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Date: 08^h July 2021

For the attention of Ed Coupe

Dear Ed

Geoenvironmental Summary – Newport Quinn SDD

Geotechnics Limited (Geotechnics) have completed the intrusive investigation at the former Quinn Radiators site in Newport. All soil and groundwater analysis has been undertaken and confirmatory ground gas monitoring has also been undertaken.

This letter report presents an initial summary of the geoenvironmental risk assessment, which will refine the initial risk assessment undertaken as part of the Desk Study report. The risk assessment present in this letter report brings together the following data sets in order to assess geoenvironmental risks to identified receptors, and outline recommendations for any further work that may be required:

- Olfactory, visual and photo-ionisation observations made during the progression of exploratory holes, soil sampling and groundwater monitoring and sampling;
- Screening of contaminant concentrations in soil and groundwater samples against suitable generic assessment criteria (GAC); and
- Assessment of confirmatory ground gas monitoring to confirm the desk study assessment of low risk from ground gases to proposed structures / site users.

Summary of On-Site Geology

Made Ground

Made ground was encountered in all exploratory holes and comprised either hardstanding (concrete or asphalt) or reworked topsoil comprising soft brown slightly sandy slightly gravelly silt with rootlets with gravel composed of mixed lithologies including sandstone, brick, clinker and quartzite.

The uppermost Made Ground deposits were underlain by silty sandy gravel with gravel comprising mixed lithologies including brick, sandstone, slag, clinker and quartzite. Obstruction were encountered in approximately half of the exploratory holes.

In some exploratory holes, deeper Made Ground deposits comprised grey mottled brown clayey slightly gravelly sand with gravel of sandstone. Further obstructions were encountered in these deposits.

Made Ground deposits were typically encountered to depths of between 0.65m bgl and 3.0 mbgl. Two exploratory holes showed Made Ground extended to 0.1 mbgl (RC-BH105) and at least 4.45 mbgl (WS-BH110).

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Quaternary River Terrace Gravel Deposits

Quaternary River Terrace Gravel deposits comprised slightly sandy slightly gravelly clay with a low cobble content. Occasional lenses of sand were encountered, especially in deeper deposits.

The deposits were typically encountered to depths of between 2.8 mbgl and 7.6 mbgl, with deposits in one exploratory hole (WS-BH109) extending to 9.4 mbgl. The deposits were absent in WS-BH111, and thin (<1 m thick) in a number of exploratory holes. Obstructions were encountered in approximately half of the exploratory holes at a relatively shallow depth.

Alluvium

Pockets of alluvial deposits were encountered in the Quaternary River Terrace Gravel Deposits, especially in WS-BH105 and WS-BH106, located in the southwest. These deposits comprised slightly sandy silt with pockets of sand and frequent pockets of organic materials. The lenses were 0.4 m thick.

Devonian Maughans Formation

Bedrock deposits of the Maughans Formation comprises extremely weak to weak brownish red mudstone with very closely spaced discontinuities. The deposits were proven to a maximum depth of between 3.45 mbgl and 15.0 mbgl with the base of the deposits not encountered.

Summary of Groundwater Observations

Groundwater was encountered within Made Ground deposits in three exploratory holes, WS-BH104, WS-BH105 and RC-BH105 with strikes in WS-BH104 and WS-BH105 at 0.9 mbgl. In WS-BH105 the strike rose to 0.55 mbgl after 20 minutes. Groundwater in RC-BH105 was struck at 2.2 mbgl and did not rise. Groundwater was not encountered in Made Ground during progression in any other exploratory hole.

Groundwater was encountered within the Quaternary River Terrace Gravel Deposits in two exploratory holes, RC-BH103 and CP-BH102 with strikes at 2.63 mbgl rising to 2.00 mbgl and 5.6 mbgl with no rise respectively.

Groundwater was encountered in the Devonian Maughans Formation at 9.0 mbgl rising to 4.53 mbgl in RC-BH104. In other exploratory holes, water observations with exploratory hole progression showed that some exploratory holes remained dry and in others, groundwater levels encountered in the Quaternary River Terrace Gravel deposits above remained approximately consistent during drilling into the Devonian Maughans Formation.

Groundwater gauging undertaken on the 16th June 2021 showed that groundwater was present in all monitoring wells, with the exception of WS-BH102 which was dry. Groundwater levels varied between 0.71 mbgl and 3.00 mbgl.

Summary of Olfactory, Visual and Photo-Ionisation Observations

There were no significant visual or olfactory indications of the presence of contaminants. Of note, there were no indications of the presence of gross petroleum hydrocarbon contaminant in Made Ground or the underlying natural ground in the southwest of the site, where potential petroleum hydrocarbons had been observed in service / drainage ducts during the walkover.

