



Dunsbury Park

Remediation Strategy and Verification Report

For Portsmouth City Council

Date: 14 April 2022

Doc ref: 19453-HYD-XX-XX-RP-GE-3001

DOCUMENT CONTROL SHEET

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Client	Portsmouth City Council	
Project name	Dunsbury Park	
Project title	Remediation Strategy and Verification Report	
BIM reference	19453-HYD-XX-XX-RP-GE-3001	
Project reference	19453-GELO	
Date	14/04/2022	

Document Production Record		
Issue Number	P1 S2	Name
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Document Revision Record			
Issue Number	Status	Date	Revision Details
S2	P1	14/04/2022	Original issue.

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1. INTRODUCTION

1.1 Terms of reference

On 30th March 2022, Hydrock Consultants Limited (Hydrock) was commissioned by Portsmouth City Council (the Client) to produce a Remediation Strategy and Verification Report (RSVP) for the site known as Dunsbury Park, Plots 500-502, Fitzwygram Way, Portsmouth, postcode PO9 4EE.

The site currently comprises a total area of approximately 2.0 Ha set at three levels (between 35m AOD to 25m AOD). The site has been recently subject to terracing and earthworks and is partially covered by aggregate surfacing. A site location plan (19453-HYD-XX-XX-DR-GE-1001) is provided in Appendix A.

This RSVP provides a strategy for the remediation that will be required for the proposed end use involving the construction of new commercial units 500, 501 and 502, with a combined floor area of approximately 7,600 sq. m. (81,870 sq. ft.), associated site infrastructure works, parking and soft landscaping. A proposed development layout (UMC Architects 'Dunsbury Park Masterplan, Portsmouth' Drawing 20179 F0009 A), is presented in Appendix A.

Preparation of this RSVP follows the completion of ground investigation work carried out at the site previously by Hydrock between July and August 2021 (report reference: 19453-HYD-XX-XX-RP-GE-1004), where a hotspot of ammonium, ammoniacal nitrogen, phenol and aromatic petroleum hydrocarbons band EC7-EC8 in groundwater at location WS5.02, and concentrations of methane above 1% were detected at locations WS5.02 and WS5.04. Subsequently, a controlled waters and ground gas risk assessment was produced in January 2022 (report reference: 19453-HYD-XX-XX-RP-GE-1006) to provide further assessment with respect to these issues. Conclusions from this report are summarised in Section 3.8.

The works have been undertaken in accordance with Hydrock's proposal referenced (19453-HYD-XX-500-FP-G-1002 dated 28th March 2022) and the Client's instructions to proceed (sent via email on 30th March 2022 by Robert Harper of Avison Young on behalf of the client).

1.2 Objectives

The objectives and scope of this RSVP are to present details of the remedial objectives and how remediation of the site will be undertaken and validated. In addition, the strategy explains how the works will be permitted under the current regulatory regime.

The remedial works will ensure that upon completion, the ground conditions at the site can be shown to be appropriate for its intended use and that it will not pose an unacceptable contamination risk to identified receptors. This document therefore, includes the protective measures required during the enabling and construction works phases in preparing the site for a commercial end use.

This is a working document and it may need to be updated, in agreement with the relevant regulatory bodies, at any stage during development dependent on any differences found between the conditions encountered and those expected from the ground investigation. The reference of this version of the RSVPS is 19453-HYD-XX-XX-RP-GE-3001-P1. Any new revisions will be given updated references. This document and any revisions are subject to the approval of the

regulators. Demolition and remediation work should not commence or continued with until such approval has been given.

1.3 Scope

The scope of the RSVP comprises:

- A summary of the conceptual ground model;
- a summary of the results of risk assessment undertaken at the site;
- a remediation options assessment;
- specification for remediation works;
- a summary of requirements with regards to reuse of soils on site and material management; and,
- a contingency plan for areas of unexpected contamination; and
- validation requirements.

