

Waterstone Homes

PHASE 2, HERITAGE GATE, COED DARCY

**Geoenvironmental Remediation Review &
Strategy Document**

12494/RAH/20/RR

CLIENT: Waterstone Homes

PROJECT: Phase 2, Heritage Gate, Coed Darcy

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1.0 INTRODUCTION

1.1 GENERAL

Waterstone Homes Ltd are proposing to redevelop a site at Coed Darcy for residential end-use.

Intégral Géotechnique (Wales) Limited have been appointed as the Geotechnical Engineers to undertake a site investigation to enable a geotechnical and geoenvironmental appraisal of the site and provide a basis for design.

This report presents the findings of the site investigation and gives recommendations for the design of foundations, floor slabs and other geotechnical and geoenvironmental aspects of the project.

This report presents the findings of previous site investigations and remediation validation reports for the site, providing a summary of the geoenvironmental findings and recommendations of these investigations.

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1.2 PROPOSED DEVELOPMENT

The proposed development will comprise nominally 140 residential dwellings with associated access roads, parking, gardens and infrastructure. A soft landscaped LLAP is indicated in the north-west of the site.

The Phase 2 Heritage Gate site is part of Area 1, of the larger Coed Darcy development site.

1.3 SCOPE OF WORKS

The objective of this report is to provide a summary of the previous investigations and remediation strategy/validation at the site with reference to the geo-environmental findings and recommendations and to highlight any remaining remedial measures relevant to the Phase 2, Heritage Gate, Coed Darcy. In order to do so, the work instructed included review of several reports, listed in Section 2.4.

1.4 LIMITATIONS

This document is intended to be a working document for further development in discussion with all concerned including the Local Planning Authority, Natural Resources Wales, and the NHBC as appropriate.

“Contamination” is taken throughout the report to mean the “presence of one or more potentially harmful substances as a result of human activity”. The use of the term in this way does not imply that harm is being or might be caused by the contamination. It should be noted that “contamination” can have different meanings under different regulatory regimes, for example, planning, building control and Part IIA of the Environmental Protection Act 1990. Naturally elevated concentrations of potentially harmful substances may also be of concern and the significance of any that have been found is also evaluated in this report.

It is important to recognise that there may be areas of contamination that have not been found, or that contaminants are present at concentrations above those that have been found. It is also important to recognise that contamination may be localised and that no investigation, however comprehensive, is capable of finding such occurrences other than by chance.

It should also be noted that vertical and lateral changes in ground conditions may be present between exploratory hole locations.

This report represents the findings of our review of the investigations and remediation validation reports prepared by others and provided to us by the Client. Some of the preceding reports have not been made available to us and as such, any reference of previous findings in the available reports has been assumed to be true.

2.0 THE SITE

2.1 SITE LOCATION AND DESCRIPTION

The site is located in the larger Coed Darcy development site in Llandarcy, immediately north of Tank Farm Road at a National Grid Reference of 271650,195600, see Figure 1. The actual site outline is known as Phase 2 Heritage Gate. This parcel of land is part of a much larger development site known as Coed Darcy.

The site is irregular in shape and occupies an area of approximately 3 hectares. The boundaries of the site are defined by Tank Farm Road to the south, and either residential properties or vacant land followed by residential properties to the north, east and west. A site plan is presented in Figure 2.

The site is generally sloping from the north-west to the south-east, with numerous mounds and slopes. A large “shear rock” escarpment face forms the sites northern boundary. A stockpile of approximately 5000m³ of rock/soil is present towards the north of the site.

The site was formerly part of an oil refinery (BP Llandarcy), with the associated buildings demolished prior to the remediation works by URS in 2007. The oil refinery covered a much larger area, with the relevant parcel of land (Phase 2), comprising a small section of land in the north-eastern part of the former BP Llandarcy site boundary.

The site currently comprises partially vegetated vacant industrial land, following site-wide remediation works, with localised gravel surfaced areas and some areas of more dense scrub vegetation.

2.2 SITE OPERATIONS

The site is in use as a building works compound which services the construction works currently ongoing in the Phase 1 Development Area of Heritage Gate.

2.3 SURROUNDING LAND USE

The surrounding land is largely residential, associated with the larger development site at Coed Darcy, with large areas of vacant industrial land following remediation of the oil refinery.

2.4 AVAILABLE SITE INVESTIGATION DATA

Several reports have been made available to us for the purpose of this review. It should be noted that some of the reports make reference to previous reports which have not been made available to us, therefore the information from the preceding reports has been assumed to be true. The below reports should be reviewed in conjunction with this report to gain a detailed appraisal of the site and the works completed to date.

The following provides a list of reports which have been used to create this report and a brief summary of the objective of the investigations:

Letter Report on Phase 2 Heritage Gate, Coed Darcy – Planning Condition 11. Planning Application P2019/0021

Completed by Intégral Géotechnique, dated December 2019
(Report ref: 12494/HP)

A recently issued letter report written to address planning condition 11 on planning application P2019/0021.

Letter Report on Chemical Testing of Stockpiles at Phase 2, Heritage Gate, Coed Darcy

Completed by Intégral Géotechnique, dated October 2019
(Report ref: 12494/PD/RevA)

A letter report detailing the chemical appraisal of two stockpiles of imported materials (circa 5000m³).

Letter Report on Proof Drilling of Innovation Plots 5 to 8 and Plots 56 to 57, Phase 2, Heritage Gate, Coed Darcy

Completed by Intégral Géotechnique, dated October 2019
(Report ref: 12494/PD/PB)

- *This report does not contain salient information for this review due to its investigation into mining risk assessment rather than geoenvironmental aspects.*

A letter report detailing plot specific proof drilling in a previously identified high-risk mining subsidence zone along the southern boundary of the site.

Letter Report on Additional Drilling Investigation and Phase 3 Coal Mining Risk Assessment, Phase 2, Heritage Gate, Coed Darcy

Completed by Intégral Géotechnique, dated September 2019
(Report ref: 12494/PD/PB)

2.4 AVAILABLE SITE INVESTIGATION DATA (CONTINUED)

A letter report detailing supplementary rotary drilling works for the purpose of a Phase 3 Coal Mining Risk Assessment on the Phase 2 Heritage Park site as well investigation into the potential for mine gas migration from possible underlying workings.

Letter Report on Phase 2, Heritage Gate, Coed Darcy

Completed by Intégral Géotechnique, dated May 2019
(Report ref: 12446)

A letter report to review the ground gas protection details detailed on Roberts Limbrick drawings and their compliance with recommendations by URS in the remediation validation report - Ref: 44382729 / BRRP0004.

BP Area 1 - Remediation Validation Report (Draft)

Completed by URS, dated January 2010.
(Report ref: 44382729/BRRRP00004)

A report summarising the remediation and validation works undertaken on Area 1, Coed Darcy, presenting the validation data and comparing it against the remedial criteria (previously set by URS and approved by the local regulators).

In addition to the above, two geotechnical reports were issued in July 2019 detailing an assessment of the rock face stability in the north-western part of the site.

2.5 BACKGROUND

2.5.1 Site Outline

The Phase 2 Heritage Gate Development site comprises part of a much larger site known as Coed Darcy. The site is part of a historic oil refinery, comprising a small section of land along the eastern boundary of the previous refinery (BP Llandarcy).

A figure has been included to provide a clear context of the site, in order to ease review of this report, see figure 2. The following provides a summary.

The Phase 2 Heritage Gate development site area is indicated on Figures 3 and 4. The site outline comprises the south-western part of "Area 1", a previously defined site outline investigated by URS. The Area 1 site area was remediated by URS and remediation was completed in phases. As such, the Area 1 site was further divided into phases A to G, Phase CS and Phase 2 for the purpose of remediation.

2.5 BACKGROUND (CONTINUED)

The URS report (and related reports) also make reference to the “lower car park area” and “area excluding the lower car park area”. The lower car park area is located to the east of the Phase 2 Heritage Gate development site, also known as the Zone A remediation zone. Accordingly, this area is not relevant in this report, due to its location outside of the Phase 2 development site. The remainder of the Phase 2 development site falls under the “area excluding the lower car park area”.

2.5.2 General Timeline of Works

For context, the following provides a brief summary of the timeline of events relating to this review.

1998

Closure of the oil refinery.

1998, 1999, 2003

Initial intrusive investigations of Area 1 by URS and associated sub-contractors and formulation of a remediation strategy for the site.

2007 – 2009

Remediation of the Area 1 and subsequent validation of remedial works by URS.

2010

URS issued a Area 1 Remediation Validation Report.

October 2019

Phase 3 Coal Mining Risk Assessment investigation by Intégral Géotechnique including the installation of gas monitoring wells.

October 2019

Investigation by Intégral Géotechnique comprising chemical testing of stockpiled materials (imported soils).

2.6 CONSULTATIONS WITH REGULATORS

Consultation with the regulators is ongoing. The report relates to the following planning application:

- P2019/0021 – Heritage Gate, Coed Llandarcy, Llandarcy Neath, SA10 6HZ
140 residential units with associated infrastructure (outline with all matters reserved).

2.6 CONSULTATIONS WITH REGULATORS (CONTINUED)

The URS BP Area 1 Remediation Validation report (2010) has previously been submitted to and approved by NPTCBC and the NRW when submitted in support of Phase 1 Heritage Gate development, allowing planning condition (ref: P/2006/1045 and 1049) No. 8 to be discharged. A copy of the NPTCBC Notification of discharge of Condition 8 is presented in Appendix A.

Accordingly, this report has been submitted in support of the Heritage Gate Phase 2 Development site.

3.0 SUMMARY OF SITE ENVIRONMENTAL SETTING

Various reports listed in Section 2.4 have been used to complete the following section which should be considered a summary. Copies of relevant appendices such as historic maps have not been included in this report and reference should be made to the previous reports for a comprehensive appraisal.

