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Remediation Strategy

1.0 Purpose and aims of this report

1.1 Introduction

By the instructions of our Client, Mr Martin Hanford, Roger Roberts Surveys Limited have been commissioned to undertake a remediation strategy plan for land adjacent to 103 Brecon Road, Pontardawe, SA8 4PD. A two storey detached dwelling, including a rear balcony and a detached garage have been constructed on the site.

This report has been drafted by Luke Roberts, **BSc (Hons), HNC, AssocRICS** and countersigned by Roger Roberts **Roger Roberts BSc (Hons), MRICS, RICS Registered Valuer. FCABEng, FISAV, DipDEA.** Our positions are that of RICS building surveyors. With a combined working experience of 52 year experience in the building sector.

This report is to indicate our proposed remediation strategy following recommendations made by Quantum Geotech's Phase 2 land contamination survey. Reference Number Q0057/LR01 findings of which can be found in section 2 of this report and a Phase 1 Desk Study Report carried out on the 6th of June 2019 by STM Environmental Consultants Ltd, report reference PH1-2019-000045. The conclusions of which found that the site and immediate adjacent land have been subject to previous potentially contaminative land uses (PCLUs),

No on site PCLUs were identified whilst off site PCLUs include a workhouse and potentially infilled land. The recommendations of the report were to carry out an intrusive site

investigation with the objective of determining the presence and extent of any soil contamination.

1.2 Site setting

The site is located adjacent to 103 Brecon Road in Pontardawe. The storey detached dwelling is currently constructed in the north western area of the site. As identified within Quantum's Phase two report, the site is bounded to the North West by Brecon Road, to the south east by trees and the Swansea Canal and to the north east and south west by neighbouring residential housing. The National Grid reference of the site is **E272865, N204760**. Geological Survey Sheet **SN-70-SW at 1:10,560 scale**, indicates the site to be underlain by Glaciofluvial Deposits typically comprising Sand and Gravel. Also, due to the historical use of the plot and surrounding area, some Made Ground material is likely to be present. The solid geology below the site is mapped as the Brithdir Member of the Upper Coal Measures, typically comprising Sandstone.

1.3

Our liaison with the local authority has been through **Jenny Griffiths, Planning Officer (Development Management)**

1.4

We would like to highlight that Japanese knotweed treatment has been implemented to the rear of the site which has not been identified or included within the phase 2 land contamination survey. Some site pollutants may be partly attributed to this treatment program. Verification of this program can be supplied at the request of Neath CBC.

