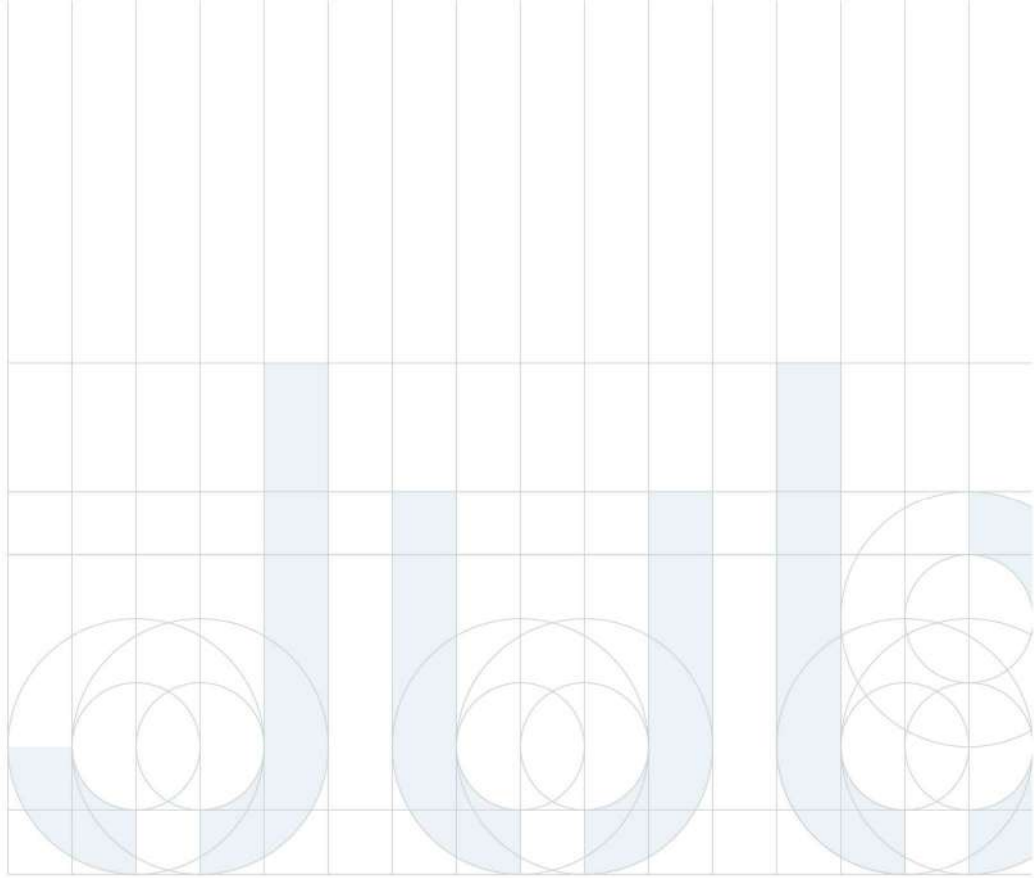




Abbey School, Neath



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1 Project Information

1.1 Project Information

Client BAM Construction

1.2 Project Details

Project Name Abbey School

Location Neath

Jubb Project Number 19264

1.3 Report Details

Version Rev 1

Status First Issue

Date 31/03/2020

1.4 Project Authorisation

ISSUE HISTORY:

Version	Date	Detail
1	31/03/2020	Planning Issue

AUTHORISATION:

Prepared By	Approved By
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2 INTRODUCTION

2.1 General

This report has been prepared by Jubb Consulting Engineers Limited (Jubb) to address the proposed remedial works for primary school development at the Former Dŵr y Felin Comprehensive School, which has now been demolished.

The report includes proposed mitigation measures for dealing with known contamination at the site including known contamination hotspots encountered during the Phase 2 investigation works carried out by Jubb in 2019 (in the context of the proposed primary school), management of existing asphalt surfaces, and a discovery strategy to deal with any unexpected contamination.

This Remediation Strategy has been prepared to mitigate the potential risk(s) to human health as identified in various previous reports as set out below.

