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Pembrokeshire County Council Eco Park

Ground Investigation and Geotechnical Design Report

For Pembrokeshire County Council

June 2022

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Quality Management

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1. Introduction

1.1 Appointment and Scope

Capita Real Estate and Infrastructure Ltd. (CREI) has been appointed by Pembrokeshire County Council to provide professional services for the proposed Pembrokeshire County Council (PCC) Eco Park. The development area is subdivided into Area A and Area B (refer Drawing PECO-CAP-EGN-XX-DR-CE-0001 for location). The Eco Park will comprise the following developments:

- Phase 1- Recycling transfer facility and associated access roads. This phase will also contain an office and a visitor centre, offering the opportunity for groups to come and learn about waste and recycling;
- Phase 2 - Vehicle / Staff parking area. There is also a vehicle maintenance workshop and staff welfare facilities as part of this phase;
- Phase 3 - Residual Waste and Recycling Facility.
- Phase 4 – Publicly accessible Waste & Recycling Centre (WRC).

The overall scope of the CREI commission is as follows:

- review the existing reports undertaken by Stantec [Ref 1 & 2] which were primarily Contaminated Land focused (undertaken for Area A only which fell within the development boundary at the time), identify gaps in the available information and any appropriate supplementary investigation. This has been completed and issued as document reference PWTF-CAP-06-XX-MO-G-0001, dated March 2021 [Ref 3];
- undertake a preliminary risk assessment for an area (Area B) to the west of the previously identified site boundary undertaken by Stantec. This was completed and issued as document reference PWTF-CAP-06-XX-RP-G-0024 P01 Area B, dated November 2021 [Ref 4];
- design an additional phase of ground investigation as recommended by the memo [Ref 3] and provide technical support during the site works. The investigation was commissioned by Pembrokeshire City Council (SCC) and completed by Earth Science Partnership (ESP) between October and November 2021; and
- prepare a combined Ground Investigation Report (GIR) and Geotechnical Design Report (GDR) following the supplementary ground investigation – this report.

1.2 Objectives

This combined Ground Investigation and Geotechnical Design Report (GIR-GDR) has been prepared for the PCC Eco Park broadly in accordance with the requirements of CD 622 (Managing Geotechnical Risk) [Ref 5] of Highways England's Design Manual for Roads and Bridges. It provides supplementary information to the existing Stantec Phase 2 Baseline Assessment Report [Ref 2] based on an interpretation of factual ground investigation data available for the site. The report summarises the findings of previous studies and ground investigations with the following objectives:

- provide a summary of the previous and recent (2021) ground investigations and evaluate the quality of the data obtained;
- describe the ground conditions anticipated to be encountered during the works;
- provide a summary of the material properties for each stratum to be encountered during construction;
- provide appropriate information to facilitate the choice of ground model and geotechnical design parameters for the proposed works; and
- identify geotechnical and geoenvironmental risks and recommend suitable mitigation measures.

Ground risks to health and safety of contractors and the general public have been identified and included in the project wide risk register.

1.3 Geotechnical Category

In accordance with CD 622 [Ref 5] and considering the nature of the proposed works, the scheme should be categorised as a Geotechnical Category 2 project. A Category 2 project is defined as:

'*Projects which include conventional types of geotechnical structures, earthworks and activities, with no exceptional geotechnical risks, unusual or difficult ground conditions or loading conditions*'.

1.4 Other Relevant Information

The following sources of information have been used in the preparation of this report:

Table 1 Sources of information

Item	Originator	Title	Document Reference	Document Date	Comments
I	PBA (part of Stantec)	Waste Transfer Station, Puma Energy Site H5 Site Condition Report	47244/3501 /R1	December 2019	
II	Stantec	New Waste Transfer Station, Puma Energy Site Phase 2 Baseline Assessment Report	47244/3502 /R1	July 2020	Geo-Environmental focus, no geotechnical engineering consideration Ref 2
III	Capita	Memo – Review of existing ground investigation information and gap analyses	PWF-CAP-06-XX-MO-G-0001	March 2021	

Item	Originator	Title	Document Reference	Document Date	Comments
IV	Capita	Area B Pembrokeshire County Council Eco Park , Geo-Environmental Desk Study – Preliminary Risk Assessment	PWTF-CAP-06-XX-RP-G-0024	November 2021	Ref 4
V	ESP	Pembrokeshire County Council Eco Park, Milford Haven Factual Ground Investigation Report	ESP.7913.3642	February 2022	Ref 6

2. Site Description and Proposed Layout

2.1 Site Description

The site (approximately 9ha.) is located to the north of the Puma Energy facility in Milford Haven, Pembrokeshire and was mainly used as a former peripheral storage/parking area lying at the edges of the wider oil refinery site. The National Grid Reference of the centre of the site is (SM) 188990, 209350 and the postcode is SA73 3FB. The site lies to the south of the village of Robeston Cross.

The site lies on a gentle hillslope which slopes to the southeast with a fall of approximately 10m across the length of the site. Land levels are typically 66.9 mAOD to the northwest and 57.50 mAOD to the south east. There is a small stream which commences 10m off site in the south eastern corner and then flow south eastwards towards the Milford Haven estuary.

The eastern half of the site is occupied partly by a former contractor's car parking area with either gravel or tarmacadam surfacing and partly by concrete floor slabs which are a legacy of demolished commercial buildings. Multiple containers and materials were stored in the northern to north-eastern part of the site where these remnant slabs are located. There is an old helipad in the central part of the eastern half of the site.

Directly to the south of the car park there is a more steeply sloping area of grassed bank which slopes down to a tree line of trees located close to the southern boundary. The lower parts of this sloping area are waterlogged.

The central part of the site was a mainly grass covered area with access roads and a helipad. In the western part of the site was an additional tarmacadam surfaced car park with an area of trees directly to its north.

2.2 Description of Project

The proposal is for a multi-faceted Eco Park and the facility will comprise the following:

- Phase 1- Recycling transfer facility and associated access roads. This phase will also contain an office and a visitor centre, offering the opportunity for groups to come and learn about waste and recycling;
- Phase 2 - Vehicle / Staff parking area. There is also a vehicle maintenance workshop and staff welfare facilities as part of this phase;
- Phase 3 - Residual Waste and Recycling Facility.
- Phase 4 – Publicly accessible Waste & Recycling Centre (WRC).

3. Existing Information

3.1 Introduction

The existing site information is detailed in the Stantec Site Condition Report [Ref 1], Phase 2 Baseline Assessment Report [Ref 2] and CREI Area B Preliminary Risk Assessment [Ref 4] and these should be referred to for full details. A summary is provided below.

3.2 Topographic Maps

A topographical survey was provided and reviewed as part of this report. The northern and northeast sections of Area A were however not covered by the survey. In summary, the levels in the westernmost area (Area B) are generally between 66 and 67m OD. The levels appear to slope downwards towards the east with ground levels of between 64 and 65m OD towards the centre of the site. Levels of between 57.5 and 63m OD are noted in the southeast area (Area A).

3.3 Geological Maps and Memoirs

3.3.1 *Geology*

The site is underlain by bedrock comprising the Milford Haven Group with Superficial Deposits indicated to be absent.

The Stantec interpretation [Ref 2] following the ground investigation in Area A suggests the presence of Glacial Till, however, upon review by Capita, the gravel is considered to be a weathered layer of the underlying bedrock and hence a more accurate interpretation is that there is no Till at the site.

<u>Made Ground</u>

Made Ground associated with historic development is likely to be encountered on site.

The previous investigation [Ref 2] within Area A recorded Made Ground/Topsoil across the site to between 0.10 and 0.70m bgl.

<u>Superficial Deposits</u>

Published data suggests the absence of Superficial Deposits at the site.

<u>Solid (Bedrock) Geology</u>

The lithographical description as given by the BGS for the Milford Haven Group is hard, red calcareous marls with sporadic red and green sandstones. The presence of basal beds of green marl, conglomerate and breccia are also noted. The group is late Silurian to early Devonian in age.

3.4 Radon

BGS information shows that the site is in an intermediate probability radon aera (in which 5 – 10% of homes are estimated to be at or above the action level). Basic radon protection measures may be necessary in the construction of new buildings.

3.5 Aerial Photographs

Aerial photographs were not reviewed as part of this report.

3.6 Record of mines and mineral deposits

Desk study information [Ref 1] determined Area A does not fall within a mining affected area (coal or non-coal mining).

The available information [Ref 4] indicates Area B does not fall within a coal mining affected area, however, there is potential for ‘localised small scale’ (non-coal mining) underground mining for vein mineral to have occurred on site and within 550m to the north. Two unspecified heaps are indicated within 75m to the north and 80m to the south respectively.

3.7 Historical Ground Investigation

Stantec undertook a Geo-Environmental ground investigation in June 2020 [Ref 2] which was focused on the Area A sub site and comprised the following:

- 5 No. rotary cored holes (BH01 to BH05) to 10m depth with gas and groundwater standpipe installations;
- 12 No. windowless sampler holes (WS01 to WS12) to 4m depth;
- 3 No. machine excavated trial pits (TP01 to TP03) to 2.20m depth
- Infiltration testing in the 3 No. trial pits;
- Geo-environmental testing; and
- 3 No. post field work groundwater and gas monitoring visits.

Table 3.1: Summary of Investigation

Hole ID	Type	Final Depth, m bgl [m OD]	Strata	Groundwater Installations	Groundwater Depth (m bgl), [m OD]	
					Water Strike	Monitored
BH01	rotary cored	10 [56.55]	Topsoil; Mudstone, Siltstone, Sandstone	standpipe installed to base (slotted from 1 to 10m)	none	3.73* [62.82]
BH02	rotary cored	10 [56.99]	Topsoil; Clay, Mudstone, Siltstone	standpipe installed to base (slotted from 1 to 10m)	none	3.96* [63.03]
BH03	rotary cored	10 [56.51]	Topsoil; Mudstone	standpipe installed to base (slotted from 1 to 10m)	none	2.96* [63.55]

Hole ID	Type	Final Depth, m bgl [m OD]	Strata	Groundwater Installations	Groundwater Depth (m bgl), [m OD]	
					Water Strike	Monitored
BH04	rotary cored	10 [55.03]	Made Ground; Gravel, Mudstone, Sandstone	standpipe installed to base (slotted from 1 to 10m)	none	2.95* [62.08]
BH05	rotary cored	10 [55.82]	Made Ground; Gravel, Mudstone	standpipe installed to base (slotted from 1 to 10m)	none	5.23* [60.59]
WS01	windowless sampler	2.50 [64.39]	Made Ground; Clay, Gravel	none	none	-
WS02	windowless sampler	2.80 [63.78]	Made Ground; Clay, Gravel	none	none	-
WS03	windowless sampler	2 [64.75]	Made Ground; Gravel	none	none	-
WS04	windowless sampler	1.90 [65.14]	Made Ground; Gravel	none	none	-
WS05	windowless sampler	3 [62.34]	Made Ground; Gravel	none	none	-
WS06	windowless sampler	1 [62.37]	Made Ground; Gravel	none	none	-
WS07	windowless sampler	4 [59.63]	Made Ground; Gravel, Clay, Silt	none	none	-
WS08	windowless sampler	3 [62.89]	Made Ground; Gravel, Clay, Sand	none	none	-
WS09	windowless sampler	3 [63.34]	Made Ground;	none	none	-

Hole ID	Type	Final Depth, m bgl [m OD]	Strata	Groundwater Installations	Groundwater Depth (m bgl), [m OD]	
					Water Strike	Monitored
			Gravel, Clay, Sand			
WS10	windowless sampler	2.50 [64.02]	Made Ground; Gravel, Clay,	none	none	-
WS11	windowless sampler	1.70 [64.28]	Made Ground; Gravel	none	none	-
WS12	windowless sampler	2 [64.45]	Made Ground; Gravel, Clay,	none	none	-
TP01	machine excavated	1.70 [64.38]	Topsoil; Mudstone	n/a	n/a	n/a
TP02	machine excavated	2.20 [64.54]	Made Ground; Mudstone	n/a	n/a	n/a
TP03	machine excavated	1.65 [62.01]	Made Ground; Clay	n/a	n/a	n/a

*shallowest monitored post-fieldworks for the 2020 investigation

As mentioned above Stantec undertook 3no. gas monitoring visits and these were undertaken between 02/07/2020 and 17/07/2020. The highest value for methane was 0.2% v/v. Carbon dioxide levels in all pipes remained below the 5% v/v trigger level at which asphyxiant risk could occur should maintenance workers enter confined spaces in the ground (eg manholes) with a maximum value of 3.6% v/v. Gas flow rates were below the limit of detection for the equipment used. Due to the lack of a detected flow, the risk from ground gas was classed as ‘very low’.

The geo-environmental testing undertaken by Stantec in 2020 involved testing 27no. samples for a commonly used brownfield suite of chemicals and elements. Results of selected determinants are provided in table 3.2 below.

Table 3.2 Selected Stantec geo-environmental results-soils

Determinant	Max Value (2020)	Commercial GAC	Pass/Fail of Assessment Criteria
Arsenic	5.4	79	Pass
Boron	1.0	21000	Pass
Cadmium	< 0.2	120	Pass
Chromium	40	1500	Pass
Copper	54	12000	Pass
Lead	15	1100 - 6000	Pass
Mercury	< 0.3	16	Pass
Nickel	41	980	Pass
Zinc	82	730000	Pass
Total TPH	< 10	~	Pass
PAH Compounds	0.40 (Fluoranthene)	23000	Pass

The table shows there were no areas of poor land quality were identified (screening against LQM/CIEH S4UL's Commercial criteria). Additionally, Made Ground that was found was seen to be limited in depth, with no visual or olfactory observations of gross contamination noted in the logs.

Stantec also analysed groundwater conditions on a single round of groundwater sampling undertaken on the 02/07/2020. The results of which are summarised in table 3.3 below.

Table 3.3 Selected Stantec geo-environmental results-groundwater

Determinant	Max Value 2020 (µg/l)	Exploratory Hole	Assessment Criteria (µg/l)	Pass/Fail of Assessment Criteria
pH	7.4	BH03	-	-
Arsenic	2.3	BH03	50	Pass
Cadmium	0.36	BH03	0.08	Fail
Copper	2.8	BH03	1.00	Fail
Lead	62	BH03	1.20	Fail
Mercury	<0.050	All samples	0.07	Pass
Nickel	28	BH05	4	Fail

The table shows there are three elevated concentrations for dissolved metals as measured using the Stantec adopted screening criteria. There were no exceedances in the concentrations of PAS's, TPH. VOC or SVOC in the samples. It is noted that ESP has continued the sampling in BH03 during 2021 and a discussion as to the equilibrium status of metals in this well is provided later sections of the report.

3.8 Recent Ground Investigation

A supplementary ground investigation was completed between October and November 2021 which included exploratory hole drilling in both Area A and Area B sub sites. The investigation was undertaken by Earth Science Partnership (ESP) on behalf of Pembrokeshire County Council (PCC) and comprised the following:

- 5 No. initially dynamic sampler (DS) holes with rotary core follow-on (BH-A1, BH-A2, BH-A3, BH-A4 and BH-A6) to between 12.00 and 15.20m depth with gas and groundwater standpipe installations in selected holes;
- 3 No. initially dynamic sampler holes with rotary open hole follow-on (BHA-5, BHA-7 and BHA-8) to 10m depth;
- 12 No. dynamic (continuous windowless) sampler holes (DCSA-1 to DCS-A8 and DCS-B1 to DCS-B4) to depths of between 0.55 and 2.50*;
- 2 No. foundation inspection pits (FIP-A1 and FIP-A2) to expose the foundations of a historic building in the northern section of Area A to 2.10m depth.
- 5 No machine excavated trial pits (TP-A1 to TP-A5) to between 2.05 and 2.20m depth;
- Infiltration (BRE 365) tests in the 5 No. machine excavated pits;
- 4 No. plate bearing tests in machine dug pits (PLT-A1 to PLT-A4);
- 2 No. hand dug pits (HP-A1 and HP-B1) to 0.90m and 0.40m respectively;
- In situ CBR (using DCP) tests within the inspection pits of several locations and some trial pits across the site;
- Permeability (falling head) tests undertaken in selected boreholes;
- Laboratory geotechnical and geo-environmental testing; and
- Groundwater and gas monitoring.

The investigation is fully detailed in ESP's factual report [Ref 6]. The following were noted:

- All of the dynamic sampler holes terminated prior to scheduled depth due to refusal in the Milford Haven Group; and
- One of the hand pits, HD-B1, was terminated at shallow depth due to dense ground conditions.

As completed details are summarised in the table below.

Table 3.4 Summary of ESP 2021 Investigation

Hole ID	Type	Final Depth, m bgl [m OD]	Strata	Groundwater Installations	Groundwater Depth (m bgl) [m 0D]	
					Water Strike	Monitored[1]
BH-A1	DS with rotary core follow-on	12 [54.10]	Made Ground; Silt, Gravel, Sand and Gravel, Mudstone, Sandstone, Siltstone	standpipe installed to 8m (slotted from 1 to 8m)	nr	2.49 [63.61]
BH-A2	DS with rotary core follow-on	15 [50.60]	Made Ground; Silt, Gravel, Mudstone, Siltstone, Mudstone, Sandstone	standpipe installed to 8m (slotted from 1 to 8m	struck at 2.40 [63.20] (rose to 1.80 [63.80])	1.88 [63.72]
BH-A3	DS with rotary core follow-on	15 [51.30]	Made Ground; Gravel, Mudstone, Sandstone	standpipe installed to 7.50m (slotted from 2 to 7.50m)	standing water at 2.83 [63.47]	3.55 [62.75]
BH-A4	DS with rotary core follow-on	12.70 [52.60]	Made Ground; Gravel, Mudstone	standpipe installed to 8m (slotted from 1 to 8m)	Struck at 2.40 [62.90]	2.52 [62.78]
BH-A5	DS with rotary open hole follow-on	10 [47.50]	Made Ground; Clay, Sandstone, Mudstone	standpipe installed to 8.50m (slotted from 1.50 to 8.50m)	artesian water conditions. standing water at surface	0 (artesian) [57.50]
BH-A6	DS with rotary core follow-on	15.20 [49]	Made Ground, Gravel, Mudstone, Siltstone	standpipe installed to 8m (slotted from 1 to 8m)	nr	1.58 [62.62]
BH-A7	DS with rotary open hole follow-on	10 [56.20]	Made Ground; Silt, Sand, Sandstone	standpipe installed to 9m (slotted from 2 to 9m)	nr	3 [63.20]
BH-A8	DS with rotary open hole follow-on	10 [51.70]	Made Ground; Silt, Gravel, Mudstone	standpipe installed to 9m (slotted from 2 to 9m)	'wet at 7m' [54.70], standing at 0.85 [60.87]	0.70 [61]
DCS-A1	DCS (windowless)	1.50 [62.70]	Made Ground; Gravel	none	nr	n/a

Hole ID	Type	Final Depth, m bgl [m OD]	Strata	Groundwater Installations	Groundwater Depth (m bgl) [m 0D]	
					Water Strike	Monitored[1]
DCS-A2	DCS (windowless)	1.05 [64.75]	Made Ground; Sand and Gravel, Gravel	none	nr	n/a
DCS-A3	DCS (windowless)	2.50 [62.90]	Made Ground; Gravel, Sand	none	nr	n/a
DCS-A4	DCS (windowless)	2 [61]	Made Ground; Gravel	none	nr	n/a
DCS-A5	DCS (windowless)	1.50 [63.80]	Made Ground; Silt, Gravel	none	nr	n/a
DCS-A6a	DCS (windowless)	2.45 [63.55]	Made Ground; Gravel	none	nr	n/a
DCS-A7	DCS (windowless)	1.45 [64.85]	Made Ground; Gravel	none	nr	n/a
DCS-A8	DCS (windowless)	1.65 [63.55]	Made Ground; Silt, Sand and Gravel, Gravel	none	nr	n/a
DCS-B1	DCS (windowless)	1.60 [64.60]	Made Ground, Silt, Gravel, Sand	none	nr	n/a
DCS-B2	DCS (windowless)	1.45 [65.65]	Made Ground; Gravel	none	standing water at 1.15m [65.95]	n/a
DCS-B3	DCS (windowless)	1.90 [64.30]	Made Ground; Gravel	none	struck at 1.20 [65], standing at 0.55 [65.65]	n/a
DCS-B4	DCS (windowless)	2 [64.30]	Made Ground; Clay, Gravel	none	struck at 1.15 [65.15], standing at 1.75 [64.55]	n/a
TP-A1	machine excavated trial pit	2.10 [64.30]	Made Ground, Glacial Till; Limestone	n/a	nr	n/a

Hole ID	Type	Final Depth, m bgl [m OD]	Strata	Groundwater Installations	Groundwater Depth (m bgl) [m 0D]	
					Water Strike	Monitored[1]
TP-A2	machine excavated trial pit	2.10 [62.20]	Made Ground; Gravel	n/a	nr	n/a
TP-A3	machine excavated trial pit	2.05 [64.85]	Made Ground; Gravel	n/a	nr	n/a
TP-A4	machine excavated trial pit	2.20 [62.50]	Made Ground; Clay, Gravel	n/a	nr	n/a
TP-A5	machine excavated trial pit	2.10 [61.20]	Made Ground; Silt	n/a	nr	n/a
HP-A1	hand dug	0.90 [61.50]	Made Ground; Gravel	n/a	nr	n/a
HP-B1	hand dug	0.40 [65.90]	Made Ground; Gravel	n/a	nr	n/a
PLT-A1	machine excavated	1.20 [64.80]	Made Ground; Gravel	n/a	nr	n/a
PLT-A2	machine excavated	0.80 [63.10]	Made Ground; Silt, Gravel	n/a	nr	n/a
PLT-A3	machine excavated	0.75 [63.45]	Made Ground; Gravel	n/a	nr	n/a
PLT-4	machine excavated	1.20 [65.30]	Made Ground; Gravel	n/a	nr	n/a

nr- not recorded; DS-dynamic sampler on rotary rig, DCS – dynamic continuous sampler; [1] shallowest monitored up to January 2021

3.9 Consultation with Statutory Bodies

CREI has consulted with the local health department as to the appropriateness of the scope for the contaminated land elements of the study. No other statutory bodies or agencies have been consulted.

3.10 Flood Records

The site is not indicated to be at risk of flooding from surface water or from rivers or sea.

3.11 Contaminated Land

The combination of data contained in the Area B Capita PRA and the Stantec baseline (desk study) for Area A has been undertaken to highlighted contaminated land (or the absence of such land) within the site. The site is generally at low risk from contaminated land due to the thin and localised made ground materials occurring on the Site.

Historically the site has formed part of a refinery although this part of the former refinery site has not been used for the production or storage of petroleum products. From construction in the early seventies the site has been a car park for staff and visitors with some landscaping sectors and the eastern section has also been used as a construction compound. Public records show that the full refinery site is listed as a historical landfill site. Due to the blanket designation of the full refinery site and the vague records it is unclear where the historical landfill is located within the wider refinery site and what the landfill material comprised of. There are a few areas located across the refinery site (located approx. 600m from the site) that are current registered landfill sites and used for managing and depositing sludge from the former refinery, it is not known whether this is still undertaken now that the refinery processes have ceased. Indeed it is possible that these sludge lagoons may also be responsible for the ‘historical landfill site’ listing mentioned above.

In addition, a review of the wider refinery site from aerial photography does show that some significant earthworks which may be related to the historical landfill records and have been undertaken to create appropriate level development platforms, tank bunding and large reservoir/lagoons to the south and west of the refinery site. Again, these areas of likely earthwork activity lie some 200m or more away from the Site.

The Stantec report highlighted the potential for additional made ground to be present beneath the site associated with crushed demolition materials imported to provide sub base soils to pavements.

The main receptors are construction workers, end users and the water filled drain located 12 m beyond the closest Site boundary to the east (a controlled water).

There is a potential risk from offsite sources related to the wider refinery but anticipated flow discretions of groundwater within the Milford Haven Group aquifer are likely to be away from the site rather than toward it. For example, the Site benefits from the topography of the land, which is higher than the processing areas of the refinery.

The site is at negligible risk in respect to UXO health and safety hazards according to Bomb risk report from Groundsure.

The Stantec Site Condition H5 report undertaken for sub area Area A did not identify any significant contamination sources as part of the drilling and pitting programme. In addition, no risk from ground gas was identified, with the maximum concentrations of methane were 0.2% and carbon dioxide were 3.6% in conjunction with flow of <0.1 l/hr.

Whilst not specifically flagged in the desk study reports the Site does lie adjacent to a large Turkey Farm and this would be expected to have some type of animal waste storage pile(s) and these may be a source of nutrients should they be uncovered and open to rainwater leaching.

4. Field and Laboratory Studies

4.1 Walkover Survey

The ESP Factual Report [Ref 6] states that a site reconnaissance and inspection visit was undertaken by ESP on 12 October 2021. A full description is given in the Factual Report.

A walkover as part of the Capita Preliminary Risk Assessment (PRA) for Area B was undertaken on 6 April 2021 by a CREI Engineer and the findings are detailed in that report [Ref 4].

4.2 Geomorphological/Geological Mapping

No geomorphological or geological mapping has been undertaken.

4.3 Ground Investigations

The following discussion comprises data from both the previous Stantec [Ref 2] and recent ground investigation by ESP [Ref 6]. The exploratory locations from both sets of investigation were provided with National Grid coordinates and these were used to the generate the exploratory hole location plan included in Appendix A, Drawing PECO-CAP-EGN-XX-DR-CE-0001.

4.3.1 *In situ tests*

Standard Penetration Test (SPT)

A combined total of 118 Standard Penetration Tests (SPTs), comprising 75 within the 2020 boreholes and dynamic sampler holes and 43 in the latest investigation, were attempted in accordance with BS EN ISO 22476-3:2005 'Geotechnical Investigation and testing – Field testing' Part 3: Standard Penetration Test [Ref 7]. A number of these could not be completed to the required blow count due to hard/dense strata. The results of the SPTs are discussed in Section 6.

In situ CBR

In situ CBR tests using Dynamic Cone Penetrometer (DCP) were undertaken during the recent (2021) investigation at the following locations:

- HP-A1, HP-B1;
- BH-A3, BH-A6;
- DCS-A2, DCS-A4, DCS-A7, DCS-B1, DCS-B3, DCS-B4, TP-A1, TP-A2
- FIP-A1
- PLT-A1, PLT-A2, PLT-A3, PLT-A4

Plate bearing tests

4 No. plate bearing tests, PLT-A1 to PLT-A4 were undertaken beneath the general area of the proposed building footprint in the eastern area of the site, Area A. These were undertaken within tests pits of up to 1m depth using a 450mm diameter plate. The tests results are discussed in Section 6.