3.1 PHYSICAL SETTING

The Phase 2 Heritage Gate site outline comprises the south-eastern part of the previously defined Area 1 site, Coed Darcy. The Phase 2 site area is located immediately north of Tank Farm Road, in west Llandarcy. The site is situated on sloping ground, sloping from north-west to south-east, falling from circa 61mAOD to circa 47mAOD.

A large shear escarpment forms the site's northern boundary.

The surrounding land is largely residential with some offices and also slopes from north-west/north to south east.

3.2 FORMER SITE USE

The site was formerly part of a very large Oil Refinery (BP Llandarcy Oil Refinery). The refinery closed in 1998 and the surrounding land to the north, east and west has been redeveloped as residential properties and as offices (including Natural Resources Wales).

When the refinery was operational, a large workshop building was present in the north-western part of the Phase 2 Heritage Gate site. The URS report indicates that the workshop operations are understood to have included a 'hydroblast' operation to clean heat exchanger bundles, including the use of the chlorinated hydrocarbon trichloroethylene (TCE) in a pit at the rear of the building, referred to as the "solvent pit". The degreasing operation is understood to have been discontinued around 1970.

The workshop building was latterly occupied by EG Lewis, whose business is understood to have comprised maintenance of valves "and related activities".

Off-site, to the north, a small fuel filling station and associated underground storage tanks (USTs) at this location were removed in 2002.

It is understood that all former buildings had been demolished prior to the remediation works by URS in 2007.

3.2 FORMER SITE USE (CONTINUED)

A timeline of the more recent events regarding the site is summarised in Section 2.5.2.

3.3 GEOLOGY

The BGS geological map (available on the online viewer) indicates that the site is underlain by Carboniferous sandstones of the Hughes Beds (Upper Coal Measures). In the southern parts of the site, the sandstone is indicated to be overlain by Glacial Till (Diamicton).

A variable thickness of made ground would be anticipated above the superficial deposits/bedrock across most of the site owing to the site's former use. URS (2010) reported that prior to the remediation works between 100 and 500mm of 'ashy fill' was present over fine-grained glacial deposits and sandstone bedrock at depths of 0.5 to 2.0m. However, these conditions will have changed following the remediation of the site in recent years.

A summary of the typical geological succession is given below in Table 1.

Table 1: Summary of Anticipated Site Geology		
Geological unit	Horizon	Description
Recent	Made ground	Various materials, ashy fill.
Quaternary	Glacial Till	Sands and gravels with varying matrix
Carboniferous	Hughes Beds	Green-grey, lithic arenites ("Pennant sandstones"), with thin mudstone/siltstone and seatearth interbeds, and thin coals.

3.4 MINING

Various phases of Coal Mining Risk Assessments have been completed by ESP and Integral Geotechnique, the most recent of which can be referred to in Intégral Géotechnique's Report ref:12494/PD/PB.

Coal mining risk at the site is not discussed in this report, which focuses on the environmental appraisal of the site.

3.4 MINING (CONTINUED)

However, it is worth noting that due to the identified potential for ground gas migration associated with mining, a programme of ground gas monitoring was completed at the site and results are further discussed later in this report (Section 9.3).

3.5 HYDROLOGY AND HYDROGEOLOGY

The Tenant Canal is located some 750m east of the site and the River Neath approximately 1km to the east of the site, flowing south.

The Coal Measures bedrock beneath the site is likely to be classed as a Secondary A aquifer by Natural Resources Wales (NRW).

Any contamination risk assessment will be protective of groundwater, the above referenced surface water features and any nearby unmapped surface water features.

3.6 POTENTIAL CONTAMINATION

The URS report identified the following contamination issues of potentially significant risk to human health in soil and groundwater for the Area 1 site, believed to also be relevant for the subject site (Phase 2):

- The presence of pieces of asbestos containing material (ACM), including pieces of gasket, rope, lagging and cemented material within both the granular and reworked drift fill material and in places the presence of dispersed asbestos fibres in fill material;
- Localised petroleum hydrocarbon contamination in soil;
- Heavy metals contamination in fill materials, including arsenic, copper, lead and zinc;
- Polycyclic Aromatic hydrocarbon (PAH) contamination in soil;
- Chlorinated hydrocarbon (trichloroethene, vinyl chloride and 1,2-Dichloroethene) contamination within groundwater.

4.0 SUMMARY OF SITE INVESTIGATIONS

The site has been subjected to extensive site investigation works carried out by URS, subsequent remediation works by URS as well as supplemental works by Intégral Géotechnique in more recent years.

4.1 URS INVESTIGATIONS

The findings of all the URS (and associated) investigations are summarised in the URS validation report dated 2010. The findings are reviewed in this report in order to characterise the Phase 2 site which comprises a smaller section of the Area 1 site. Reference should be made to the URS Remediation Validation Report or the preceding investigation reports, for details on the findings of the previous site investigations.

Pre-remediation (1998, 1999 and 2003)

Several investigations have been undertaken on the Area 1 site outline by URS in 1998, 1999 and 2003. The works included trial pitting, the installation and sampling of groundwater wells and sampling and analyses of soils and groundwater.

Following these initial URS intrusive investigations, URS commissioned supplemental works by Anchem Analytical Laboratories in 2003, primarily to investigate previously identified hotspots of asbestos as well as general sampling and analysis.

URS then undertook investigation works for detailed asbestos delineation comprising the excavation of trial pits on an approximately 20m grid, to complete sampling for asbestos identification and where necessary quantification.

Remediation Works (Generally 2007 to 2009)

During the remediation of the site, ongoing investigation was completed by URS to monitor the remediation works and deal with any contamination or unexpected ground conditions encountered as part of the scheme. The remediation works largely comprised the excavation of acceptable materials, appropriate screening and disposal/re-use elsewhere. The remediation strategy is summarised in Section 6.0 and the works discussed in Section 7.0.

Remediation Validation (2007 to 2010)

Following remediation, a validation investigation was completed by URS as part of the remediation validation. This comprised a visual walkover, trial pitting on a 15m grid with samples analysed at 0.6m intervals and a PID survey across the site which comprised soil sampling (below surface) on a 10m grid for headspace testing.

4.1 URS INVESTIGATIONS (CONTINUED)

Where exceedances of the validation criteria were identified, the impacted soils were removed and sampling and analysis of the resultant excavation sides was completed in order to confirm that the remaining soils were acceptable or appropriate risk assessment was undertaken and approved by Neath Port Talbot County Council.

The remediation validation is summarised in Section 8.0.

4.2 INTÉGRAL GÉOTECHNIQUE – GAS MONITORING

In September 2019, following the remediation by URS, 30No. rotary open hole boreholes were drilled across the Phase 2 development site for the purpose of a Phase 3 Coal Mining Risk Assessment. As part of this investigation, mine working related gas monitoring was undertaken.

Gas monitoring wells were installed into boreholes IG2, IG25 and IG30 to depths of between 4.4m and 3.5mbgl and a programme of gas monitoring commenced on 25/09/2019 comprising six fortnightly visits.

The concentration levels of methane, carbon dioxide and oxygen were measured in the standpipes during each visit by using a GA5000 Landfill Gas Analyser. In addition, gas flow rate and the atmospheric pressure at the time of the field measurements were also recorded and Volatile Organic Compounds (VOCs) were measured using a Photo Ionisation Detector (PID).

In addition, during each gas monitoring visit the depth to groundwater was recorded at each location.

Gas monitoring has been carried out over a range of atmospheric pressures to include at least one reading in low and/or falling pressure, in accordance with the recommendations made in CIRIA Report C665.

The results of the field gas monitoring are presented in Appendix B and a discussion of results is detailed in Section 9.3.

4.3 INTÉGRAL GÉOTECHNIQUE – STOCKPILE SAMPLING

In September 2019, following the importation of circa 5000m³ of granular soils to the Phase 2 development site, the suitability of the re-use of the stockpiled soils was completed by way of chemical sampling and analysis.

4.3 INTÉGRAL GÉOTECHNIQUE – STOCKPILE SAMPLING (CONTINUED)

Sampling was undertaken by a Qualified Geotechnical Engineer who utilised a tracked excavator to collect representative samples from the stockpiles, at a frequency of approximately 1 sample per 250m³, thus a total of 20 samples were collected.

The samples were stored at the appropriate temperature and dispatched to the laboratories of i2 for laboratory chemical testing within 24 hours.

The samples were tested for a range of contaminants as specified in the Validations Suite specification in the URS Remediation Validation Report (2010). A list of the soil testing carried out is given below:

Beryllium	Cadmium
Total Chromium	Hexavalent Chromium (VI)
Copper	Lead
Mercury	Nickel
Vanadium	Zinc
Arsenic	Boron
Selenium	Elemental Sulphur
Total Cyanide	Total Sulphate
Sulphide	Water Soluble Sulphate
pH	Monohydric Phenol
Polyaromatic Hydrocarbons (PAH)	Petroleum Hydrocarbons (VPH/EPH)
Asbestos	BTEX
Volatile Organic Compounds (VOCs)	
Semi Volatile Organic Compounds (SVOCs)	

The approximate locations of the sampling points are shown on Figure 3. Chemical test results of the stockpile sampling are included as Appendix C. The results of the chemical testing are discussed in Section 9.2.

5.0 SUMMARY OF IDENTIFIED CONTAMINATION (PRE-REMEDIATION)

5.1 PRE-REMEDIATION GROUND CONDITIONS

The URS investigations identified a general site-wide 0.1m to 0.5m thickness of ashy fill, overlying silty and clayey glacial drift, overlying sandstone from between 0.5m to 2.0mbgl. In some locations the ash fill was overlain by granular fill and in areas such as the lower car park area (outside of the Phase 2 development site), glacial drift had been reworked as fill. Localised groundwater was identified in the deeper areas of drift, thought to represent perched groundwater.

