Mid & West Wales Fire Service

EARLSWOOD BURN HOUSE, JERSEY MARINE, NEATH

Outline Remediation Strategy Report

14050/LW/23/ORS

Intégral
Géotechnique

CLIENT:	**Mid & West Wales Fire Service**
PROJECT:	**Earlswood Burn House, Jersey Marine, Neath**
TITLE:	**Outline Remediation Strategy Report**
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Geotechnical Engineers:

Intégral Géotechnique (Wales) Limited
Integral House
7 Beddau Way
Castlegate Business Park
Caerphilly
CF83 2AX

Tel: 029 2080 7991

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1.0 INTRODUCTION

1.1 GENERAL

Intégral Géotechnique (Wales) Limited have been appointed as Geotechnical and Geoenvironmental Consultants by Mid & West Wales Fire Service to prepare a remediation strategy for the construction of a new development within the existing Earlswood Training Centre to a standard suitable for commercial end use.

A Site Investigation Report Ref: 14050/LS/22/SI/RevB, dated October 2022 has been previously prepared by Intégral Géotechnique (Wales) Limited. The previous report has been used as information as part of the remediation strategy and should be read in conjunction.

The purpose of this report is to provide a remediation strategy for the delivery of the site to a standard suitable for the proposed commercial end use and details how the remediation works will be monitored and validated.

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1.2 PROPOSED DEVELOPMENT

The proposed development will comprise of the construction of a new training facility within the existing structure of the building consisting of a two-storey residential building, materials store and vehicle wash down area. External to the pre-existing building a control room, smoke filter housing and fan will be constructed.

Lawray Architects have provided a drawing for the project entitled ‘Proposed Ground Floor Plan and Roof Plan’ under the project number 19655, dated 22nd February 2022.

2.0 BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The site is located in Neath, west of Briton Ferry at a National Grid Reference of 273109, 194177, see Figure 1.

The site is rectangular in shape and occupies an area of approximately 0.7 hectares. The boundaries of the site are defined by the wider Earlswood Training Centre site to the north and west, a small, wooded area to the east and Earlswood Depot Access Road to the south. A site plan is presented in Figure 2.

The site is situated on relatively level ground from an approximate elevation of 6.5m AOD.

The site itself comprises largely of a pre-existing building, which currently has no use. Outside the footprint of the building, the site comprises areas of hardstanding of asphalt and concrete.

2.2 AVAILABLE SITE INVESTIGATION DATA

The following reports have been reviewed as part of these works:

- Earth Science Partnership, Proposed Training Facility (Commercial Development) Mid & West Wales Fire Service, Geotechnical & Geo-Environmental Desk Study, Report Ref. ESP.8178.3720 dated June 2022

- Intégral Géotechnique (Wales) Ltd, Earlswood Burn House, Jersey Marine, Neath, Site Investigation Report, Report Ref. 14050/LS/22/SI/RevB dated October 2022

The above reports should be reviewed in conjunction with this Outline Remediation Strategy Report in order to gain a detailed appraisal of the site and the works completed to date. The previously submitted reports provide the information on which this Outline Remediation Strategy Report is based.

2.3 SITE HISTORY

The history of the site has been traced based on information detailed within the Desk Study Report produced by ESP and summarised within the Site Investigation Report as referenced above.

2.3 SITE HISTORY (CONTINUED)

In the 1880s a railway line crossed through the site associated with Earlswood Colliery located to the west, this was dismantled in the late 1890s and the site remained vacant. The site remained vacant until 1965 when a track was constructed across the site and a small building encroached across the southern boundary. The site was completely vacant by the 1980's although the present-day boundary of the Earlswood Training Facility was evident. By 1995 the existing building on site is present, the layout resembled the present-day layout.

2.4 SUMMARY GROUND CONDITIONS

The site investigation undertaken in July 2022, comprised the drilling of five windowless sample boreholes.

A summary of the ground conditions encountered across the site is presented below.

2.4.1 Concrete Slab

The concrete slab which is situated underneath the giraffe building was cored at three locations (Core 1 to Core 3).

The locations of the cored samples are shown in Figure 3.

Descriptions of the concrete cores are provided in Figures 4, 5 and 6.

2.4.2 Surface Hardstanding

A surface covering of reinforced concrete was observed at three exploratory locations (WS1, WS2 and WS3) typically to 0.3m below existing ground level (bgl).

A surface covering of tarmac was observed at two exploratory locations (WS4 and WS5) to a depth of 0.02mbgl.

At WS5, bituminous material overlay the concrete.

2.4.3 Made Ground

Made ground was observed at each windowless sample borehole location and was proven to extend to depths of between 1.0m and 2.2m below existing ground level.

2.4 SUMMARY GROUND CONDITIONS (CONTINUED)

The made ground underlying the concrete and tarmac was poorly consolidated, predominately granular but with some cohesive layers and was characterised by the presence of angular and sub angular limestone and occasional anthropogenic materials including brick, ash, clinker and slag.

Uncorrected N values derived from in-situ testing in the windowless sample boreholes ranged from between 4 and 15 within the made ground. This indicates that with the exception of localised concentrations of cobbles, elevating the N value, the made ground is generally loose or soft.