2.2 Site Description

The site is approximately 3.3 Ha in area, and irregular in shape due to the presence of Neath Abbey Infants School to the east of the site. The eastern half of the site forms two separate terraces occupied by abandoned level playing fields. To the western half of the site, the site forms approximately three different terrace levels, which were previously the site of multiple school buildings. The site slopes moderately downhill to the east by 5°. At the time of investigation, these buildings had been demolished, with only the foundations and floor slabs remaining *in-situ*. Demolition material was observed to be crushed and distributed around the slab areas infilling topographic lows and was also used to form graded slopes. Towards the centre of the site, running north-south is a 4 m high soil/fill batter present between the playing field and the car park and a 3.5 m high soil/fill batter present between the school and the car park. Additional soil cut/embankment batters are present to the northwest of the site at the northern playing field up to 3.5 to 4 m in height.

The site is bound to the south by The Drive, to the east by Heol Penlan, Neath Abbey Infant School and residential housing to the north-eastern corner of the site, to the north by farmland and a covered reservoir and to the west by forestry and a single residential building. Running along the western site boundary is a 3-4 m high grass cutting, forming slope angles up to 38°. Car parking (asphalt surfaces occupy the centre of the site. The site is completely enclosed with 2 m high palisade security fencing.

2.3 Previous Reporting

Jubb and Géotechnique (Wales) Limited have undertaken the following reports at the site:

- Integral Géotechnique (Wales) Limited, October 2014. Dŵr y Felin School, Neath, Site Investigation Report, Document Ref: 11437/CF/14/SI/Rev A; and
- Jubb Consulting Engineers, November 2019. Abbey School, Supplementary Ground Conditions Assessment Report.

2.4 Planning Status

Planning Application Recommended for Approval was received in December 2019 following an appeal, under reference P2019/5679.

Under the existing consent, a number of planning conditions were proposed, including Condition 22 which relates to investigation of contaminated land at the site as follows:

- *In the event that contamination is found at any time when carrying out the approved development that was not previously identified, work on site shall cease immediately and shall be reported in writing to the Local Planning Authority. A Desk Study, Site Investigation, Risk Assessment and where necessary a Remediation Strategy must be undertaken in accordance with the following document :- Land Contamination: A Guide for Developers (WLGA, WAG & EAW, July 2006). This document shall be submitted to and agreed in writing with the Local Planning Authority. Prior to occupation of the development,*

The above planning conditions are pre-commencement and hence need to be discharged as soon as practicable to allow the development to proceed.

This report provides details of the proposed remedial actions required to allow discharge of the relevant planning condition(s).

2.5 Proposed Land-Use and Soft Landscaping

The consented scheme includes two storey T-shaped building which occupies the majority of the western portion of the site, with areas surround as hard standing paved areas and paved car parking to the south and access road to the southeast of the site. A MUGGA asphalt surfaced pitch is positioned to the northwest of the site.

Soft-landscaping has been proposed in all peripheral areas of the western portion of the site. The majority of the eastern portion of the site is soft landscaped which includes a grassed sports pitch. Trees have been indicated along the north-western site boundary and towards the centre of the site.

NB - All tree planting will be carried out within tree pits appropriate to the proposed tree species, and with due regard to the proximity to sensitive structures.

3 SITE CONDITIONS AND SUMMARY OF RISKS

3.1 Geology and Ground Conditions

The 1:50,000 scale geological map (Swansea -Sheet 247) indicates the site to be underlain by the Swansea member, which form part of the Upper Pennant Measures. These deposits typically comprise a green-grey, lithic arenite, known as Pennant Sandstone with thin mudstone/siltstone and seatearth interbeds and mainly thick coal layers.

The Grovesend Formation is present to the north and northeast of the site, comprising argillaceous mudstone and siltstone. The basal contact of the unit is with the Swansea Four-Feel Coal (equivalent of the Llasntwit No.3 Seam). Bedding is expected to be dipping by 18 to 25° to the west in areas east of the Dyffryn Fault.

The bedrock is shown to be overlain by surficial Glacial Till deposits comprising a mixture of clays, sand, gravel and boulders.

The Dyffryn Fault is shown approximately 200 m west of the site (trending north-south, with downthrow to the east) and the Cwm Felin fault is approximately 300 m to the east (trending north-south, with downthrow to the west).