Reference should be made to the URS 2010 Remediation Validation Report for further detail on the following findings.

5.2 SOIL CONTAMINATION

Intrusive investigations by URS identified asbestos as being the “primary remedial driver” for Area 1, encountered as a combination of asbestos containing materials as well as loose fibres in soils. Asbestos delineation investigation identified a ‘trace’ content of asbestos fibres was identified in the granular fill on a widespread but irregular basis across much of the development area.

The URS report identified localised elevations of petroleum hydrocarbons and polycyclic aromatic hydrocarbons within fine grained soils (proposed to remain in-situ following removal of granular fill).

Frequent exceedances of metals were recorded in granular fill materials, notably of arsenic, copper, lead and zinc.

Historic seepages of petroleum hydrocarbons had been observed from the western end of the sandstone rock face along the north-western site boundary. The URS report suggests that the observations of such seepages had diminished over time, following the decommissioning of the process plant and storage tanks which were located on the elevated ground above the rock face to the west in 2001/2002. The rock face was subjected to high pressure washing in 2008, and regularly inspected during the remediation works.

Of 65 soil samples analysed, none reportedly contained volatile organic compounds (VOC) at levels above the laboratory limit of detection (0.005mg/kg).

5.2 SOIL CONTAMINATION (CONTINUED)

Elevated chlorinated solvents (principally trichloroethylene, with its assumed degradation products 1,2 dichloroethylene and vinyl chloride) was identified within the area of the former 'solvent pit'.

5.3 GROUNDWATER CONTAMINATION

Limited groundwater contamination was identified during the URS investigations, with the exception of groundwater within the bedrock in the area of the former solvent pit.

A limited dissolved chlorinated solvent plume was interpreted to be located in the vicinity of the previous workshops and stores buildings, believed to be associated with a former degreasing pit in this area.

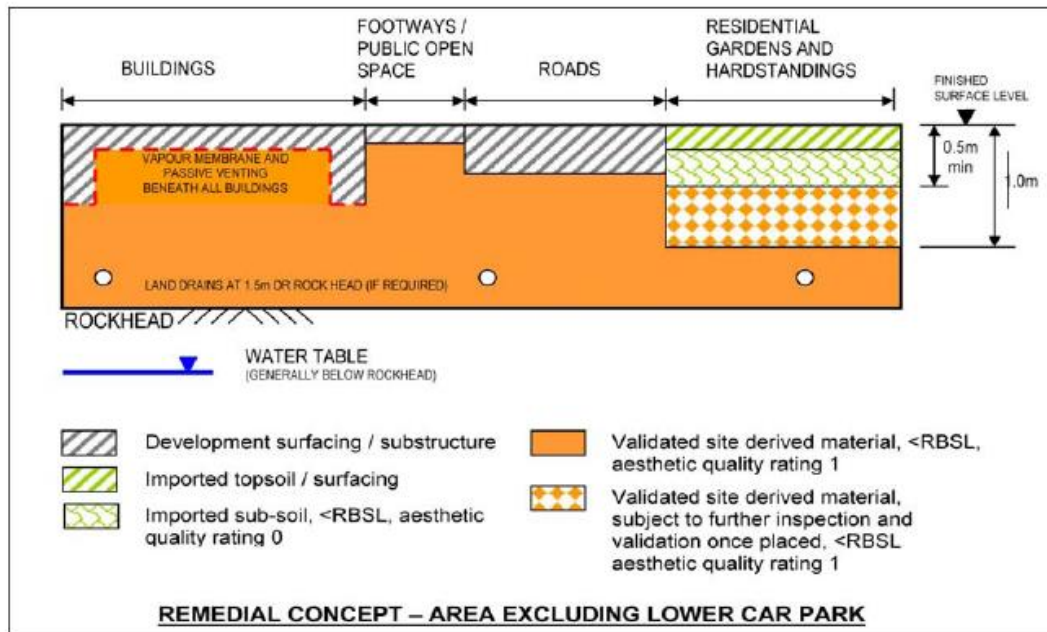
Therefore, URS identified 'an implied risk to future site occupants from (this VOC) groundwater contamination in wells'. Accordingly, an area was identified around the solvent pit where development would be excluded, referred to as the Solvent Exclusion Zone.

Preliminary investigation encountered in excess of 2mm thickness of free phase hydrocarbons in wells, however no free phase hydrocarbon compounds were reportedly detected on the groundwater using an air-oil-water interface probe in monitoring wells during monitoring in 2003 to 2005. The URS reported that there was "no known plausible continuing hydrocarbon source in this part of the site" and suggested that the change in conditions was due to a reduction in mobility of hydrocarbons over time.

6.0 URS REMEDIATION STRATEGY

Based on the results of the pre-remediation investigations which identified asbestos as the primary remedial driver and encountered several contamination issues across the site, a remediation strategy to manage the contamination was formulated.

The general remedial strategy for soils remaining on-site is summarised in the flow diagram below, which has been extracted from the URS report.



Insert 1: Remedial Concept Extracted from URS, 2010.

To summarise, the remediation works would be largely divided into two areas (for the Area 1 site), “the area excluding the lower car park” and the “lower car park” which is no longer referred to due to its location outside of the Phase 2 Heritage Gate development site. The site was then sub-divided into Remediation Zones A, B, C, D, E, F, G, Ph2 and CS, of which, zones A, B and CS are outside of the subject site (Phase 2 Development site) and phases D and E are partially within the subject site. The general works would comprise the excavation and removal of granular fill and either re-use elsewhere on the Llandarcy site following screening and confirmation of its suitability for re-use, or appropriate disposal at an off-site facility.

The solvent exclusion zone was required to be approached separately, and was proposed to be finished as public open space. Specific remedial targets were not proposed, but there was intent to remediate groundwater quality in the area by reducing the source mass in order to accelerate the process of natural attenuation.

More information on the remediation strategy and the proposed validation criteria is provided in the URS report (2010).

7.0 URS REMEDIATION WORKS

Remediation of the Area 1 site was undertaken under URS supervision in circa 2007, 2008 and 2009.

Unacceptable materials were removed during the remedial works across the Phase 2 development site. This included removal of the general granular fill which had previously been identified as a risk, requiring complete excavation and removal, removal of hotspots of contamination associated with solvent/hydrocarbon odours, hydrocarbon contaminated soils, an area of substantial asbestos materials and solvent impacted groundwater.

Zones C and D

During remediation, granular ash fill horizons and fine grained soils were encountered in Zone C and granular black ash fill was encountered across Zone D, observed to greater depths moving south. During the excavation of the granular fill in 2007, strong hydrocarbon or solvent odours were identified along the northern margins of Zones C and D (and the south-eastern margin of Zone G) and elevated PID readings were recorded (100 to 600ppm). The readings did not exceed the remediation criteria, however it was reported that the aesthetic criteria had not been satisfied. These soils were excavated and removed off site to an agreed location within the refinery. Subsequent validation testing reportedly indicated no exceedances of the remedial criteria.

Zone E

Granular black ash fill was encountered across Zone E, observed to greater depths moving south. During the removal of the granular fill, a small (3m³) hotspot of hydrocarbon contaminated soils was encountered just to the south-east of the Phase 2 development boundary. The fill was coated with a 'green grease-like substance' and laboratory test results confirmed an elevated TPH concentration 220,000mg/kg. The soils were excavated and subsequent validation confirmed that the underlying materials satisfied the remediation criteria.

Zone F

In Zone F, a thin layer of granular fill overlying fine grained fill and shallow bedrock was encountered during the excavation of the fill. No significant contamination was observed and therefore no special measures were required.

Zone G (Including the Solvent Pit)

During the remediation of Zone G, several aspects of contamination that required attention were encountered. This area of the site was formerly the large workshop/warehouse building and contained the previously identified solvent pit.

7.0 URS REMEDIATION WORKS (CONTINUED)

Asbestos cement and gaskets were encountered, bonded to the concrete hardstanding. As such, all concrete hardstanding was removed from the development site (and stored elsewhere on the refinery site).

URS identified an 'asbestos grave' within the south-eastern margin of Zone G, comprising an area of substantial buried asbestos. Accordingly, excavation of depths up to 3m was required and the excavated soils were reportedly removed to appropriate licensed landfills.

As discussed above, along the shared margins of Zones C, D and G, strong odours of hydrocarbon/solvents were reported. Elevated PID readings were recorded (100 to 600ppm) and whilst the readings did not exceed the remediation criteria, it was reported that the aesthetic criteria had not been satisfied. These soils were excavated and removed off site to an agreed location within the refinery. Subsequent validation testing reportedly indicated no exceedances of the remedial criteria.

The area of the 'solvent pit' was remediated on a voluntary basis by BP. This comprised the dewatering the sandstone bedrock to expose the residual solvent in the fractures (ie the mass source), which was subsequently removed in 2007 by dual phase solvent extraction techniques. It is understood that the solvent extraction was completed to the satisfaction of the Environment Agency (now NRW).

Phase 2

Note that "Phase 2" refers to the phase 2 remediation zone rather than the full Phase 2 development site. This area of the site was remediated as a separate zone due to the presence of a high-pressure gas main which was removed in 2008. The ground conditions during remediation were reported as limited areas of ash and clinker, which were removed as necessary.

The strong solvent/hydrocarbon odours identified elsewhere in the site (along the margins of zones C, D and G) were also encountered in the northern margins of Phase 2. As such, the soils were removed, and the surrounding soils validated as discussed above.

8.0 URS REMEDIATION VALIDATION

Remediation validation was completed by URS in 2007 and 2008 comprising trial pitting on a 15m grid to allow sampling at 600mm depth intervals and a PID survey across the site on a 10m grid. As detailed in Section 7.0, during the validation process, several areas of contamination were identified and dealt with. Full detail on the remediation validation is included in the URS Remediation Validation Report (2010).