2.4.4 Superficial Soils

The made ground deposits were proven to be underlain by natural superficial deposits at depths of between 1.3m and 2.2m below ground level.

Uncorrected N values ranged from between 2 and 9 with values typically around 3. This indicates the superficial deposits are very loose to loose or very soft to soft.

The natural superficial deposits consisted predominantly of loose yellow beige, light brown, orange dark brown, dark grey fine to coarse sand.

The superficial sand deposits within windowless sample boreholes WS1, WS2 and WS5 had inclusions of fine to coarse subangular and subrounded sandstone gravel.

Locally to WS4 between 3.7m and 4.0mbgl and within WS1 between 4.7m and 5.0mbgl the deposits were noted as soft dark grey very sandy silty clay.

In WS3, the superficial deposits were described as medium dense orange, brown clayey gravel. The gravel consisted of fine to coarse sub angular and sub rounded sandstone between the depths of 1.0m and 1.10mbgl.

The laboratory Atterberg Limit test results on the recovered superficial sand deposits indicated negligible volume change potential of these materials

2.4.5 Groundwater

The groundwater conditions are based on observations made at the time of the fieldwork. It should be noted that groundwater levels may vary due to seasonal and other effects.

2.4 SUMMARY GROUND CONDITIONS (CONTINUED)

Table 1: Summary of Groundwater Observations	
Exploratory point	**Groundwater Observations**
WS1	Groundwater struck at 1-2m and standing at 0.77m.
WS2	Groundwater struck at 2-3m and standing at 1.27m.
WS3	Groundwater struck at 2-3m and standing at 0.88m.
WS4	Groundwater struck at 2-3m and standing at 0.8m.

The rise in water level within the windowless sample boreholes indicates that the groundwater contained in the superficial deposits is under sub artesian pressure.

The groundwater conditions are based on observations made at the time of the fieldwork.

It should be noted that groundwater levels may vary due to seasonal and other effects.

2.5 IDENTIFIED CONTAMINATION

The results of the laboratory testing on samples of made ground indicate that most of the analysed chemical elements or compounds are present at concentrations below the appropriate thresholds. However, the initial screening indicates exceedances of arsenic and lead.

Five exceedances of lead have been identified within the made ground in WS1 and WS2 at depths of between 0.3m to 1.9m, the results of which exceeded the adopted screening value of 2330mg/kg. The elevated concentrations of lead ranged between 4,900mg/kg and 12,000mg/kg.

Two exceedances of arsenic have been identified within the made ground within WS1 at depths of between 0.3m and 0.6m below existing ground level with the recorded value of 1,200mg/kg exceeding the adopted screening value of 640mg/kg.

Asbestos has been identified in two out of twelve samples of made ground. Fibres of loose chrysotile asbestos were identified within the made ground at WS1 (0.5-0.6mbgl) and WS2 (1.0-1.5m).

2.5 IDENTIFIED CONTAMINATION (CONTINUED)

Both samples in which chrysotile fibres were identified in soil were sent for quantification. The results of the quantification tests indicates <0.001% by weight of asbestos in the made ground sample analysed.

The twelve samples of made ground were also tested for perfluorooctane sulfonic acid and perfluorooctanoic acid (PFOS and PFOA). The results of the analysis for PFOS and PFOA have been screened against the Soil Screening Values (SSV) published by the Environment Agency. The adopted screening value is 0.014mg/kg dry weight (DW). There were no exceedances of this adopted screening value within any of the samples.

No further exceedances were detected within the samples of made ground.

No visual or olfactory evidence of contamination of the in-situ natural ground was identified during the excavation of the drilling of the windowless sample boreholes.

The results of the field gas monitoring indicated that no specific gas protective measures are required.

2.6 DETAILED SITE-SPECIFIC RISK ASSESSMENT – HUMAN HEALTH

The 'general' approach for assessing the potential risk to a receptor is by a combination of qualitative and quantitative risk assessment. A quantitative risk assessment would involve selecting and deriving generic assessment criterion to compare contaminants against, based on the fate, transport and toxicological properties and the exposure scenario being considered.

With regards to assessing risk to human health, a generic quantitative risk assessment has been undertaken using published screening criteria values for a proposed commercial end use.

Elevated concentrations of arsenic and lead have been identified within the made ground along with asbestos fibres.

2.6 DETAILED SITE-SPECIFIC RISK ASSESSMENT – HUMAN HEALTH (CONTINUED)

It should be noted that there are no published screening criteria values for asbestos in soil. As discussed in CIRIA Report C733 Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks, agreement has yet to be reached in the UK on an appropriate toxicological criterion on which a screening value for asbestos could be based. It also states that 'based on current knowledge, it is believed that a scientifically defensible UK GAC (generic acceptance criteria) for asbestos in soil cannot be developed or imported.'

It is therefore considered that a more qualitative assessment of the potential risk to human health from asbestos in soil is appropriate.