1.5 Site Location plan (NOT TO SCALE)

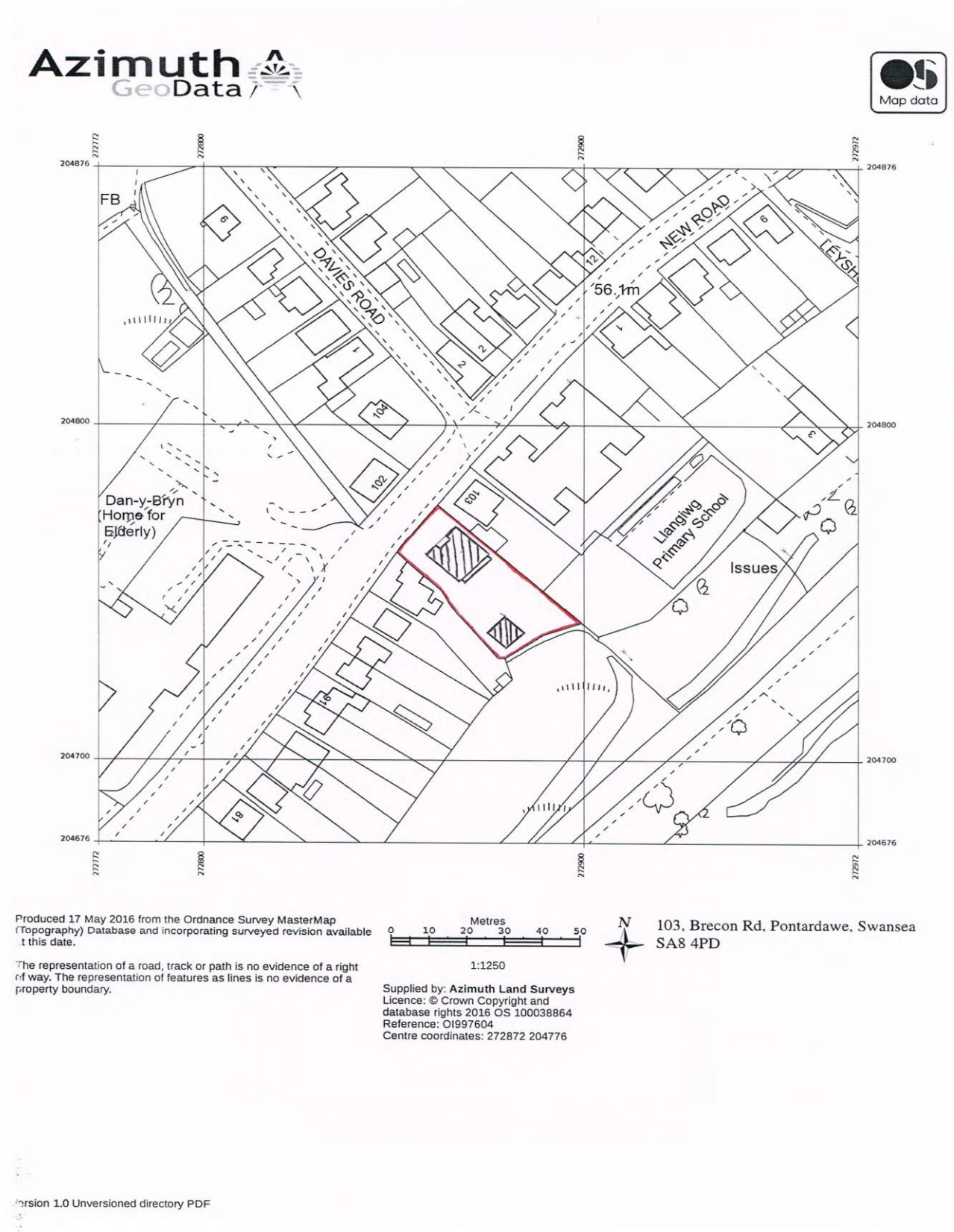


Figure 1: Site location Plan(See appendix one for scaled version)

2.0 Remediation Strategy

2.1 Site Zoning

Please see attached site plan for site zoning and hard standing lay out.

2.2 Objectives

The objectives set out in this section of report will cover the pollutants identified within Quantum's Phase 2 land contamination survey, and our intended strategy in dealing with these on the basis of a 'source-pathway-receptor' methodology. This will include our remediation methodology to include justification for the intended remediation method.

2.3 Summary Assessment of Risk to Human Health

2.3.1 Phase 2 comments:

"The risks to human health of site end users is based upon a '*source – pathway - receptor*' analogy, whereby the contaminants would be the **source**, the **pathway** would typically be dermal contact, inhalation and ingestion in this scenario and the **receptor** being the future site users. To reduce the risk to acceptable levels, one element of this model must be removed.

The Made Ground has been identified as a potential contamination source, which it should be assumed to be site wide. A potential pathway exists, notably within the proposed garden areas / soft Land Adjacent to 103 Brecon Road, Pontardawe Q0057GI/LR01 Ground Investigation GeoEnvironmental Letter Report 16 August 2019 landscaping for the site end user to come into contact with the contaminated soils over the long term.

Therefore, a source-pathway-receptor (S-P-R) linkage has been identified through this ground investigation. In order to reduce the risk to future site users to acceptable levels, it is recommended either the potential contamination source is removed/excavated and disposed of off-site, or the potential contamination pathway is severed by placing the material under a suitably designed capping layer or an impermeable surface."