Initially, a URA walkover was completed across all zones to confirm that “all significant granular fill had been removed” and that no visual signs of ACM were identified. Subsequent sampling and analysis confirmed that the majority of the samples did not contain contaminants at levels greater than the remediation criteria, however very localised exceedances were recorded. Due to elevated concentrations of metals or hydrocarbons, occasionally materials were required to be removed from Zones C, F and G. Any other exceedances were concluded to pose a low risk to site end users following, either, resampling, statistical analysis and/or agreement with NPT Borough Council.

Future validation testing

The URS remediation validation report recommended that final validation sampling and analysis of capping soils within gardens is completed in due course. The report stated that the soil which will form the second half metre below finished level in garden areas is required to be turned over mechanically or placed in a controlled manner by the contractor and subject to visual inspection by URS. Final validation samples will be taken of that layer down to rock head. At the time of the URS report, this had been completed for 41No. plots outside (immediately north-east of) the Phase 2 development site only.

Additionally, the report stated that any imported soils/materials proposed for re-use in the development site will require appropriate validation testing.

9.0 SUPPLEMENTARY WORKS

9.1 CHEMICAL TESTING OF EXPORTED SOILS

Following the remediation works and validation by URS, a bulk earthworks removal and reprofiling programme was undertaken by Dawnus on behalf of Edward Ware Homes in order to achieve the required development levels. The reprofiling works resulted in an overall net removal of soils from site. As such, in accordance with the remediation specification, soils required for export needed to be subjected to chemical analysis.

A total of 3000m³ of site-won materials were stockpiled for re-use. 15No. samples were collected and tested by URS, 2No. samples exhibited concentrations of contaminants (nickel) at levels unsuitable for re-use on Area 1. Therefore, the stockpiles represented by samples SPCE11 and SPCE13 were not re-used on Area 1 and were instead removed to the top terrace in the main site. Following removal of the unacceptable materials (as confirmed by validation testing) or and removal of materials which did not satisfy the aesthetic criteria, the remaining materials were available for re-use in commercial or recreational development elsewhere on the Llandarcy Main Site.

The remaining stockpiles of acceptable materials were used to raise site levels in Area 1, in the lower car park area as well as the area to the north of this.

9.2 CHEMICAL TESTING OF IMPORTED SOILS

Since the URS Remediation Validation in 2010, soils were imported to the Phase 2 development site from the wider Coed Darcy development. Owing to the potential risks associated with the source of the soils from the former refinery site, and the requirements of the future validation testing outlined by URS, the suitability of the re-use of materials was uncertain and chemical analysis of the materials was required.

During a site visit by Intégral Géotechnique on 18th September 2019, the stockpiled materials were recorded as brown loam and clay with sand, gravel and stone inclusions.

The samples were collected on a frequency of 1 per 250m³ and subjected to chemical testing comprising the contaminant suite listed in the validation specification (VS – Validation Suite).

The chemical test results indicate that 19 of the 20 samples did not contain any contaminants at concentrations greater than the Suitable 4 Use Level (S4UL) guidance values for residential end use with home grown produce. None of the samples exceeded the remediation criteria outlined by URS (2010).

9.2 CHEMICAL TESTING OF IMPORTED SOILS (CONTINUED)

In one sample only, (S17) a very slight elevated exceedance of beryllium was identified, with a concentration of 1.9mg/kg, marginally higher than the S4UL of 1.7mg/kg.

The chemical test results of the stockpile samples are included as Appendix C.

9.2.1 Statistical Analysis

Given that only a single elevated beryllium concentration has been recorded, we have implemented the use of the ESI Contaminated Land Statistics Calculator developed by Environmental Simulations International (ESI) Limited to further assess the results. As the stockpiled materials all exhibited the same physical and chemical characteristics it is considered reasonable to consider them as one averaging area for the purpose of statistical assessment.

The results of the beryllium testing have been compared to a critical concentration and statistical analysis undertaken to produce an Upper Confidence Limit (UCL0.95), against which the soil contamination concentrations can be compared. If the Upper Confidence Limit (set as a default at 95%) is achieved then the Null Hypothesis (i.e. the level of contamination is the same as, or greater than the critical concentration) can be rejected and no further analysis or remedial works are likely to be required at the site. If the Upper Confidence Limit is not achieved then either further statistical data is required (comprising further chemical laboratory analysis) or remedial action may be required, which in case would comprise not re-using the soils.

The statistical analysis has identified the elevated concentration of 1.9mg/kg from S17 as a statistical outlier. However, even when incorporating this outlier into the full set of results, the evidence against the null hypothesis is recorded at 99%, thus the null hypothesis can be rejected. A copy of the statistical analysis for beryllium is presented in Appendix D.

Consequently, the stockpile(s) of materials tested as part of this investigation are deemed suitable for re-use on site within a residential with homegrown produce end use scenario.

It should be noted that this analysis only pertains to those stockpiles sampled and as detailed on Figure 1. Care should be undertaken when handling materials such that the stockpiles do not become cross contaminated by other materials. The nature of the materials in the stockpile was very coarse, containing frequent oversized sandstone boulders, as such, the stockpile would need to be physically reprocessed where screening and crushing techniques may be required to obtain optimum particle size for the structural re-use of this material.

9.3 GROUND GAS MONITORING

As part of a coal mining risk assessment on the Phase 2 area, gas monitoring wells were installed into three rotary boreholes in September 2019 (Intégral Géotechnique).

The gas monitoring over across six fortnightly visits did not record any concentrations of carbon dioxide, methane or Volatile Organic Compounds (VOCs) at levels of concern. Methane concentrations did not exceed 0.5%, the maximum carbon dioxide concentration was 1.9% and gas flow rate did not exceed 0.3l/hr in any of the site locations. The maximum concentrations of VOCs were recorded in IG2 during the first visit, at 9.10ppm, this location exhibited minor concentrations of VOCs during all monitoring rounds.

The field gas monitoring results are included as Appendix B.

10.0 CONTINUED REMEDIATION MEASURES

Following the remediation works on Area 1, several remediation validation requirements are outstanding until the earthworks and construction phase of the works has been completed.

10.1 GARDEN VALIDATION

Once the site has been profiled and construction has advanced to the point that property boundaries are known with confidence, the soil which will form the second half metre below finished level in garden areas is required to be placed in a controlled manner by the contractor and subject to visual inspection by Intégral Géotechnique. Final validation samples will be taken at a frequency of one topsoil and one subsoil sample per four plots. Photographic records of garden capping should be kept.

10.2 IMPORTATION OF SOILS

Any imported materials will be required to be subjected to chemical analysis to assess the suitability of the materials for re-use on-site, typically at a rate of one sample per 250m³ imported to site from greenfield or quarried sources.

10.3 THE SOLVENT EXCLUSION ZONE

The Developer is prevented by the terms of the development agreement with BP from constructing any residential dwellings within the Solvent Exclusion Zone (previously referred to as the solvent pit). The development levels are set such that there is a slight convex profile to the landform in this area, therefore promoting runoff away from the infilled pit. Additionally, covering the infilled pit is a capping layer site derived natural clay material placed as a subsoil, a minimum of 0.5m thickness.

10.4 GAS PROTECTION

Recent gas monitoring has not recorded any gas concentrations at levels of concern to the proposed development, and any soils with volatile contaminants or locations with elevated VOC concentrations during the PID survey. Nonetheless, to implement good practice and address any risk to health arising from vapour ingress to buildings from contamination remaining in-situ or from groundwater, the remediation validation report has identified the requirement for a vapour resistant membrane alongside the following measures:

10.4 GAS PROTECTION (CONTINUED)

- The membrane is required to be incorporated by the developer into each dwelling or other building likely to be occupied by people.
- The membrane is required to provide a low permeability barrier against the ingress of any gas from the ground into the building fabric (methane/TPH/SVOC/VOC resistant).
- The membrane is required to have a design life of 60 years and all services and other penetrations through the vapour resistant membrane are required to be properly sealed.
- The vapour membrane is to be maintained
 - A restrictive covenant by BP requires this to be incorporated into house sale agreements.

Passing venting is also required within all habitable structures in the form of either a highly permeable, lightly compacted granular layer (at least 200mm thick) beneath a reinforced concrete floor slab (incorporating a vapour membrane), or alternatively a ventilated sub-floor void.

Installation of groundwater wells is precluded.

10.5 GROUNDWATER

In the event that site development results in a plausible risk that future residents may come into contact with groundwater from the bedrock, the Developer will install land drains at a minimum depth of 1m (below final ground level) and a maximum of 1.5m or rockhead, whichever is shallower. The purpose of such drainage would be to control ground water level as a precautionary measure in the event that contaminated water remains within the rock. Provision would be made for discharge of any water arising, appropriate to its quality.

11.0 SUMMARY

Extensive investigation by URS in 1998, 1999 and 2003 followed by thorough remediation works and remediation validation as reported in URS – BP Area 1 Remediation Validation report dated 2010, indicate that the Phase 2 Heritage Gate development site has been sufficiently remediated such that the risk to site end users (residential end use) has been removed. Some aspects of remediation validation are required to be continued as the development of the site progresses, notably gardens are required to be validated, any importation of soils should be assessed, and ground gas protection measures are required in the construction of new dwellings.

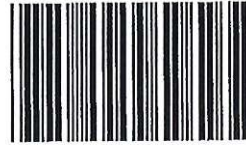
A solvent exclusion zone has been outlined by URS along the northern boundary of the Phase 2 Heritage Gate site. The area has been remediated by dewatering and is proposed for development to public open space with a 500mm capping layer over a slightly convex topography in the area to discourage surface water run-off to the infilled pit. The developer is precluded from constructing residential dwellings in this area.

With the investigations completed at the site indicating that it has been validated and remediated consistent with the requirements of the remediation strategy, it is considered that this report provides a summary of information required to support planning application P2019/0021.