CIRIA Report C733 states that asbestos (asbestos containing materials and asbestos containing soils) only presents a risk to health if airborne fibres are released into the atmosphere. The report goes on to state that the number of fibres released into the air from asbestos containing soils is likely to be influenced by a number of site-specific factors, as listed below.

- Characteristics of the asbestos (concentration, degree of heterogeneity, depth in relation to final ground level, volume/area, type, condition, extent of bonding, weathering, fraction of free fibres, shape of fibres);
- Characteristics of the soil (type, moisture content, surface vegetation, presence of hard standing);
- Weather (humidity, precipitation, temperature, ground freezing, wind speed and direction); and
- Land use/soil disturbing activities (behaviour of receptors, distance between receptor and source, types of activity, duration/frequency of activity, dust mitigation measures).

The depth below ground level of the asbestos containing soils is imperative to the potential risk posed. CIRIA Report C733 states that in the absence of significant physical disturbance, exposure to airborne asbestos fibres from soil will be from friable materials or asbestos fibres present at, or very close to, the soil surface (the soil – air interface). Materials that have been buried, or are below the soil surface, will pose a lower, or less immediate, risk as these materials are unable to release airborne fibres unless brought to the soil surface by physical activity/disturbance.

Given the contamination, including the presence of asbestos fibres, recorded within the materials beneath the site, it is considered that a potential risk to human health may exist via the following relevant contaminant pathways when considering the continued commercial usage:

2.6 DETAILED SITE-SPECIFIC RISK ASSESSMENT – HUMAN HEALTH (CONTINUED)

- Dermal contact
- Ingestion of soil or soil derived dust
- Inhalation of soil bourn dust

It is considered that remedial measures will be necessary to protect future site end users and construction site operatives from the contamination recorded within the materials across the site.

The remediation measures to be carried out have been designed to address the identified potentially active contaminant pathways listed above.

3.0 REMEDIATION STRATEGY

The findings of the site investigation carried out across the site have identified that a potential risk to end users exists within the site due to elevated arsenic, lead and the presence of asbestos fibres within the made ground.

A remediation strategy is proposed such that the site is prepared to a standard suitable for the proposed commercial end use.

The following remediation strategy is proposed for the site:

- Following site strip, all exposed formations should be visually inspected and handpicked of any identified asbestos containing materials (ACM). Additionally, any excavated made ground materials should also be visually inspected and handpicked of any identified ACM. These works should be carried out by a suitably licenced contractor in accordance with an appropriate risk assessment and managed in accordance with the requirements of the Control of Asbestos Regulations (2012).

- Any handpicked ACM should be disposed off-site at a suitable licensed facility as hazardous waste. Daily records and waste transfer notes should be kept in order to document the identification and subsequent removal of any ACM. These records and waste transfer notes should be made available for review as they will be required for remediation verification.

- Following the completion of the ACM checks, it is understood that the site surface is to be covered entirely with hardstanding (with no areas of soft landscaping), which provides an effective capping layer, breaking the pathway between the made ground and site users. The integrity of the hardstanding capping layer should be maintained at all times. Any areas where this surface layer is broken or absent should be repaired and/or extended.

4.0 REMEDIATION IMPLEMENTATION

4.1 OBJECTIVES

The main objective of the proposed remediation works is to render the site suitable for commercial end use. In order to achieve this objective, it is necessary to break any potential pathways between proposed site end users and contaminated soils/materials.

4.2 METHODOLOGY

The remediation works required in order to meet the objective defined above will be undertaken as follows:

1. During construction, all exposed formations should be visually inspected by an asbestos awareness trained groundworker. Any identified asbestos containing materials (ACM) should be reported to the site management and picked/disposed off site by a licensed asbestos contractor.

2. Any excavated material (e.g. arisings from foundation and drainage run excavations, site strip etc.) should be visually inspected by an asbestos awareness trained groundworker. Any identified ACM should be reported to the site management and picked/disposed off site by a licensed asbestos contractor.

3. During excavation, in order to prevent cross contamination of materials, the arisings should be segregated from any underlying natural soils.

4. In order to protect end users from the identified contamination, the excavated material should be placed beneath proposed building floor slabs or areas of hard standing, in areas that are unlikely to be disturbed in the future e.g. away from proposed buried service runs or removed from site or alternatively disposed off site at a suitable facility.

5. All of the above works should be carried out under an appropriate risk assessment and managed in accordance with the Control of Asbestos Regulations 2012. Any handpicked ACM should be disposed off-site at a suitable licensed facility as hazardous waste.

6. Daily records and waste transfer notes should be kept in order to document the identification and subsequent removal of any ACM if found on site. These records and waste transfer notes should be made available for review as they will be required for potential remediation verification.

4.2 METHODOLOGY (CONTINUED)

7. A system should be established by which any 'unusual' materials and potential hotspots of contamination that may be encountered are reported rapidly to the site management, so that the appropriate action may be taken, following specialist advice if necessary. An unusual material may be identified on site by colour, odour or physical nature.

8. The site surface is to be covered entirely with hardstanding (with no areas of soft landscaping), which provides an effective capping layer, breaking the pathway between the made ground and site users. The integrity of the hardstanding capping layer should be maintained at all times. Any areas where this surface layer is broken or absent should be repaired and/or extended.