1.4 Available information

The following documents, reports etc have been produced by Hydrock for the site:

- Hydrock. March, 2022. 'Dunsbury Park Plots 500-502 Controlled waters and ground gas risk assessment' undertaken for Portsmouth City Council. Reference: 19453-HYD-XX-XX-RP-GE-1006.
- Hydrock. December, 2021. 'Dunsbury Park Plots 500-502 Ground Investigation Report' undertaken for Portsmouth City Council. Reference: 19453-HYD-XX-XX-RP-GE-1004.
- Hydrock. September, 2021. 'Dunsbury Park Plots 500-502 Ground Investigation Factual Report' undertaken for Portsmouth City Council. Reference: 19453-HYD-XX-XX-RP-GE-1001.
- Hydrock. June, 2021. 'Dunsbury Park Phase 1 Desk Study' undertaken for Portsmouth City Council. Reference: 19453-HYD-XX-XX-RP-GE-1001.

The following documents, reports etc have been provided to Hydrock by the Client for use in the preparation of this report:

- 1st Line Defence. July, 2021. 'Dunsbury Park - Detailed Unexploded Ordnance (UXO) Risk Assessment' undertaken for Avison Young Holdings Limited. Reference: DA13636-00.
- UMC Architects. June 2021. 'Dunsbury Park Masterplan, Portsmouth'. Drawing reference: 20179 F0009 A.
- Avison Young. March 2021. 'Project Brief Dunsbury Park Portsmouth PO9 4EE';
- Bam design. 17th May 2017. 'Dunsbury Park Masterplan'. Drawing reference: DHF-BMD-MP-XX-DR-A-10014-S2-P19.
- Bam design. 11th May 2017. 'Dunsbury Park – Site infrastructure: External works Eastern access road construction details'. Drawing reference: DHF-BMD-ZZ-XX-DR-S-20511 RD.
- Bam design. October 2014. 'Dunsbury Hill Farm – Below ground drainage strategy'. Drawing reference: 4330.

The Client has commissioned or obtained assignment of the above documents and Hydrock and Hydrock is entitled to full reliance upon their contents.

1.5 Limitations

Hydrock has prepared the report based on available information obtained during the project period. Although every reasonable effort has been made to gather all relevant information, all potential environmental constraints or liabilities associated with the site may not have been revealed.

The report has been prepared for the exclusive benefit of Portsmouth City Council and those parties designated by them for the purpose of providing information on the remediation and verification works to be undertaken during the enablement and construction phase of the development. The contents of this RSVP and associated documents should only be used in that context. Furthermore, new information, changed practices or new legislation may necessitate revised consideration of the document after its submission and approval.

Hydrock has used reasonable skill, care and diligence in the design of the remediation of the site. The inherent variation of ground conditions allows only definition of the actual conditions at the locations and depths of trial pits and boreholes at the time of the investigation. At intermediate locations, conditions can only be inferred. Information provided by third parties has been used in good faith and is taken at face value. However, Hydrock cannot guarantee the accuracy or completeness of any information provided by others.

The work has been carried out in general accordance with recognised best practice as detailed in guidance documents such as Land Contamination Risk Management (Environment Agency 2021), BS5930:2015 and BS10175: 2011+A2:2017.

2. CONCEPTUAL MODEL

2.1 Context

This section presents a summary of the conceptual model pertaining to the site which was developed in previous ground investigation reports referenced in Section 1.4, and should be referred to for full details.

2.2 Site location and current land use.

The site is located to the north of Fitzwygram Way, Havant, Hampshire, nearest postcode PO9 4EE, to the east of the A3 (M), adjacent to junction 3, approximately 8 miles north of Portsmouth. The National Grid Reference of the approximate centre of the site is 469876E, 109295N.

Units 500, 501 and 502 areas are currently split over three terraces over an area of approximately 2.0 Ha. Each terrace is separated by a slope. The site is partially grassed with aggregate surfacing (limestone gravel in a fine matrix), with field boundary hedgerows remaining in-situ to the east and north and landscaping and planting present along the west. A recently constructed roundabout and main access road (Fitzwygram Way) is located in the south area of the site. New drainage infrastructure is noted running approximately north to south along to the eastern boundary. The Hermitage stream is noted to flow north to south, circa 75m south of the site.

2.3 Site history

The site has remained largely undeveloped until 2014, at which time development of infrastructure (including site roads, site levelling/plateaus and utility connections) was commenced. The construction of the roundabout and main road infrastructure (Fitzwygram Way) at the south boundary of the site is understood to have been completed in 2016.