2.3.2

Remediation strategy and methodology:

The phase two report recommends either the removal of any contaminated land on site, a designed capping layer or the installation on impermeable layers on-site. Our choose strategy will be an impermeable layer. This is due to the significant financial implementations of the capping layer or the removal of soil from site. As all contamination readings were identified as low-moderate we believe this approach to be reasonably practicable.

Our recommendations are to level all tested soil on site and cover these with a mixture of non-permeable coverings, so physical contact with the subsoil cannot be made. This will include, tarmacked driveways, concrete paving slabs and in the remaining areas artificial lawn with an under layer of 'Tarram' or similar non-permeable ground cover layers. The design of which can be viewed by the attached site plan.

2.4 Summary Assessment of Risk to Controlled Waters

2.4.1 Phase 2 comments

Soil leachate testing identified concentrations of Copper, Lead and Zinc within the Made Ground in WS1 and the concentrations of Lead and Zinc within the Made Ground in WS4 were above the relevant EQS values. Therefore, a risk may exist to controlled waters from potential mobile contaminants held within the soils.

The strata underlying the Made Ground (potential contamination source) was identified as anticipated low permeability Clays and therefore the risk of any mobile contaminants entering on-site groundwater is considered negligible. However, given the increase in depth to the Clay layer from north west to south east, towards the stream in the south eastern area of the site / site boundary, the potential risk exists for any mobile contaminants to flow across the upper surface of the clay into the stream.

Given the low levels of leachate concentrations measured, when one considers the natural attenuation and dilution of any leachate that might ultimately reach a controlled water, the risk is in all likelihood very low.

Given no groundwater was identified across the site, preventing the downward movement of water through the Made Ground will reduce the potential for leachate generation. It is recommended, if a capping layer is installed, it is of low permeability. In addition, soakaway drainage is not recommended as the introduction of concentrated quantities of water into the ground will significantly increase the potential for leachate containing elevated contaminant concentrations to be generated.

Considering the remedial measures outlined in Section 5.4, once these are completed, then the risk from any leachate will be further reduced.

2.4.2 Remediation strategy and methodology:

Due to the admittance of the phase 2 report that any leachate that might ultimately reach a controlled water, being in all likelihood very low, we believe that it is un-reasonable to follow the recommendations of not allowing surface water to be displaced via soakaways on-site. This along with the fact some pollutants could be attributed to the current and prolonged Japanese Knotweed treatment program on site do not justify the displacement of surface water which would ultimately have to be displaced into the Welsh water sewage system. Currently and before operations started onsite surface water has been allowed to freely leech through the entire site as it was previously not developed on. Thus, we intend to carry out operations as normal on site in line with current building regulations.

2.5 Review of Conceptual Site Model (CSM)

2.5.1 Phase 2 comments

The on-site investigation and subsequent laboratory testing has identified that heavy metals of Arsenic and Nickel is a potential soil contaminant and was above the prescribed Soil Guideline Values for Residential with plant uptake. As such a possible pollutant linkage of dermal contact and ingestion of soil, to future site users is a risk.

Other potential pollutant linkages have been dismissed through the soil testing process, i.e. chemical attack of building materials. The site-derived chemical dataset did not highlight any potentially deleterious chemicals/ contaminants within the soil matrix onsite to be at

concentrations, which may lead to chemical attack and corrosion of building materials, in particular, concrete and mortar, as well as buried services and utilities.

In conclusion, based on the Phase I Desk Study and the findings of the Phase II Investigation, the only source-pathway-receptor (S-P-R) linkage identified for the site is that of the heavy metals on site, which can be avoided with the removed/excavated and disposed of off-site, or the potential contamination pathway is severed by placing the material under a suitably designed capping layer or an impermeable surface.

2.5.2 Remediation strategy and methodology:

The phase two report highlighted no contaminated on site which would be detrimental to the building already constructed of site thus no details are required in regard to these comments. The heavy metal identified on site will be addressed with the same recommendations made in section 2.3.2 of this report.