The site will be deemed remediated by the following active remedial measures:

- Handpicking and removal of any encountered ACM by a licenced asbestos contractor
- Placement of a hardstanding capping layer across the entire site.

4.3 OPERATIONS

The groundworks are to be undertaken by an asbestos awareness trained contractor experienced in brownfield reclamation/remediation.

Site preparation and operational constraints will be covered in the contractor's method statements. These should include the contractor's proposals for controls and monitoring of dust, noise, vibrations and odour.

Site procedures for managing the remedial works in a manner that will not cause pollution to controlled waters will be covered in the contractor's method statements which will be submitted in discharge of the Conditions of Planning.

The remediation works will be controlled by the appropriate mobile treatment license to be held by the remediation contractor if such works become necessary. The conditions imposed under the planning process will be considered adequate to control the works.

An appropriately licensed asbestos contractor will be required to deal with and dispose of identified asbestos containing materials (ACM).

5.0 REMEDIATION VERIFICATION

5.1 OBJECTIVES

A remediation verification report is required in order to record the data gathering necessary to demonstrate that the works have been carried out in accordance with the agreed strategy, confirm that the works satisfy the site remediation criteria and that the site is suitable for the proposed commercial development.

5.2 REMEDIATION VERIFICATION METHODOLOGY AND DATA GATHERING REQUIREMENTS

The site reclamation/remediation will be verified by the following measures:

- Evidence to be provided of site records and waste transfer notes relating to identification and subsequent removal of any asbestos containing materials (ACM), if found to be present
- Validation of the placement of a hardstanding capping layer across the entire site
- Notification in the CDM file of residual risks associated with the remediated site

6.0 FINAL REMEDIATION VALIDATION

The development will not be complete, in accordance with the remediation strategy for the site, until the placement of hardstanding across the site. Site photographic records will be kept to validate the placement of the hardstanding capping.