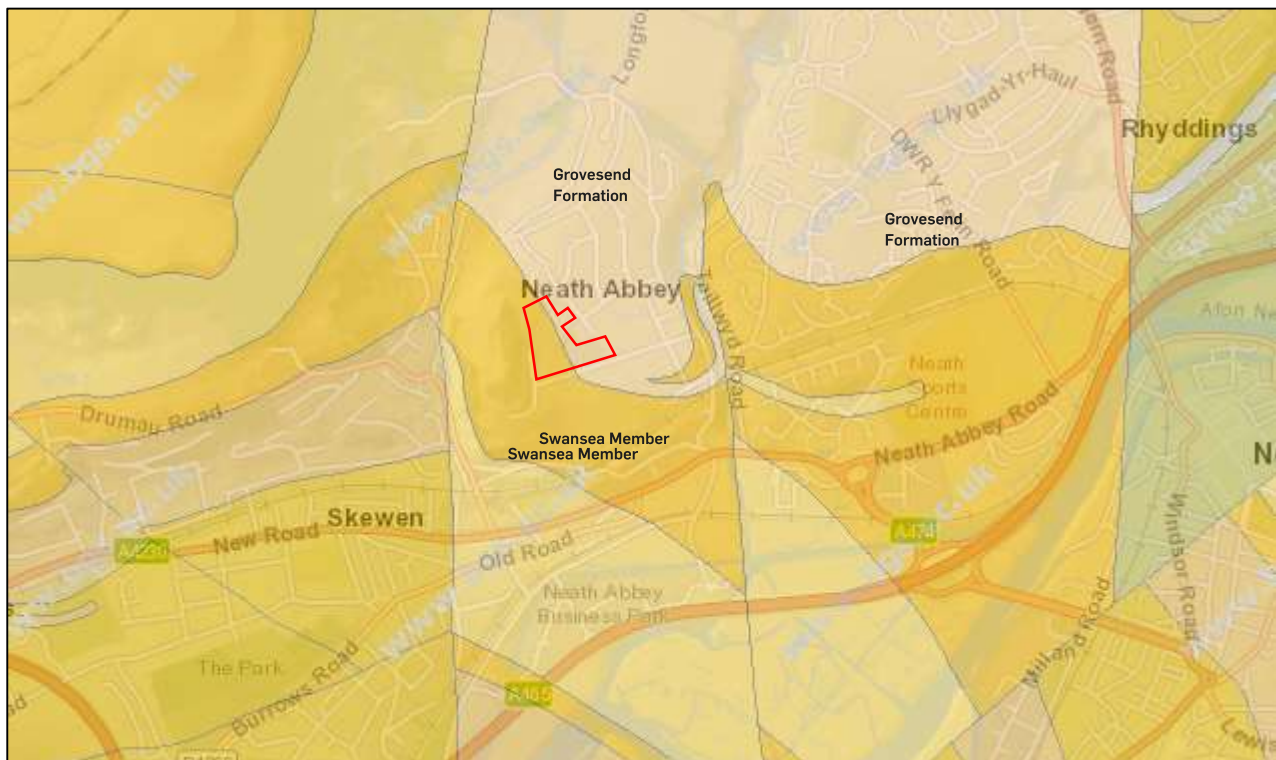


Figure 1. Geological Map (red outline of the site)

The site investigation comprised a series of trial pits, window samples and boreholes, which indicated the following ground conditions:

- Southern portion of the site:
 - Made ground up to 1.6 m comprising orange, grey and black sandy GRAVEL, slightly sandy gravelly CLAY, slightly sandy clayey SILT and COBBLES and BOULDERS with clasts of concrete, brick and sandstone. Car parking (asphalt) surfaces occupy the central southern portion of the site;

- Glacial Till Deposits comprising firm to stiff grey mottled orange brown and bluish grey gravelly CLAY and medium dense to dense very sandy very clayey GRAVEL to an average depth of 2.1 m (max 4 m depth); and
 - Light grey, grey and brown SANDSTONE with interbeds of dark grey and black coal.
- Northern and Eastern portion of the site:
 - Topsoil is present over the eastern half of the site comprising dark brown slightly gravelly sandy SILT with roots and rootlets up to 0.3 m thickness.
 - Glacial Till Deposits comprising firm to stiff grey mottled orange brown and bluish grey gravelly CLAY and medium dense to dense very sandy very clayey GRAVEL to an average depth of 2.1 m (max 4 m depth); and
 - Light grey, grey and brown SANDSTONE with interbeds of dark grey and black coal.

3.2 Summary of Contamination Encountered

The results of the Phase 2 Site Investigation carried out by Jubb in 2019 and Integral in 2004 indicated a number of contamination hotspots within the made ground with exceedances of predominantly Arsenic with PAH, TPH, Lead and Asbestos also present across the site, which have been discussed below.