2.6 Ground Gas Assessment

2.6.1 Phase 2 comments

2 No. post-fieldwork monitoring ground gas visits have been undertaken to allow a preliminary assessment to be undertaken. Appendix III presents the monitoring records with the results discussed below.

The results show CH₄ concentrations of 0%v/v and CO₂ concentrations between 0.0 and 2.8%v/v. Maximum measured flow rate was recorded as 0.0l/hr whilst O₂ levels ranged between 16.5 and 21.3%v/v. No H₂S or Carbon Monoxide (CO) was recorded.

The potential risks posed by any recorded presence of potentially harmful gases can be assessed on a semi-quantitative basis by reference to the guidance in documents CIRIA 665 and BS8485. The assessment comprises multiplying the maximum measured steady gas flow rate (expressed as litres per hour) by the maximum steady gas concentration (expressed as percentage-by-volume; divided by 100) to derive a Gas Screening Value (GSV). The GSV can then be used to determine a risk classification and a Characteristic Situation for the site as defined in Table 16. Based on the ground gas monitoring findings to date, the site is classified as Characteristic Situation 1, Low risk, with GSV's of 0.0.

2.6.2 Remediation strategy and methodology:

Due to the phase two report identifying gas monitoring findings to be low risk and placing them into classification Situation 1 with GSV's of 0.0 no further actions are required.

3.0 Preparation of works and verification strategy.

3.1 Preparation works and operational constraints

The site consists of a level land with a single dwelling already constructed onsite. No risks to the building were identified from the phase two report so no action is required in this regard. The building does not present an operational risk as there is remaining access of 1.2 meters to one side of the property and 3.5 meters to the other side of the property. Preparation works onsite will consist of the levelling of all pre-tested ground onsite and where applicable this installation of hardcore to receive the layers of tarmac and concrete paving slabs. These are identified in the attached site plan. Hardcore layers, finer hardcore layers and sand layers will be installed where the artificial lawn is intended to be placed which will receive the Tarrem (or similar) non-permeable layer.

3.2 Site management procedures

Due to no contaminated on site being identified as high in concentrate and all but one within uk drinking water standard levels as identified on page 16, Table 8 of Quantum's phase 2 report, no emergency contingency plans are required. No hazardous substances were found on site thus there is no rational for a site management plan to be implemented. The capping of the sub-soil surface with tarmac roadways and concrete paving slabs areas, together with the non-permeable layer underneath the artificial lawn will address all low risks identified on site.

3.3 Location and construction details

Not applicable, due to low levels of heavy metals and contaminated identified on-site. A proposed site lay out plan with intended coverings can be views in the attached site plan document.

3.4 Permits and licences

Not applicable, the phase 2 report did not identify any requirements for permits or licences.

3.5 Site plans/drawings

All site plans and drawings of the property and proposed external coverings can be found in the attached PDF documents.

3.6 Constitution of completion and verification

The proposed constitution of completion of all external works onsite will be the finalization of landscaping on all external areas onsite. This will include the tarmac driveway, hardstanding concrete paved seating areas, concrete paved footpaths and the rear artificial lawned areas. We as independent RICS Chartered Surveyors proposed to monitor external operations on site and confirm that no new soil is imported to site. The Tarram non-permeable layer is inserted below the artificial lawned areas and concrete paving and tarmacking is completed to an acceptable standard. Photographic evidence as well as a written report on verification will be provided to Neath and Port Talbot council upon completion of works.

4.0 Verification Plan

4.1

A verification plan is not required outside the scope of recommendations made in section 3.6. This is due to no serious or hazardous material being identified on site during the phase two survey. No sampling or future monitoring was recommended in the conclusion (section 6.0) section of Quantum Geotech's Phase 2 land contamination survey. A gas management system is also not required and no new soil will be introduced to site.

This report has been produced by:

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Countersigned by:

Signature:



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