FIGURES

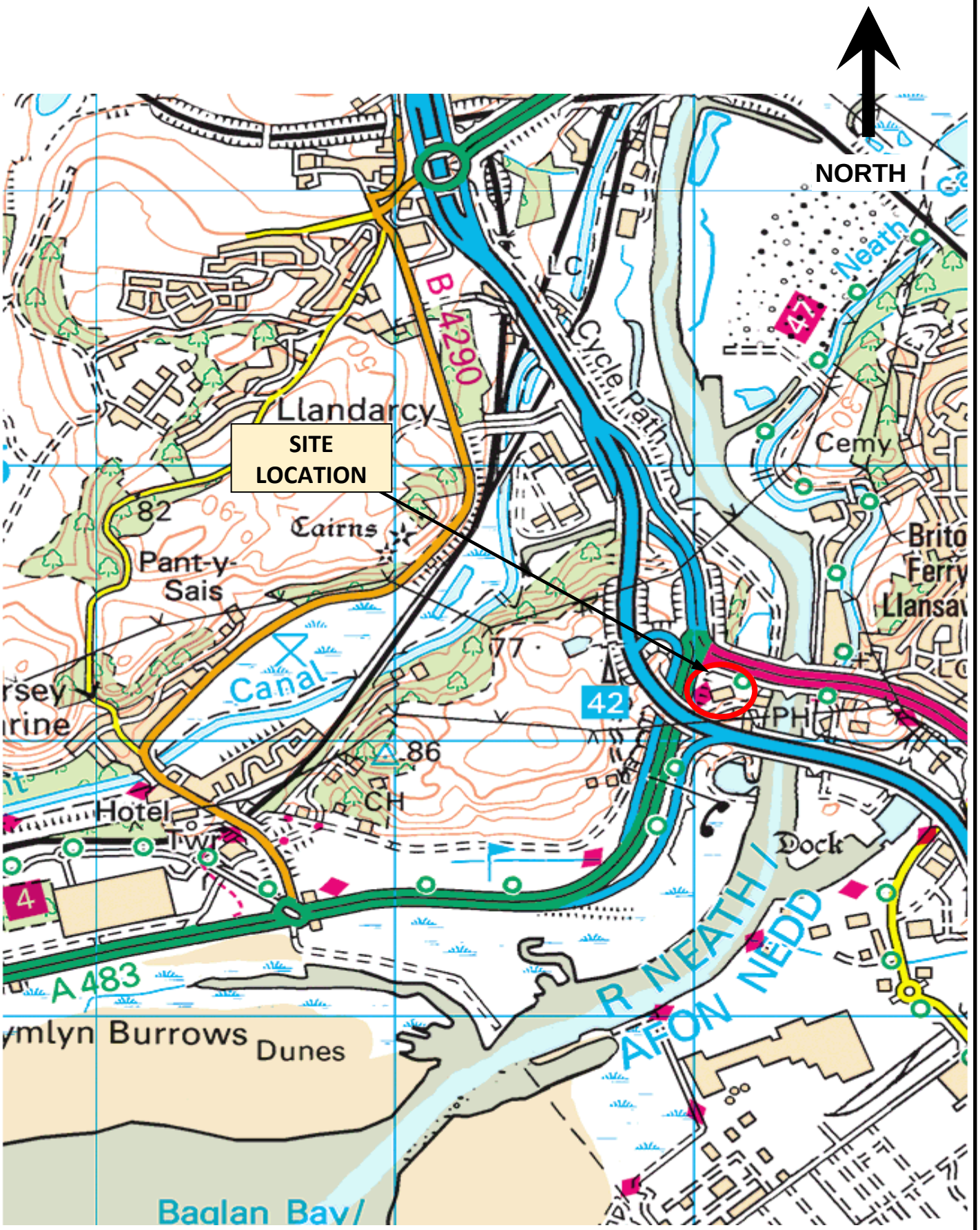


FIGURE 1: SITE LOCATION

Earlswood Burn House, Jersey Marine, Neath

Intégral Géotechnique
Intégral House
7 Beddau Way