Infiltration (BRE 365 trial pit soakage) tests

Three soakaway (BRE 365 -Ref 9) tests were undertaken in the previous investigation in TP01, TP02 and TP03 within Area A. The results of these tests together with the 5 No. additional tests undertaken during the 2021 ground investigation within the machine excavated pits in Area A, TP-A1 to TP-A5 are discussed in Section 6.

Permeability tests

Falling head permeability tests were undertaken in four of the rotary core holes (BHA2, BH-A4, BHA-7 and BHA-7 and the results are discussed in Section 6.

4.4 Geophysical Studies

No geophysical surveys have been undertaken.

4.5 Pile Tests

No pile tests required.

4.6 Other Field Work

No other field work has been undertaken for the purpose of this report.

4.7 Laboratory Testing

All the geo-environmental testing in the 2020 investigation was scheduled and undertaken by Stantec. The geotechnical and geo-environmental testing in the 2021 investigation was scheduled by CREI and undertaken by ESP.

4.7.1 *Description of Tests*

Geotechnical laboratory testing

Geotechnical laboratory testing was undertaken in accordance with BS EN ISO 1377-2: 1990 'Methods for testing soils for civil engineering purposes, Parts 1 to 8 [Ref 8], although this is partially superseded for a number of tests. The following laboratory testing was undertaken:

Table 4.1 Geotechnical laboratory testing scope

Test Type	Test Name	Number of tests scheduled
Classification	Water (natural moisture) content	31
	Atterberg Limit determinations	31
	Particle Size Distribution (PSD): wet sieving	31
	Particle Size Distribution (PSD): sedimentation by pipette	7
Compaction related	Compaction: Light compaction (2.5kg rammer)	3

Test Type	Test Name	Number of tests scheduled
	Moisture Condition Value	3
	(Laboratory) CBR: Remoulded Specimen	5
	Measurement of point load strength (pair of measurements) on irregular rock lump or core sample (either axial or diametral test)	14
Chemical (sulphate related) Tests	Water Soluble Sulphate	25
	Acid Soluble Sulphate	6
	Total Sulphur	6
	pH	25

Geo-environmental laboratory testing

Table 4.2 Geo-environmental testing scope

Test Type	Test Name	Number of tests scheduled
Soil	pH	40
	Inorganics	31
	Heavy metals and metalloids	31
	Polycyclic Aromatic Hydrocarbons (PAH)	31
	Total Petroleum Hydrocarbons (TPH – Aliphatics/Aromatics)	31
	Asbestos	31
Waste Acceptance Testing (WAC	Inert WAC	7
Water	pH	30
	Inorganics	30

Test Type	Test Name	Number of tests scheduled
	Heavy metals and metalloids	30
	Polycyclic Aromatic Hydrocarbons (PAH)	30
	Total Petroleum Hydrocarbons (TPH – Aliphatics/Aromatics)	30

4.7.2 *Test Results*

Copies of the historic and recent geotechnical and geo-environmental test results can be found within the Stantec Phase 2 report [Ref 2] and the ESP factual report [Ref 6].

5. Ground Summary

The ground conditions as encountered are provided in the Stantec Phase 2 Baseline Assessment Report [Ref 2] and the recent ESP Factual Report [Ref 6] whose scope is summarised in Section 4 of this report.

The ground conditions comprised of Topsoil, Made Ground (encountered locally) and solid geology broadly consistent with the geological maps.

5.1 Made Ground and Topsoil

Made Ground was encountered across the site in both phases of investigation, generally to a depth of less than 0.50m bgl, although it was locally recorded to up to 0.75m bgl together with a single location where the Made Ground extended to 1.75m bgl. This area of relatively deep Made Ground was recorded in TP-A5, located in the southeast corner of Area A, in the recent ESP investigation.

Topsoil was recorded at three locations in the Stantec investigation within BH01, BH02 and TP01 all positioned centrally within Area A. The ESP investigation did not identify any topsoil material with all near surface soils being described as 'Made Ground' though in practice a large quantity of this surface material could also be given a 'topsoil' description.

The Made Ground mainly comprises slightly silty to silty, very clayey and/or sandy to very sandy gravel noted to be dark brownish grey, yellowish or reddish brown and fine to coarse angular to subangular. The gravel was mainly described to be of igneous material and mudstone in the previous investigation. Where the gravel was described in the recent investigation, it was noted to include sandstone and mudstone with inclusions of tarmacadam, rare wood, metal wire or plastic sheeting fragments. Low cobble content was noted at DCS-A3, WS05 and WS06 with moderate cobble content recorded in DCS-A2, DCS-B3 and DCS-B4.

Made Ground described as slightly gravelly to very gravelly, occasionally sandy, clayey silt noted to be dark reddish brown with the gravel component described as fine to medium angular to subrounded was also encountered locally.

5.2 Solid Geology

The Milford Haven Group was recorded in all the exploratory holes across both investigations. The exploratory records indicate weathering within the top of the Milford Haven Group in all the exploratory holes across both investigations with descriptions of gravel and occasionally sand and gravel as well as clay/silt in some locations. It was described as clay or silt at the following locations:

- DCS-B4: 0.40 to 0.60m bgl. Firm, gravelly, very silty CLAY;
- DCS-B1: 0.15 to 0.25m bgl. Stiff, sandy, gravelly SILT;
- BH-A1: 0.30 to 0.65m bgl. Very soft to soft, slightly sandy, gravelly, clayey SILT;
- BH-A7: 0.25 to 0.50m bgl. Very soft to soft, slightly sandy, slightly gravelly, clayey SILT;
- WS01: 0.30 to 1.30m bgl. Firm, slightly gravelly, slightly sandy CLAY;
- BH02: 0.30 to 1.10m bgl. Firm, slightly sandy, gravelly CLAY;
- DCS-A8: 0.30 to 0.55m bgl. Firm, very sandy, gravelly SILT;

- WS07: 0.40 to 3.65m bgl. Stiff slightly gravelly, slightly sandy CLAY;
- WS07: 3.65 to 4m bgl (base). Very stiff, slightly gravelly, slightly sandy SILT;
- DCS-A5: 0.20 to 0.80m bgl. Firm to stiff, slightly sandy, gravelly SILT.
- TP02: 0.25 to 1.50m bgl. Very soft, slightly gravelly, slightly sandy, silty CLAY;
- WS08: 0.70 to 1.65m bgl. Stiff, slightly gravelly, slightly sandy to sandy, silty CLAY;
- TP-A4:0.25 to 1.50m bgl. Firm becoming stiff, silty, very gravelly, very sandy CLAY;
- PLT-A2: 0.15 to 0.45m bgl. Stiff, gravelly, slightly sandy SILT;
- TP03: 0.15 to 1.65m bgl (base). Extremely weak mudstone recovered as gravelly, slightly sandy, silty CLAY;
- TP-A5: 1.75 to 2.10m bgl. Firm, sandy, very gravelly, clayey SILT;
- WS12: 0.20 to 1.30m bgl. Stiff, slightly sandy, slightly gravelly to gravelly, slightly sandy CLAY; and
- WS10: 0.40 to 1.10m bgl. Very stiff, slightly gravelly, sandy, silty CLAY.

Where gravel and/or sand and gravel was encountered, it comprises extremely weak mudstone recovered as sandy, silty clayey gravel or sandy to very sandy, slightly clayey to clayey gravel. It was further noted to be reddish brown with the gravel described as mainly mudstone or mudstone and siltstone, with sandstone locally encountered, angular to subangular and fine to coarse. Slightly gravelly, very clayey sand, noted to be light brown, brown and/or dark yellow, is present locally.

Low cobble content was noted within the weathered Mudstone at the following locations:

- TP-A4: 1.50 to 2.20m bgl (base). Medium cobble/boulder content;
- DCS-A7: 0.25 to 1.45m bgl (base). Low cobble content;
- PLT-A1: 0.20 to 1.20m bgl (base). Low cobble content; and
- PLT-A4: 0.18 to 1.20m bgl (base). Low cobble content.

The base of the weathered zone/top of the intact bedrock was only encountered in boreholes and the interface was located at depths of between 1.40 and 3.90m bgl. In the remaining holes comprising dynamic sampler holes, trial pits and hand pits, the weathered zone extended to the base of the holes. There was no pattern as where the weathering zone was thicker or thinner.

The intact material generally comprises mudstone, noted to be reddish brown, mottled grey/light grey/greenish with interbedded siltstone and sandstone at some locations. It is noted that the mudstone is mostly described as medium strong to strong in the ESP investigation [Ref 6], although very weak to weak mudstone was locally encountered. The previous investigation [Ref 2], mostly describes the mudstone as very weak to weak. Discontinuities/fractures in the mudstone are extremely to very closed spaced with light yellowish brown and/or black staining together with brown and/or brown and white clay infill.

The siltstone which is subordinate to mudstone in its distribution, comprises weak and medium strong, locally strong, in the previous investigation and very weak to medium strong as well as strong to very strong in the more recent ESP (2021) ground investigation. In colour the material is brown, darkish grey brown, dark reddish brown mottled ‘greeny’ grey or light green with closely to extremely closely spaced sub-horizontal and sub-vertical discontinuities/fractures containing black staining. A ‘chemical dissolution void’ of <10mm is noted in BH01 (Stantec) between 8.40 and 8.70m bgl.

The sandstone which is subordinate to mudstone in its distribution, comprises dark brown, greyish brown, reddish brown or light brown and fine to coarse and indicated to be very weak, weak and weak to moderately strong. Fractures (rough/smooth) containing black staining and locally infilled with light grey and green clay and extremely to very closed spaced are noted.

5.3 Groundwater

Groundwater was not recorded in any of the locations during drilling/excavation the previous investigation [Ref 2]. Groundwater was encountered generally within 2m bgl in 4 No. boreholes and 2 DCS holes in the recent investigation [Ref 6]. Artesian water conditions were observed in BH-A5.

Post field works monitoring recorded groundwater within 3m bgl in the 5 no. historic boreholes which were all installed with standpipes.

The monitoring rounds following the additional ground investigation included observations from selected previous locations as well as the newly installed monitoring wells. Groundwater was monitored between 1.60 and 3.50m bgl (64.85 to 61.63m OD) in all the exploratory holes with standpipe installations with the exception of BHA5 and BH-A8, the two southernmost locations. Groundwater was recorded at ground level (57.50m OD) within BH-A5 which suggest that the initial artesian condition at the borehole, equilibrated to a slight less elevated pressure head. The next shallowest water level was at a minimum depth of 0.70m bgl (61) in BH-A8.

Details of the observations together with the monitored depth post fieldworks are discussed in Section 6.

5.4 Olfactory and visual field observations

As stated in 5.1, Made Ground was encountered across the site in both phases of investigation generally to a depth of less than 0.50m bgl. Constituents of the made ground included tarmacadam, rare wood, metal wire or plastic sheeting fragments.

There were no observations of olfactory or visual evidence of contamination throughout both phases of ground investigation.

5.5 Summary

A summary of the ground conditions across both investigations is presented below.

Table 5.1: Summary of Ground Conditions

Strata		Depth to base of stratum (m bgl)	Elevation at base of stratum (m OD))	SPT N_{60}/N values in stratum
Made Ground*/Topsoil		0.20 – 1.75[a]	98.94 – 85.45	Not recorded
Milford Haven Group	Clay/Silt	0.35 – 4[b]	65.85 – 55.80	15 - 59
	Sand + Gravel /Gravel	1.60 – 3.90	64.70 – 59.30	25 – 50+

Strata		Depth to base of stratum (m bgl)	Elevation at base of stratum (m OD))	SPT N_{60}/N values in stratum
	Mudstone	proven to 15.20	Proven to 49	15 – 50+
	Siltstone	encountered to 10 but is mainly present as a thin interlayer	encountered to 56.55	50+
	Sandstone	encountered to 14.75	encountered to 50.60	50+

[a] recorded in TP-A5; max depth generally 0.50m across the site, although relatively deeper MG encountered locally; not proven - base of WS07

6. Ground Conditions and Material Properties

6.1 Introduction

The ground conditions encountered together with the in situ and laboratory testing undertaken across both investigations is discussed in this section.

The Stantec [Ref 2] investigation data was not provided in digital format (AGS) format, therefore relevant data was compiled manually from the pdf provided.

6.1.1 *In situ tests*

SPTs

The Stantec 2020 investigation [Ref 2] includes Standard Penetration Tests (SPTs), however, the energy ratio for the hammer was not reported and, therefore these results cannot be normalised to 'N_{60}' values. SPT's were carried out in the 2021 ESP Investigation [Ref 6] as well and the energy ratio (s) was reported upon request.

In situ CBR

In situ CBR tests were undertaken in the recent 2021 ground investigation at selected locations mainly within the inspection pits of scheduled boreholes and dynamic sampler holes as well as trial pits to minimise surface breaking. These were undertaken using a Dynamic Cone Penetrometer (DCP).

Plate bearing tests

Plate bearing tests (450mm diameter plate) were undertaken at 4 N. locations, two each, beneath the buildings in the southeast (Phase 4 – Area A) and northeast of the site (Phase 1 – Area A).

Infiltration (BRE 365 trial pit soakage) tests

Eight soakaway (BRE 365) tests in total were undertaken across both investigations in 3 No locations in the previous investigation and 5 No. locations in the recent ground investigation, all within Area A (eastern area of the site).

Permeability tests

Falling head permeability tests were undertaken in four of the rotary core holes located approximately in the centre of the site, BHA2 and BH-A7, and BH-A4 and BH-A8 in the southeast corner.

6.1.2 *Laboratory tests*

None of the Uniaxial Compressive Strength (UCS) tests scheduled for the rock samples were completed. This was queried with ESP and their response states the samples were not suitable for testing due to the nature of the material (soil/weathered bedrock). The test requires an intact core section of rock.

6.2 Topsoil

No laboratory or in-situ testing (other than chemical testing as part of the Geo-Environmental suites) was undertaken within the topsoil.

6.3 Made Ground

6.3.1 *Description*

As discussed above, Made Ground was encountered across the site in both investigations, mostly up to 0.50m.

The material mainly comprises slightly silty to silty, clayey to very clayey and sandy to very sandy gravel, noted to be light grey, grey and/or brown fine to coarse and angular to subangular or slightly clayey to clayey, slightly sandy to very sandy, slightly gravelly to very gravelly silt noted to be reddish brown, dark reddish brown, brown or dark brown with the gravel described as fine to coarse and angular to subangular.

Tarmacadam surfacing with concrete locally encountered, assumed to be associated with the historic site usage, was recorded at the following locations:

- DCS-A6 – 100mm thick
- DCS-B1 – 80mm thick
- DCS-B2 - tarmac fragments within the 300mm Made Ground layer
- DCS-B3 – 100mm
- PLT-A1 – 70mm
- BH04 – tarmac 50mm; concrete 250mm
- WS04 – 100mm
- TP02 – concrete 150mm

Low to medium cobble content was locally encountered in the Made Ground. Wood fragments as well as rare root and rootlets are locally recorded within the Made Ground.

The deepest Made Ground, 1.75m depth was recorded at TP-A5, located in the southeast corner of the site, just outside the footprint of the Phase 3 building and potentially coinciding with the detention basin proposed in the south easternmost corner of the site. The top 1m of the Made Ground was described as gravel with a rare boulder noted and plastic sheeting fragment.

6.3.2 *Strength*

SPTs were not generally undertaken within the Made Ground due to the limited thickness in the dynamic sampler holes and boreholes where these tests were undertaken.

A plate load test, PLT-A3, was undertaken at 0.20m depth within the Made Ground with the following reported:

Table 6.1 Summary of Plate Bearing Test

Load (kN/m^2)	Time (minutes)	Average Plate Settlement (mm)
100	4	1.38
200	8	3.14
300	12	4.85
0 – unload	16	3.18

6.3.3 *Classification*

Particle Size Distribution (PSDs)

Two particle size distribution tests (PSDs) were undertaken on samples from the Made Ground, TP-A3 at 0.70m and TP-A5 at 0.70m, both within horizons described as silty to very silty, clayey gravel. The PSD results are in broad agreement with the field descriptions.

Atterberg Limit

Atterberg Limit determinations were undertaken on 4 No. samples from the Made Ground. One of the samples, DCS-A2 0.20m, returned a 'non-plastic' result. The remaining three all plotted above the A-line as clays of low to intermediate plasticity.

6.4 Milford Haven Group

6.4.1 *Description*

The Milford Haven Group is considered to comprise a weathered zone in the upper horizons across the site with descriptions of gravel, sand and gravel and clay.

Cohesive horizons within the weathered zone were described as slightly gravelly to gravelly, silty to very silty and sandy to very sandy clay and occasionally sandy to very sandy, gravelly to very gravelly, sandy silt at several locations. The clay/silt was noted to be mainly very soft to firm, with the consistency described as stiff locally.

The granular weathered zone was described as extremely weak mudstone recovered as sandy to very sandy, silty, slightly clayey to clayey gravel. The gravel was further noted to be reddish brown and comprising mainly of mudstone or mudstone and siltstone, with sandstone locally encountered, angular to subangular and fine to coarse. Slightly gravelly, very clayey sand, noted to be light brown, brown and/or dark yellow, was locally encountered. Low cobble content was locally encountered within the weathered Mudstone at TP-A4, DCS-A7, PLT-A1 and PLT-A4.

The intact material was generally encountered in the boreholes and was mainly described as reddish brown, mottled grey/light grey/greenish mudstone with interbedded siltstone and sandstone at some locations.

6.4.2 *Strength*

SPTs

One hundred and five Standard Penetration Tests (SPTs) comprising 49 from the previous investigation and 46 from the recent ESP GI were recorded in the Milford Haven Group with values in the weathered layers described as clay, sand, gravel mainly ranging from 15 to 50. Values of 50 and above were generally recorded in the intact material.

A plot of the SPT values vs depth using a correlation of SPT x 4.5N is presented as Figure 6.4.1.

The Atterberg Limit test results (see below) suggest a characteristic constant volume of shearing resistance, or critical state friction angle, ϕ'_{crit}, of 24.1 to 28° [Ref 12].

The PSD results suggest an effective critical angle of internal friction, ϕ'_{crit}, of 30° to 33 [Ref 12]. This is higher than that based on Atterberg limits and reflects the contribution from the coarse fraction.

Point Load Tests

Nineteen Point Load Tests were undertaken and the results generally ranged between 0.1 and 2.1MPa for the size corrected point load index (Is50). A value of 4.4MPa was determined at one location. The results are presented on Figure 6.4.2.

Plate Bearing tests

Three plate load tests were undertaken on the natural soils and the results from the are reported below:

- PLT-A1 1m bgl – Gravel

Table 6.2a

Load (kN/m^2)	Time (minutes)	Average Plate Settlement (mm)
100	4	1.44
200	8	2.54
300	12	3.47
0 - unload	16	2.27

- PLT-A2 0.15m bgl – Silt

Table 6.2b

Load (kN/m^2)	Time (minutes)	Average Plate Settlement (mm)
100	4	0.91
200	8	1.62
300	12	2.40
0 - unload	16	1.09

- PLT-A4 1m bgl – Gravel

Table 6.2c

Load (kN/m^2)	Time (minutes)	Average Plate Settlement (mm)
100	4	1.38

200	8	3.14
300	12	4.85
0 - unload	16	3.18

6.4.3 *Classification*

Atterberg Limit and Moisture Content

Thirty Atterberg Limit determinations were undertaken on samples from the Milford Haven Group, of which eight returned a 'non-plastic' result. The data is summarised on a plasticity chart presented as Figure 6.4.3 which shows all the samples discussed above plot above the A line as clays of low to intermediate plasticity.

Particle Size Distribution (PSDs)

The PSDs from the Milford Haven Group are plotted as Figures 6.4.4a and Figure 6.4.4b.

6.4.4 *Compaction Related*

Dry Density/Moisture Content Relationship

Three compaction tests (2.5kg rammer) were undertaken on samples from the Milford Haven Group in the recent investigation. The tests yielded maximum dry densities of between 1.85Mg/m^3 and 1.90 Mg/m^3 with corresponding optimum moisture contents ranging between 9.4% and 14%. The results are as follows:

Table 6.3

Hole and Sample ID	Test Method	Stratum Description	Initial (Natural) Moisture Content, %	(Optimum) Moisture Content, %	Maximum Dry Density, Mg/m^3
TP-A2 0.50m	Light (2.5kg rammer)	Clayey, silty, sandy mudstone/siltstone Gravel	14	14	1.85
TP-A4 0.50m	Light (2.5kg rammer)	Silty, very gravelly, very sandy Clay	16	12	1.88
PLT-A3 0.70m	Light (2.5kg rammer)	Clayey, silty, very sandy siltstone Gravel	14	9.4	1.90

Moisture Content Value (MCV calibration) and moisture content relationship testing was undertaken on the same samples on the table above, however, the results were reported as a single point rather than multiple points to allow for plotting with the compaction tests.

The compaction tests are presented on Figure 6.4.5 in Appendix B.

<u>Laboratory CBR</u>

Five laboratory CBR tests have been completed on samples re-compacted using a 2.5kg rammer are discussed in Section 10.

6.5 Chemical (Ground Aggressivity) Tests

The sulphate and pH test data from the 2021 investigation (which includes results undertaken as part of the Geo-Environmental suites) has been assessed in accordance with BRE Special Digest 1 [Ref 13].

<u>Soil Samples</u>

The acid soluble results from a number of scheduled full BRE suites (pH, water soluble sulphate, acid soluble sulphate and total sulphur) were not received. This was queried with ESP, however, the response did not resolve the query raised.

Table 6.4 Ground Aggressivity Tests – Soil Samples

Stratum	Depth m bgl	pH value	2.1 extract (mg/l)	Total Sulphur (%)	Acid Soluble (%)	TPS (%)	OS (%)	Pyritic Ground OS>0.3%
Made Ground	BH-A1 0.20	5.88	<10	-	-	-	-	-
	BH-A8 0.20	6.39	10.9	-	-	-	-	-
	BH-A8 0.40	6.76	<10	-	-	-	-	-
	DCS-A1 0.20	5.85	<10	-	-	-	-	-
	DCS-B2 0.20	8.33	31.64	-	-	-	-	-
	DCS-B3 0.20	7.56	15.59	-	-	-	-	-
	DCS-B3 0.65	8.47	<10	-	-	-	-	-
	DCS-B4 0.20	7.91	<10	-	-	-	-	-
	HP-B1 0.20	8.19	<10	-	-	-	-	-
MHG – Silt	BH-A1 0.45	6.83	<10	-	-	-	-	-
	BH-A2 0.40	7.70	10	<0.01	0.01	<0.03	<0.02	No
	DCS-A5 0.70	7.60	17					

MHG – Gravel/ Sand	HP-B1 0.35	7.21	<10	-	-	-	-	-
	TP-A2 1.50	8.03	23	0.01	0.01	0.03	0.02	No
	DCS-B2 0.40	7.34	<10	-	-	-	-	-
	DCS-B3 0.80	7.55	<10	-	-	-	-	-
	DCS-A1 0.40	8.33	<10	-	-	-	-	-
	BH-A6 0.80	7.60	10	-	-	-	-	-
	BH-A7 0.60	7.50	10	-	-	-	-	-
	BH-A1 0.70	8.40	25	0.02	0.02	0.06	0.04	No
	PLT-A2 0.70	7.10	16	-	-	-	-	-
	PLT-A3 0.70	7.4	13	<0.01	-	-	-	-
	PLT-A4 0.70	7.0	27	<0.01	-	-	-	-
	DCS-A2 0.45	7.5	15	<0.01	-	-	-	-

Water Samples

A number of water samples were tested as part of the Geo-Environmental suites and the results are as follows:

Table 6.5 Ground Aggressivity Tests – Water Samples

Hole ID	pH	Sulphate as $S0_4$, mg/l
BH02	6.4	<10
BH-A3	7.2	<10
BH-A4	7.1	<10
BH-A5	6.4	11
BH-A7	6.9	12
BH-A8	6.8	11

6.6 Infiltration and Permeability Tests

As stated above, seven infiltration tests which include 2 No. from the previous investigation, TP01 and TP02; and 5 No. from the more recent investigation, TP-A1 to TP-A5 were undertaken. The tests were undertaken in accordance with the BRE Digest 365 [Ref 9] with 3 No tests each per location. These were all located within Area A (central and eastern area). A Hydrogeological Assessment Technical Note, reference PECO-CAP-PW-XX-TN-G-009004 [Ref 10], has been produced as a sister document to this report to inform the drainage design and this should be referred to for descriptions of flow directions and predictions of groundwater mounding in the event that soakage features are used in the scheme drainage design. A summary of the infiltration rates as summarised on the technical note is presented below:

Table 6.6 BRE 365 infiltration test data summary

Location	Infiltration Rate (m/s)
TP01	7.98×10^{-5}
TP02	4.35×10^{-5}
TP-A1	2.01×10^{-4}
TP-A2	8.26×10^{-6}
TP-A3	4.94×10^{-5}
TP-A4	1.51×10^{-4}
TP-A5	1.14×10^{-4}

Permeability tests were undertaken within selected boreholes during the recent investigation. The permeability values as calculated by the GI Contractor are as follows:

Table 6.7 Permeability test results in boreholes

Location	Borehole Depth	Ground conditions	Infiltration Rate (m/s) and test depth **
BH-A2	2.50	GL to 0.60m – Silt	2.32 x 10^{-4}* (1.2 m to 2.5m)
		0.60 to 2.50 – silty Gravel	
BH-A4	3.60	GL to 3.60 – sandy Gravel but very silty between 2.6m and 3.9m	5.10 x 10^{-7} (1.2m to 3.6m)
BH-A8	3.65	GL to 0.75 – Silt	5.10 x 10^{-8} (2.7m to 3.65m)
		0.75 to 2.40 – silty Gravel	
		2.40 to depth – Mudstone	

*average rate from two tests, tests undertaken using falling head method to BS EN ISO 22282-1-2002

** test depth is base of casing followed by base of hole in depth bgl

The borehole test results suggest that the intact mudstone has lower permeability than the shallower weathering layer materials, though the testing undertaken is limited to a single test.

6.7 Groundwater

6.7.1 *Groundwater observations during field work*

Groundwater was not encountered during the field works in the 2020 investigation. Groundwater was recorded within 2m bgl during the site works in the 6 No. locations it was encountered in the 2021 investigation. Artesian water conditions were observed in BH-A5.

