent.

A summary of the test results is found in item 6 of section four above - Quantum Geotechnical Limited (for Dawnus Construction Limited): Enviroparks, Hirwaun – Supplementary Geotechnical & Geo-Environmental Report. Ref G345 Enviroparks_LR01, October 2013.

The additional testing undertaken on samples around the identified potential hotspot confirmed no perceived risk from manual handling of the soil, no undue risk to site's end use as commercial/industrial property and that no risk exists to groundwater.

In February 2017, Pell Frischmann produced the Geo-Environmental Assessment Report RQ80023G001B for Phase 2. The report review and summarised the ground and groundwater conditions encountered, interpret the geochemical data, including a quantitative risk assessment of potential contaminants. The report also provide an updated Conceptual Site Model for the site and draw conclusion on 'suitability for use' for the proposed development under the current planning regime. It recommended that supplementary groundwater sampling and analysis should be undertaken in the Phase 2 area. This was carried out and the results are included in their letter reports ref LQ80023/G001 and LQ80023/G002.

Pell Frischmann supplementary groundwater and soil sampling identified no significant contaminants of concern and concluded no further assessment or any remediation required.

Foundation Assessment

While the overall strata in terms of layer thickness is relatively consistent within each layer there is significant variation of the material. Bands of clays of variable thickness are present in both the Made Ground and underlying Glacial Deposits, although the soils overall are predominantly granular. This makes it very difficult to give definitive guidelines for foundations for a structure as a particular footing could be on a part of the site where clay predominates while the adjacent footing is on predominantly granular soils. In this case the condition exist for differential movement as each stratum has differing settlement/stiffness properties. It is therefore advisable to pile all the structures that are sensitive to ground movement.

The further investigation carried out by Quantum in 2013 agrees closely with the recommendation in the findings of the interpretative letter report prepared by Pell Frischmann for piled foundation.

Design of Piled Foundation

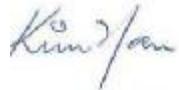
Preliminary design of the building superstructure has been carried out to assess the loadings on the foundation. The frame loads indicate the use of piles taken down to bedrock to a projected average depth of 12.0m below ground level. Discussions with specialist contractor is still to take place to explore the various piling method but owing to the high load, it is likely to be reinforced concrete auger piles of 450mm diameter. The number of piles is in the region of 800 subject to final design.

Risk of Pathway Created by Foundation Proposal

The auger piles will penetrate the near surface soils and will form a pathway to the groundwater body in the sand and gravel strata and the weathered rock. However the chemical testing carried out in previous ground investigations has demonstrated that the near surface soils has negligible levels of contamination present. Apart from its load carrying capacity, the adoption of auger pile has the benefit of less voids between the surrounding soils and the face of the piles as the plastic state of the concrete during its installation forms a strong interlock with the surrounding soil. This method has negligible risk of creating preferential pathway for easy contamination from the surface to the lower strata.

Auger pile is a non-displacement cast-in place piles. This method involves the extraction of the soil prior to placing the pile. It will not in normal circumstances lead to soil being dragged downwards. The arising need to be disposed of in an appropriate manner if they are not suitable for re-use within the site earthworks.

Prepared by



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For and on behalf of JPG

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