Castlegate Business Park
Caerphilly
CF83 2AX
Tel: 029 2080 7991
Fax: 029 2086 2176

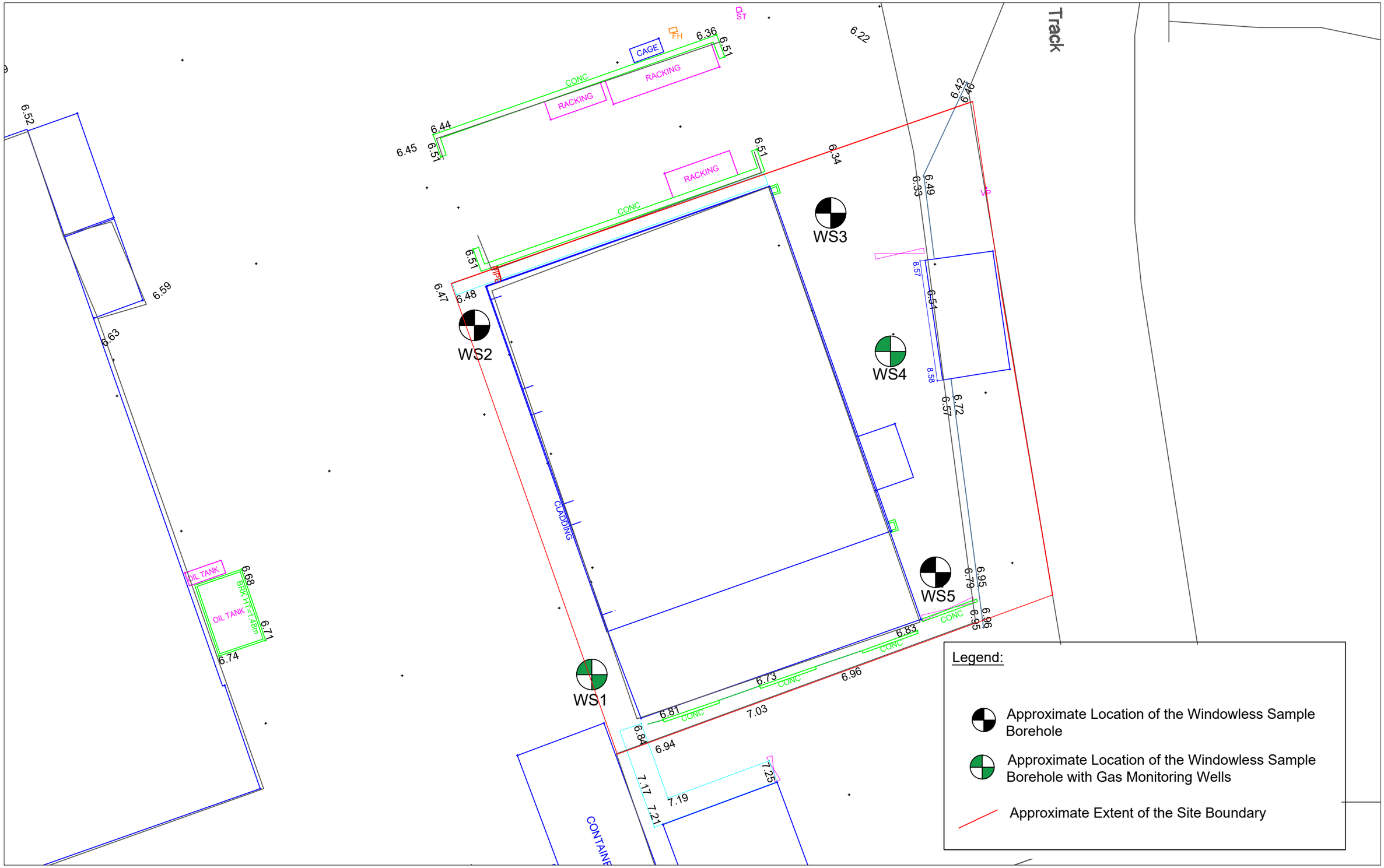
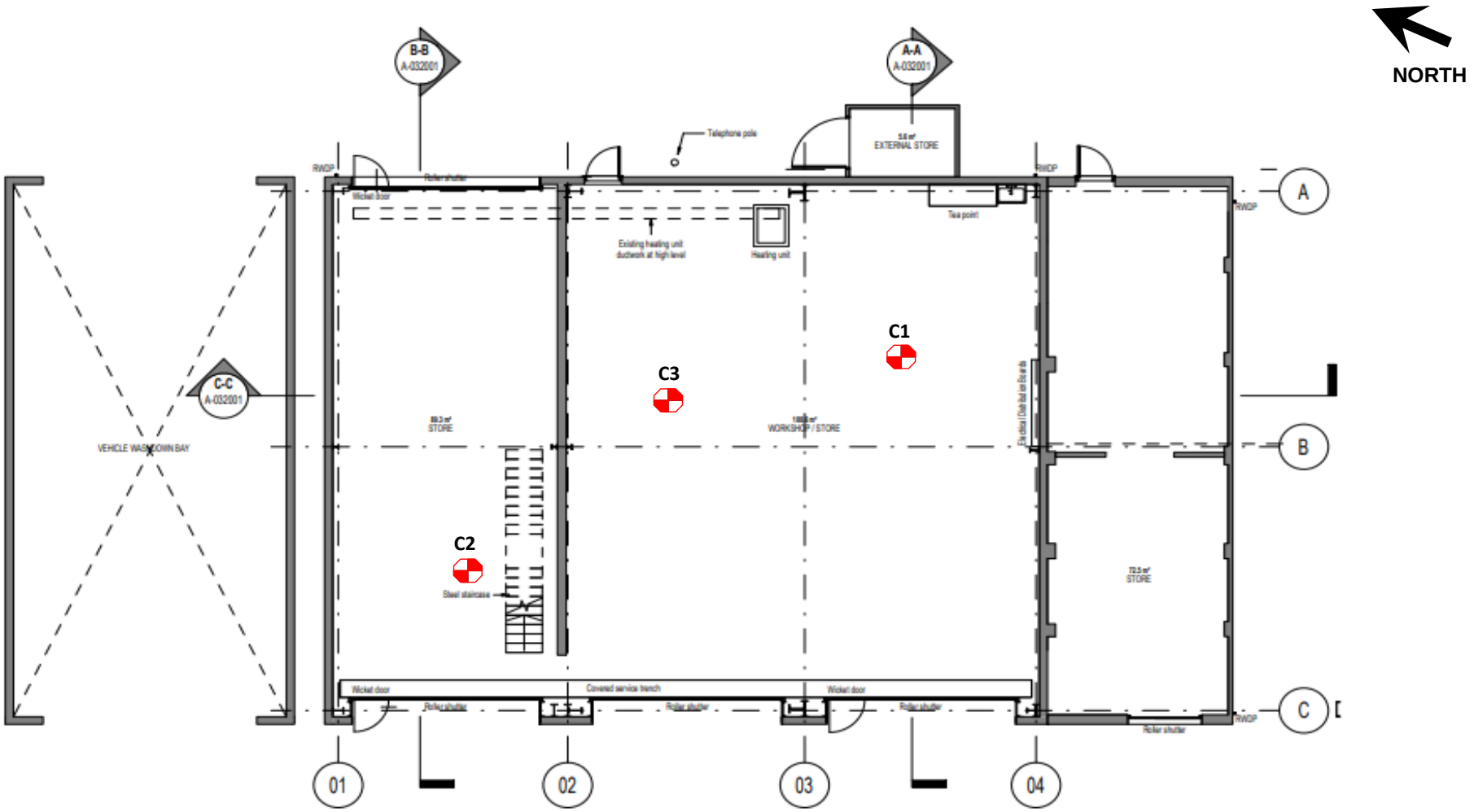