6.7.2 *Groundwater monitoring post field works*

A comprehensive hydrogeological assessment was undertaken and presented on the Technical Note, reference PECO-CAP-PW-XX-TN-G-009004 [Ref 10]. This should be referred to for full details. The monitored groundwater levels across both investigations are summarised below. Additionally, the standpipes from the 2020 investigation were monitored as part of the recent ESP supplementary ground investigation.

Table 6.8 Summary of Groundwater Monitoring – 2020 GI

Location/ well ID	02/07/2020		10/07/2020		17/07/2020	
	GW Depth (m bgl)	Elevation (m AOD)	GW Depth (m bgl)	Elevation (m AOD)	GW Depth (m bgl)	Elevation (m AOD)
BH-01	4.59	61.96	3.73	62.82	4.10	62.45
BH-02	5.19	61.80	3.96	63.03	4.37	62.62
BH-03	4.75	61.76	2.96	63.55	3.65	62.86
BH-04	4.02	61.01	2.95	62.08	3.44	61.59
BH-05	6.04	59.78	5.23	60.59	5.27	60.55

The monitoring rounds following the additional ground investigation included observations from the previous locations as well as the newly installed monitoring wells.

Table 6.9

Location	10/10/2021		23/11/2021		08/12/2021		13/12/2021		04/01/2022	
	Depth (m bgl)	Elevation (m AOD)	Depth (m bgl)	Elevation (m AOD)	Depth (m bgl)	Elevation (m AOD)	Depth (m bgl))	Elevation (m AOD)	Depth (m bgl))	Elevation (m AOD)
BH-01	3.49	63.06	3.21	63.34	2.41	64.14	2.70	63.85	2.40	64.15
BH-02	4.12	62.87	3.33	63.66	2.59	64.40	2.82	64.17	2.14	64.85
BH-03	4.01	62.50	3.01	63.50	2.52	63.99	2.62	63.89	2.41	64.10
BH-04	2.77	62.26	2.90	62.12	2.40	62.63	2.36	62.67	2.26	62.77
BH-05	Well not located									
BH-A1	Wells not drilled		3.25	62.85	2.52	63.58	2.82	63.28	2.49	63.61
BH-A2			2.65	62.95	1.95	63.65	2.22	63.38	1.88	63.72
BH-A3			4.67	61.63	3.55	62.75	3.79	62.51	3.49	62.81
BH-A4			3.20	62.10	2.76	62.54	2.52	62.78	2.74	62.56
BH-A5*			0.23	57.27	0.02	57.48	0.00	57.50	0	57.50
BH-A6			2.21	61.99	1.74	62.46	1.69	62.51	1.58	62.62
BH-A7			3.98	62.22	3.00	62.20	3.31	62.89	3.05	63.15
BH-A8			0.99	60.71	0.74	60.96	0.74	60.96	0.70	61

*artesian conditions

The hydrogeological assessment [Ref 11] includes an assessment of the groundwater conditions as it relates to the proposed drainage and a summary of the conclusions is presented on Section 10.

6.8 Geo-Environmental Testing

The results of the geo-environmental testing from the 2021 ground investigation have been compiled and are presented in Tables D1 and D2 within Appendix D. A summary table of the key results are presented within Table 6.10 below. Exceedances are highlighted.

Table 6.10 Minimum and maximum values of selected determinands

Determinant	Minimum Value (mg/kg)	Maximum Value (mg/kg)	Commercial GAC (mg/kg)
Arsenic	1.4	8.6	79
Boron	0.2	0.4	21000
Cadmium	0.1	1.3	120
Chromium	3	42	1500
Copper	9.8	74	12000
Lead	1.5	29	1100 - 6000
Mercury	0.05	0.06	16
Nickel	5.1	51	980
Zinc	22	76	730000
Total TPH	< 10	96	~
Benzo(a)pyrene	< 0.1	< 0.1	35

As part of the testing, an asbestos screen was undertaken on 31 No. samples. All samples came back as non-detect for asbestos.

Table 6.11 Summary of Groundwater Testing Results

Determinant	Minimum Value (ug/l)	Maximum Value (ug/l)	Capita Screening Value (ug/l)
Arsenic, Dissolved	< 0.16	0.85	7.5
Boron, Dissolved	<12	65	750
Cadmium, Dissolved	< 0.03	0.05	0.054
Chromium, Dissolved	6.4	190	5
Copper, Dissolved	<0.4	2.7	2.12
Lead, Dissolved	< 0.09	0.71	7.2
Mercury, Dissolved	< 0.01	0.01	0.07
Nickel, Dissolved	< 0.5	6.4	8.6
Zinc, Dissolved	1.6	160	7.9
Total TPH	< 10	< 10	10
Benzo(a)pyrene	< 0.01	< 0.01	0.00017
Benzo(b)fluoranthene	< 0.01	<0.01	0.016
Benzo(g,h,i)perylene	< 0.01	0.05	0.0082
Ammonia	15	4500	200

As part of the water testing suite, BTEX was also tested for. All samples came back as non-detect for BTEX. It is noted that the detection limit for Benzo(a)pyrene could not get below the Capita screening value.

Table 6.12 Summary of Ditch water Testing Results

Determinant	Minimum Value	Maximum Value	Capita Screening Value
Chromium, Dissolved	0.46	4.4	5
Copper, Dissolved	<0.4	1.9	2.12
Zinc, Dissolved	3.1	51	7.9
Total TPH	< 10	< 10	10
Benzo(a)pyrene	< 0.01	< 0.01	0.00017
Benzo(b)fluoranthene	< 0.01	0.02	0.016
Benzo(g,h,i)perylene	< 0.01	0.06	0.0082
Ammonia	25	2400	200

As part of the water testing suite, BTEX was also tested for. All samples came back as non-detect for BTEX. The ditch samples were also tested for oils and grease and the ditch when sampled on the second round provided a result of 4400 ug/l which is elevated. It is noted that the detection limit for Benzo(a)pyrene could not get below the Capita screening value.

7. Summary of Geotechnical Properties

7.1 Soil Parameters

7.1.1 *Bulk Unit Weight*

Made Ground

Based on the information available and previous experience, a unit weight of 18kN/m^3 is considered appropriate for the Made Ground.

Milford Haven Group – Silt/Clay

BS8002:2015 [Ref 12] suggests a silt should have a characteristic weight density between 18 and 21.5kN/m^3. Based on the information available and previous experience, a unit weight of 20kN/m^3 is considered appropriate.

Ref 11 indicates a clay of medium to high strength should have a characteristic weight density between 16.5 and 22kN/m^3. Based on the information available and previous experience, a unit weight of 20kN/m^3 is considered appropriate.

Milford Haven Group – Gravel/ Sand and Gravel

Bulk density values from the two CBR tests were 1.97 and 2.19Mg/m corresponding to weight densities of approximately 19 and 21kN/m^3.

Published data, previous experience, and the information available suggest a unit weight of 20kN/m^3 is appropriate.

7.1.2 *Strength*

Made Ground

Considering correlations with Plasticity Index [Table 2 – Ref X], the heterogeneous and unpredictable nature of Made Ground and previous experience, a characteristic friction angle of 21° is suggested for design with an effective cohesion, c' of 1kN/m^2.

Milford Haven Group – Silt/Clay

Based on the SPT N values, the log descriptions and the nature of the material, an undrained strength of 65kPa is considered appropriate for the clay.

Considering correlations with Plasticity Index [Table 2 – Ref 12] and previous experience, a constant volume friction angle of 24 to 28° is considered appropriate for both the clay and silt. A characteristic friction angle of 24° is suggested for design with an effective cohesion, c' of 1kN/m^2.

Milford Haven Group – Gravel/Sand and Gravel

Considering correlations with classification tests (Plasticity Index for the fine fraction [Table 2 – Ref 12] and PSDs) and previous experience, a constant volume friction angle of 32 is considered appropriate for gravel or sand and gravel. A characteristic friction angle of 32° is suggested for design with an effective cohesion, c' of 0kN/m^2.

7.2 Characteristic Values

In the following table, site wide characteristic values are suggested for engineering design purposes. These are based on the available data, published information and engineering judgement. During any detailed design, local data should always be reviewed to identify any significant variance to the tabulated values below.

Table 7.1 Characteristic Soil Parameters

Material Property	Made Ground	Milford Haven Group - Silt/Clay	Milford Haven Group – Gravel/Sand and Gravel	Milford Haven Group – Intact
Bulk Weight (kN/m^3)	18	20	20	20
Undrained Shear Strength, Cu, kN/m^2	-	65	-	-
Effective Cohesion, c'k (kN/m^2)	1	1	0	-
Friction Angle characteristic strength, $Ø'_k$, (degrees)	21	24	32	40[a]
Undrained Young's Modulus, Eu (MPa)	-	24	-	157.5[a]
Drained Young's Modulus, Eu (MPa)	-	18	25	118.1[a]

[a] – conservative estimate to represent high strength material rather than accurately model strength.

7.3 Buried Concrete

An assessment for aggressive chemicals to buried concrete has been undertaken.

For both the soil (Made Ground and natural soil) and groundwater samples, Table C2 of the BRE Special Digest [SD1- Ref 13] suggests the characteristic values of the water-soluble sulphate indicates a Design Sulphate Class of DS-1. pH values of less than 6.5 were however determined in both the groundwater and Made Ground samples.

The oxidisable sulphate values were less than 0.3% from the samples subjected to total sulphur and acid soluble content testing where the full results were received. This suggests pyrite is not present and a modification of the DS class for these strata is therefore not required.

The classification is based on a brownfield site with mobile ground water conditions which is deemed appropriate based on the groundwater monitoring information discussed in previous sections.

pH values of less than 6.5 were however determined in both the groundwater and soil samples which suggests an ACEC Class of 2z for the site.

Table 7.2 Buried Concrete Classification

Stratum	Soil		Pyritic Ground, OS% > 0.3	Water		DS Class	ACEC Class
	2:1 extract, SO_4 mg/l	pH		2:1 extract, SO_4 mg/l	pH		
Made Ground	<500	5.85	No	<500	6.4	DS-1	AC-2z
Milford Haven Group	<500	6.97	No			DS-1	AC-2z

8. Foundations, Earthworks and Retaining Walls

8.1 Introduction

8.1.1 The proposed development is shown on the General Arrangement drawing PECO-CAP-PW-XX-DR-C-050101 and the scheme has been subdivided into 4 phases, the footprints of which are indicted by different boundary line colours. The foundation, earthwork and retaining walls (if any) change from phase to phase and the scope, in order of location moving east to west, as is summarised as follows:

- Phases 1 and 3 (Area A) in the easternmost area of the site comprise 4 buildings; one main structure with three relatively smaller buildings.
- Phase 4 (Area A), located approximately at the centre of the site comprises 3 buildings; a compactor shed which is the largest, an open sided canopy and a small staff office. Phase 4 is proposed to be constructed on an embankment (earthworks fill). A retaining wall (up to 1.6m high) to support the access road around the Phase 4 site with the exception of the western end is indicated on the drawing.
- Phase 2 (Area B) mainly comprises parking spaces with a building located in the south.

8.1.2 The Structural Engineer has provided the following information on the buildings:

- Based on the main building in Phase 1, the characteristic actions on the foundations are as follows:
  F_z - 354.2kN (vertical); F_y – 169.2kN (horizontal lateral); F_x – 23.6kN
- Pad foundations of 2.50 x 2.50 x 0.75m are proposed based on a design bearing pressure of 150kN/m^2
- All buildings are to comprise ground bearing slabs of 300mm thick reinforced concrete isolated from the main frame and foundations. General loading of 10kN/m^2 on trafficked areas of slab. Slabs to support 4m high legato block walls which will act as bunds for waste / recycling materials. Slab at the underside of legato walls to support bearing pressure of up to 150kN/m^2.

8.2 Foundations

Based on the available data and with reference to published sources the total settlement based on a 150 kN/m^2 bearing pressure is anticipated to fall within permitted limits within structural design, assuming the pads are founded at sufficient depth, either 100mm into the top of the gravel type of completely weathered rock or the intact rock. Areas of relatively low strength, where the rock has weathered completely to a clay/silt (soft to firm), were recorded in both investigations and it is recommended to deepen the foundation where this is encountered.

For the downslope building edge of Phase 3 building and the covered bays in Phase 3 which are constructed on a wedge of fill, foundations extending 100mm into gravel type of completely weathered rock will need to be carefully observed to ensure that fill is fully penetrated. The structural engineering drawings have been prepared to show target founding depths, but the above inspection process should be followed to confirm suitability.

For all buildings in Phase 3 with push walls it is necessary that a layer of well compacted Specification for Highway Works (SHW) 6N or 6F fill is used (a single class being selected for consistency) to provide an additional support to the floor in this sector. For clarity the 6N/6F blanket shall place beneath the Class 1 150mm fill layer and is additional to it. Thicknesses are shown in the building drawings. This is to limit differential settlement.

Minimum foundation depths for pads of 0.9m bgl levels should be applied across the site, slightly deeper depths may be scheduled in the building drawings on the north flank of Building 3 and the covered bays in Phase 3 in order to ensure that the foundation pressure bulbs from the pads does not intercept the shingle infill to deeply buried leachate and stormwater tanks positioned in the service yard.

For the southernmost building in Phase 3 (Area A), a short section of the proposed attenuation basin lies very close to the building platform. To reduce the risk of erosion undermining the development platform, it is recommended the landscaping batter here includes burrow resistant matting or similar.

It is understood that foundations will also be required for a generator, water tanks, substation, diesel tank, an entrance kiosk and a ramp-style weighbridge. It would be appropriate to use raft foundations for support of these structures. A bespoke design bearing pressure (less than the bearing pressure on the structures elsewhere on the site) for the raft foundations should be determined in order to limit settlement. Additionally, the foundations should be cast on a 500mm layer of well compacted SHW 6N (or Type 1) to ensure the removal of potential frost susceptible zones and in part reduce the risk of founding on softer clayey ground near surface layer. A thick ST1 blinding layer may be used in lieu of the SHW 6N fill. Prior to the 6N fill/lean mix concrete being placed, the formation should be inspection for soft material. Should this be encountered, it should be excavated and replaced with well compacted material. The depth of the excavation should be assessed (by a geotechnical engineer) on a case-by-case basis.

The thickened edge beam for the water tank rafts, as shown on the General Arrangement Drawing may not be sufficient to withstand the tank fixing bolts. This needs to be considered at detailed design stage.

As stated above, groundwater was recorded at relatively shallow levels across the site with the levels monitored at/close to ground level in the southeast corner in the area of the proposed building and attenuation basin. Where buried tanks or watertight chambers have a base set below the water table these structures will need to be designed to resist uplift, assuming an empty state.

Dewatering may be required for some of the excavations for the pad foundations should these coincide with the water table. It should be noted that dewatering may induce settlements in adjacent structures. This may be pertinent should the construction of the buildings across the site be phased.

8.3 Floor Slab

Ground bearing slabs of 300mm thick reinforced concrete are proposed. Beneath the proposed building footprints, the Made Ground is generally less than 300mm thick and anticipated to be removed, although there are localised areas where relatively deeper Made Ground was encountered. Made Ground, in an untreated state, is not considered a suitable founding stratum, however, PLT-A3 was undertaken on the Made Ground and settlements were within 10mm.

Differential settlements between the slab at the underside of the push walls which would be subject to a bearing pressure of 150kN/m^2 and the remaining slab areas subject to general loading of 10kN/m^2 are not anticipated to exceed 10mm should these be constructed on competent ground.

The cut levels selected as part of the design should remove thin layers of soft silt which in places can be present at the very top of the weathered rock strata. An example is the top of the virgin soil profile at the footprint of the service garage in Phase 2. Site inspections should take place to verify removal of the soft layer.

Verification of the formation in the form of in-situ testing may be required should detailed design reveal the need for a stricter settlement tolerance.

Consideration should be given to floor jointing in the Phase 3 buildings as despite the stiffening which will be brought about placing of SHW 6N under sections of the push walls which do not sit on pad foundations (see paragraph 8.2 above), high dynamic forces may result from a push loader hitting high up the wall which may induce enough overturing moment to crack the slab at /near the point where the thickened floor slab (PWTF-CAP-25-P1-DR-S-25100 P01) finishes if its designed as a single floor element. This needs to be considered at detailed design stage.

The structural engineering team require spring stiffness values which will act on the base of the new floor slab to Building 3 and these values have been calculated from the plate bearing test results undertaken by ESP. The plate tests have been interpreted using a 100kN/m2 pressure applied on an arbitrary 1m x 1m panel. Recommended values are provided in Table 8.1.

Table 8.1 Spring Stiffness Values for new floors in Phase 3

Stratum	Undrained Spring Stiffness (kN/m^2/m)*	Drained Spring Stiffness (kN/m^2/m)*
Made ground	6950	6550
Weathered Mudstone - Clay/Silt	25875	18690
Weathered Mudstone – Gravel	-	26665

*Note the floor design should apply -75% to +50% of the reported values to determine a lower and upper bound settlement response respectively.

8.4 Retaining Walls

The detailed design of the retaining walls is to be undertaken by the Structural Engineer and geotechnical information has been provided to facilitate it. Backfill to the walls is to be SHW 6N/6P fill. Bearing pressures at the base of the retaining wall is anticipated to be c.75kN/m^2 and the ground conditions will support this pressure subject to the minimum gravel type strata penetrations described in section 8.2. A geotechnical sheet with details on the local ground and groundwater conditions has been provided to facilitate the detail design.

8.5 Acoustic Barrier

It is noted that a 3m high acoustic barrier is indicated to the north of Phase 2 and Phase 4. Overturning is the main design concern with acoustic foundations. As such, foundations of an adequate size should be designed to resist overturning and sliding and the manufacturers typical foundation details should be reviewed by a geotechnical engineer to endorse the arrangement.

8.6 Earthworks Volume

It is understood the volume of excavation, excluding Topsoil, exceeds 15,000m^3. This material will mainly be generated from the excavation of the cuttings across the site, the foundations and the drainage features discussed in the following sections.

Although there is a requirement for filling across the site, a substantial proportion of this will likely be imported due to the nature of fill required (SHW Class 6). Opportunities for re-use of the site won material however exists and the re-useability of the ex-site material is discussed below.

8.7 Cutting Stability

8.7.1 *General*

In the April initial issue of this report, issued during preliminary design stage, the stability of cuttings at two locations were analysed using slope stability software. It was recognised that the content of this section may change if slope angles were slackened and this section is updated to reflect the ‘for approval’ earthworks design. Section 520 (refer Dwg PECO-CAP-PI-XX-DR-C-000160 for configuration and Dwg PECO-CAP-PI-XX-DR-C-000153 for location) was selected to be representative of worst case cut in Phase 1 and the section considered lies to the south east of the fire water tank. The drawings here show a cut depth of up to 1.3m below crest level.

The cutting excavation will variably intercept the upper weathered zone described as clay/silt/gravel and gravel and/or sand and possibly Made Ground above this.

The stability of cuttings is most critical in the long term and this design case has been assessed.

The stability assessment was undertaken using Design Approach 1 Combination 2 (DA1C2) and the partial factors specified in the UK National Annex of EC7 [Ref 14]. In the EC7 approach, partial factors are applied to characteristic values of actions and material properties to derive design values and it is a requirement to demonstrate that the design resistance exceeds the design values of actions to confirm that the GEO ultimate limit state of slope stability is not exceeded.

8.7.2 *Section 520*

The slope on the 'for approval drawings' for Section 520, is 1 (vertical): 3 (horizontal). It is noted a mini slope is indicated at the toe of the main slope for a relatively short distance. The analysis discussed below however considers a continuous slope from the crest to the toe.

The traffic (vehicle and pedestrian) loading at the base of the cutting is a favourable variable action and therefore a partial factor of 0 applies. This has therefore been omitted from the analysis.

The analysis was undertaken using Rocscience Slide2. A summary of the analysis input is as follows:

Table 8.2 stability modelling: geological sequence input parameters for chainage 520

Section Location	Exploratory holes used for strata sequence	Strata sequence (from existing ground/crest level)	Groundwater level
Section G-G	DCS-A4,BHA-4,WS12,TP-A4 and WS08	Made Ground c. 0.50m; Clay 1.50m; Gravel c.5m; and intact bedrock >10m	62.80m (3m below highest point)

The actions and material properties used are summarised below:

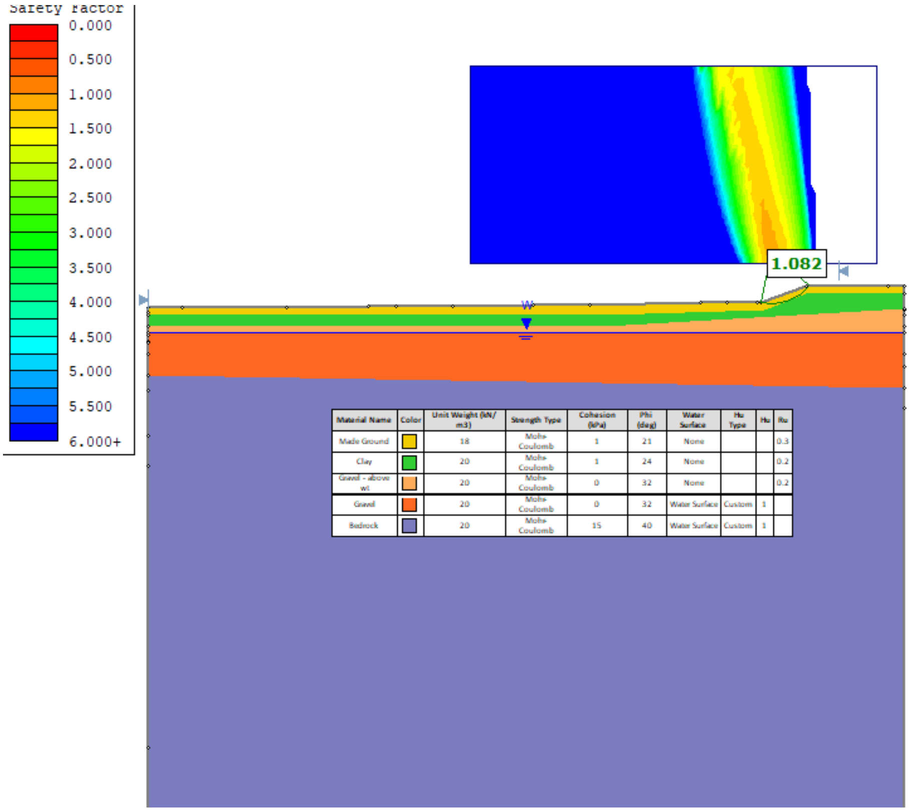
Table 8.3 stability modelling: actions and material properties input parameters for chainage 520

Partial Factor Set	Property	Partial Factor (DA1 C2)	Characteristic Value
Actions (A)	Surcharge (Variable, Favourable)	0	5 – 10kN/m^2
	Made Ground		
Material Properties (M)	Effective Cohesion, c'	1.25	1
	Friction angle, φ	1.25 (tan φ)	21
	Bulk Unit Weight, γ	1.00	18kN/m^3
	Milford Haven Group – Clay		
	Effective Cohesion, c'	1.25	1
	Friction angle, φ,	1.25 (tan φ)	24

Partial Factor Set	Property	Partial Factor (DA1 C2)	Characteristic Value
	Bulk Unit Weight, γ	1.00	20 kN/m^3
	Milford Haven Group – Gravel		
	Effective Cohesion, c’	1.25	0
	Friction angle, φ,	1.25 (tan φ)	32
	Bulk Unit Weight, γ	1.00	20 kN/m^3
	Milford Haven Group – Intact Rock		
	Effective Cohesion, c’	1.25	15
	Friction angle, φ,	1.25 (tan φ)	40
	Bulk Unit Weight, γ	1.00	20 kN/m^3

A pore water coefficient (Ru) of 0.3 and 0.2 was applied to the strata above the water table to account for seasonal fluctuations and climate change. The results are presented in Figure 8.1 and the outputs indicate a satisfactory factor of safety (≥1) which is considered satisfactory.

Figure 8.1 Section 520 modelling output



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Made Ground		18	Mohr-Coulomb	1	21	None			0.3
Clay		20	Mohr-Coulomb	1	24	None			0.2
Gravel - above wt		20	Mohr-Coulomb	0	32	None			0.2
Gravel		20	Mohr-Coulomb	0	32	Water Surface	Custom	1	
Bedrock		20	Mohr-Coulomb	15	40	Water Surface	Custom	1	

8.7.3 *Section 420 beneath Building 3*

Section 420 was also considered for slope stability and this lies just below the service track to the south of Building 3 (refer Dwg PECO-CAP-PI-XX-DR-C-000159 for configuration and Dwg PECO-CAP-PI-XX-DR-C-000160 for location).

The southernmost building in Phase 3 comprises push walls and as stated on paragraph 9.1.2, the push walls would apply a bearing pressure of 150kN/m^2 together with a general floor loading of 10kN/m^2. These have been applied as permanent actions along the crest at a depth beneath the surface for the push wall loading and at ground level for the general floor loading. A maintenance access track is indicated immediately beyond both ends of the attenuation basin. The nominal traffic loading of 10kN/m^2 which would apply at the base of the cutting is a favourable variable action and therefore a partial factor of 0 applies. This has therefore been omitted from the analysis.