Additional trial pitting was carried out by Terra Firma (South) in February 2020 to further define and delineate the extent of the contamination. The investigation comprised an additional 36 no. trial pits around known hotspot areas and 7 no. trial pits within the existing pavement areas. The location of the trial pits has been presented in drawing no: 19264-ABBY-JUBB-V1-ZZ-DR-C-650 P01. The works were directed by Jubb.

In addition, potential coal tar based asphalt is present beneath existing modern pavement areas to the south and central southern areas of the site, which are discussed further in Section 3.3 of this report.

The generic assessment criteria used in this case are generally the LQM/CIEH Suitable 4 Use Levels (S4ULs), based on minimal or tolerable risk and are intended to be protective of human health. Different criteria are provided for a variety of land use, and the criteria for "Residential without plant uptake" has been adopted here.

Arsenic

During the Phase 2 investigation works, 7 no. Arsenic hotspots were encountered, which required further investigation to delineate extent and concentrations of the contamination.

Arsenic was the most widely distributed contaminant across the site, with elevated levels detected within 11 no. of the additional sample locations.

18 no. of the 68 no. soil samples were found to be elevated above the Generic Assessment Criteria (40mg/kg), the mean of the sample data was 33mg/kg, with a range of values from 4.3 - 270 mg/kg.

The Upper Confidence Limit (95 percentile) for the Arsenic concentrations is 55mg/kg, so in general Arsenic concentrations across the site can be considered to be above the adopted C4SL threshold values of 40mg/kg.

The background Arsenic values as published by the National Soil Inventory (NSI) under the DEFRA and BGS dataset indicate average 'background' concentration of 74.14 mg/kg in this area.

As indicated above, the site is located in an area known to be heavily mineralised, which is typically associated with elevated concentrations of various heavy metals, including Arsenic.

Due to absence of any specific anthropogenic source of the elevated arsenic concentrations, it is considered that they are 'naturally elevated' due to the chemistry of the bedrock and subsoil.

Lead

During the previous phase of investigation, elevated Lead was detected in 2 no. locations.

6 no. of the 68 no. soil samples were found to be elevated above the Generic Assessment Criteria (130mg/kg), the mean of the sample data was 66mg/kg, with a range of values from 4.0 – 690 mg/kg.

The Upper Confidence Limit (95 percentile) for the Lead concentrations is 120 mg/kg, so in general Lead concentrations across the site can be considered to be below the adopted C4SL threshold values of 130mg/kg.

The background Lead values as published by the National Soil Inventory (NSI) under the DEFRA and BGS dataset indicate average 'background' concentration of 124.57 mg/kg in this area.

As indicated above, the site is located in an area known to be heavily mineralised, which is typically associated with elevated concentrations of various heavy metals, including Lead.

Polyaromatic Hydrocarbons (PAH)

PAH exceedances were previously encountered at a single location during Phase 2 works.

However, more widespread PAH exceedances were detected within 6 no. of the 9 no. investigated hotspot locations for Benzo[b]fluoranthene, Benzo[a]pyrene and Dibenzo[ah]anthracene. A single sample from TP219 contains elevated of all three of these PAHs.

Benz[a]anthracene

Exceedances in Benz[a]anthracene were encountered in WS4 of 140 mg/kg and in WS5 of 25mg/kg in excess of the Generic Assessment Criteria of 15mg/kg.

Statistical analysis of dataset as a whole indicates a UCL 95 value of 23.8mg/kg, which is in excess of the adopted Generic Assessment Criteria values. The exceedance encountered in WS4 can be considered an outlier, which if excluded from the dataset the UCL 95 is calculated at 4.5mg/kg, which is well below the adopted GAC of 15mg/kg.

Chrysene

A single exceedance of Chrysene was encountered in WS4 of 130mg/kg, which is in excess of the adopted Generic Assessment Criteria value of 32mg/kg. However, the calculated UCL 95 of the dataset is 22.1mg/kg, which is well below the adopted values.

Benzo[b]fluoranthene

Exceedances in Benzo[b]fluoranthene were encountered in WS4 of 180mg/kg and in WS5 of 34mg/kg, TP206 of 4.9mg/kg, TP207 of 5.7mg/kg, TP219 of 15mg/kg and TP220 of 4.1mg/kg in excess of the Generic Assessment Criteria of 4mg/kg.

Statistical analysis of dataset as a whole indicates a UCL 95 value of 16mg/kg, which is in excess of the adopted Generic Assessment Criteria values.