Figure 2: Site Plan

Project: Earlswood Burn House, Jersey Marine, Neath	Job No.: 14050	Intégral Géotechnique
Client: Mid & West Wales Fire Service	Scale: 1/25xp at A3	

Integral House,
7 Beddau Way,
Castlegate Business Park,
Caerphilly,
CF83 2AX.
Tel: 029 2080 7291



Existing Ground Floor Plan
1 : 100

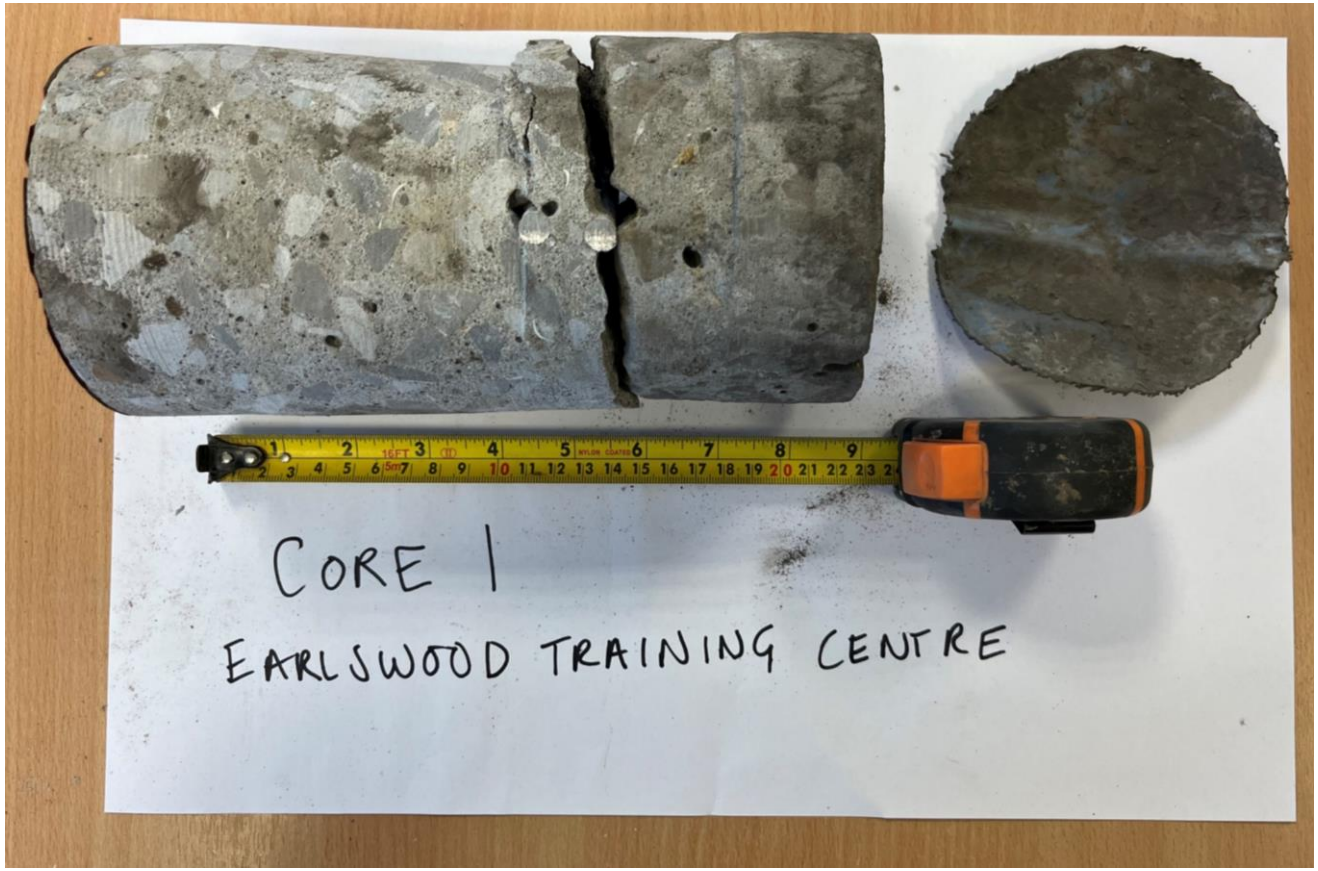
07/2022 12:15:41

FIGURE 3: SITE PLAN of Cored Concrete Slab

Earlswood Burn House, Jersey Marine, Neath

Intégral Géotechnique

Intégral House
7 Beddau Way
Castlegate Business Park
Caerphilly
CF83 2AX
Tel: 029 2080 7991
Fax: 029 2086 2176



Core Description: Reinforced Concrete
Core Length: 245mm
Core Diameter: 115mm
Reinforcement: 10mm, 8mm and 6mm steel
Distance to 8mm (from the top of the slab): 125mm
Distance to 8mm (from the top of the slab): 145mm
Distance to 8mm (from the top of the slab): 160mm
Distance to 6mm (from the top of the slab): 190mm

Suspected two layers of reinforcement.

Matrix supported aggregate.
Aggregate size: 2mm to 30mm
Aggregate description: Elongate, sub rounded to sub angular, siltstone, sandstone.
Matrix cement with fine to coarse grained sand.
Approximate air void content: 5%
Voids noted: 1mm up to 10mm.

Notes:

Concrete cast on plastic membrane.
Top of floor slab painted.
No screed present.

Figure 4: Core 1

Earlswood Burn House, Jersey Marine, Neath

Intégral Géotechnique

Intégral House
7 Beddau Way
Castlegate Business Park
Caerphilly
CF83 2AX
Tel: 029 2080 7991
Fax: 029 2086 2176

Core Description: Reinforced Concrete

Core Length: 460mm of solid core.
Retrieved as two cores:
1st core length: 290mm
2nd core length: 170mm
10mm of core which was unable to be retrieved as solid core.
Core Diameter: 1st core - 112mm
2nd core - 115mm

Reinforcement (within the 2nd core): 8mm steel
Distance to 8mm (from the second core): 150mm

Aggregate size: 2mm to 40mm
Aggregate description: Elongate, sub rounded to sub angular, siltstone, sandstone.
Matrix cement with fine to coarse grained sand.
Approximate air void content: 5%
Voids noted: 1mm up to 5mm.