The analysis was undertaken using Rocscience Slide2. A summary of the analysis input is as follows:

Table 8.4 Ground model for chainage 420

Section Location	Exploratory holes used for strata sequence	Strata sequence (from existing ground/crest level)	Groundwater level
Section H-H	BH-A5, TP-A5, PLT-A3, TP03,PL-A2 and BH-A4	Made Ground up to 1m; Clay up to 4m; Gravel c.6m; and intact bedrock >10m	62.50m (c.1.40m below highest point)

The actions and material properties used are summarised below:

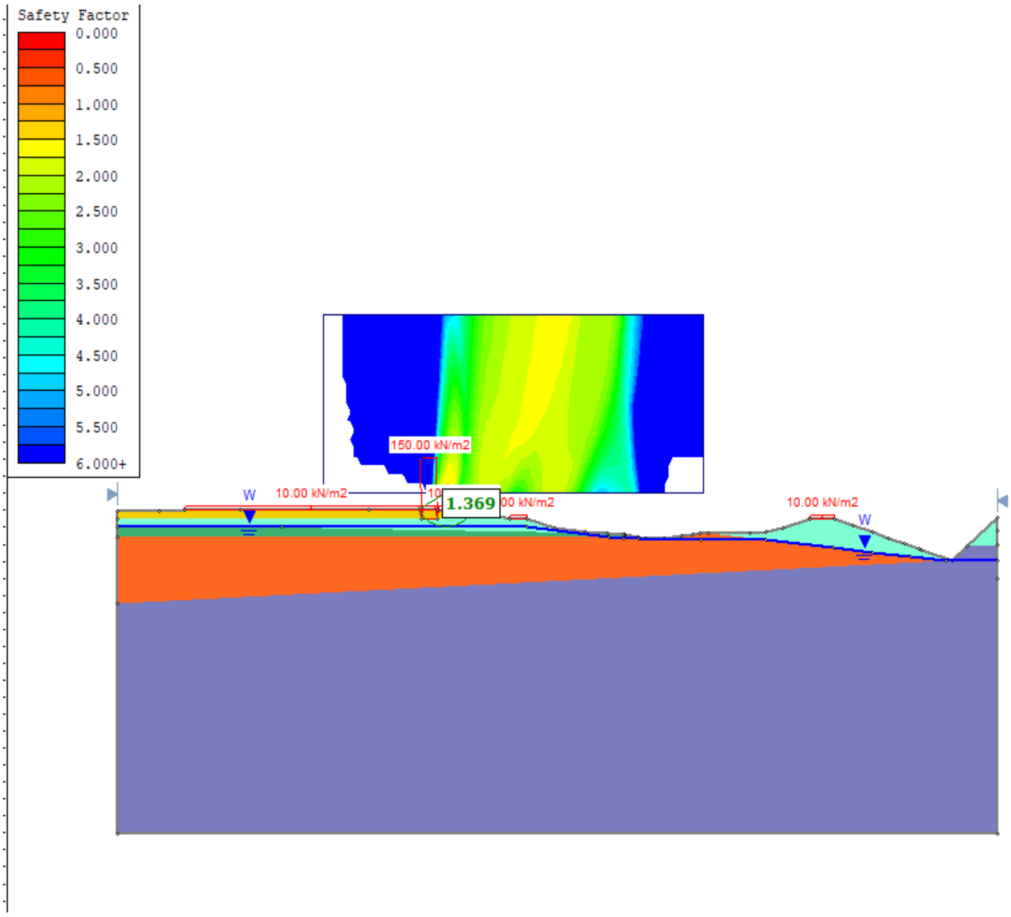
Table 8.5 slope stability input parameters for chainage 420 beneath building 3

Partial Factor Set	Property	Partial Factor (DA1 C2)	Characteristic Value
Actions (A)	Surcharge (Variable, Unfavourable)	1.3	$10kN/m^2$
	General floor loading (Permanent, Unfavourable)	1.0	$10kN/m^2$
	Push walls (Permanent, Unfavourable)	1.0	$100kN/m^2$
	Made Ground		
Material Properties (M)	Effective Cohesion, c'	1.25	$1kN/m^2$
	Friction angle, φ	1.25 (tan φ)	21°
	Bulk Unit Weight, γ	1.00	$18kN/m^3$
	Milford Haven Group – Clay		
	Effective Cohesion, c'	1.25	$1kN/m^2$
	Friction angle, φ,	1.25 (tan φ)	24°
	Bulk Unit Weight, γ	1.00	$20kN/m^3$
	Milford Haven Group – Gravel		
	Effective Cohesion, c'	1.25	$0kN/m^2$
	Friction angle, φ,	1.25 (tan φ)	32°

Partial Factor Set	Property	Partial Factor (DA1 C2)	Characteristic Value
	Bulk Unit Weight, γ	1.00	20kN/m^3
	Milford Haven Group – Intact Rock		
	Effective Cohesion, c’	1.25	15kN/m^2
	Friction angle, φ,	1.25 (tan φ)	40°
	Bulk Unit Weight, γ	1.00	20kN/m^3

A pore water coefficient (Ru) of 0.3 and 0.2 was applied to the strata above the water table to account for seasonal fluctuations and climate change. The results run on the ‘for approval’ design which uses a 1v:13h slope re provided in Figure 8.2,

Figure 8.2 slope stability modelling output for chainage 420 beneath building 3



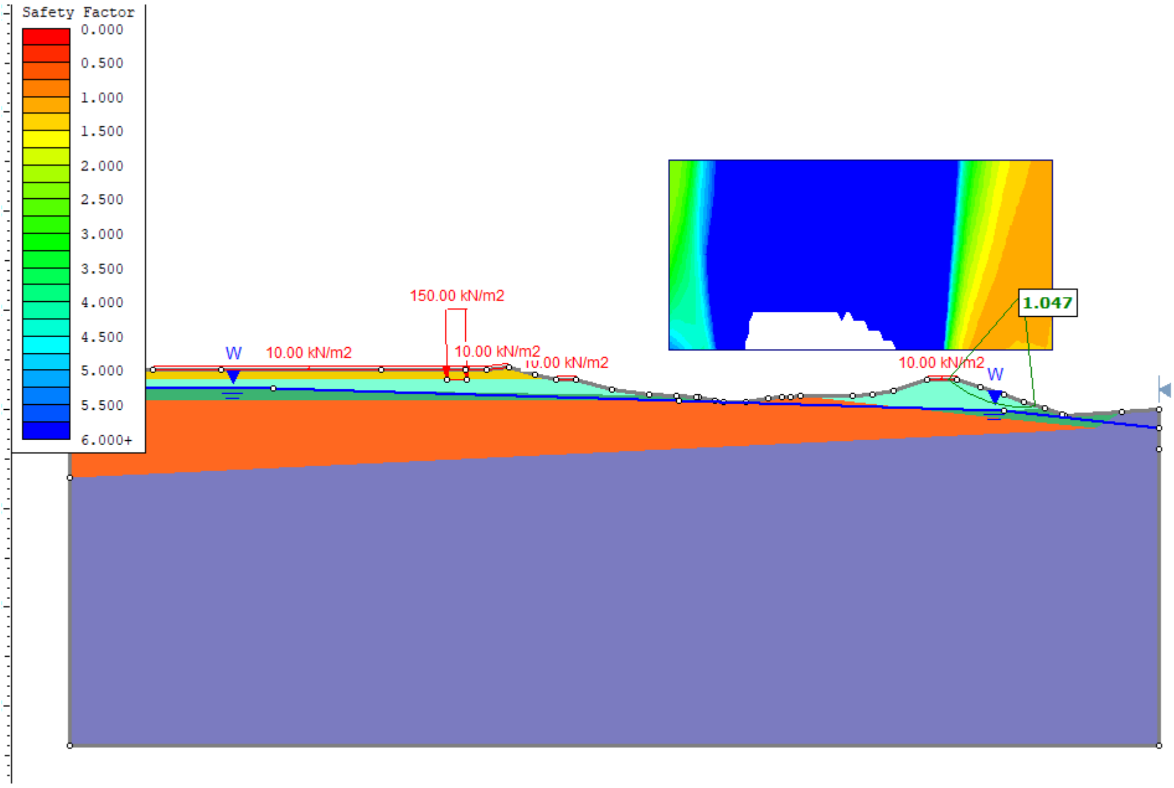
The factory safety derived by the modelling is F=1.3 which shows that a stable slope is present in this locality.

8.8 Embankment Stability

An area of filling is proposed immediately beyond the attenuation basin to the south to provide part of the basin's enclosing embankment. Chainage 420 crosses through the feature. Given the volume of potential surplus material from excavation and cutting, the potential use of the site won material (re-use of material is discussed on Section 9.9), the model was run with the embankment comprising stony cohesive fill (clay) ie Class 2C.

The ground conditions, material properties and actions are per Tables 8.4 and Table 8.5 supplied above. The results run on the 'for approval' design which uses a 1v:13h slope are provided in Figure 8.3

Figure 8.3 slope stability modelling output for chainage 420 for retention basin berm



The factory safety derived by the modelling is F-1.05 which shows that a stable slope is present in this locality. Whilst the stability is marginal it is noted that conservate input parameters have been used in the modelling.

8.9 Material Re-use

8.9.1 *General*

The discussion below is provided to assess options for the re-use of the material generated on site as a result of the construction activities.

The discussion assumes that the Specification for Highway Works (SHW) [Ref 15] method specification for compaction will be adopted for this Contract. Observations on the nature of the material arising during the construction works are given in the following sections together with an assessment of classification into one or more of the fill classes given in the 600 series of the SHW.

The potential sources of material to be generated from the current scheme are:

i. From topsoil strip;

ii. Existing concrete slabs to demolished buildings, brick and concrete making foundations to demolished buildings and tarmac/bitumen pavements. Also gravel subs base layer beneath slabs;

iii. Existing gravelled lorry/ construction material storage stands;

iv. from the excavations in areas across the site where the ground level is to be reduced to enable construction of various structures and pavements across the site;

v. from excavations for foundations; and

vi. from the excavations to form the drainage features (see Section 10)

It should be noted that the geology between the exploratory locations is inferred from the ground investigations and actual conditions may vary.

8.9.2 *Topsoil*

It is difficult to quantify topsoil volumes from the site as none of the logs differentiate this material from the Made Ground. The presence of reasonably verdant grass cover at the site and examination of the trial photographs suggests that topsoil is between 0.25m and 0.3m thick. Two organic content tests on topsoil provide organic matter result of 1.8 an 2.9% v/v which are common results for a general-purpose topsoil.

8.9.3 *Existing slabs*

The two foundation reveal pits encountered a reinforced concrete floor slab between 0.2m and 0.3m thick. When this layer is broken out it will provide significant hard core type material with a potential to be recycled for use as Type 1 or 2 specified for the road pavements. If this approach is taken then acceptability tests as per as per Clause 801 of SHW Series 800 and Tables 8/1, 8/2 and 8/3 should be undertaken to explore the viability of this.

Foundations comprising brick strip footings 0.9m were present in one of the foundation reveal pits and again this has potential to be including in fills of suitably crushed and perhaps screened. The gravel sub base layers beneath the slab was either 350 or 370mm thick.

8.9.4 *Existing gravelled lorry/ construction material storage stands*

A gravel layer comprising of either granite or limestone provided the running layer for the lorry/construction material storage stand. No bulk samples of this material were collected during the ground investigation so it is not known whether the grading would be compliant (or otherwise) with an MOT type 6F1 material. The thickness, as found at six excavation pits, was between 0.08m and 0.2m, with an average of 0.13m. In most places there was geofabric separation fabric at the base.

8.9.5 *Made Ground*

Based on the limited grading data alone, the Made Ground (granular) lying beneath topsoil /yard gravel or slabs would generally classify as a SHW [Ref 15] Class 2C. The material could be used as a general cohesive fill subject to consideration of its moisture condition.

Due to the limited thickness of the Made Ground across most of the site, earthworks testing (compaction, MCV etc) was not undertaken within this stratum.

On the basis of the limited testing, sporadic occurrence on site and general unpredictability of Made Ground (likely to comprise man-made inclusions such as plastic), the Made Ground is not recommended for use other than for landscaping fill (see below).

8.9.6 *Milford Haven Group (weathered)*

Due to the depths indicated, excavations are likely to encounter the upper weathered layer of the Milford Haven Group which comprises sand and/or gravel, silt and clay.

Based on the site wide grading data alone, the weathered Milford Haven Group would generally classify as a SHW [Ref 15] Class 2C with potentially 1A/B and 2A/2B locally encountered. The material could be used as a general cohesive fill subject to consideration of its moisture condition. Although this includes areas where excavation is not proposed, the material properties are anticipated to be generally similar across the site.

Table 8.6 Potential SHW Classification for various materials on a hole by hole basis

Hole and Sample ID	Log Description of horizon	Potential SHW Classification*
BH-A1 0.55m	Silt (very soft to soft slightly sandy, gravelly, clayey)	2C
BH-A2 0.50m	Silt (soft to firm slightly sandy, slightly gravelly, very clayey)	2C
BH-A2 0.80m	Gravel (slightly sandy, silty)	2C
BH-A3 0.50m	Gravel (very clayey, sandy)	1A/1B
BH-A4 0.80m	Gravel (silty, sandy)	2C
BH-A6 0.50m	Gravel (silty, very sandy)	1A/1B
BH-A7 0.65m	Sand (slightly silty)	2A/2B
DCS-A1 0.60m	Gravel (very clayey, silty, sandy)	2C
DCS-A2 0.55m	Sand and Gravel (silty, very clayey, very sandy)	2C
DCS-A2 0.80m	Gravel (slightly sandy)	1A/1B

Hole and Sample ID	Log Description of horizon	Potential SHW Classification*
DCS-A3 0.50m	Gravel (very clayey, very sandy)	2C
DCS-A3 1.70m	Gravel (very clayey, very sandy)	1A/1B
DCS-A4 0.80m	Gravel (slightly silty, sandy)	1A/1B
DCS-A4 1.50m	Gravel (silty, sandy)	2C
DCS-A5 0.40m	Silt (slightly sandy, gravelly)	2C
DCS-A5 1.10m	Gravel (clayey, silty, very sandy)	2C
DCS-A6 0.40m	Gravel (slightly clayey, sandy)	1A/1B
DCS-A6a 1.40m	Gravel (silty, clayey, sandy)	2C
DCS-A7 0.50m	Gravel (clayey, silty, sandy)	2C
DCS-A8 0.80m	Sand and Gravel (silty)	1/A/1B
DCS-A8 1.50m	Gravel (silty, sandy)	1A/1B
DCS-B1 0.80m	Gravel	2C
DCS-B2 0.80m	Gravel	2C
DCS-B3 1m	Gravel	2C
DCS-B4 0.90m	Gravel	2C
DCS-B4 1.60m	Gravel	2C
PLT-A1 1.10m	Gravel	2C
PLT-A2 0.70m	Gravel	2C
PLT-A3 0.70m	Gravel	2C
PLT-A4 0.70m	Gravel	2C
TP-A1 0.90m	Gravel	2C

Hole and Sample ID	Log Description of horizon	Potential SHW Classification*
TP-A2 0.50m	Gravel	2C
TP-A3 1.10m	Gravel	2C
TP-A4 0.50m	Clay	2C
TP-A4 1.90m	Gravel	2C

Moisture Condition Values (MCVs) should be considered for construction control. This is the preferred method for Class 2 materials and the sister earthworks specification will provide appropriate site control methods and upper limiting values.

The use of Class 2 materials, due to moisture sensitivity, is not advisable beneath structures but the materials should be suitable for landscaping fill and most sections of embankments (the earthworks specification will clarify where the materials can and cannot be used). For this general use, segregation of the soft silt/clay from the gravel may be required to avoid excessive settlements in completed landforms. It is likely some of the material may require reconditioning (re-wetting) if testing at the time of excavation reveals the material to be too dry for use as general fill.

9. Drainage

9.1 General

The proposed drainage strategy is illustrated on the following drawings:

i. PECO-CAP-PW-XX-DR-D-050515
ii. PECO-CAP-PW-XX-XX-DR-D-050506
iii. PECO-CAP-PW-XX-DR-D-050502
iv. PECO-CAP-PW-XX-DR-D-050501
v. PECO-CAP-PW-XX-DR-D-050503
vi. PECO-CAP-PW-XX-DR-D-050505
vii. PECO-CAP-PW-XX-DR-D-050504

These should be referred to for full details. A summary is provided below.

9.2 Drainage Strategy Summary

In summary, drainage is to be provided via a combination of attenuation storage tanks and a basin; bioretention systems, permeable paving, filter drains and traditional piped system.

9.3 Hydrogeological Assessment

As discussed above, a hydrogeological assessment [Ref 10] was undertaken to inform the drainage strategy and a summary of the conclusions is as follows:

- Groundwater flooding is highly unlikely to occur at the site from the current proposed drainage system and predicted infiltration rates. Groundwater flows are to the south east and the groundwater contours show a subdued reflection of the topography of the site.
- The SuDS requirement of a minimum distance of 1 m between base of the infiltration system will entail selection of shallow seated drainage channels/pipework where infiltration gardens are to be used as otherwise the base of the infiltration feature will not have the desired vadose zone thickness. There is potential to use specially selected bio-retention soil layers to allow for thinning of the vadose layer subject to agreement by the drainage authorities.
- Due to the high groundwater levels in the southeast of the site (<1m bgl) it would be favourable not to line the pond and detention basin with an impermeable liner as such a liner may lift from the subgrade if water pressures were to develop beneath. This may require an inside face lining of lower permeability fill to avoid excessive seepage loss through the embankment/natural cut slopes. This is a P1 version report and the ‘for construction’ designs do not have any impermeable liner in the pond so liner uplift will not be an issue.

10. Pavement Design, Subgrade and Capping

10.1 Pavement Design Summary

10.1.1 *General*

The pavement design has been developed and is fully detailed on the relevant drawings. The scheme drawing, reference PECO-CAP-PW-XX-DR-C-050101, should be referred to for full details. A summary of the design is provided below.

10.1.2 *Assumptions and Pavement Options*

The proposed pavement, including the roadway around the buildings along the perimeter of the site mainly comprises a bituminous surface. A concrete hardstanding in indicated around the buildings in the eastern section, Area A, Phase 1 and 2. Permeable paving is proposed locally in Areas A and B.

10.2 Subgrade Assessment

10.2.1 *General*

A subgrade assessment is reported for the Milford Haven Group (mainly the top weathered zone). Based on the exploratory data, the subgrade is anticipated to comprise Made Ground over silt /clay and/or Gravel.

10.2.2 *In situ CBR tests*

In-situ CBR tests were undertaken during the ESP (2021) ground investigation and following results were reported:

Table 10.1 In situ CBR test results

Location and Depth	Stratum Description	Estimated CBR (minimum within zone) Value (%)
HP-A1 – 0.30 to 0.60m	Made Ground	1.2
HP-A1 – 0.60 to 0.90m	Gravel	7
HP-B1 – 0.30 – 0.40m	Gravel	>20
BH-A2 – 0.40 to 0.60m	Silt	5
BH-A2 – 0.60 to 0.90m	Gravel	>15
BH-A3 – 0.25 to 0.43m	Gravel	>20
BH-A6	test abandoned within 0.25m Made Ground layer	
DCS-A2 – 0.30 to 0.45m	Sand and Gravel	>20
DCS-A4 – 0.30 to 0.475	Gravel	>15
DCS-A7 – 0.30 to 0.95	Gravel	>20
DCS-B1 – 0.15 to 0.35	Silt	>15
DCS-B1 – 0.35 to 0.94	Gravel	15
DCS-B2	Test abandoned within 0.30m Made Ground layer	
DCS-B3	Test abandoned within 0.70m Made Ground layer	
DCS-B4 – 0.10 to 0.40	Made Ground	11
DCS-B4 – 0.40 to 0.60	Clay	>15
DCS-B4 – 0.60 to 0.85	Gravel	>20
TP-A1 – 0.12 to 0.55	Made Ground	2.3
TP-A1 – 0.55 to 0.95	Gravel	>10
TP-A2 – 0.08 to 0.35	Made Ground	>10
FIP-A1 - 0.55 to 0.95	Clay	>10
PLT-A1 – 0.20 to 0.94	Gravel	>20
PLT-A2 (b) – 0.15 to 0.45	Silt	>20
PLT-A2 (b) – 0.45 to 0.80	Gravel	>30
PLT-A3 – 0.10 to 0.55	Made Ground	>20
PLT-A3 – 0.55 to 0.75	Gravel	>20
PLT-A4 – 0.20 to 0.95	Gravel	>20

10.2.3 *Laboratory CBR tests*

Laboratory CBR tests were undertaken in the recent 2021 investigation and the results are as follows:

Table 10.2 CBR values from laboratory results from recompacted samples

Location and Depth	Stratum Description	CBR (minimum within zone) Value (%)
TP-A1 – 0.90m	Gravel	26
DCS-A2 – 0.55m	Sand and Gravel	0.94
DCS-B4 - 0.90m	Gravel	12
DCS-A1 0.60m	Gravel	8.7
DCS-B2 0.80m	Gravel	12

10.2.4 *CBR Correlations from Classification Tests*

CBR correlations for the sub-grade using classification test data may be undertaken for cohesive strata in accordance with TRRL 1132 Table C1 (Ref 17) using the plasticity index data. Average construction conditions and a thin pavement together with a high water table is assumed. The data below only includes tests within 1.60m bgl. Tests above 0.30m bgl were not included as these are likely to be too shallow to be representative of the actual formation once the site topsoil strip has been completed.

Table 10.3 CBR values interpreted from index testing

Location and Depth (m bgl)	Stratum Description	Plasticity Index (%)	Equilibrium Suction CBR, %
TP-A1 – 0.70	Clayey, silty, sandy Gravel	27	>10
TP-A2 – 0.50	Clayey, silty, sandy Gravel	14	>10
TP-A3 – 0.70	Made Ground	8	>10
TP-A4 – 0.40	Silty, very gravelly, very sandy Clay	20	4
TP-A5 – 0.70	Made Ground	11	>10
DCS-A1 – 0.45	Very clayey, silty, sandy Gravel	16	>10
DCS-B1 – 0.70	Silty, clayey, very sandy Gravel	19	>10
DCS-B2 – 0.40	Very clayey, silty, very sandy Gravel	21	>10
DCS-B4 – 0.50	Gravelly, very silty Clay	18	3.5
PLT-A1 – 1.10	Silty, clayey, sandy Gravel	20	>10
PLT-A4 – 0.70	Silty, sandy, very clayey Gravel	23	>10
DCS-A4 – 0.70	Slightly silty, sandy Gravel	23	>10
DCS-A6a – 1.30	Silty, clayey, sandy, siltstone Gravel	17	>10
DCS-A8 – 0.50	Very sandy, gravelly Silt	17	1*
DCS-A8 – 0.70	Silty Sand and Gravel	15	>10
DCS-A3 – 1.10	Silty, very clayey, very sandy Gravel	14	>10
BH-A3 – 1.00	Very clayey, sandy Gravel	13	>10
BH-A1 – 0.45	Slightly sandy, gravelly, clayey Silt	25	1*
BH-A2 – 0.40	Slightly gravelly, very clayey Silt	25	1*
BH-A2 – 1.20	Slightly sandy, silty Gravel	21	>10

*TRRL estimate based on assumption on probability of material saturating

Consideration of the in-situ and laboratory CBR results as well as correlations of CBR value with Atterberg Limit Test results as per IAN73 [Ref 18] and TRRL1132 [Ref 17] has been undertaken. In accordance with CD225 [Ref 18], a CBR value of 3% is considered appropriate. Due to the presence of weathered deposits, some of which is described as soft, verification testing in the form of in-situ CBR testing is recommended. Where a CBR value of less than 3% is indicated, the underlying material should be removed and replaced with well-compacted fill to a depth of 500mm below. Acceptable in-situ CBR test methods include: TRL Dynamic Cone Penetrometer testing, California Bearing Ratio (BS1377, Part 9), or alternatively the CBR values may be derived from Plate Bearing Test Data. Table 10.1 suggests that two small areas of the site have already been shown to give an in-situ CBR results below 3% and that is at the entrance roundabout (HP-A1) and in a central section of Phase 4 area (TP-A1).

Formation levels should be rolled and inspected for any soft or loose material in order to achieve the above CBR value.

Given that the formation is commonly described as comprising a SILT, it is possible that it may be frost susceptible. Where this material is present, it should be removed from within 450mm of the road surface and replaced with non-frost susceptible material.

11. Assessment of Potential Contamination

11.1 Introduction

Based on the soil testing from the 2021 ground investigation (31no. samples tested for the standard Capita contamination suite) there were no samples exceeding the adopted screening criteria. This supports the geo-environmental findings of the Stantec investigation. Additionally, Made Ground was free of visual or olfactory observations of gross contamination as noted in the logs.

The screening process used to define the poor quality uses the LQM/CIEH S4UL's Commercial criteria which best reflect the future land use, except for lead which uses the C4SL level for commercial land use.

11.2 Future Works

Given that there were no exceedances in the soil testing, care should be taken during grubbing up onsite tarmac to avoid contamination of the soils from hazardous tars potentially present in the tarmac. The development proposes waste storage sheds and a new fuelling station. Both of these have mitigation measures built into the design to stop the migration of pollutants into the environment (assuming routine maintenance is kept up with and regular emptying of any interceptor trap contents).

The absence of contamination applies to those boreholes which we positioned in the general area of the disused helicopter landing pads.

11.3 Potential Phytotoxicity

Given it is likely that the soils may be re-used in the scheme in landscape areas the level of phytotoxic elements have been assessed (using the guidance given in BS 3882: 2017 [Ref 17] for upper limits of multipurpose topsoil), key elements being zinc, copper and nickel. None of these elements are present at levels above the prescribed limits which suggest that re-use potential is possible subject to additional testing (BS 3882 testing is more extensive than just phytotoxic checks).

11.4 Leachate Testing

Although no specific leachate testing was undertaken from the samples, the leachate results from the WAC testing have been analysed. With the exception of zinc, no evidence of potential leaching issues is present as there are no exceedances against Capita's adopted screening values present. The exception being DCS-A1 @ 0.20m bgl had a leachate value of zinc =19 ug/l which is 2.4x the screening value.

11.5 WAC Testing

7no. WAC tests were undertaken from samples taken from the site. 6no. test were classified as inert. 1no. (BH-A4 @0.20m bgl) sample was classed as Stable Non-Reactive Hazardous Waste (SNRHW). The parameter that caused the SNRHW classification was the TOC value which may simply be a consequence of the sample being a topsoil.

11.6 Groundwater

Groundwater conditions have been assessed from samples taken from 8no. monitoring wells installed within exploratory hole locations and a further sample taken from the ditch on site. 4no. rounds of water sampling were undertaken between 23/11/2021 and 19/01/2022. There were a number of groundwater samples that had determinant values above the screening values. 4no. samples had exceedances in benzo(g,h,i)perylene levels (max 0.06 ug/l). These trace values were only found on the first monitoring run, with levels returning to levels below the limit of detection for the remaining monitoring visits. This suggests that the elevated values were the result of the drilling works rather than an indication of equilibrium groundwater conditions.

Elevated levels of dissolved ammoniacal nitrogen were also found in the first round of monitoring visits. The results in the other rounds returned levels much lower. This suggests that either there is an unknown source that has temporal fluctuations in levels, or it was a drilling flush derived phenomena. The latter seems unlikely since the ditch sample provided the same elevation on the first round and no drilling flush entered the ditch.   Whatever the initial source was it has not been apparent in last three rounds.