APPENDIX A

**CONDITION 8 APPLICATION REF: P2006/1045 AND 1049/NPTCBC
NOTIFICATION OF DISCHARGE**

Reference No: P/2006/1045



3D900

**NEATH PORT TALBOT COUNTY BOROUGH COUNCIL
CYNGOR BWRDEISTREF SIROL CASTELL-NEDD PORT TALBOT**

**TOWN AND COUNTRY PLANNING ACT 1990
THE TOWN AND COUNTRY PLANNING (GENERAL DEVELOPMENT
PROCEDURE) ORDER 1995**

APPROVAL OF DETAILS

Name and address of the applicant

Name and Address of the agent

**BP OIL REFINERY LTD UK
TECHNICAL BUILDING
LLANDARCY
NEATH
SA10 6EL**

**URS CORPORATION LTD
COMPANY HOUSE
TOWER HILL
BRISTOL
BS2 0EQ**

Whereas on the Thursday, 27 July 2006 you submitted an application for the following development:-

PROPOSAL AGREE CONDITION 8 OF PLANNING APPLICATION
P/05/809 WITH REGARD TO THE SUBMISSION OF A
SCHEME FOR REMEDIATION.

LOCATION BP OIL REFINERY LTD UK LLANDARCY NEATH

**THE NEATH PORT TALBOT COUNTY BOROUGH COUNCIL AS THE
LOCAL PLANNING AUTHORITY IN PURSUANCE OF ITS POWER
UNDER THE ABOVE MENTIONED ACT AND ORDER HEREBY
APPROVES THE DETAILS:**

Signed :
Geoff White – Head Of Planning

Date : 01/09/2006

Cont.

Reference No: P/2006/1049



NEATH PORT TALBOT COUNTY BOROUGH COUNCIL
CYNGOR BWRDEISTREF SIROL CASTELL-NEATH

**TOWN AND COUNTRY PLANNING ACT 1990
THE TOWN AND COUNTRY PLANNING (GENERAL DEVELOPMENT
PROCEDURE) ORDER 1995**

APPROVAL OF DETAILS

Name and address of the applicant

Name and Address of the agent

BP OIL REFINERY LTD UK
LLANDARCY
NEATH

URS CORPORATION LTD
COMPANY HOUSE
TOWER HILL
BRISTOL
BS2 0EQ

Whereas on the Thursday, 27 July 2006 you submitted an application for the following development:-

PROPOSAL AGREE CONDITION 8 OF PLANNING APPLICATION
P/2006/1287 WITH REGARD TO THE SUBMISSION
OF A SCHEME FOR REMEDIATION
LOCATION BP OIL REFINERY UK LLANDARCY NEATH

**THE NEATH PORT TALBOT COUNTY BOROUGH COUNCIL AS THE
LOCAL PLANNING AUTHORITY IN PURSUANCE OF ITS POWER
UNDER THE ABOVE MENTIONED ACT AND ORDER HEREBY
APPROVES THE DETAILS:**

Signed :
Geoff White – Head Of Planning

Date : 01/09/2006

Cont.

APPENDIX B

FIELD GAS MONITORING RESULTS – INTÉGRAL GÉOTECHNIQUE, 2019

FIELD GAS MONITORING RESULTS - SUMMARY

Job No.: 12494
Site: Phase 2 Heritage Park Coed Darcy

Maximum Methane Concentration (%v/v)	Maximum Carbon Dioxide Concentration (%v/v)	Maximum Gas Concentration (%v/v)	Maximum Gas Flow Rate (l/hr)	GSV (l/hr)
<0.5	1.90	1.90	<0.3	<0.0057

Methane							
Location	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Maximum
IG 2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
IG 25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
IG 30	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50

Carbon Dioxide							
Location	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Maximum
IG 2	1.40	1.50	1.60	1.40	1.40	1.30	1.60
IG 25	1.90	1.70	1.50	1.70	1.90	1.60	1.90
IG 30	0.40	0.50	0.60	0.50	0.30	0.50	0.60

Oxygen							
Location	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Minimum
IG 2	17.90	18.10	19.10	17.80	17.80	17.80	17.80
IG 25	15.40	16.30	15.90	16.20	15.90	16.80	15.40
IG 30	20.10	19.90	18.50	19.20	20.10	19.10	18.50

Gas Flow Rate							
Location	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Maximum
IG 2	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.30
IG 25	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.30
IG 30	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.30

FIELD GAS MONITORING RESULTS

Job No.:12494

Site:Phase 2 Heritage Park Coed Darcy

Monitoring Date:25.09.19

Monitoring Round:1

Monitoring Conditions

Weather:Cloudy

Ambient Temp:14°C

Instrument:GA5000

Barometric Pressure (mb)

On Arrival:996

During Monitoring:996

End of Monitoring:996

Location	Well Base Level (mbgl)	Water Level (mbgl)	Methane (CH4) %v/v		Methane % LEL		Oxygen (O2) %v/v		Carbon Dioxide (CO2) %v/v		Carbon Monoxide (CO) (ppm)	Hydrogen Sulphide (H2S) (ppm)	Peak Gas Flow (l/hr)	VOC Vapours (ppm>background)
			Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady				
IG 2	3.48	1.82	<0.5	<0.5			17.90	17.90	1.40	1.50	<1	<1	<0.3	9.10
IG 25	4.42	0.83	<0.5	<0.5			15.40	15.30	1.90	1.80	<1	<1	<0.3	0.10
IG 30	3.67	2.44	<0.5	<0.5			20.10	20.10	0.40	0.40	<1	<1	<0.3	0.10
Typical Instrument Accuracy: %CH₄ 0-70% +/- 0.5% CO 0-500ppm +/- 2% FS %CO₂ 0-60% +/- 0.5% H₂S 0-5000ppm +/- 2.0% FS %O₂ 0-25% +/- 1.0% Flow from borehole +/- 0.3l/h LEL = Lower Explosive Limit N/R = No Reading Taken FS = Full Scale														
Notes:														

FIELD GAS MONITORING RESULTS

Job No.:12494

Site:Phase 2 Heritage Park Coed Darcy

Monitoring Date:10.10.19

Monitoring Round:2

Monitoring Conditions

Weather:

Light Rain

Ambient Temp:

15

°C

Instrument:

GA5000

Barometric Pressure (mb)

On Arrival:

989

During Monitoring:

989

End of Monitoring:

989

Location	Well Base Level (mbgl)	Water Level (mbgl)	Methane (CH4) %v/v		Methane % LEL		Oxygen (O2) %v/v		Carbon Dioxide (CO2) %v/v		Carbon Monoxide (CO) (ppm)	Hydrogen Sulphide (H2S) (ppm)	Peak Gas Flow (l/hr)	VOC Vapours (ppm>background)
			Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady				
IG 2	3.48	1.80	<0.5	<0.5			18.10	18.10	1.50	1.40	<1	<1	<0.3	6.80
IG 25	4.42	0.79	<0.5	<0.5			16.30	16.30	1.70	1.70	<1	<1	<0.3	0.20
IG 30	3.67	2.42	<0.5	<0.5			19.90	19.90	0.50	0.30	<1	<1	<0.3	0.10
Typical Instrument Accuracy: %CH₄ 0-70% +/- 0.5% CO 0-500ppm +/- 2% FS %CO₂ 0-60% +/- 0.5% H₂S 0-5000ppm +/- 2.0% FS %O₂ 0-25% +/- 1.0% Flow from borehole +/- 0.3l/h LEL = Lower Explosive Limit N/R = No Reading Taken FS = Full Scale														
Notes:														

FIELD GAS MONITORING RESULTS

Job No.:12494

Site:Phase 2 Heritage Park Coed Darcy

Monitoring Date:01.11.19

Monitoring Round:3

Monitoring Conditions

Weather:

Light Rain

Ambient Temp:

12

°C

Instrument:

GA5000

Barometric Pressure (mb)

On Arrival:

997

During Monitoring:

997

End of Monitoring:

997

Location	Well Base Level (mbgl)	Water Level (mbgl)	Methane (CH4) %v/v		Methane % LEL		Oxygen (O2) %v/v		Carbon Dioxide (CO2) %v/v		Carbon Monoxide (CO) (ppm)	Hydrogen Sulphide (H2S) (ppm)	Peak Gas Flow (l/hr)	VOC Vapours (ppm>background)
			Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady				
IG 2	3.48	1.79	<0.5	<0.5			19.10	19.10	1.60	1.40	<1	<1	<0.3	4.70
IG 25	4.42	0.81	<0.5	<0.5			15.90	16.20	1.50	1.50	<1	<1	<0.3	0.20
IG 30	3.67	2.44	<0.5	<0.5			18.50	18.60	0.60	0.40	<1	<1	<0.3	0.20
Typical Instrument Accuracy: %CH₄ 0-70% +/- 0.5% CO 0-500ppm +/- 2% FS %CO₂ 0-60% +/- 0.5% H₂S 0-5000ppm +/- 2.0% FS %O₂ 0-25% +/- 1.0% Flow from borehole +/- 0.3l/h LEL = Lower Explosive Limit N/R = No Reading Taken FS = Full Scale														
Notes:														

FIELD GAS MONITORING RESULTS

Job No.:12494

Site:Phase 2 Heritage Park Coed Darcy

Monitoring Date:14.11.19

Monitoring Round:4

Monitoring Conditions

Weather:

Light Rain

Ambient Temp:

5

°C

Instrument:

GA5000

Barometric Pressure (mb)

On Arrival:

989

During Monitoring:

989

End of Monitoring:

989

Location	Well Base Level (mbgl)	Water Level (mbgl)	Methane (CH4) %v/v		Methane % LEL		Oxygen (O2) %v/v		Carbon Dioxide (CO2) %v/v		Carbon Monoxide (CO) (ppm)	Hydrogen Sulphide (H2S) (ppm)	Peak Gas Flow (l/hr)	VOC Vapours (ppm>background)
			Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady				
IG 2	3.48	1.74	<0.5	<0.5			17.80	17.80	1.40	1.40	<1	<1	<0.3	4.30
IG 25	4.42	0.80	<0.5	<0.5			16.20	16.20	1.70	1.70	<1	<1	<0.3	0.10
IG 30	3.67	2.38	<0.5	<0.5			19.20	19.20	0.50	0.50	<1	<1	<0.3	0.10
Typical Instrument Accuracy: %CH₄ 0-70% +/- 0.5% CO 0-500ppm +/- 2% FS %CO₂ 0-60% +/- 0.5% H₂S 0-5000ppm +/- 2.0% FS %O₂ 0-25% +/- 1.0% Flow from borehole +/- 0.3l/h LEL = Lower Explosive Limit N/R = No Reading Taken FS = Full Scale														
Notes:														

FIELD GAS MONITORING RESULTS

Job No.:12494

Site:Phase 2 Heritage Park Coed Darcy

Monitoring Date:06.12.19

Monitoring Round:5

Monitoring Conditions

Weather:

Ambient Temp:

Instrument:

Light Rain

9

GA5000

°C

Barometric Pressure (mb)

On Arrival:

During Monitoring:

End of Monitoring:

1006

1006

1006

Location	Well Base Level (mbgl)	Water Level (mbgl)	Methane (CH4) %v/v		Methane % LEL		Oxygen (O2) %v/v		Carbon Dioxide (CO2) %v/v		Carbon Monoxide (CO) (ppm)	Hydrogen Sulphide (H2S) (ppm)	Peak Gas Flow (l/hr)	VOC Vapours (ppm>background)
			Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady				
IG 2	3.48	1.83	<0.5	<0.5			17.80	17.80	1.40	1.20	<1	<1	<0.3	7.10
IG 25	4.42	0.81	<0.5	<0.5			15.90	15.90	1.90	1.70	<1	<1	<0.3	0.10
IG 30	3.67	2.48	<0.5	<0.5			20.10	20.10	0.30	0.30	<1	<1	<0.3	0.10
Typical Instrument Accuracy: %CH₄ 0-70% +/- 0.5% CO 0-500ppm +/- 2% FS %CO₂ 0-60% +/- 0.5% H₂S 0-5000ppm +/- 2.0% FS %O₂ 0-25% +/- 1.0% Flow from borehole +/- 0.3l/h LEL = Lower Explosive Limit N/R = No Reading Taken FS = Full Scale														
Notes:														

FIELD GAS MONITORING RESULTS

Job No.:12494

Site:Phase 2 Heritage Park Coed Darcy

Monitoring Date:16.12.19

Monitoring Round:6

Monitoring Conditions

Weather:Cloudy

Ambient Temp:9°C

Instrument:GA5000

Barometric Pressure (mb)

On Arrival:997

During Monitoring:997

End of Monitoring:997

Location	Well Base Level (mbgl)	Water Level (mbgl)	Methane (CH4) %v/v		Methane % LEL		Oxygen (O2) %v/v		Carbon Dioxide (CO2) %v/v		Carbon Monoxide (CO) (ppm)	Hydrogen Sulphide (H2S) (ppm)	Peak Gas Flow (l/hr)	VOC Vapours (ppm>background)
			Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady				
IG 2	3.48	1.83	<0.5	<0.5			17.80	17.90	1.30	1.30	<1	<1	<0.3	5.10
IG 25	4.42	0.87	<0.5	<0.5			16.80	16.80	1.60	1.60	<1	<1	<0.3	0.10
IG 30	3.67	2.41	<0.5	<0.5			19.10	19.10	0.50	0.50	<1	<1	<0.3	0.10
Typical Instrument Accuracy: %CH₄ 0-70% +/- 0.5% CO 0-500ppm +/- 2% FS %CO₂ 0-60% +/- 0.5% H₂S 0-5000ppm +/- 2.0% FS %O₂ 0-25% +/- 1.0% Flow from borehole +/- 0.3l/h LEL = Lower Explosive Limit N/R = No Reading Taken FS = Full Scale														
Notes:														

APPENDIX C

CHEMICAL TEST RESULTS – STOCKPILE SAMPLING BY INTÉGRAL GÉOTECHNIQUE IN 2019



Peter Davies

Integral Geotechnique
Integral House
7 Beddau Way
Castlegate Business Park
CF83 2AX

t: 02920807991
f: 02920862176
e: peterd@integralgeotec.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 19-60629

Project / Site name:	Coed Darcy	Samples received on:	20/09/2019
Your job number:	12494-PD	Samples instructed on:	20/09/2019
Your order number:		Analysis completed by:	30/09/2019
Report Issue Number:	1	Report issued on:	30/09/2019
Samples Analysed:	20 soil samples		

Signed: *Karolina Marek*

Karolina Marek
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320924	1320925	1320926	1320927	1320928
Sample Reference				S1	S2	S3	S4	S5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	3.00	1.00	2.00
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	34	21	39	10
Moisture Content	%	N/A	NONE	8.1	6.4	5.5	5.1	6.8
Total mass of sample received	kg	0.001	NONE	0.94	1.0	1.2	1.2	1.1

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	7.8	8.4	8.2	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	340	120	330	160	250
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.066	0.016	0.10	0.018	0.059
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	170	71	180	110	150
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.2	0.9	1.0	1.1	1.2
Loss on Ignition @ 450°C	%	0.2	MCERTS	3.6	2.0	2.2	2.2	2.6

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320924	1320925	1320926	1320927	1320928
Sample Reference				S1	S2	S3	S4	S5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	3.00	1.00	2.00
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	8.6	11	7.1	4.5
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.67	0.71	0.94	0.70	0.72
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.3	0.4	0.2	0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	17	17	17	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	61	16	10	14	13
Lead (aqua regia extractable)	mg/kg	1	MCERTS	94	24	22	14	23
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	29	36	41	29	28
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	18	17	17	15	17
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	170	76	75	69	73

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
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Environmental Science

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320924	1320925	1320926	1320927	1320928
Sample Reference				S1	S2	S3	S4	S5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	3.00	1.00	2.00
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Environmental Science

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320924	1320925	1320926	1320927	1320928
Sample Reference				S1	S2	S3	S4	S5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	3.00	1.00	2.00
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320929	1320930	1320931	1320932	1320933
Sample Reference				S6	S7	S8	S9	S10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	2.00	1.00	0.50	1.50
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	8.3	8.7	8.2	11	8.3
Total mass of sample received	kg	0.001	NONE	1.1	1.0	1.1	1.0	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.7	8.2	7.6	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	180	630	460	270	570
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.025	0.11	0.040	0.013	0.079
Sulphide	mg/kg	1	MCERTS	< 1.0	45	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	96	410	270	150	500
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.9	1.2	1.4	1.2	1.1
Loss on Ignition @ 450°C	%	0.2	MCERTS	2.9	3.5	3.5	3.4	2.8

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.36	< 0.05	0.44
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.42	< 0.05	0.45
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.17	< 0.05	0.22
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.34	< 0.05	0.27
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29	< 0.05	0.24
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.13	< 0.05	0.12
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.17	< 0.05	0.16
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	2.17	< 0.80	1.90
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Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320929	1320930	1320931	1320932	1320933
Sample Reference				S6	S7	S8	S9	S10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	2.00	1.00	0.50	1.50
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	7.9	20	14	16
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.65	0.82	0.80	0.60	0.91
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.4	0.5	0.4	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	0.4	< 0.2	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	17	21	18	16
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	35	69	39	36
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20	29	66	32	55
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	26	25	29	24	26
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	18	20	22	21	17
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	75	120	210	100	160

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10



Environmental Science

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320929	1320930	1320931	1320932	1320933
Sample Reference				S6	S7	S8	S9	S10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	2.00	1.00	0.50	1.50
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Environmental Science

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320929	1320930	1320931	1320932	1320933
Sample Reference				S6	S7	S8	S9	S10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	2.00	1.00	0.50	1.50
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.36	< 0.05	0.44
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.42	< 0.05	0.45
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.17	< 0.05	0.22
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.34	< 0.05	0.27
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29	< 0.05	0.24
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.13	< 0.05	0.12
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.17	< 0.05	0.16
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320934	1320935	1320936	1320937	1320938
Sample Reference				S11	S12	S13	S14	S15
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	4.00	2.00	0.50	1.50
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	30	< 0.1	30	< 0.1	21
Moisture Content	%	N/A	NONE	5.4	8.0	5.8	6.8	6.2
Total mass of sample received	kg	0.001	NONE	0.97	1.3	1.0	1.0	0.99

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	8.0	8.0	7.9	7.6
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	210	160	370	640	890
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.075	0.037	0.075	0.12	0.36
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	160	100	230	280	510
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.9	1.2	1.4	2.3	2.2
Loss on Ignition @ 450°C	%	0.2	MCERTS	2.2	2.5	2.8	4.4	4.0

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320934	1320935	1320936	1320937	1320938
Sample Reference				S11	S12	S13	S14	S15
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	4.00	2.00	0.50	1.50
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.8	2.7	5.8	8.6	6.1
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	0.86	0.90	0.94	0.99
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.3	0.4	0.7	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	17	17	23	20
Copper (aqua regia extractable)	mg/kg	1	MCERTS	9.5	15	24	47	24
Lead (aqua regia extractable)	mg/kg	1	MCERTS	16	15	26	18	17
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	45	33	30	30	38
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	16	18	18	21	20
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	75	69	92	76	76

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10



Environmental Science

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320934	1320935	1320936	1320937	1320938
Sample Reference				S11	S12	S13	S14	S15
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	4.00	2.00	0.50	1.50
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Environmental Science