However, the highest two Benzo[b]fluoranthene values encountered in the dataset are both indicated as an outlier to the data set. If these two values are excluded, the recalculated UCL 95 value is 2.2mg/kg, which is below the Generic Assessment Criteria of 4mg/kg.

This would suggest the two highest values of Benzo[b]fluoranthene encountered are 'hotspots', and not indicative of the site wide concentrations of Benzo[b]fluoranthene.

Benzo[a]pyrene

Exceedances in Benzo[a]pyrene were encountered in TP114 of 3.5mg/kg, in WS4 of 93mg/kg, 20mg/kg in WS5 and 8.9mg/kg in TP219 in excess of the Generic Assessment Criteria of 3.2mg/kg.

Statistical analysis of dataset as a whole indicates a UCL 95 value of 8.3mg/kg, which is in excess of the adopted Generic Assessment Criteria values.

However, the highest three Benzo[a]pyrene values encountered in the dataset are both indicated as an outlier to the data set. If these three values are excluded from the dataset, the recalculated UCL 95 value is 0.94mg/kg, which is below the Generic Assessment Criteria of 3.2mg/kg.

This would suggest the three highest values of Benzo[a]pyrene encountered are 'hotspots', and not indicative of the site wide concentrations of Benzo[a]pyrene.

Indeno[123-cd]pyrene

A single exceedance of Indeno[123-cd]pyrene was encountered in WS4 of 55mg/kg, which is in excess of the adopted Generic Assessment Criteria value of 46mg/kg. However, the calculated UCL 95 of the dataset is 9.3mg/kg, which is well below the adopted values.

Dibenz[ah]anthracene

Exceedances in Dibenz[ah]anthracene were encountered in TP114 of 1.0mg/kg, in WS4 of 22mg/kg, WS5 of 3.2mg/kg, TP202 of 0.98mg/kg, TP204 of 1.3mg/kg, TP205 of 1.1mg/kg, TP219 of 2.7mg/kg, TP220 of 1.1mg/kg, TP221 of 0.31mg/kg, TP230 of 0.41mg/kg, TP235 of 0.35mg/kg and TP236 of 0.72mg/kg in excess of the Generic Assessment Criteria of 0.32mg/kg.

Statistical analysis of dataset as a whole indicates a UCL 95 value of 9.3mg/kg, which is in excess of the adopted Generic Assessment Criteria values.

However, the highest three Dibenz[ah]anthracene values encountered in the dataset are indicated as an outlier to the data set. If these three values are excluded from the dataset, the recalculated UCL 95 value is 0.22mg/kg, which is below the Generic Assessment Criteria of 0.32mg/kg.

This would suggest the three highest values of Dibenz[ah]anthracene encountered are 'hotspots', and not indicative of the site wide concentrations of Dibenz[ah]anthracene.

Petroleum Hydrocarbons (EC >40-70)

2 no. of the 68 no. soil samples were found to be elevated above the Generic Assessment Criteria (1900mg/kg), the mean of the sample data was 129.9mg/kg, with a range of values from 10 – 2100 mg/kg.

However, elevated results are considered to be a hotspots, and remaining values are well below the adopted assessment criteria.

BTEX and MTBE testing was also undertaken on 6 no. samples, with no detections of any determinants (values <0.01 mg/kg).

Asbestos

Asbestos was encountered within 5 no. trial pit locations. Amosite was encountered in TP236 and Chrysotile was encountered within TP119. WS05, TP224 and TP228 all within samples from the made ground.

Based on these findings and the information from the previous investigation asbestos is expected to be present throughout the made ground. Removal of made ground and building rubble will need to be carried out in general accordance with the Health and Safety Executive 'Control of Asbestos Regulations' 2012.

Radon

The Envirocheck report indicates no radon protection measures are required for new developments.

3.3 Pavement Coal Tar Test Results

Coal Tar contained within older road construction (i.e. tarmac dating from the 1980's or earlier) is known to be potentially hazardous to health and is classified as a Hazardous Waste, due to high quantities of PAH.

Chemical testing was carried out on the existing asphalt pavement areas to the south and central south of the site for the presence of Coal Tar. This was determined by using both PAK marker spray, and undertaking chemical testing for PAHs.

During the investigation, two layers of asphalt were visually identified. The current top surface was found to be non-reactive to the PAK spray and was generally found to be between 20 mm to 30 mm in thickness. It has been