A single well has produced on the first visit a highly elevated levels for chromium (Cr= 190 ug/l ,38x higher than the screening value) with this being BH02. Given that this an up-gradient well, located at the top of the site then it is possible that there is an off site source in land to the north, else it could due to some mineralisation in the bedrock in this locale or upgradient. Indeed, whilst levels of chromium reduced in this well during rounds 2, 3and 4 levels of zinc were then elevated (Zn=160 ug/l in round 3).

In conclusion baseline levels for selected metals would need to be taken from the upgradient wells at the site, which would need to include BH02. It is noted that the elevated dissolved lead level found in the original BH03 well in 2020 (at a single sampling visit) did not continue to be elevated in the more recent testing undertaken by ESP (max 0.44 ug/l versus 62ug/l seen previously).

11.7 Surface Water

Surface water displayed a single exceedance in benzo(b)fluoranthene and another of . benzo(g,h,i)perylene in round 1 but these were trace values and no further elevation of these chemicals was seen in later rounds. Mirroring what was observed in groundwater there were high levels of ammoniacal nitrogen in the first round (N = 2.4 mg/l) which did not appear in later rounds (falling back N= 0.054 mg/l).

Dissolved levels of zinc are elevated in the stream (Zn =51 ug/l) and this is attributed to baseflow from groundwater which itself carries moderate to high levels of zinc

On the second sampling round levels of total oils and grease were high in the ditch (4400 ug/l) and the reason for this is unclear possibly due to run off of hardstands on the upper parts of the PUMA complex. The issue was temporal and may be rainfall related.

11.8 Ground Gas

Ground gas conditions within the site have been assessed using 10no. monitoring wells installed within exploratory hole locations and a gas monitoring programme comprising 5no. visits that were undertaken between 23/11/2021 and 04/01/2022. The visits all returned non detects for methane. Carbon dioxide levels in all pipes remained below the 5% v/v trigger level at which asphyxiant risk could occur should maintenance workers enter confined spaces in the ground (eg manholes) with a maximum value of 4.2% v/v. Gas flow rates were below the limit of detection for the equipment used. Full results are found in Appendix J of the ESP Factual Report. This testing supplements that carried out by Stantec in 2020 and the 2021 findings are consistent with the earlier monitoring.

Radon gas emissions were not monitored as part of the work but are assumed to be slightly elevated commensurate with background levels for the area.

11.9 Refined Conceptual Site Model

A conceptual site model was developed in the PSSR (November 2021) as discussed in Section 3.10, which has been reviewed and updated based on the initial ground investigation findings and assimilation with the original desk study findings, including off site potential sources of contamination as well as the on-site ones discussed above by Capita in the PSSR [Ref 3].

Table 11.1 Conceptual site model for Site

Potential Sources of Contamination	Potential Pathway	Potential Receptor	Consequence of risk being realised		Risk	Justification / Comments
On-site						
General Made Ground, either imported unclean material or in-situ and receiving spillages from vehicles and contractor compound use	Dust / fibre inhalation, vapour inhalation/radio particle emission and dermal contact	Construction / maintenance workers? End users when in landscaped areas	Medium	Unlikely	**Low**	GAC exceedances not found within the exploratory hole locations. Potential to find other pockets of Made Ground, especially beneath floors of demolished buildings. Watching brief may identify new suspect material (also applies all rows in table). Proper segregation, storage and testing of grubbed tarmac before disposal.
Spillage of fuel petrol and oils from cars and fuelling area and heavy metals from tyre wear etc	Leaching, horizontal migration, vertical migration	Controlled Waters (surface and groundwater)	Medium	Unlikely	**Low**	In operation -designed mitigation measures will stop migration of pollutants from these areas. Historically the extensive GI has not identfied any sources.
Leakage of leachate from waste treatment operation should the design not include suitable collection and containment systems	vertical migration then in ground horizonal migration	Controlled Waters (surface and groundwater)	Medium	Unlikely	**Low**	Designed mitigation measures will stop migration of pollutants from these areas.
Radon emissions (natural phenomena)	Particle emission into office spaces	End users	Medium	Likely	**Moderate**	The risk stated is the unmitigated status, and will drop to low when an anti radon barrier membrane is included in floors to office areas
Off-site						
Turkey farm to east (ammonia), petroleum refinery and lagoons to south	Dust / fibre inhalation, vapour inhalation/radio particle emission and dermal contact	Construction / maintenance workers	Medium	Unlikely	**Low to moderate**	Ammonia in groundwater was only found during one visit. All other sources appear to be down gradient of site. Watching brief will allow for identification of potential sources and signs of impact from these sources. On one occasion the ditch has displayed elevated oil and grease levels

The identified potential pollution risk from ground gas (other than radon particles) has been seen to be low and does not warrant special measures to keep gases out of the buildings. In terms of radon then it would be prudent to include a radon barrier in the floor construction which lie beneath office sections of the buildings.

The site's current condition does not appear to have been adversely affected, contamination wise, from its previous use as a construction compound and parking area or helicopter landing areas. The site does contain areas of tarmac that needs removing as part of site strip operations and in the event that this material contains tars then it may be classified as a hazardous waste and carry a heightened cost to remove to a licensed facility.

A potential pollution risk, in the unmitigated scenario, arises from the storage and dispensing of diesel fuel in the fuelling bay area which be created as part of the new development. This will be mitigated by selection of diesel tank and dispensing equipment manufactured to all current standards and the provision of a fuelling apron with suitable drainage incorporating a fuel interceptor.

A further risk, in the unmitigated scenario, arises from the storage and short term stockpiling of a variety of waste materials and the release of small amount of leachate from the moist materials. This will be mitigated by selection of concrete waste floors with water tight joints and the provision of drains that link to an underground leachate pit. The leachate pit will be emptied at regular intervals by a suction tanker.

There is potential to uncover additional pockets of Made ground or contaminated soils during the excavation works, especially around the remnant slabs to the former buildings and where the attenuation basin is due to be placed. It is recommended that a watching brief should be maintained whilst excavating through the Made Ground layer. Given the age of buildings on site, there is a chance to uncover asbestos, and the person undertaking the watching brief will need to be made aware of this possibility.

The water quality of groundwater at the site has been established and the pattern of results for dissolved metals at the site points to there being an of site source or perhaps natural elevation due to mineralization in the bedrock of zinc and chromium. These metals are already established in groundwater (and to a degree the ditch located at the edge of the site) and the design of the new drainage systems will not heighten the concentrations of these elements. At the start of groundwater monitoring a temporal issue with elevated dissolved ammoniacal nitrogen was released by the sampling and testing and the reason for this widespread impact is unclear, for example there was no pattern with higher levels next to the neighbouring turkey farm. Cross contamination by escape of drilling water flush into the aquifer (which used the sites raw water supply taken from hydrants) is considered unlikely as the ditch was similarly affected which suggest a regional rather than point source -drilling location escape was the issue. It is recommended that ammoniacal nitrogen is kept as a chemical of test during the mandatory operational phase groundwater monitoring (as needed to satisfy the waste permit).

The ditch was found to have an elevated oil and grease concentration on one of the three sampling rounds which suggests that in the present day operations of the Puma facility there are occasions where release of oils and grease occurs.

12. Conclusions and Recommendations

12.1 Conclusions

A ground investigation has been completed at the redevelopment site which was designed to supplement earlier intrusive investigations on part of the Site. The ground conditions encountered generally confirm the results of the initial ground investigation with the exception being that most recent work was undertaken in winter and groundwater levels are higher than found previously. In addition, investigations have now taken place in more lower lying -southerly parts of the Site and here groundwater is at or very close to the surface of the site. This will have a material effect on the design of the drainage system.

Where buried tanks or watertight chambers have a base set below the water table these structures will need to be designed to resist uplift, assuming an empty state.

It was decided at an early stage that spread foundations can adopted for the support of the buildings and this report provides design parameters for the types and configurations of foundations selected by the structural engineers for the project. Design strategies for both pad foundations and raft foundations are provided in the report. In order to control settlements, foundation pads will need to penetrate 100mm into sandy or silty sandy Gravel strata and be taken through any shallower Made Ground or soft/firm clays. Due to the unpredictable nature of the presence or absence of a clay layer the foundation excavations will require inspecting by a ground engineering professional prior to pouring concrete. In a similar manner the subgrade for the floor for the maintenance building in Phase 2 will require inspecting to show removal of soft silt capping.

The ground underlying the push walls will be reasonably heavily loaded and in order to control differential settlement it is recommended that a blanket of pad of well compacted 6N /6F material is placed beneath building 3 and the cover bays in Phase 3 to give extra stiffening in the heavily loaded zone.

The strength and modulus for the various buildings floor slabs are described in the report. CBR values are provided as well as modulus values derived from in-situ plate load testing. Equilibrium subgrade CBR values are provided for the roads and hardstands at the site.

Both new embankment slopes and cutting slopes have been assessed for their stability based on initial configurations shown in the planning drawings. The earthwork cut slopes for the most easterly edge of the phase 3 platform have been shown to have a stable configuring. A significant part of the cut slope forming the northern section of the attenuation basin's batter is currently too steep and needs to be slackened to 1v:3h to provide an acceptable factor of safety against sliding. Also in Phase 3, the attenuation basin's southern batter is also set too steep (at 1v:2h) assuming it is constructed of materials coming from the cut (without any washing or sieve pre-treatment). This is a P1 revision report and it can be conformed that 'for construction' earthwork drawings use slackened off cut and fill slopes of 1v:3h so long term slope stability should be maintained.

The contamination status of the soils at the site has examined via a screening process (against commonly adopted UK land use criteria) and no issues have been identified other than ubiquitous risks which stem from possibility of finding so -far unfound contaminated pockets of material, the possibility that there could be carcinogenic tar levels in the existing black top materials and the likelihood of elevated radon levels being present. The later risk will need mitigation by placement of suitable membranes within the floor construction in office areas.

Groundwater quality at the site is good in terms of absence or very low levels of organic chemicals but is locally poor for selected dissolved metals which may be a background - natural phenomenon lined to mineralization in the bedrock.

12.2 Recommendations

Checks on buoyancy uplift should be made on any underground tank or chamber and the depths of footings to avoid stressing the sides of buried tank backfill. Overbridging slab design, where tanks lie beneath, is ongoing at the time of issue of this report.

Large parts of the Phase 1 and 3 sites comprise a former contractor's compound laid to a crushed igneous stone or limestone that may have been selected as a Type 6F1 material. Subject to confirmatory sieve analysis/LAV testing then there is opportunity to re-use this material to replace imported materials of the same speciation. This action will reduce scheme construction costs and have cost and sustainability benefits.

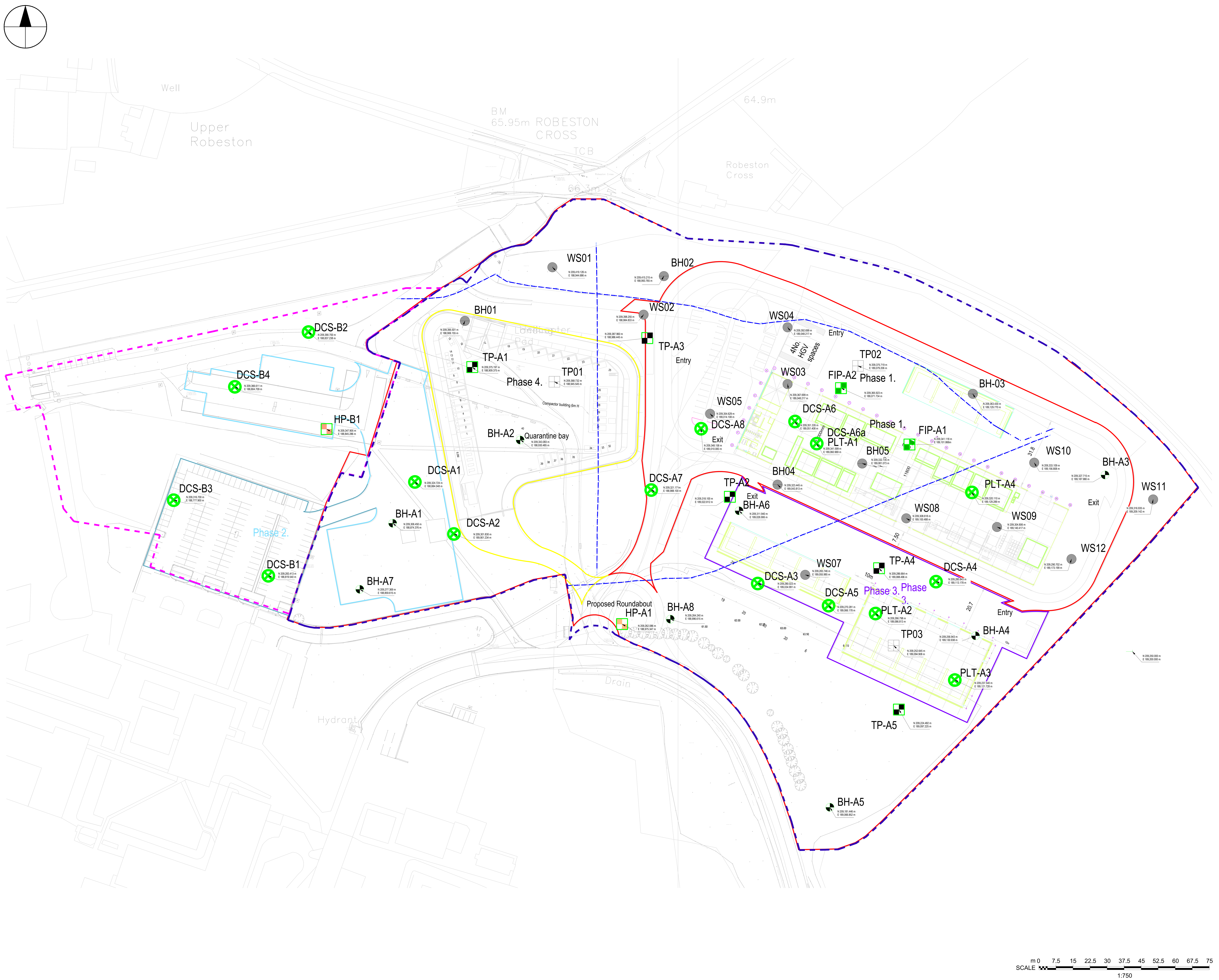
An inspection regime of the formation to pads and or slabs in specific areas of the site is recommended to be applied as a check that foundations are placed in competent materials.

Programming of the installations for the deeply buried drainage and leachate tanks will be a key consideration as the features close to buildings and excavations with associated edge minor settlement and minor settlement arising from effective stress changes would best be accommodated when the site is little developed and the building frames or floors are yet to be installed.

13. References

1. Peter Brett Associates (part of Stantec), Waste Transfer Station, Puma Energy Site H5 Site Condition Report, December 2019
2. Stantec, New Waste Transfer Station, Puma Energy Site Phase 2 Baseline Assessment Report, July 2020
3. Capita, Memo – Review of existing ground investigation information and gap analyses Dunelm Geotechnical and Environmental, March 2021
4. Capita, Area B Pembrokeshire County Council Eco Park, Geo-Environmental Desk Study – Preliminary Risk Assessment , November 2021
5. Design Manual for Road and Bridges (DMRB – Volume 4 Section 1), CD622, Managing Geotechnical Risk
6. ESP, Pembrokeshire County Council Eco Park, Milford Haven Factual Ground Investigation Report, February 2022
7. BS EN ISO 22476-3:2005 'Geotechnical Investigation and testing – Field testing' Part 3: Standard Penetration Test
8. BS EN ISO 1377-2: 1990 'Methods for testing soils for civil engineering purposes, Parts 1 to 8
9. BRE Digest 365, Soakaway Design
10. Capita, PECO Hydrogeological Assessment (technical note) (technical note) ref PECO-CAP-PW-XX-TN-G-009004 March 2020
11. TRRL 1132: The Structural Design of Bituminous Roads
12. BS8002: 2015 Code of Practice for earth retaining structures
13. BRE Special Digest 1:2005 (includes 2017 amendments) 'Concrete in Aggressive Ground'
14. BS EN 1997-1:2004+A1:2013. Eurocode 7: Geotechnical Design
15. Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works, Series 600, Earthworks
16. BS6031:2009: Code of Practice for Earthworks
17. TRRL 1132: The Structural Design of Bituminous Roads
18. Interim Advice Note 73/06: Design Guidance for Road Pavement Foundations
19. CD225 Design for New Pavement Foundations

Drawings



Key

- Location Ownership Boundary A
- Location Ownership Boundary B
- Raw Water Service
- Phase 1 boundary
- Phase 2 boundary
- Phase 3 boundary
- Phase 4 boundary

Stantac (2020) Locations

- Stantec (2020) Trial Pit
- Stantec (2020) Dynamic Sampler with rotary follow-on
- Stantec (2020) Windowless Sampler hole

ESP (2021) Locations

- ESP (2021) Trial Pit
- ESP (2021) Hand Pit
- ESP (2021) Foundation Inspection Pit
- ESP (2021) Dynamic (Windowless) Sampler hole
- ESP (2021) Dynamic Sampler with rotary follow-on

Rev	Drwn	Chk'd	App'd	Description	Date
P01	HKK	SE	NG	Issued for Information	02-MAR-2022

Purpose of Issue
S2 - ISSUED FOR INFORMATION

Client
PEMBROKESHIRE COUNTY COUNCIL

Project
PEMBROKESHIRE COUNTY COUNCIL ECO PARK

Drawing
EXISTING LAYOUT WITH EXPLORATORY HOLE LOCATIONS

Scale at A1	Drawn	Checked	Approved
1:750	HKK	SE	NG

Project No.	Date
ED/101993	02-MAR-2022

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
PECO-CAP-EGN-XX-DR-CE-0001 Revision P01

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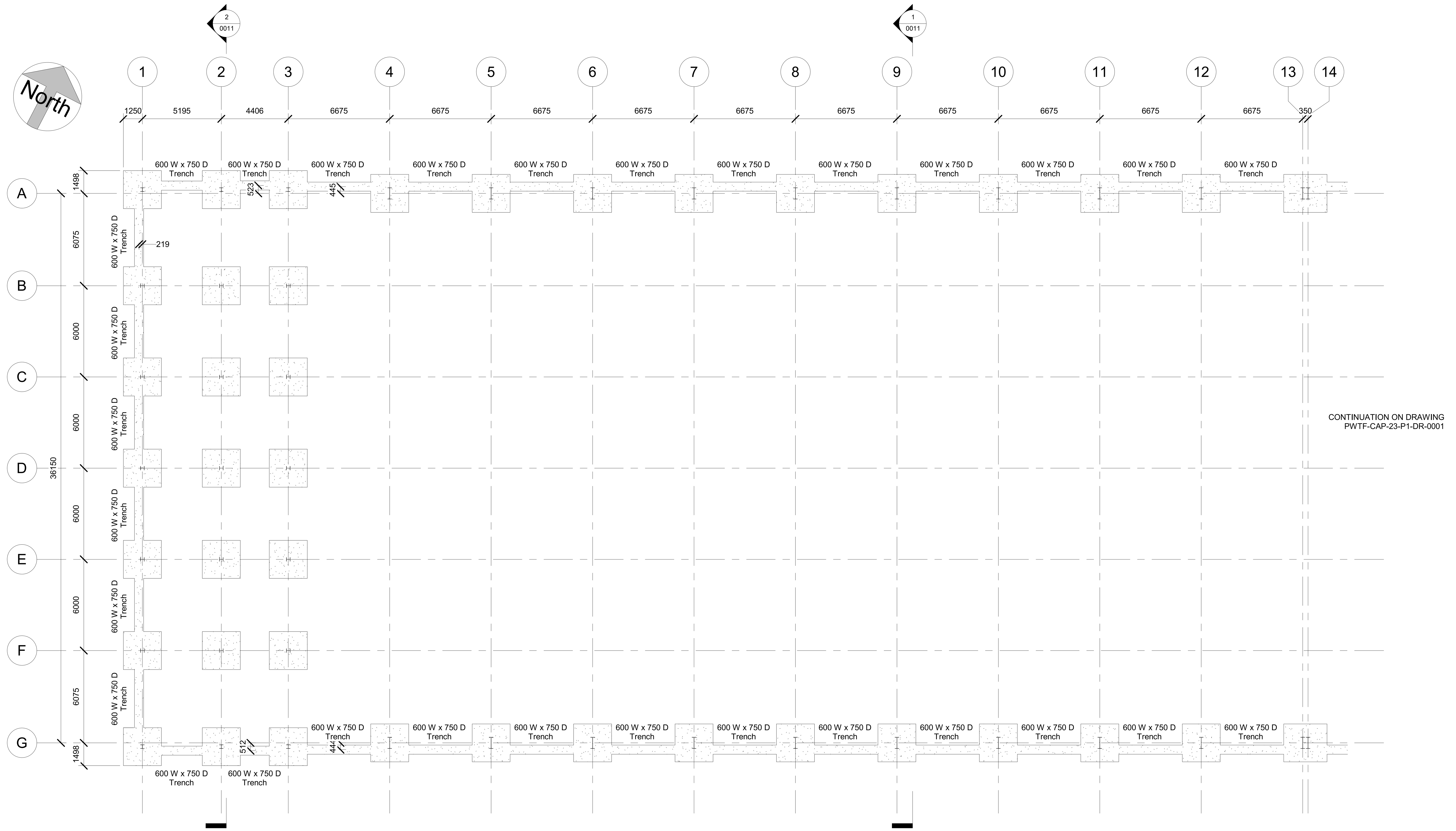
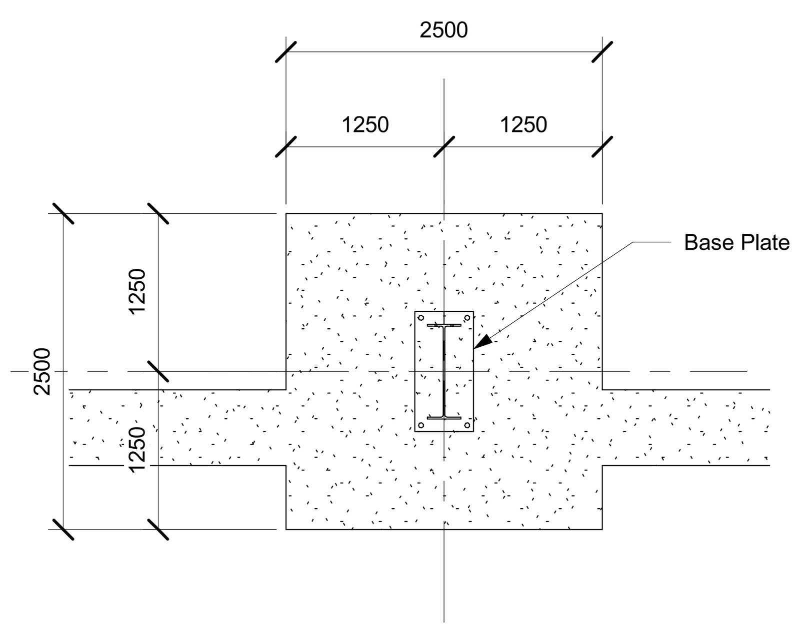


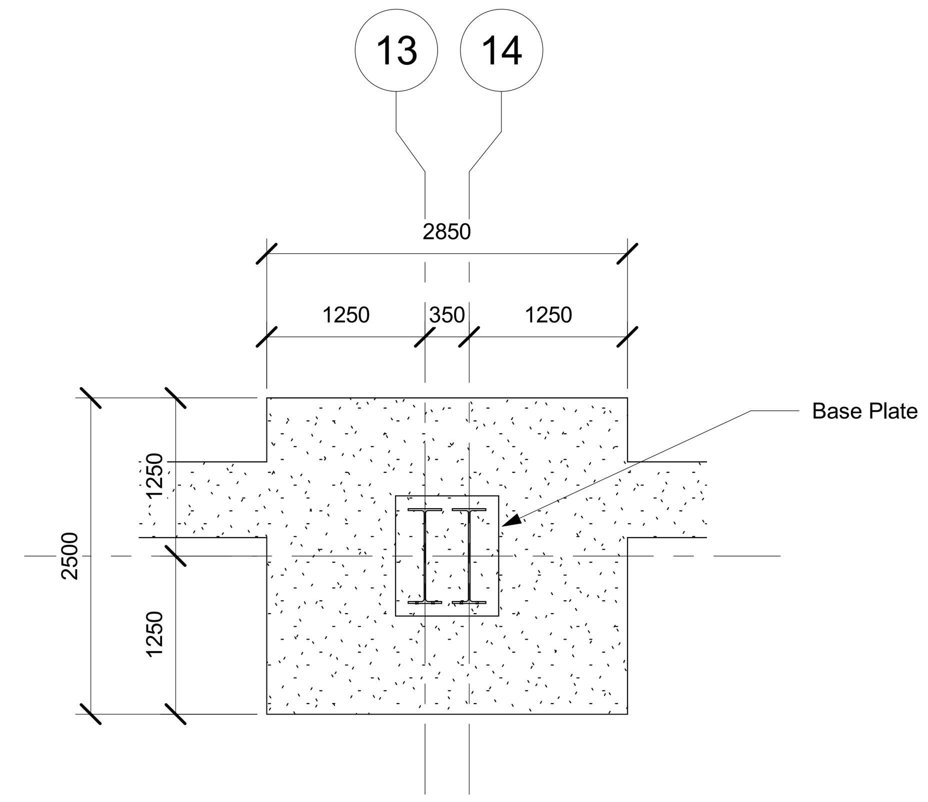
1 Foundation Layout Sheet 1 of 2

1 : 150



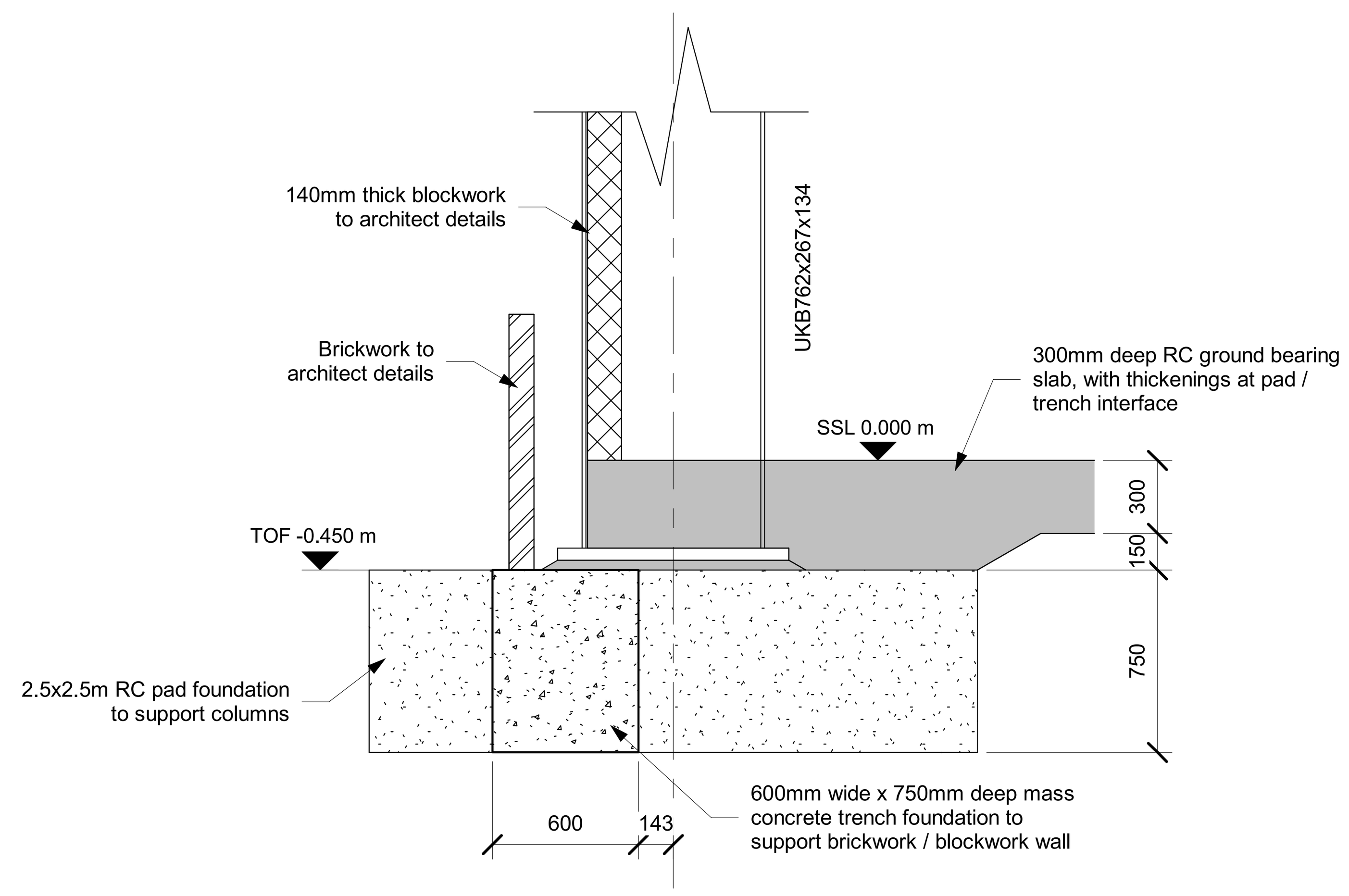
2 Typical Pad Foundation Plan

1 : 50



3 Plan of Pad Foundation at GL13/14

1 : 50



4 Typical Section Through Pad Foundation

1 : 25

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3. STRUCTURAL LEVELS ARE IN METRES.