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320934	1320935	1320936	1320937	1320938
Sample Reference				S11	S12	S13	S14	S15
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	4.00	2.00	0.50	1.50
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320939	1320940	1320941	1320942	1320943
Sample Reference				S16	S17	S18	S19	S20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.50	0.10	2.50	0.10	0.10
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	56	30	27	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	5.9	5.9	8.6	3.1	4.2
Total mass of sample received	kg	0.001	NONE	0.87	1.0	0.94	0.80	1.0

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	7.9	7.8	8.3	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	410	370	720	430	320
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.064	0.071	0.12	0.057	0.032
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	270	370	320	260	160
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.6	2.2	1.5	1.0	1.0
Loss on Ignition @ 450°C	%	0.2	MCERTS	3.5	5.0	2.9	2.5	2.6

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320939	1320940	1320941	1320942	1320943
Sample Reference				S16	S17	S18	S19	S20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.50	0.10	2.50	0.10	0.10
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	27	2.7	15	6.9
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	1.9	0.75	0.80	0.54
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.2	0.6	0.5	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	16	17	18	16
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	27	35	28	24
Lead (aqua regia extractable)	mg/kg	1	MCERTS	19	30	19	42	15
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	36	51	25	26	21
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	19	24	20	20	18
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	77	90	75	100	69

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10



Environmental Science

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320939	1320940	1320941	1320942	1320943
Sample Reference				S16	S17	S18	S19	S20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.50	0.10	2.50	0.10	0.10
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Environmental Science

Analytical Report Number: 19-60629

Project / Site name: Coed Darcy

Lab Sample Number				1320939	1320940	1320941	1320942	1320943
Sample Reference				S16	S17	S18	S19	S20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.50	0.10	2.50	0.10	0.10
Date Sampled				18/09/2019	18/09/2019	18/09/2019	18/09/2019	18/09/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1320924	S1	None Supplied	0.50	Brown gravelly sand with vegetation.
1320925	S2	None Supplied	1.50	Brown loam and clay with gravel and stones.
1320926	S3	None Supplied	3.00	Brown loam and sand with gravel and stones.
1320927	S4	None Supplied	1.00	Brown loam and clay with gravel and stones.
1320928	S5	None Supplied	2.00	Brown loam and clay with gravel and stones.
1320929	S6	None Supplied	0.50	Brown clay and sand with gravel.
1320930	S7	None Supplied	2.00	Brown clay and sand with gravel.
1320931	S8	None Supplied	1.00	Brown loam and clay with gravel and vegetation.
1320932	S9	None Supplied	0.50	Brown loam and clay with gravel and vegetation.
1320933	S10	None Supplied	1.50	Brown loam and clay with gravel.
1320934	S11	None Supplied	1.00	Brown loam and clay with gravel and stones.
1320935	S12	None Supplied	4.00	Brown clay and sand.
1320936	S13	None Supplied	2.00	Brown loam and clay with gravel and stones.
1320937	S14	None Supplied	0.50	Brown loam and sand with gravel.
1320938	S15	None Supplied	1.50	Brown loam and sand with gravel and stones.
1320939	S16	None Supplied	3.50	Brown loam and clay with gravel and stones.
1320940	S17	None Supplied	0.10	Brown loam and sand with gravel and stones.
1320941	S18	None Supplied	2.50	Brown loam and clay with gravel and stones.
1320942	S19	None Supplied	0.10	Brown loam and sand with gravel.
1320943	S20	None Supplied	0.10	Brown loam and sand with gravel.

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Project / Site name: Coed Darcy

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS

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The results included within the report are representative of the samples submitted for analysis.

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Project / Site name: Coed Darcy

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/cleanup.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

APPENDIX D

STATISTICAL ASSESSMENT OF BERYLLIUM IN STOCKPILE SAMPLES

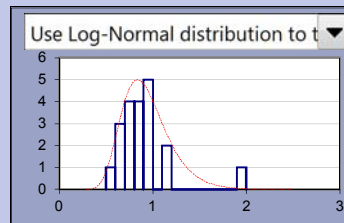
Test Results

Client/client ref: Jehu Group
Project ref: Coed Darcy

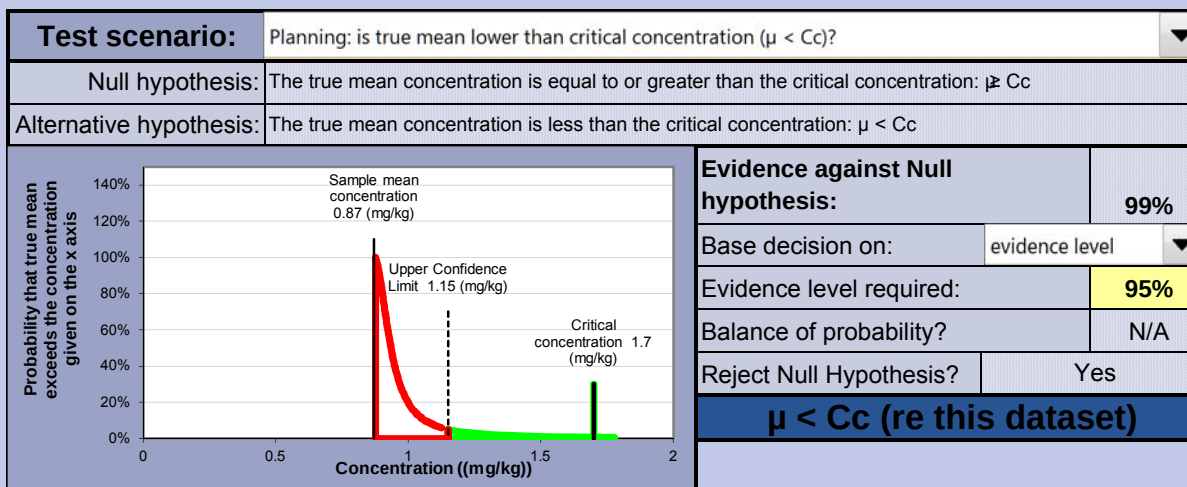
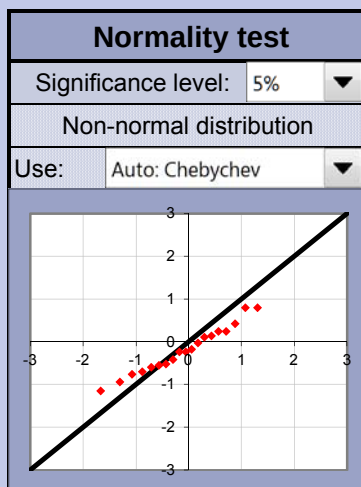
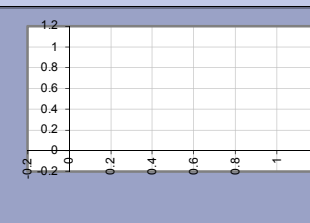
Site ref: 12494
Data description:

Date: 07-Oct-2019
User details: RB

Dataset:	Beryllium ((mg/kg))
Sample mean, $\bar{X}$ ((mg/kg))	0.87
Sample standard deviation, s	0.2872
Sample size, n	20
Critical concentration, Cc ((mg/kg))	1.7



Outliers & non-detects	
Outliers present?	YES
Significance level	5%
Outliers removed?	0
Non-detects	0



[Back to data](#)

[Back to summary](#)

[Go to outlier test](#)

[Go to normality test](#)

FIGURES

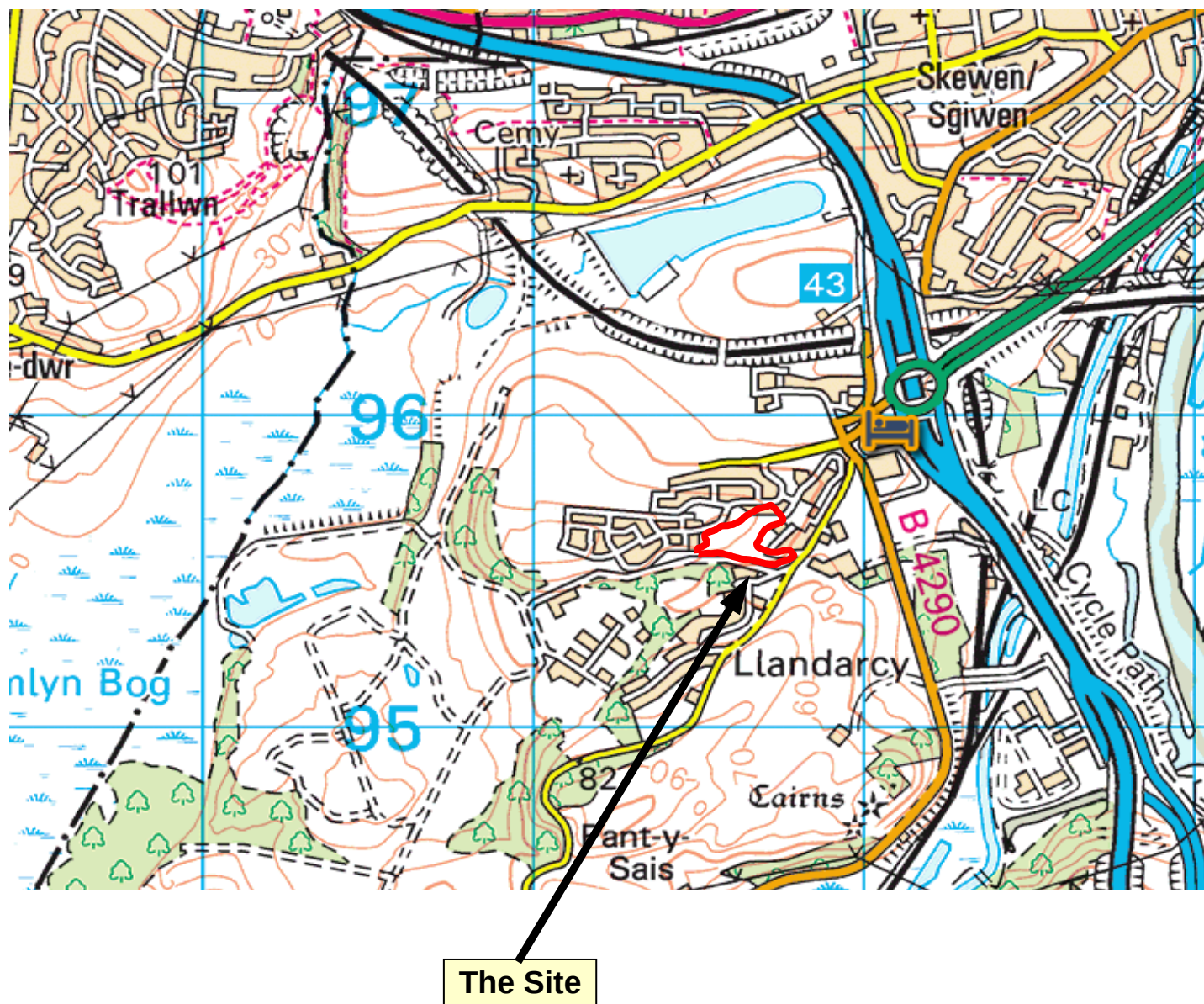
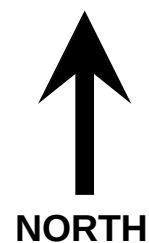