No significantly elevated photo-ionisation readings were encountered. All soil VOC and SVOC analysis showed all contaminants were below the laboratory limit of detection.



GAC Screening of Soils for Human Health Receptors

Soils have been screened for human health GAC for a commercial / industrial end-use values. All contaminants concentrations were below the relevant GAC, except for hexavalent chromium (calculated based on chromium to chromate equilibrium), and this is driven by high pH in three samples of Made Ground. High pH may be associated with cement / concrete as well as possible slag deposits.

It should also be noted that no VOC or SVOC compounds were detected above the laboratory limit of detection. No asbestos has been encountered in any samples submitted for analysis.

There are assessed to be no significant risks to end users. Potential risks from hexavalent chromium and high pH during any construction activities can be mitigated by the use of appropriate personal protective equipment.

GAC Screening of Groundwater for Controlled Waters Receptors

Groundwater samples have been screened against Environmental Quality Standards (EQS), which are appropriate for the protection of surface water receptors. No groundwater abstractions occur in the vicinity of the site, and base flow to surface water courses is the most appropriate receptor to consider.

Exceedances of initial EQS GACs were encountered in both perched water in Made Ground and deeper groundwater for the following contaminants:

- Copper (maximum concentration of 3.2 µg/l compared to the unadjusted EQS of 1 µg/l)
- Manganese (maximum concentration of 3,000 µg/l compared to the unadjusted EQS of 123 µg/l)
- Mercury (maximum concentration of 0.34 µg/l compared to the unadjusted EQS of 0.07 µg/l)
- Nickel (maximum concentration of 7.4 µg/l compared to the unadjusted EQS of 4 µg/l)
- Selenium (maximum concentration of 15 µg/l compared to the EQS of 10 µg/l)
- Fluoranthene (maximum concentration of 0.06 µg/l compared to the EQS of 0.0063 µg/l NB Laboratory limit of detection is 0.01 µg/l)
- Benzo(b)fluoranthene (maximum concentration of 0.04 µg/l compared to the EQS of 0.00017 µg/l NB Laboratory limit of detection is 0.01 µg/l)
- Benzo(a)pyrene (maximum concentration of 0.01 µg/l compared to the EQS of 0.00017 µg/l NB Laboratory limit of detection is 0.01 µg/l)
- TPH (only Aliphatic >C21-C35 in one sample) (concentration of 24 µg/l compared to EQS of 10 µg/l)

The concentration show that for most exceedances shows that the majority of exceedances are extremely marginal and not shown across the whole site. There is no discernible difference between concentrations in perched groundwater in Made Ground and deeper groundwater in natural deposits.

Use of the metal bioavailability assessment tool (M-BAT) for copper, nickel, zinc and manganese showed that based on other water chemistry parameters (dissolved organic carbon, pH and concentration of calcium), these metals were less bioavailable and higher GACs were calculated, although exceedances still occurred. However, this further demonstrates that risks to controlled water are low.

Where the exceedances are relatively large, mostly demonstrated for manganese in isolated areas, probably relates to natural processes from the localised reduction of manganese bearing minerals both in natural groundwater and perched groundwater.



There is no evidence of gross impact of perched groundwater or natural groundwater from petroleum hydrocarbons and no separate phase petroleum hydrocarbons were observed during monitoring and/or purging of groundwater prior to sampling.

No VOC or SVOC compounds were detected above the laboratory limit of detection.
No significant risks to controlled waters are considered to be present.

Findings of Confirmatory Ground Gas Monitoring

The risk assessment undertaken as part of the desk study showed that there are no significant sources of ground gases present at the site. During groundwater monitoring, confirmatory ground gas monitoring has been undertaken, and this has confirmed that there are no significant risks from ground gases. No ground gas protection measures, including from radon, will be required for any proposed structures.

Summary of Geoenvironmental Risks

There are no significant geoenvironmental risks identified at the site. During any construction works, the use of personal protective equipment will mitigate minor risks to construction workers. If these Made Ground materials remain on-site following development, the risk to end-users will be mitigated by hard standing and cover from landscaping.

Although there are exceedances of GACs for contaminants in groundwater, the magnitude of the exceedances is generally marginal. Those contaminants which show a greater magnitude of exceedance (ie manganese) is probably due to natural reduction of manganese bearing minerals within the soil matrix.

No other geoenvironmental risks have been identified.

Initial Recommendations for Further Work / Assessment

No further investigation is required. Recommendations will be made in the full report to mitigate any residual risks as detailed above.

We will issue a more formal geoenvironmental assessment in our interpretive ground investigation report. In the meantime, if you require any further information, please do not hesitate to contact me.

Kind regards

For and on behalf of Geotechnics Limited

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Principal Geoenvironmental Engineer