Rev	Description	(Chk'd / App'd)	Date
P01	Stage 2 - For Information (RM/AJH/AJH)		14.09.2021

Status
S2 - Issued for Information

Classification
Confidential

Client

Project
Pembrokeshire Waste Transfer Facility

Drawing
Phase 1 Building Foundation General Arrangement Sheet 1 of 2

Scale @ A1	Drawn	Checked	Approved
As indicated	RM	AJH	AJH

Project No.
CS/101089

Date
02.09.2021

Drawing Identifier

project	origin	zone	level	file type	role	number	revision
PWTF-	CAP-	25 -	P1 -	DR -	S -	25100	P01

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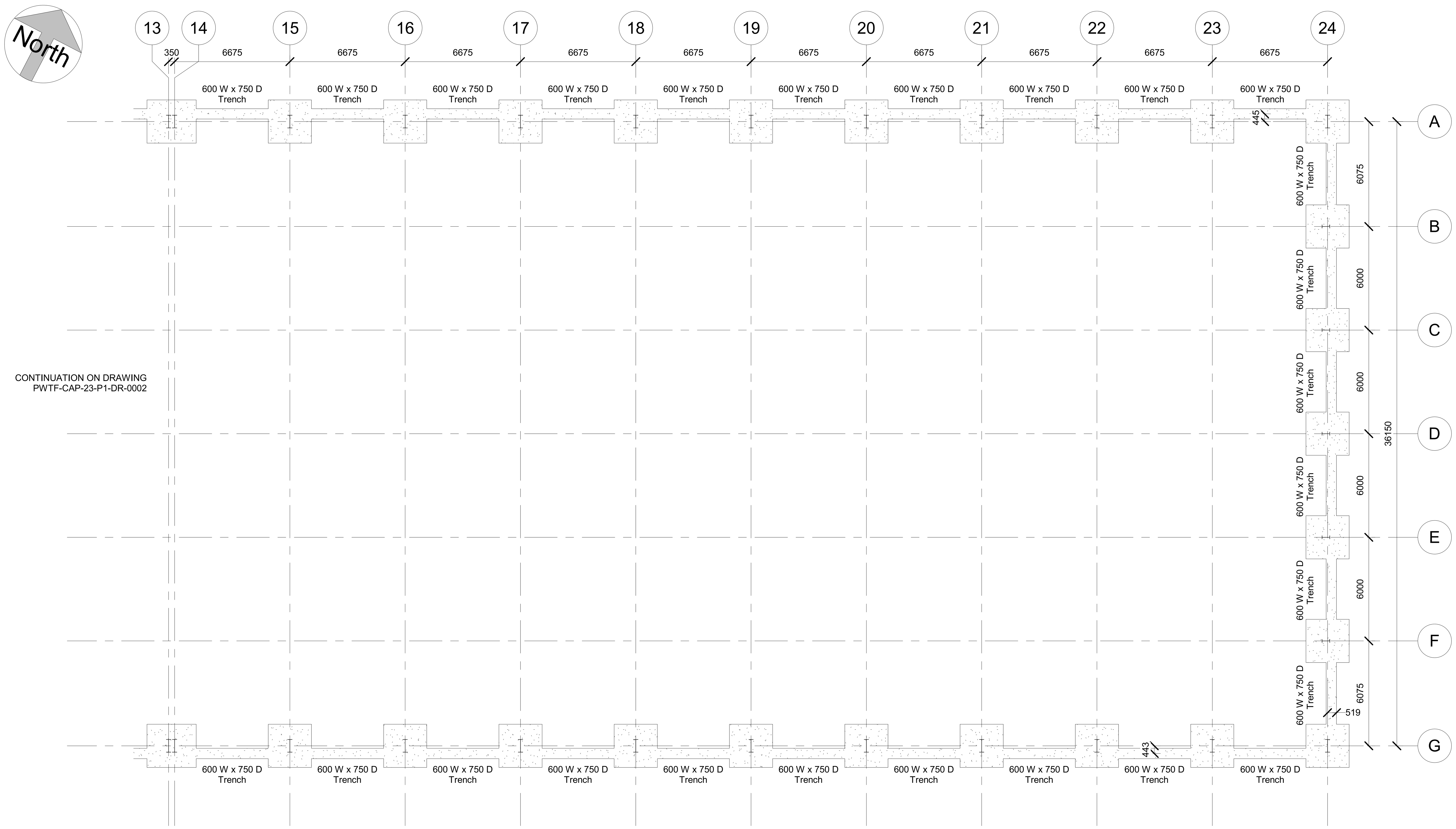

1 Foundation Layout Sheet 2 of 2

1 : 150

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NOTES:

1. FOR GENERAL NOTES SEE DRAWINGS PTWF-CAP-25-XX-DR-S-100.
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Rev	Description	(Chk'd / App'd)	Date
P01	Stage 2 - For Information (RM/AJH/AJH)		14.09.2021

Status
S2 - Issued for Information

Classification
Confidential

Client

Project
Pembrokeshire Waste Transfer Facility

Drawing
Phase 1 Building Foundation General Arrangement Sheet 2 of 2

Scale @ A1	Drawn	Checked	Approved
1 : 150	RM	AJH	AJH

Project No. CS/101089
Date 02.09.2021

Drawing Identifier
project - origin - zone - level - file type - role - number - revision
PWTF-CAP-25-P1-DR-S-25101 P01

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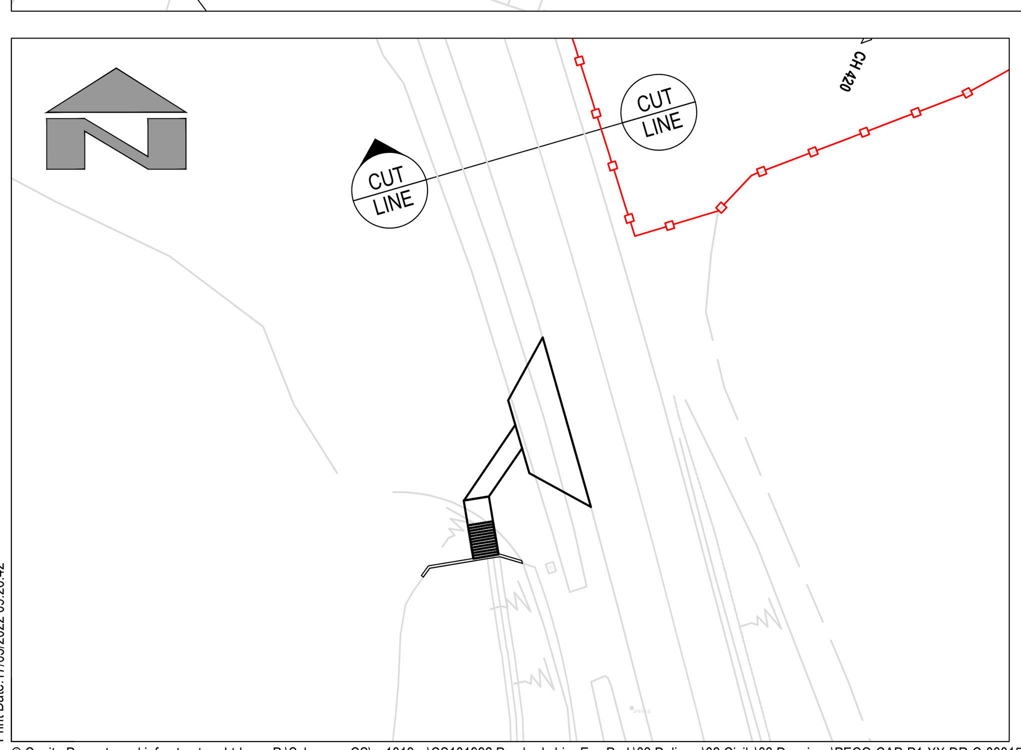
Print Date: 16/09/2021 10:51:47



Notes

1. For General Arrangement details, refer to drawing PECO-CAP-P1-XX-DR-C-000152.
2. For Long Section details, refer to drawing PECO-CAP-P1-XX-DR-C-000154.
3. For Cross Section details, refer to drawings PECO-CAP-P1-XX-DR-C-000155 - PECO-CAP-P1-XX-DR-C-000160.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

1. 11KV overhead WPD line north of proposed site - potential infringement of overhead line during construction
2. 3 inch / 18inch / 21inch DCWW water main crossing the proposed site

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

0 10 20 30 40 50m

SCALE 1:500

Rev	Drwn	Chk'd	App'd	Description	Date
P01	TAJ	SM	BW	First Issue	17/05/2022

Purpose of Issue

S2 - Suitable for Information

Classification

Confidential

Client

Project

Pembrokeshire County Council Eco Park

Drawing

Phase 1 and 3 Cross Section Locations

Scale @ A1	Drawn	Checked	Approved
1:500	TAJ	SM	BW

Project No.: ED/101992

Date: 05-APR-22

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
PECO-CAP-P1-XX-DR-C-000153

BS1192 Compliant revision: P01

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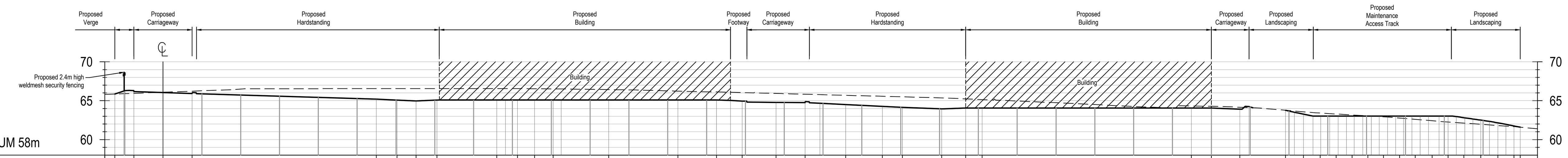

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HA_P1_MC01 - CH 440
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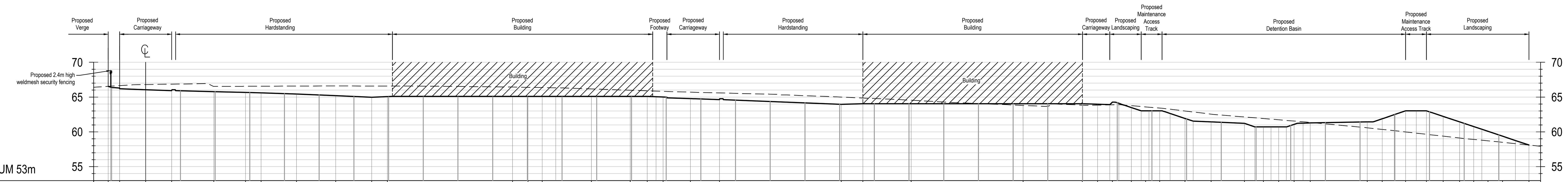

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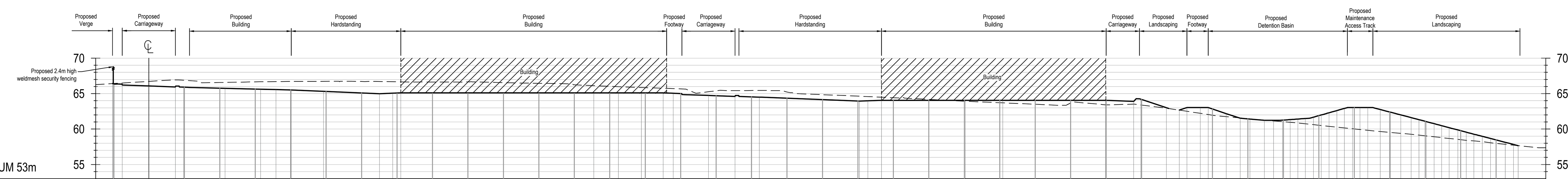

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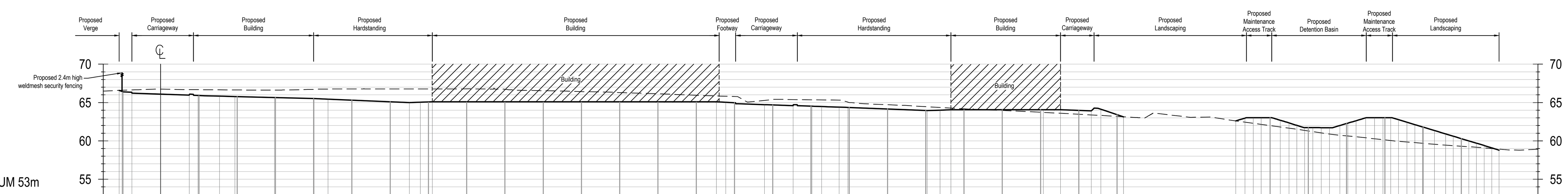
SCALE 1:500



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HA_P1_MC01 - CH 380
SCALE 1:500

Key:
- Proposed Ground Profile (solid line)
- Existing Ground Profile (dashed line)

Notes:

1. This drawing should be read in conjunction with drawing PECO-CAP-P1-XX-DR-C-000153.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

1. 11KV overhead WPD line north of proposed site - potential infringement of overhead line during construction
2. 3 inch / 18inch / 21inch DCWW water main crossing the proposed site. Diversions being arranged with DCWW prior to contract commencing

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

Rev	Drwn	Chk'd	App'd	Description	Date
P01	TAJ	SM	BW	First Issue	17/05/2022

Purpose of Issue
S2 - Suitable for Information

Classification
Confidential

Client

Project
Pembrokeshire County Council
Eco Park

Drawing
Phase 1 and 3
Cross Sections
Sheet 5 of 6

Scale @ A1	Drawn	Checked	Approved
1:500	TAJ	SM	BW

Project No.: ED/101992
Date: 05-04-2022

Drawing Identifier (BS1192 Compliant)
Project - Originator - Zone - Level - File Type - Role - Number
PECO-CAP-P1-XX-DR-C-000159
revision: P01

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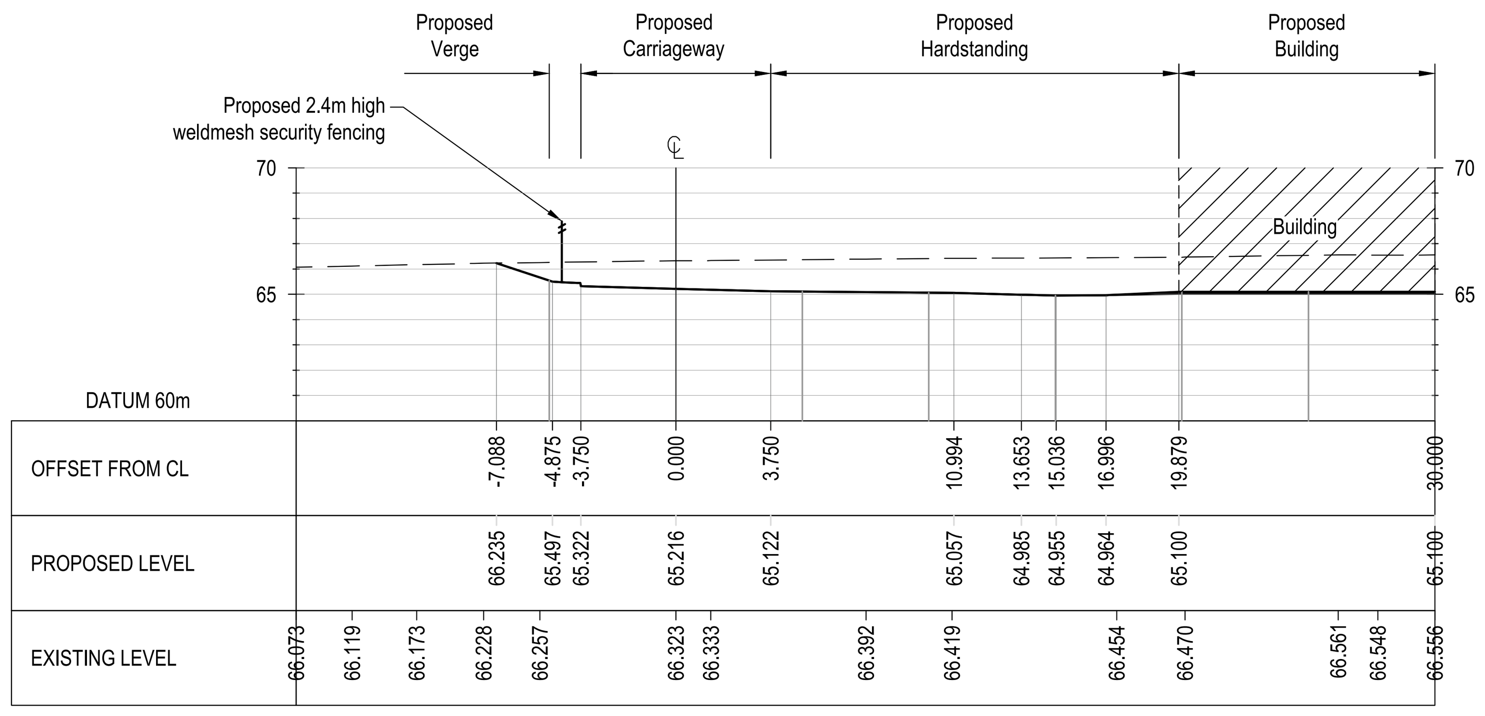

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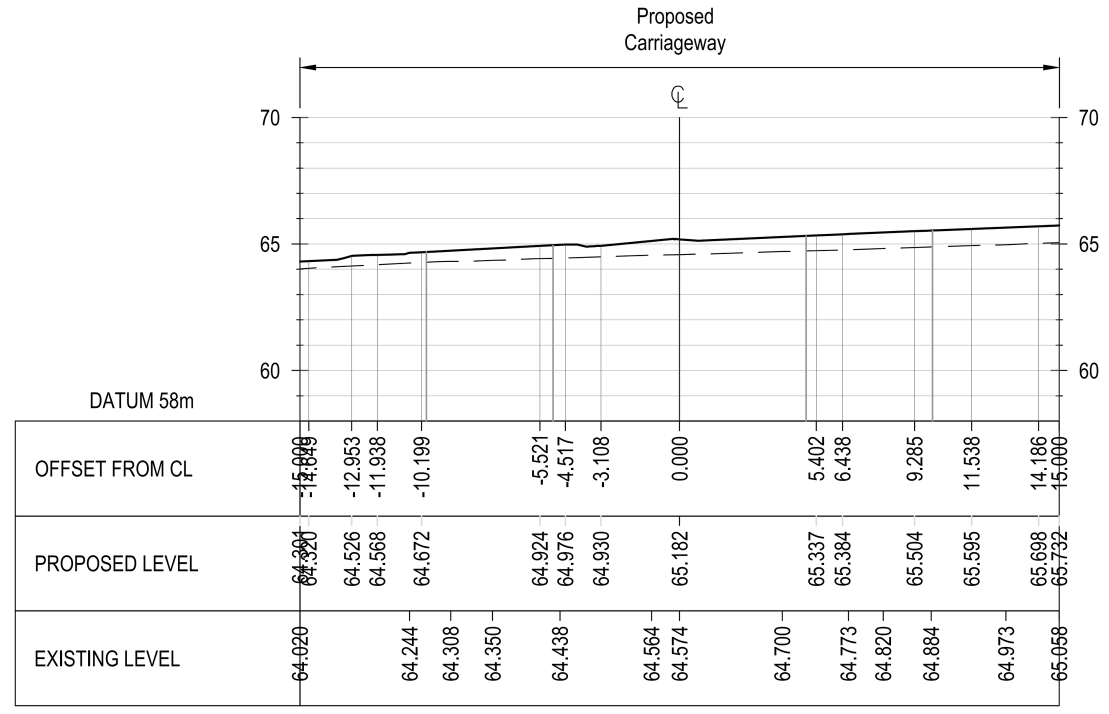
SCALE 1:250



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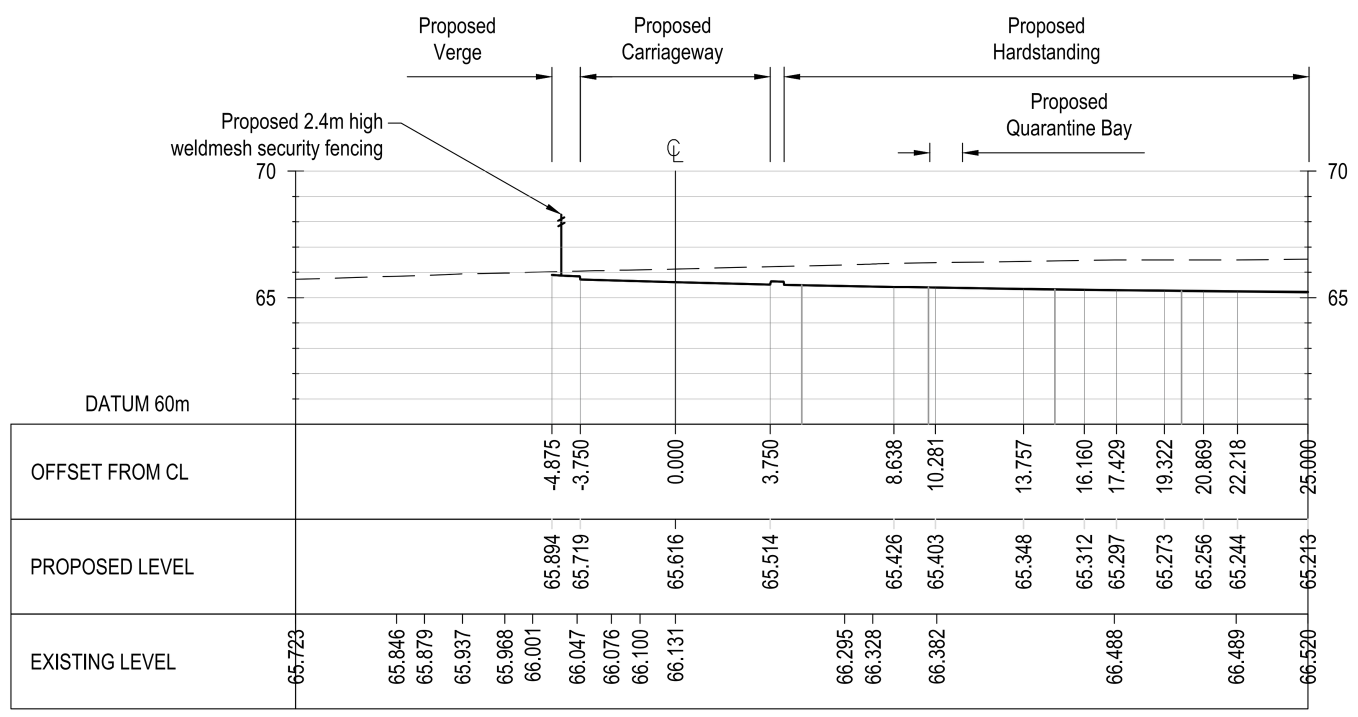