Figure 1 - Site Location Plan

12494 - Phase 2 Heritage Gate Development Site, Coed Darcy

Intégral
Géotechnique

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

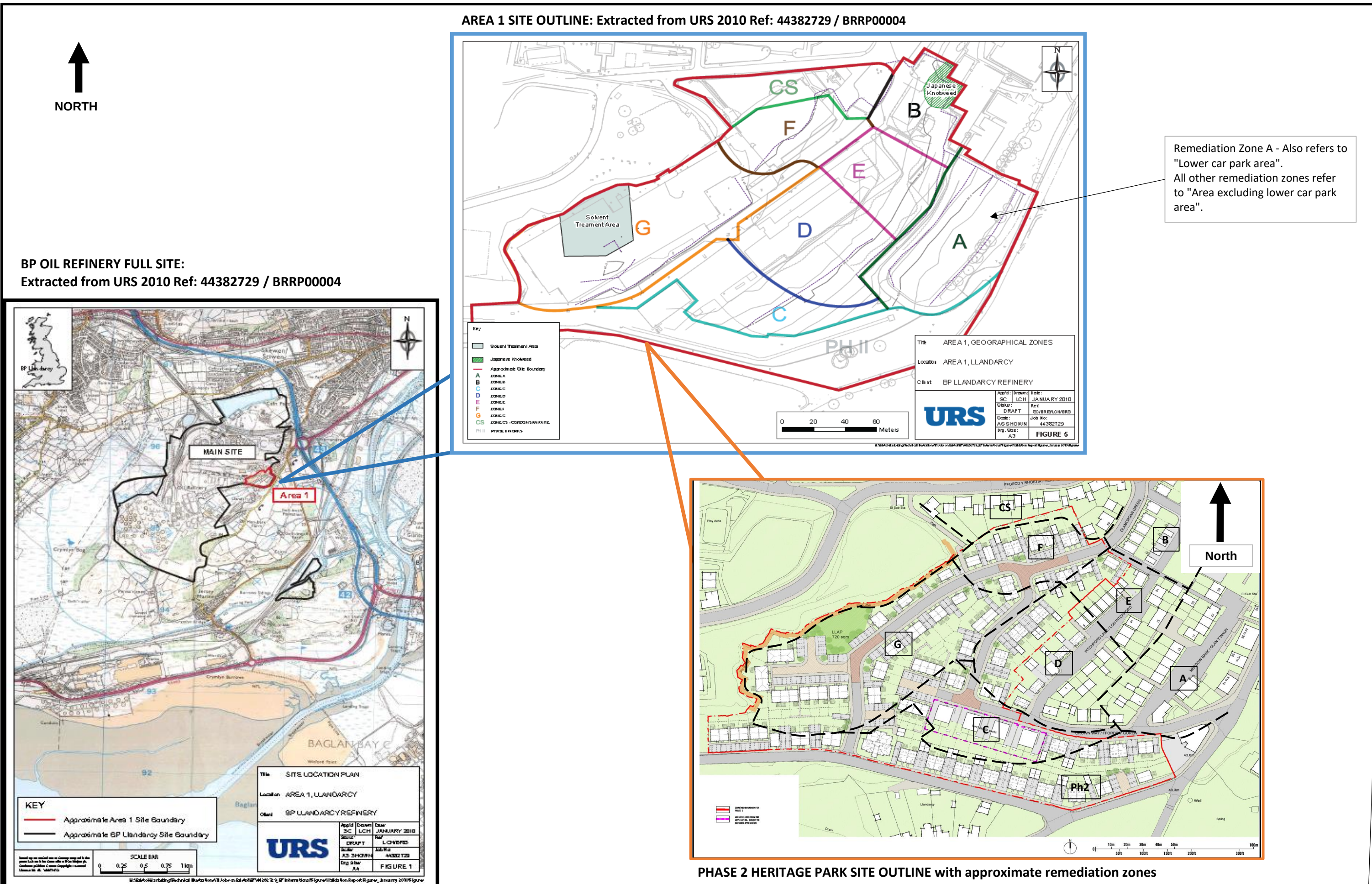


Figure 2 - Site Context

12494 - Phase 2 Heritage Gate Development Site, Coed Darcy



 S1 Approximate Stockpile Sampling location
 Approximate Location of Stockpile (no longer present)

Figure 3 - Stockpile Sampling

12494 - Phase 2 Heritage Gate Development Site, Coed Darcy



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

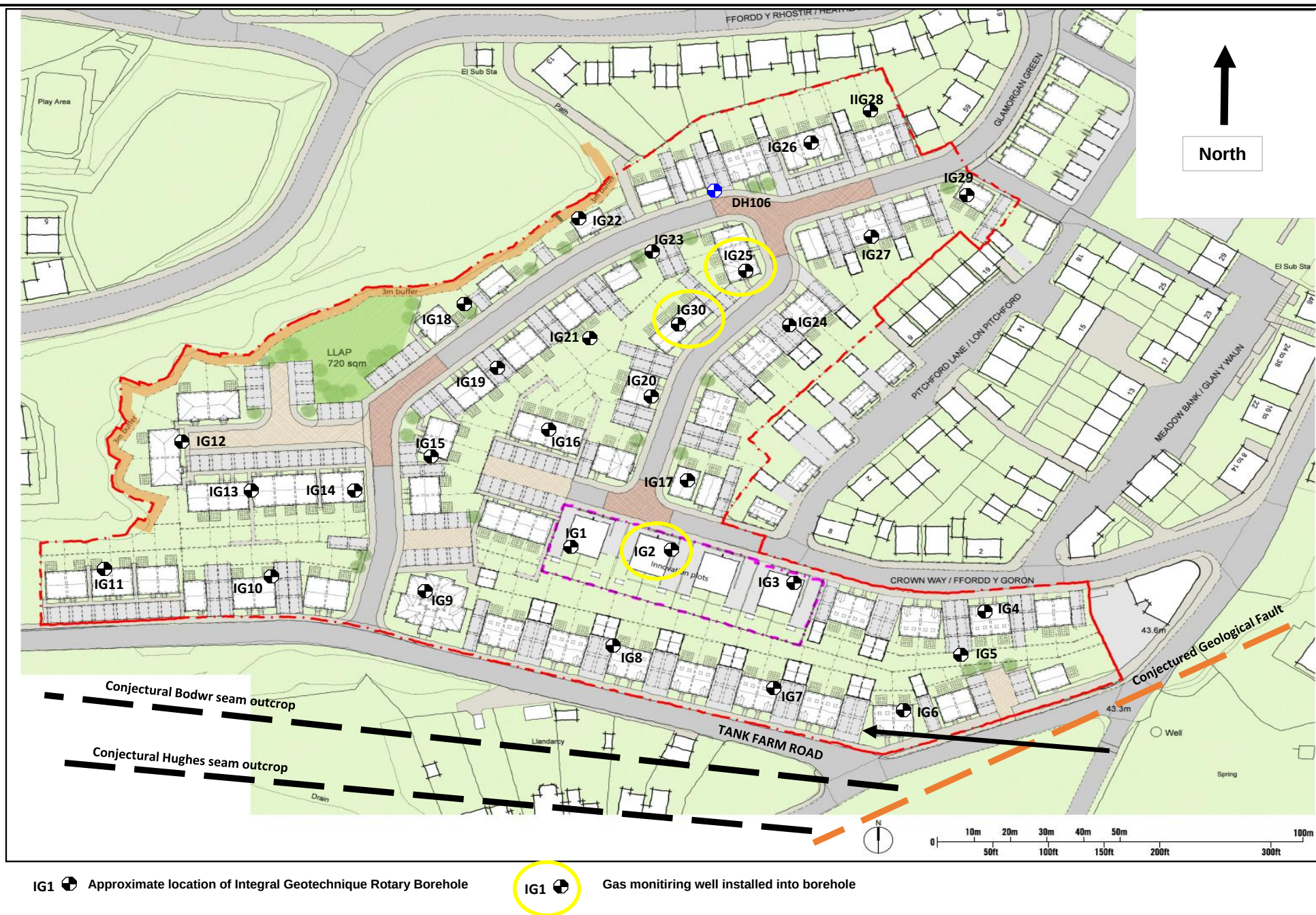


Figure 4 - Rotary Borehole and Gas Monitoring Well Locations

12494 - Phase 2 Heritage Gate Development Site, Coed Darcy