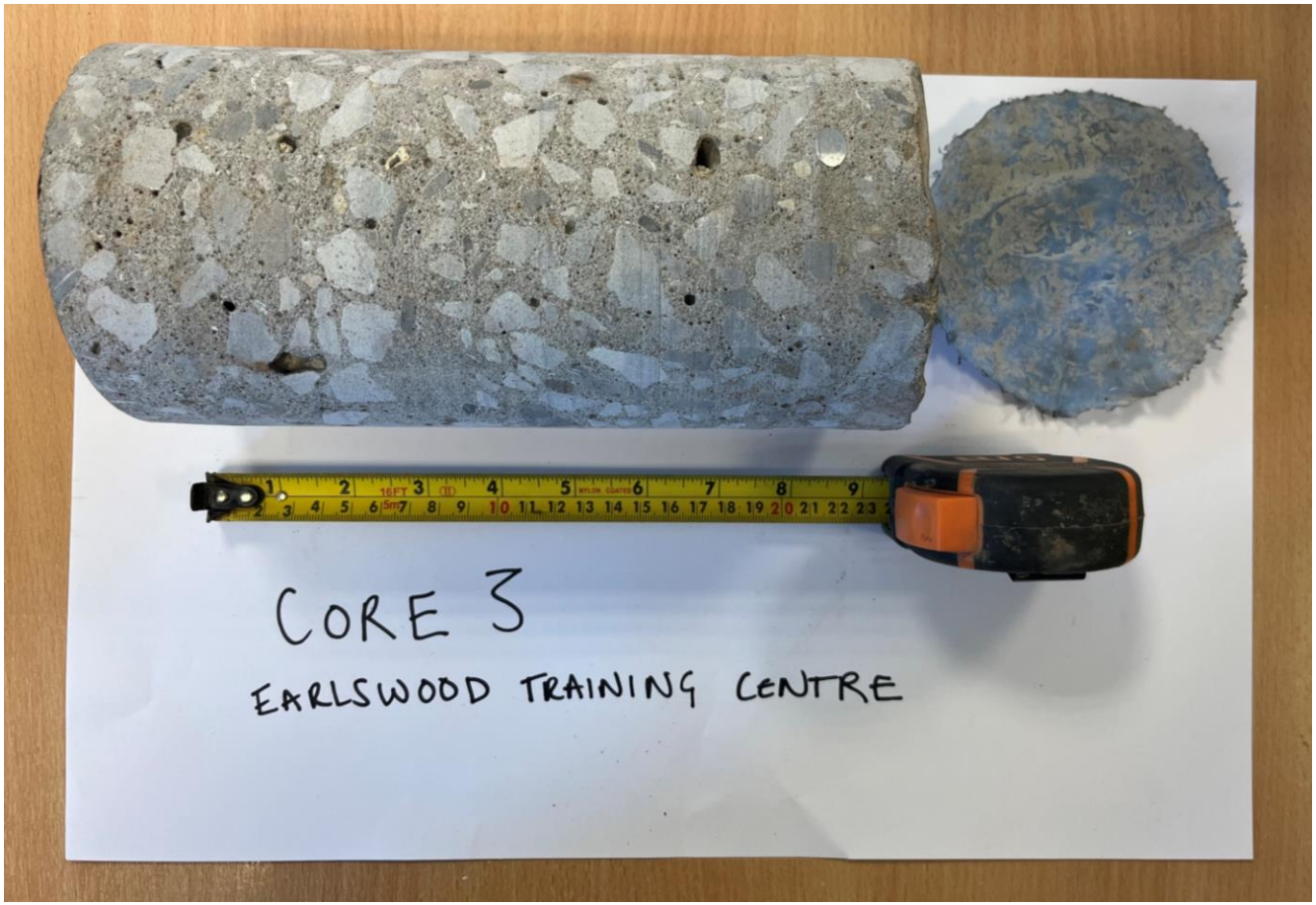
Notes:
Top of floor slab painted.
No screed present.

Figure 5: Core 2

Earlswood Burn House, Jersey Marine, Neath

Intégral Géotechnique

Intégral House
7 Beddau Way
Castlegate Business Park
Caerphilly
CF83 2AX
Tel: 029 2080 7991
Fax: 029 2086 2176



Core Description: Reinforced Concrete

Core Length: 235mm
Core Diameter: 115mm
Reinforcement: 10mm and 8mm steel
Distance to 10mm (from the top of the slab): 175mm
Distance to 8mm (from the top of the slab): 195mm

Suspected mesh reinforcement.

Matrix supported aggregate.
Aggregate size: 2mm to 30mm
Aggregate description: Elongate, sub rounded to sub angular, siltstone, sandstone.
Matrix cement with fine to coarse grained sand.
Approximate air void content: 5-10%
Voids noted: 1mm up to 15mm diameter.

Notes:

Concrete cast on plastic membrane.
Top of floor slab painted.
No screed present.

Figure 6: Core 3

Earlswood Burn House, Jersey Marine, Neath

Intégral Géotechnique

Intégral House
7 Beddau Way
Castlegate Business Park
Caerphilly
CF83 2AX
Tel: 029 2080 7991
Fax: 029 2086 2176