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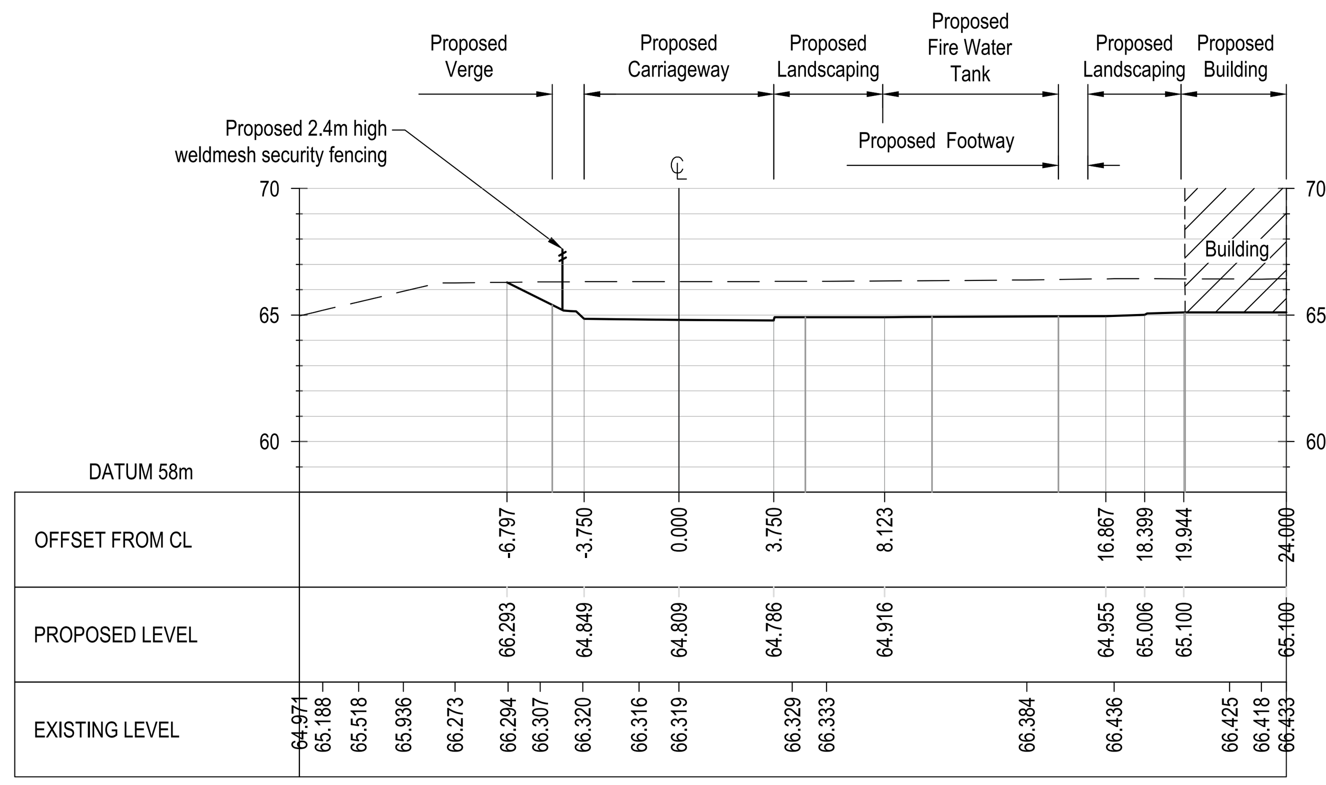

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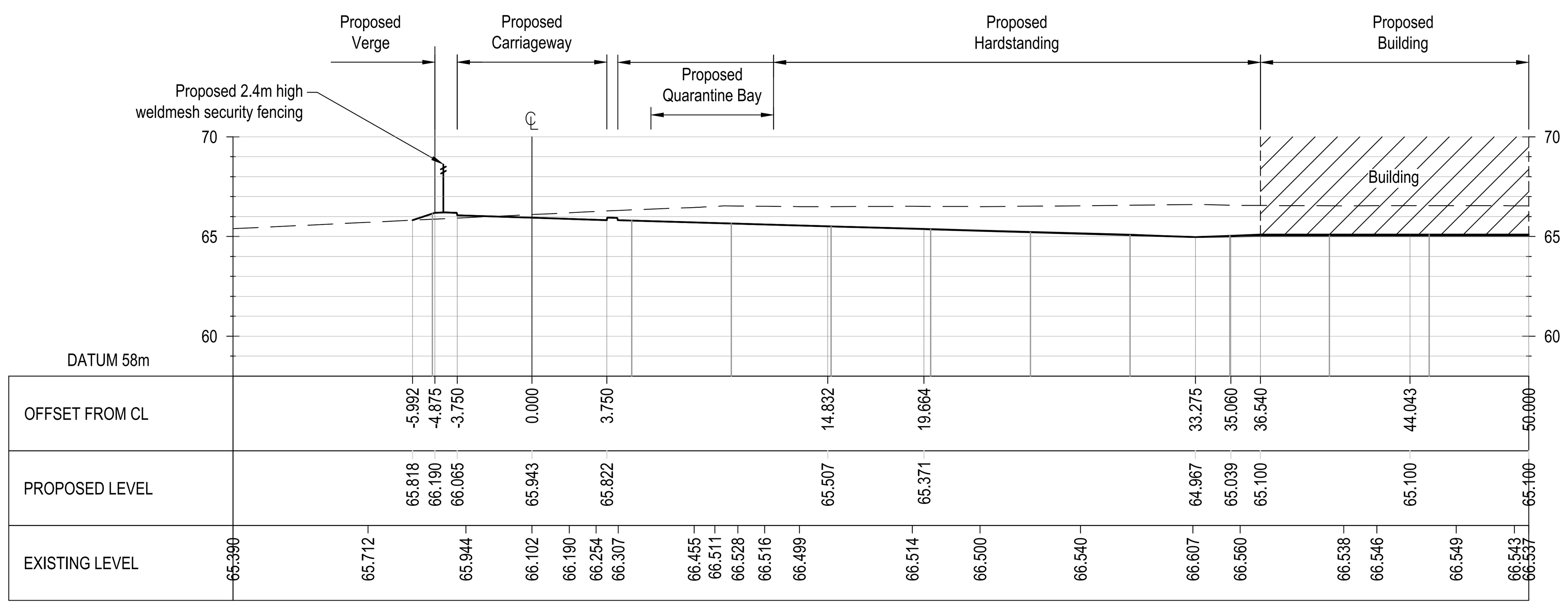

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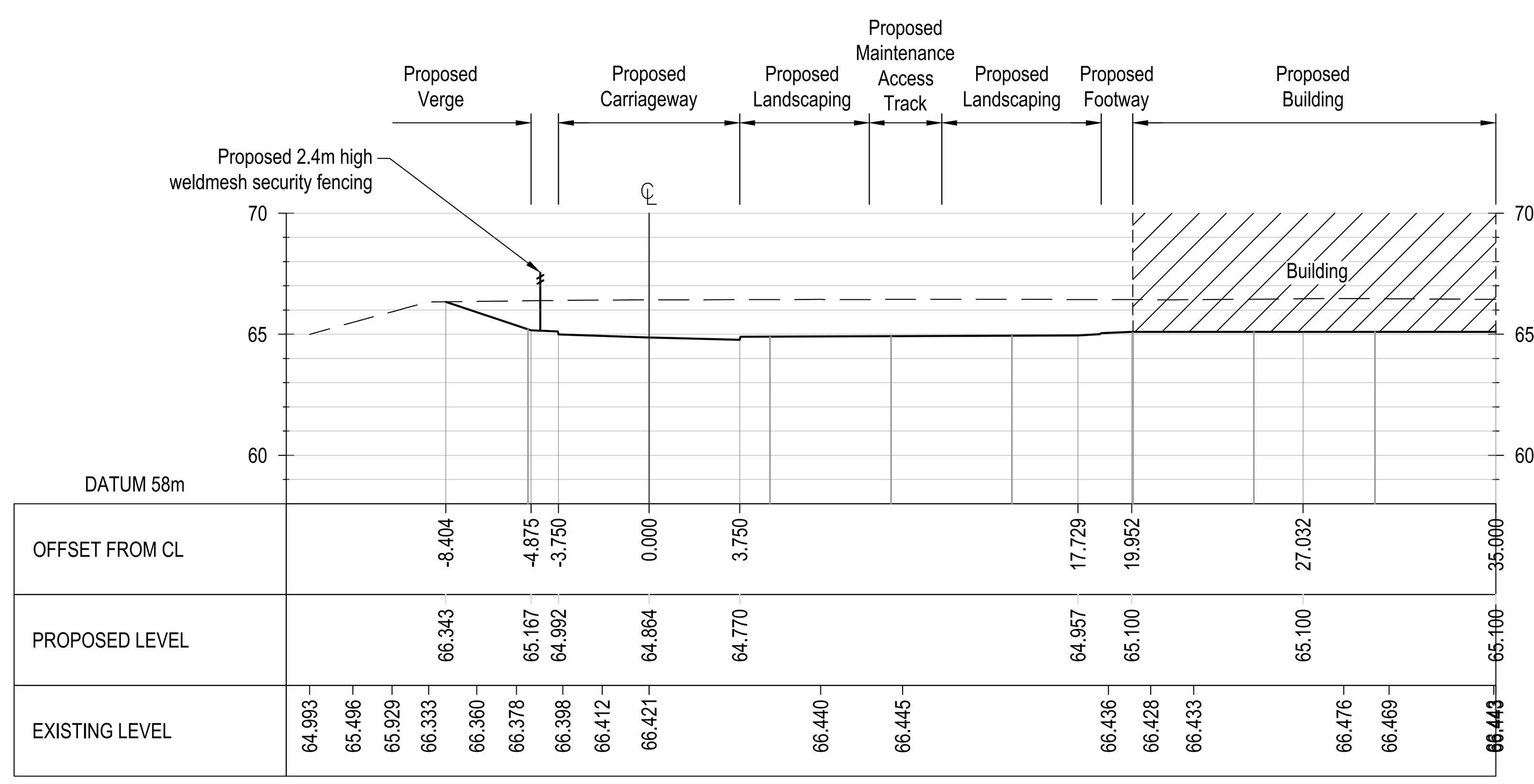

HA_P1_MC01 - CH 520
SCALE 1:250

Key:

Proposed Ground Profile

Existing Ground Profile

Notes:

1. This drawing should be read in conjunction with drawing PECO-CAP-P1-XX-DR-C-000153.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

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2. 3 inch / 18inch / 21inch DCWW water main crossing the proposed site. Diversions being arranged with DCWW prior to contract commencing

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Rev	Drwn	Chk'd	App'd	Description	Date
P01	TAJ	SM	BW	First Issue	17/05/2022

Purpose of Issue
S2 - Suitable for Information

Classification
Confidential

Client

Project
Pembrokeshire County Council
Eco Park

Drawing
Phase 1 and 3
Cross Sections
Sheet 6 of 6

Scale @ A1	Drawn	Checked	Approved
1:250	TAJ	SM	BW

Project No.: ED/101992
Date: 05-04-2022

Drawing Identifier (BS1192 Compliant)
Project - Originator - Zone - Level - File Type - Role - Number
PECO-CAP-P1-XX-DR-C-000160
revision P01

CAPITA
Real estate and infrastructure

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Key

- Detailed Planning Application Boundary (9.28ha)
- Outline Planning Application Boundary (0.87ha)

Stantac (2020) Locations

- Stantec (2020) Trial Pit
- Stantec (2020) Dynamic Sampler with rotary follow-on
- Stantec (2020) Windowless Sampler hole

ESP (2021) Locations

- ESP (2021) Trial Pit
- ESP (2021) Hand Pit
- ESP (2021) Foundation Inspection Pit
- ESP (2021) Dynamic (Windowless) Sampler hole
- ESP (2021) Dynamic Sampler with rotary follow-on

Rev	Drwn	Chk'd	App'd	Description	Date
P01	HKK	SE	NG	Issued for Information	02-MAR-2022

Purpose of Issue

S2 - ISSUED FOR INFORMATION

Client

PEMBROKESHIRE COUNTY COUNCIL

Project

PEMBROKESHIRE COUNTY COUNCIL ECO PARK

Drawing

PROPOSED LAYOUT WITH EXPLORATORY HOLE LOCATIONS

Scale at A1	Drawn	Checked	Approved
1:750	HKK	SE	NG

Project No. ED/101993

Date 02-MAR-2022

Drawing Identifier

Project - Originator - Zone - Level - File Type - Role - Number

PECO-CAP-EGN-XX-DR-CE-0004

Revision P01

CAPITA

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Appendix A – Geo-environmental data (A1-soils and A2-waters)

Table A2 - Soils Results Screening Table PCC Eco Park

Lab No					1924893	1924894	1924895	1924896	1924897	1924898	1924899	1924900	1924902	1931275	1931276	1931277	1931278	1931279	1931280	1931281	1931282	1934621	1934622	1934623	1934624	1934625	1934626	1934627	1934628	1934629	1934630	1934631	1934632	1934809	1935200	1935201	1935202	1935206	1935207	1935209	1935210	1935213	1935214	1935215
.Sample ID					TP-A1	TP-A2	TP-A3	TP-A4	TP-A4	TP-A5	TP-A5	HP-A1	HP-A1	DCS-A1	DCS-A1	DCS-B2	DCS-B2	DCS-B3	DCS-B3	DCS-B3	DCS-B4	DCS-A2	DCS-A6	DCS-A8	DCS-B2	DCS-B3	PLT-A2	PLT-A3	PLT-A4	DCS-A2	DCS-A3	DCS-A5	DCS-A7	DCS-A4	DCS-A3	DCS-A7	BH-A3	BH-A1	BH-A1	HP-B1	HP-B1	BH-A2	BH-A8	BH-A8
Depth					0.2	0.2	0.7	0.2	0.7	0.7	1.1	0.2	0.7	0.2	0.4	0.2	0.4	0.2	0.65	0.8	0.2	0.2	0.2	0.2	0.7	1.4	0.7	0.7	0.7	0.45	1.1	0.7	1	0.1	0.2	0.2	0.2	0.2	0.45	0.2	0.35	0.4	0.2	0.4
Other ID					ES	ES	ES	ES	ES	ES	ES	ES	ES																															
Sample Type					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date					18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	20/10/2021	20/10/2021	03/11/2021	03/11/2021	03/11/2021	03/11/2021	03/11/2021	03/11/2021	03/11/2021	03/11/2021	04/11/2021	04/11/2021	04/11/2021	03/11/2021	04/11/2021	02/11/2021	02/11/2021	04/11/2021	04/11/2021	04/11/2021	05/11/2021	04/11/2021	04/11/2021	05/11/2021	04/11/2021	04/11/2021	10/11/2021	10/11/2021	11/11/2021	11/11/2021	10/11/2021	09/11/2021	09/11/2021
Sampling Time					n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
LOD	Units	GAC	Min	Max																																								
0.2	mg/kg	640	1.4	8.6	5.8	4.8	8.4	3.3	5.9	5.3	6.5	7.4	5.2	8.6	4.9	2.1	2.5	4.3	1.4	3.4	1.5	5	6.4	5										2.9	3	4.2	1.6	7.8	4.9	1.8	2.9	5.1	6.5	6.4
0.2	mg/kg	240000	0.2	0.4	0.2	< 0.2	0.3	< 0.2	< 0.2	< 0.2	0.3	< 0.2	< 0.2	0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.2	0.2	< 0.2										< 0.2	< 0.2	< 0.2	< 0.2	0.4	< 0.2	< 0.2	< 0.2	< 0.2	0.2	< 0.2
0.1	mg/kg	410	0.1	1.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	< 0.1	0.2	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1										0.5	0.6	1.3	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.15	mg/kg	8600	3	42	23	28	25	30	28	27	26	29	24	24	29	34	42	18	11	29	16	21	21	17										17	3	16	22	21	26	16	27	23	25	26
1	mg/kg	49	0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
0.2	mg/kg	68000	9.8	74	22	45	32	56	36	33	25	32	24	22	12	74	13	23	21	21	39	24	38	16										28	12	25	48	19	16	42	9.8	18	21	20
0.3	mg/kg	2300	1.5	29	19	7.8	24	3.2	7.8	13	15	27	16	29	15	4.5	9.2	17	2.3	11	1.9	9.2	8.6	7.7										3.8	4.8	8.1	3.1	21	13	1.5	8.9	16	21	15
0.05	mg/kg	58	0.05	0.06	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05										< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1	mg/kg	980	5.1	51	23	16	25	14	32	27	28	29	28	25	38	16	51	21	5.9	37	9.2	23	22	15										9.4	5.1	16	9.9	20	29	9.4	37	19	26	28
0.5	mg/kg	12000	0.6	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5										< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5
1	mg/kg	730000	22	76	67	74	65	66	55	51	64	76	64	59	69	75	61	44	37	64	69	61	60	54										63	22	56	65	51	60	56	67	45	61	57
			0	0																																								
	pH	<5, >9	5.9	10.2	6.3	8.3	6.4	7.7	7.2	6.8	6.7	6.3	7	5.9	6.3	8.3	7.3	7.6	8.5	7.6	7.9	7.6	7.7	7.6	7.6	7.2	7.1	7.4	7	7.5	10.2	7.6	7.6	7.7	9.1	6.8	8	5.9	6.8	8.2	7.2	6.5	6.4	6.8
0.1	mg/kg	40	0.1	0.4	0.2	< 0.1	0.2	< 0.1	< 0.1	< 0.1	0.2	0.2	< 0.1	0.4	0.2	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1										< 0.1	< 0.1	< 0.1	< 0.1	0.3	0.2	< 0.1	< 0.1	0.2	0.3	0.2
0.1	%		0.1	3.2	1.8	0.2	2.7	0.3	0.4	1.1	1.9	2.1	0.7	2.9	1.1	0.2	0.3	1.4	0.2	0.5	0.6	1	1.7	0.2										0.6	3.2	0.6	0.5	2.2	0.9	0.1	0.2	1	1.5	1
10	mg/l		11	200	< 10	34	15	11	11	12	< 10	< 10	< 10	< 10	< 10	32	< 10	16	< 10	< 10	< 10	23	65	63	59	39	16	13	27	15	200	17	31	16	35	12	< 10	< 10	< 10	< 10	< 10	< 10	11	< 10
			0	0																																								
0.01	mg/kg	3200	0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01										< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.01	mg/kg	7800	0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01										< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.01	mg/kg	2000	0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01										< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1.5	mg/kg	9700	0	0	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5										< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
1.2	mg/kg	59000	1.4	1.4	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	1.4	< 1.2										< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
1.5	mg/kg	1000000	3.2	3.2	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	3.2	< 1.5										< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
3.4	mg/kg	1000000	30	30	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	30	< 3.4										< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
10	mg/kg		36	36	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	36	< 10										< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
0.01	mg/kg	27	0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01										< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.01	mg/kg	56000	0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01										< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.01	mg/kg	3500	0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01										< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.9	mg/kg	16000	0	0	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9										< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
0.5	mg/kg	36000	1.5	1.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5										< 0.5	1.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
0.6	mg/kg	28000	2	2.3	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	2.3	< 0.6										2	2	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
1.4	mg/kg	28000	57	88	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	57	< 1.4										< 1.4	88	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
10	mg/kg		60	92	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	60	< 10										< 10	92	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
10	mg/kg		92	96	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	96	< 10										< 10	92	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
			0	0																																								
0.1	mg/kg	84000	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	83000	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	520000	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	170	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	77	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	44	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	3900	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	1200	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	350	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	3.5	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	23000	0.2	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	63000	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	500	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	190	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	22000	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1	mg/kg	54000	0.2	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	< 0.03	< 0.03										< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1.6	mg/kg		0	0	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 0.10	< 0.10	< 0.10										< 0.10	< 0.10	< 0.10	< 0.10	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6
			0	0																																								
0.3	mg/kg	440	0.5	1.2	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3										< 0.3	0.5	< 0.3	< 0.3	0.7	1.2	< 0.3	0.7	< 0.3	< 0.3	< 0.3

Table A2 - Water Results Screening Table PCC Eco Park

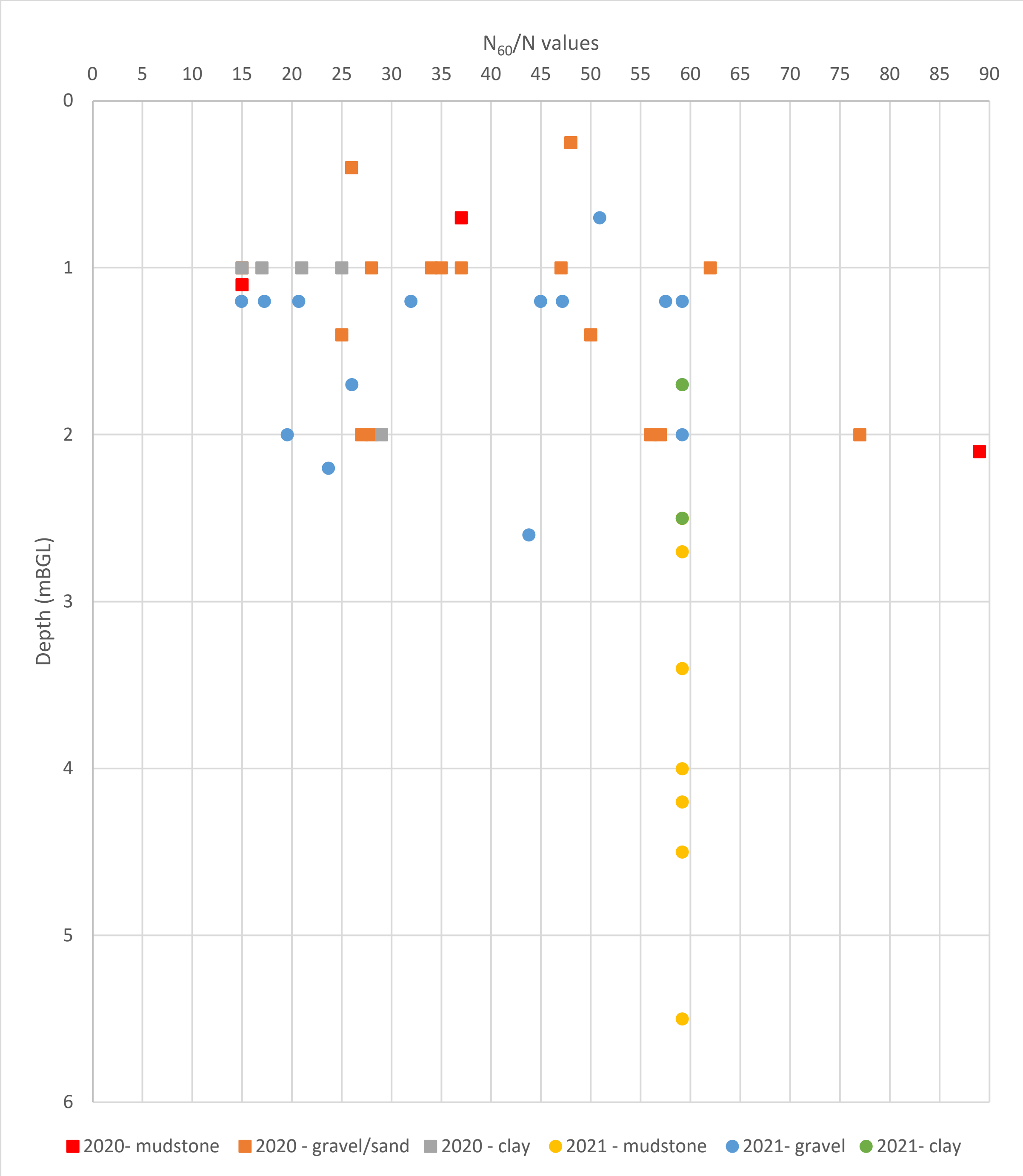
Test	Method	LOD	Units	capita GAC	Min	Max	1939623	1939624	1939625	1939626	1939627	1939628	1939629	1939630	1939631	1949866	1949867	1949868	1949869	1949870	1949871	1949872
Lab No							1939623	1939624	1939625	1939626	1939627	1939628	1939629	1939630	1939631	1949866	1949867	1949868	1949869	1949870	1949871	1949872
.Sample ID							BH02	BH03	BHA2	BHA3	BHA4	BHA5	BHA7	BHA8	Ditch	BH02	BHA3	BHA4	BHA5	BHA7	BHA8	Ditch
Depth							6	5	4	5	6	7	7	6								
Other ID																						
Sample Type							WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sampling Date							23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021	13/12/2021	13/12/2021	13/12/2021	13/12/2021	13/12/2021	13/12/2021	13/12/2021
Sampling Time							n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Metals																						
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	7.5	0.17	0.85	0.42	0.17	0.33	0.27	< 0.16	< 0.16	0.33	0.48	0.2	0.59	< 0.16	< 0.16	< 0.16	0.48	0.36	0.47
Barium, Dissolved	DETSC 2306	0.26	ug/l	100	8.8	39	21	11	20	19	8.8	11	34	39	21	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Boron, Dissolved	DETSC 2306*	12	ug/l	750	13	65	15	25	23	13	< 12	< 12	18	19	< 12	43	23	22	24	28	23	25
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.054	0.05	0.05	0.05	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Calcium, Dissolved	DETSC 2306	0.09	mg/l	250000	5.2	170	5.2	6.4	11	11	5.7	12	23	31	17	130	10	9.7	13	170	28	160
Chromium, Total	DETSC 2306*	0.25	ug/l	5	0.46	190	2.5	4.3	15	8.3	7.9	3.8	190	27	0.46	8.6	6.7	12	12	18	13	4.4
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.12	0.5	2.7	1.4	0.7	1.1	0.5	0.6	0.7	< 0.4	1	0.8	1.2	1.1	0.6	2.7	1.4	< 0.4	1.9
Lead, Dissolved	DETSC 2306	0.09	ug/l	7.2	0.09	0.71	0.52	0.14	0.12	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	0.51	0.09	< 0.09	< 0.09	0.24	< 0.09	0.32
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.07	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	8.6	0.5	6.4	2.3	2.1	2.1	2.2	2.7	0.9	1.3	0.8	< 0.5	2.7	1.1	2.5	0.8	2.2	0.8	3.5
Phosphorus as P, Dissolved	DETSC 2306	18	ug/l	700	22	250	51	< 18	130	30	22	28	99	35	33	140	26	24	32	250	58	240
Selenium, Dissolved	DETSC 2306	0.25	ug/l	10	0.32	3.9	0.75	0.4	0.99	1.3	0.34	0.77	0.7	3.9	0.7	0.59	0.34	0.47	0.82	0.92	1	0.76
Zinc, Dissolved	DETSC 2306	1.3	ug/l	7.9	1.6	160	12	27	12	11	6.7	3.6	2	1.6	3.1	120	53	49	57	51	44	51
Inorganics					0	0																
pH	DETSC 2008		pH	6.6	5.6	7.2	6.7	6.6	6.5	6.5	6.5	6.4	6.6	6.6	6.5	6.4	7.2	7.1	6.4	6.9	6.8	5.6
Chemical Oxygen Demand, Total	DETSC 2032	10	mg/l		15	92	32	40	92	56	45	25	69	82	46	50	54	42	37	43	43	60
Cyanide, Total	DETSC 2130	40	ug/l	1	0	0	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40
Dissolved Organic Carbon	DETSC 2033*	2	mg/l		2.4	2.7	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	2.7
Solids, Rapidly Settleable	DETSC 2034*	5	mg/l		14	290									30							290
Solids, Settleable	DETSC 2034*	5	mg/l		32	400									33							400
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.2	0.015	4.5	0.073	3	4.5	2.8	2.8	2.5	2.2	2.7	2.4	< 0.015	< 0.015	< 0.015	< 0.015	0.017	< 0.015	0.054
Nitrate as N	*	0.1	mg/l	4	0.1	2.9	1.2	1.2	1.8	2.9	1.5	1.8	1	1.1	2	0.29	0.1	0.44	0.73	1.1	0.99	1.6
Sulphate as SO4	DETSC 2055	0.1	mg/l	400	4.1	21	4.1	12	6.3	12	11	9.8	13	21	11	4.3	6.6	5	11	12	11	11
Sulphide	DETSC 2208	0.01	mg/l	0.25	0.01	0.03	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.01	0.02
Petroleum Hydrocarbons					0	0																
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	10	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	10	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	10	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	10	0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	10	0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	10	0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	10	0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l		0	0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	0.75	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	10	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	10	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	2	0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	10	0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	0.00017	0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	0.0082	0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l		0	0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	ug/l		0	0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3322	1	ug/l		0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l		0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l		0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l		0	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Oils and Grease (hexane extractable material)	DETSC 3002	1000	ug/l	1000	4400	4400									< 1000							4400

Test	1954908	1954909	1954910	1954911	1954912	1954913	1954914	1961097	1961098	1961099	1961100	1961101	1961102	1961103
Lab No	1954908	1954909	1954910	1954911	1954912	1954913	1954914	1961097	1961098	1961099	1961100	1961101	1961102	1961103
.Sample ID	BH02	BHA3	BHA4	BHA5	BHA7	BHA8	Ditch	BH02	BHA3	BHA4	BHA5	BHA7	BHA8	Ditch
Depth														
Other ID														
Sample Type	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sampling Date	04/01/2022	04/01/2022	04/01/2022	04/01/2022	04/01/2022	04/01/2022	04/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Metals														
Arsenic, Dissolved	0.55	0.37	< 0.16	0.23	0.34	0.41	0.29	0.85	0.23	< 0.16	0.2	0.3	0.34	0.26
Barium, Dissolved	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Boron, Dissolved	65	31	22	35	25	28	20	61	40	33	32	33	34	32
Cadmium, Dissolved	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.05	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Calcium, Dissolved	7.7	12	5.9	11	24	24	17	7.6	12	6.8	15	22	25	17
Chromium, Total	9.9	6.4	7	18	38	47	0.81	19	6.6	11	16	71	21	0.49
Copper, Dissolved	0.5	0.6	< 0.4	< 0.4	0.7	< 0.4	< 0.4	1.3	0.8	0.7	0.5	< 0.4	< 0.4	0.8
Lead, Dissolved	0.71	0.44	0.2	0.15	0.12	0.25	0.14	0.57	0.19	< 0.09	< 0.09	0.21	< 0.09	0.09
Mercury, Dissolved	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	6.4	2.5	1.8	1	1.1	0.8	0.8	2.6	2.1	2	0.7	0.9	< 0.5	0.5
Phosphorus as P, Dissolved	26	36	36	40	140	59	56	41	22	27	64	120	55	51
Selenium, Dissolved	0.39	0.56	0.32	0.78	0.76	0.91	0.7	1.1	1.1	0.51	0.84	0.84	0.96	0.73
Zinc, Dissolved	160	79	58	92	52	62	50	100	60	52	43	43	49	47
Inorganics														
pH	6.6	6.6	6.6	6.5	6.7	6.8	6.7	6.7	6.6	6.6	6.5	6.6	6.7	6.7
Chemical Oxygen Demand, Total	< 15	< 15	< 15	15	< 15	26	< 15	31	< 15	< 15	< 15	20	26	< 15
Cyanide, Total	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40
Dissolved Organic Carbon	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	2.4	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Solids, Rapidly Settleable							14							< 5.0
Solids, Settleable							32							< 5.0
Ammoniacal Nitrogen as N	< 0.015	< 0.015	0.015	< 0.015	< 0.015	< 0.015	0.089	0.033	0.13	0.042	0.025	0.019	0.027	0.025
Nitrate as N	< 0.10	0.92	0.21	0.77	0.26	0.81	1.2	0.49	1.7	0.6	1.5	0.46	0.98	1.5
Sulphate as SO4	14	9.7	6.4	8.3	12	9.5	9.1	5.2	12	6.4	12	11	8.7	9.5
Sulphide	0.02	0.02	0.01	0.02	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Petroleum Hydrocarbons														
Aliphatic C5-C6	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C35	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Oils and Grease (hexane extractable material)							< 1000							< 1000

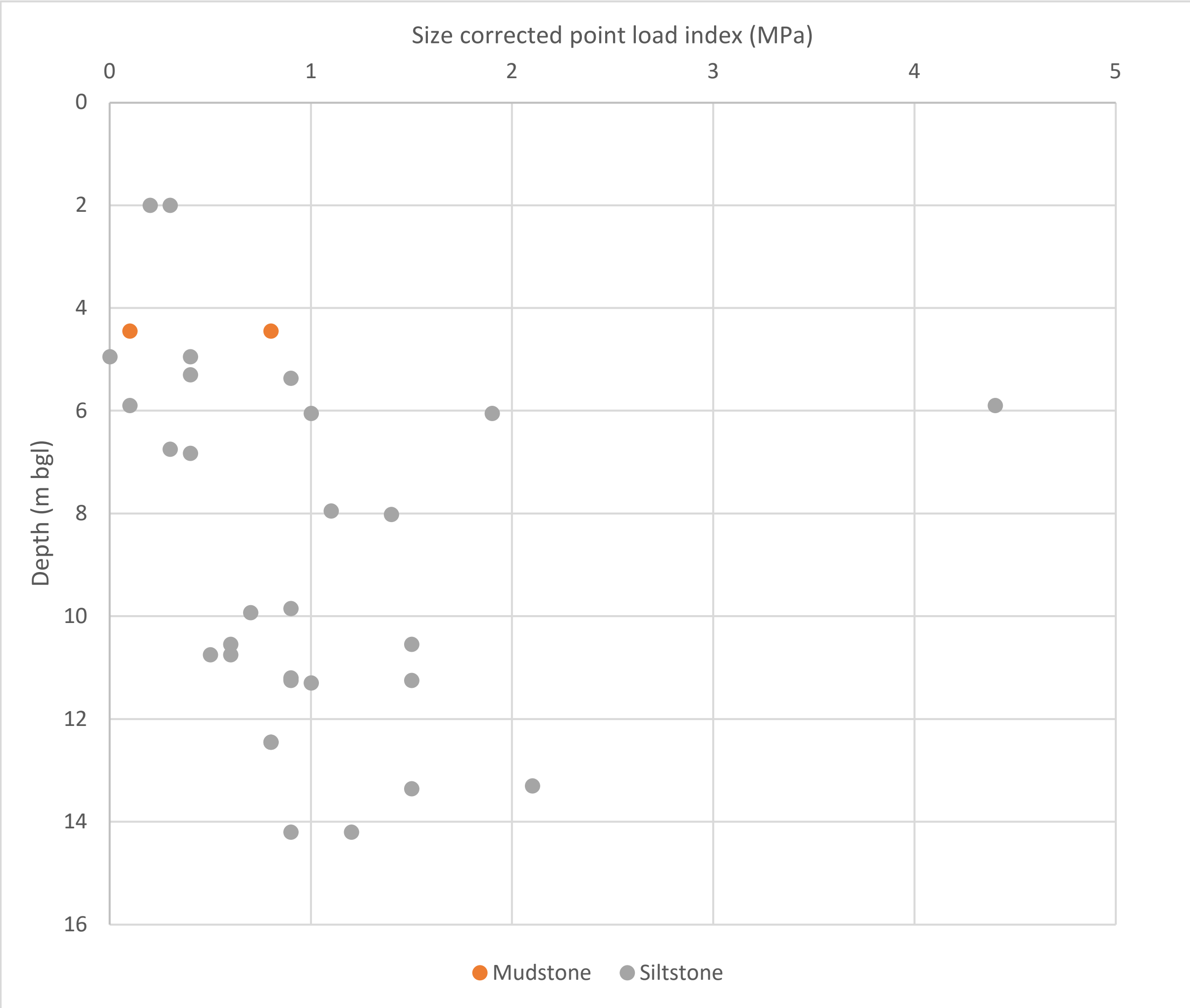
Table A2 - Water Results Screening Table PCC Eco Park

Lab No							1939623	1939624	1939625	1939626	1939627	1939628	1939629	1939630	1939631	1949866	1949867	1949868	1949869	1949870	1949871	1949872	1954908	1954909	1954910	1954911	1954912	1954913	1954914	1961097	1961098	1961099	1961100	1961101	1961102	1961103
.Sample ID							BH02	BH03	BHA2	BHA3	BHA4	BHA5	BHA7	BHA8	Ditch	BH02	BHA3	BHA4	BHA5	BHA7	BHA8	Ditch	BH02	BHA3	BHA4	BHA5	BHA7	BHA8	Ditch	BH02	BHA3	BHA4	BHA5	BHA7	BHA8	Ditch
Depth							6	5	4	5	6	7	7	6																						
Other ID																																				
Sample Type							WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sampling Date							23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021	13/12/2021	13/12/2021	13/12/2021	13/12/2021	13/12/2021	13/12/2021	13/12/2021	04/01/2022	04/01/2022	04/01/2022	04/01/2022	04/01/2022	04/01/2022	04/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Sampling Time							n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**	**capita GAC**	**Min**	**Max**																														
PAHs					0	0																														
Acenaphthene	DETSC 3304	0.01	ug/l		0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	DETSC 3304	0.01	ug/l		0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	0.052	0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l		0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	0.00017	0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	0.016	0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	0.0082	0.03	0.06	< 0.01	< 0.01	< 0.01	< 0.01	0.03	0.04	0.05	0.05	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	0.017	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l		0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l		0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.0033	0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l		0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	0.03	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Naphthalene	DETSC 3304	0.05	ug/l	0.075	0	0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	DETSC 3304	0.01	ug/l		0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.01	0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	DETSC 3304	0.01	ug/l		0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l		0	0	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Phenols					0	0																														
Phenol - Monohydric	DETSC 2130	100	ug/l		0	0	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
VOCs					0	0																														
Dichlorodifluoromethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloromethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromomethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloroethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichlorofluoromethane	DETSC 3432*	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-dichloroethylene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Methylene Chloride	DETSC 3432*	27	ug/l		0	0	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27	< 27
Trans-1,2-dichloroethylene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-dichloroethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cis-1,2-dichloroethylene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2,2-dichloropropane	DETSC 3432	2	ug/l		0	0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Bromochloromethane	DETSC 3432	4	ug/l		0	0	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
Chloroform	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-trichloroethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-dichloropropene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Carbon tetrachloride	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Benzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloroethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethylene	DETSC 3432*	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloropropane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dibromomethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromodichloromethane	DETSC 3432	4	ug/l		0	0	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
cis-1,3-dichloropropene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Toluene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
trans-1,3-dichloropropene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,2-trichloroethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethylene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,3-dichloropropane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dibromochloromethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dibromoethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chlorobenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1,2-tetrachloroethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ethylbenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
m+p-Xylene	DETSC 3432	2	ug/l		0	0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
o-Xylene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Styrene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromoform	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Isopropylbenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,2,2-tetrachloroethane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromobenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2,3-trichloropropane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-propylbenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2-chlorotoluene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,3,5-trimethylbenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
4-chlorotoluene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tert-butylbenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2,4-trimethylbenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
sec-butylbenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
p-isopropyltoluene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,3-dichlorobenzene	DETSC 3432	2	ug/l		0	0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,4-dichlorobenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-butylbenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichlorobenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-dibromo-3-chloropropane	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2,4-trichlorobenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Hexachlorobutadiene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2,3-trichlorobenzene	DETSC 3432	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MTBE	DETSC 3432*	1	ug/l		0	0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Appendix B – Geotechnical plots



Scheme: **PCC Eco Park**	**CAPITA** Real Estate and Infrastructure Capita House, Wood Street, East Grinstead, West Sussex, RH19 1UU T 01342327161 http://www.capitaproperty.co.uk
Title: **SPT vs Depth – Milford Haven Group**	**Figure: 6.4.1**



Scheme: **PCC Eco Park**

Title: **Size corrected Point Load Index – Milford Haven Group**

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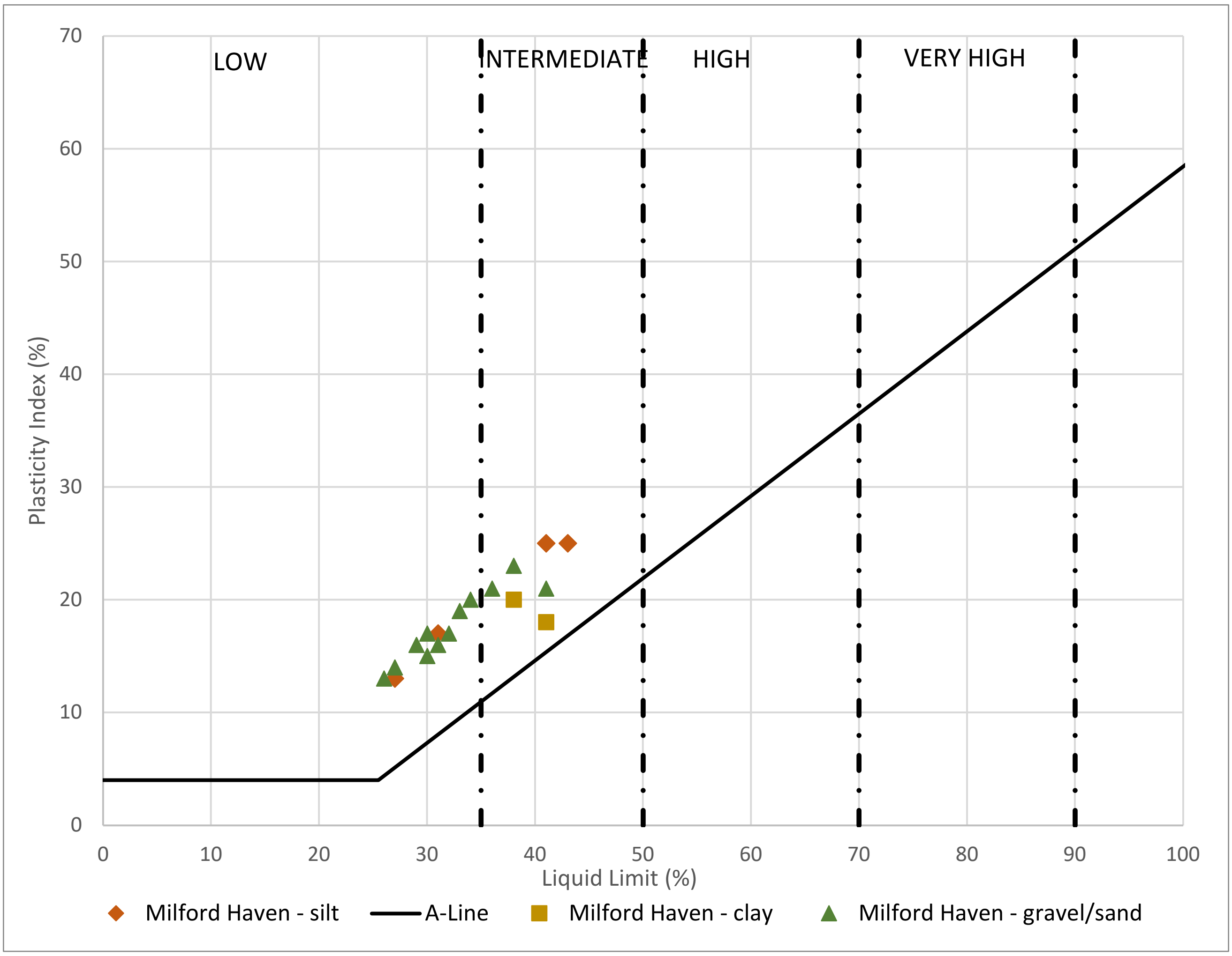
Figure: **6.4.2**



Scheme: **PCC Eco Park**

Title: **Plasticity Chart – Milford Haven Group**

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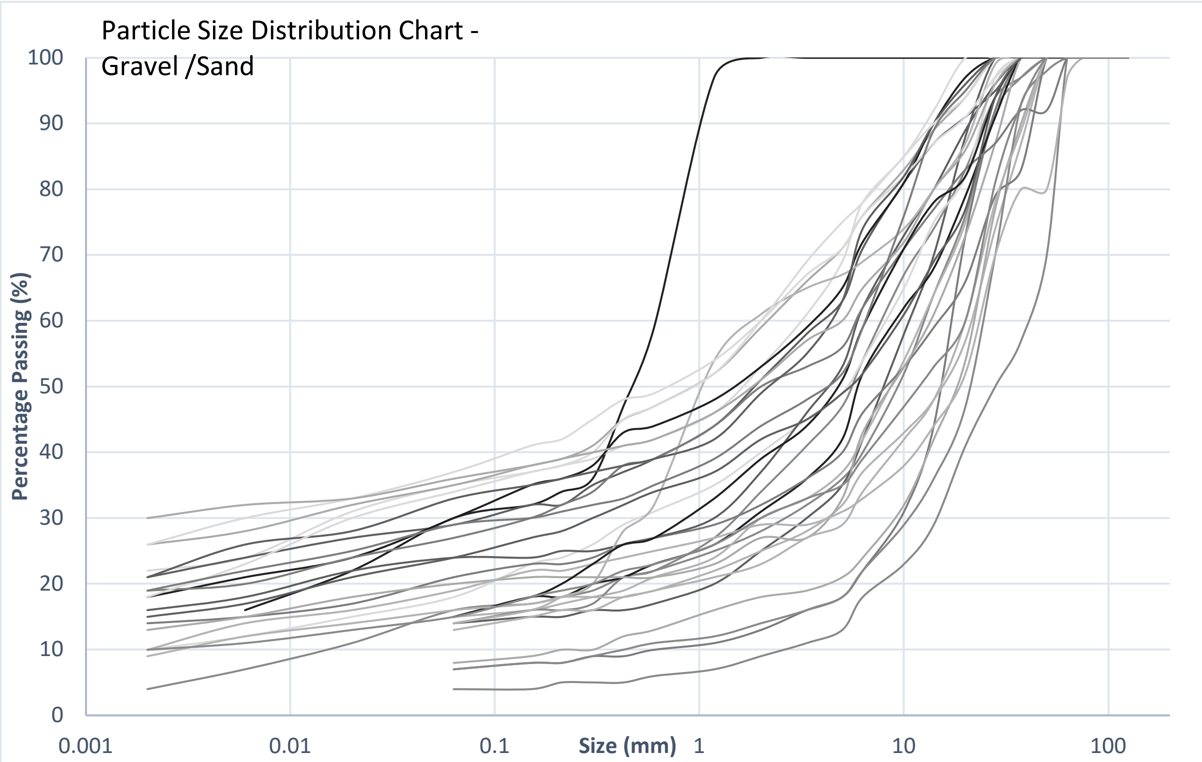
Figure: **6.4.3**



Scheme: **PCC Eco Park**

Title: **Grading Chart – Milford Haven Group**

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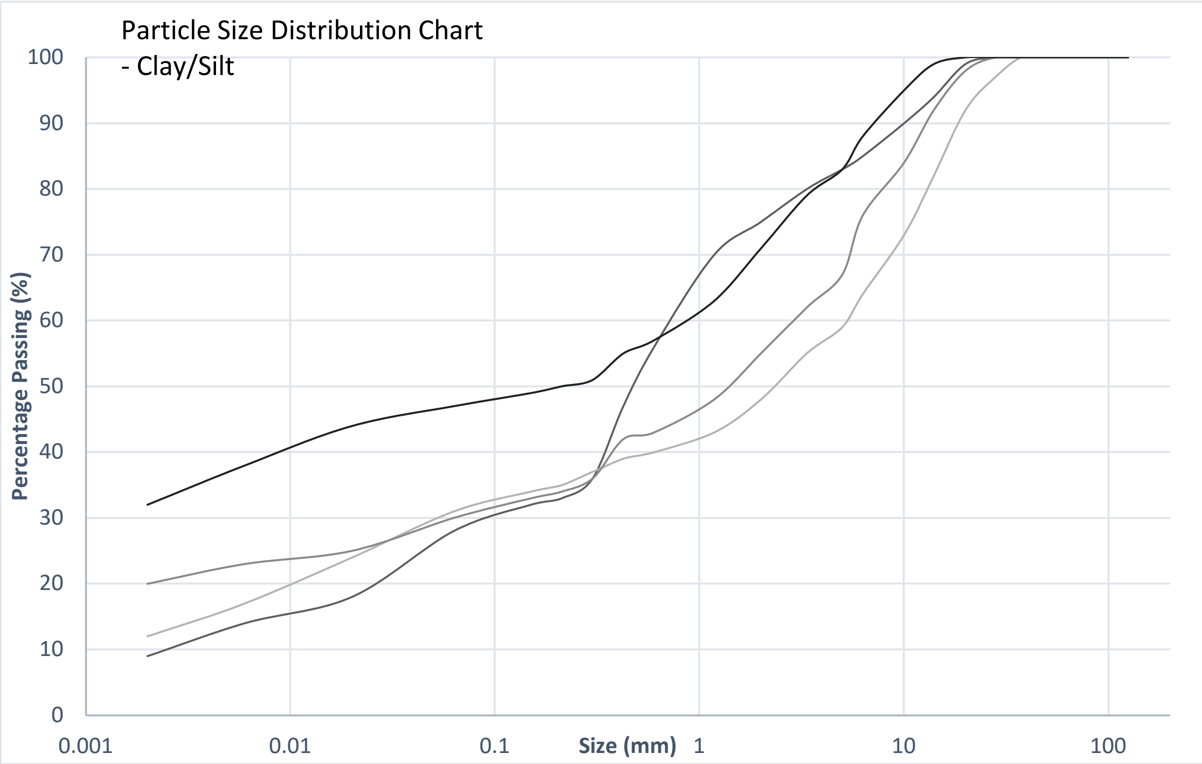
Figure: **6.4.4a**



Scheme: **PCC Eco Park**

Title: **Grading Chart – Milford Haven Group**

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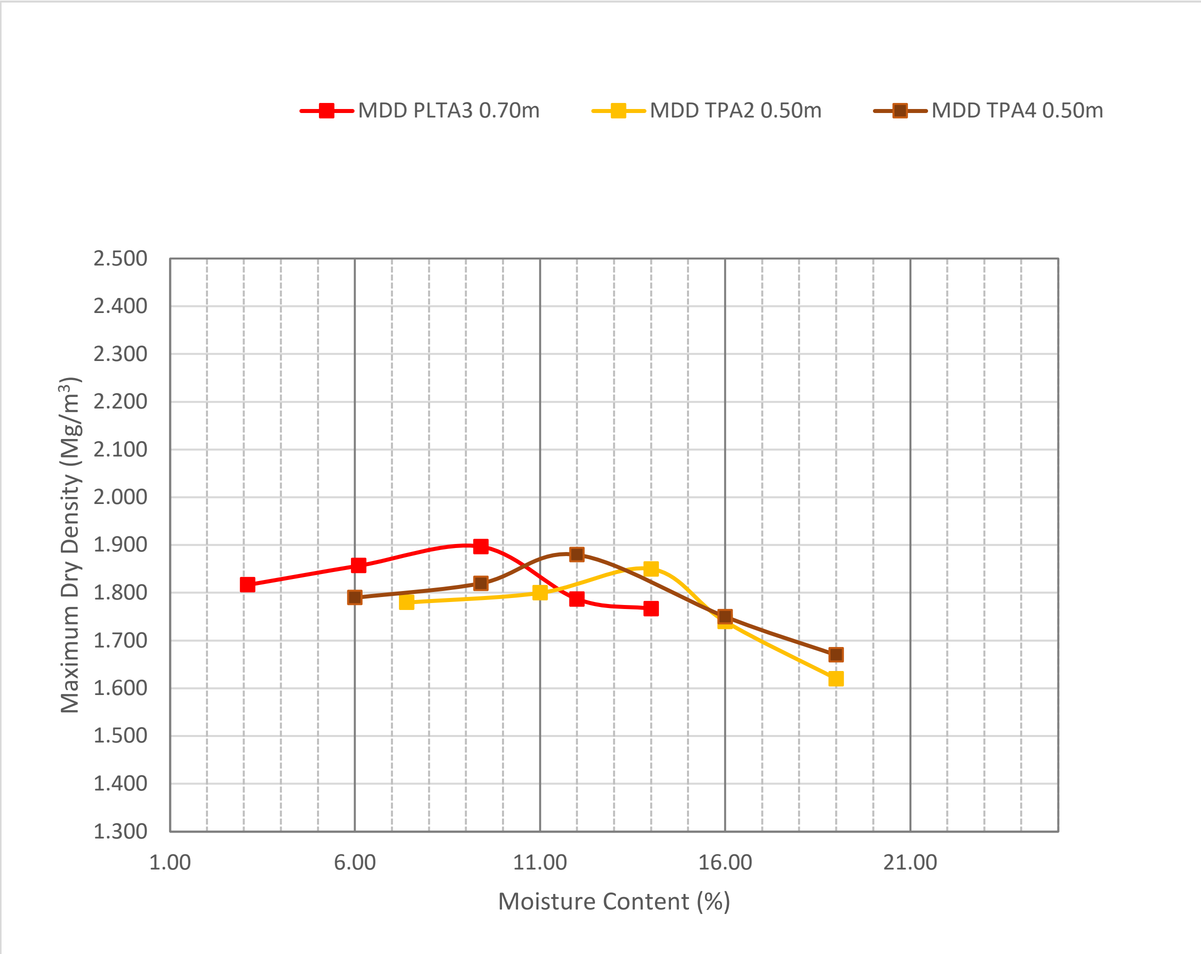
Figure: **6.4.4b**



Scheme: **PCC Eco Park**

Title: **Compaction Curves**

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Figure: **6.4.5**

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