With regards the surrounding areas, features of note include a clay pit, brick and tile works and brick kiln are known to have been located within 200m of the site between 1859 and 1867. In the 1970s the construction of residential developments across the area started and continued to increase until 1985. Earthworks were noted along the west boundary of the site between 1980 and 1991 related to the construction of A3 (M). It is understood that an area to the north east of the site, recorded as landfilled, is formed of soils cut from the line of the A3 (M).

One historical tank record was noted to the west of the site in 1970 over 100m away from the wider site boundary. No historical records related to historical garages or military land were identified within 500m of the site during the desk study research. Eight records of electricity substations were identified within 167m to 500m of the site between 1970 and 1993. One record of a gas governor was identified at 478m west of the site between 1984 and 1992.

2.4 Geology

Localised Made Ground is likely to be present as a result of earthworks and construction works.

The solid geology is formed by Bognor Sand Member, comprising glauconitic bioturbated or cross-bedded fine- and medium-grained partially cemented sands (with an average thickness of 5-10m according to BGS records), overlying the London Clay Formation, comprising blue-grey or grey-brown bioturbated or poorly laminated slightly calcareous, silty to very silty clay/ clayey silt

and sometimes silt, with some layers of sandy clay (with a thickness up to 150m according to BGS records).

Drawing 19453-HYD-XX-XX-DR-GE-1007 presented in Appendix A shows the proposed development in relation to BGS geological map records.

2.5 Hydrogeology

The Bognor Sand Member is classed as a Secondary A aquifer and the London Clay Formation as Unproductive strata.

The site is within a Zone 1C Source Protection Zone for confined aquifer body, presumed to relate to the underlying (at depth) chalk. There are no groundwater abstractions within 2km of the site.

2.6 Hydrology

There are no surface water features within the site boundary. The nearest surface water feature (Hermitage Stream) is located approximately 150m southwest from the south boundary of the site.

Reference to the Environment Agency website shows the site is located within the catchment of the East Hampshire Rivers, with the specific river water body being the Hermitage Stream - source to confluence with Langstone Harbour. The current (2019 cycle 2) overall status under the Water Framework Directive is 'moderate'.

The nearest licensed surface water abstraction is 1558m northeast of the site corresponding to direct spray irrigation.

2.7 Flood risk

The desk study information indicates the proposed development is in Flood Zone 1 (with a low probability of flooding from rivers or the sea).

No further consideration of flood risk is undertaken in this report. Specialist flood risk advice should be sought with regard to drainage and flooding.

2.8 Mining and mineral extraction

In summary, the risk associated with mining or mineral extraction within the site boundary is considered low. The desk study information indicates several records of surface mining and surface groundworks in the vicinity of the site, described as cuttings, between 28m to 211m west, probably associated with the construction of the A3 (M), and brick kiln and tile works are recorded at 155m east and 124m south of the site.

2.9 Waste management

There is one historical landfill record located 140m east and north east of the site at its closest point (between the Unit 600 and 700 areas), records indicate the material deposits was inert waste (understood to be related to construction of the A3 (M)).

2.10 Radon

The site is not in a Radon Affected Area.

2.11 Unexploded ordnance (UXO)

The specialist UXO risk assessment indicates a Low-Medium Risk from items of German aerial delivered UXO and Low from Allied UXO across the site.

2.12 Ground model

2.12.1 Physical ground model

The physical ground conditions as encountered by Hydrock's investigation in 2021 at the site comprise:

- Made Ground, comprising 3 types:
 - » Surface Covering, between ground level and 0.30m below ground level (bgl), comprising sandy to very sandy gravel of limestone aggregates; over
 - » Engineered Fill between 0.05m bgl to 1.00m bgl generally comprising very yellowish brown silty fine sand (probable lime/ cement-based stabilised soils).
 - » General, at the eastern side of the site from 0.70m bgl to 1.50m bgl comprising orangish/ yellowish brown silty sand with rare mudstone and brick fragments.
- Topsoil, at the western side of the site, between ground level and 0.12m bgl comprising orangish brown sandy silt/clay with abundant rootlets.
- Bognor Sand Member, across the centre and south areas of the site between 0.40m bgl and 2.30m bgl, comprising medium dense yellowish/ orangish brown with occasional light grey mottling, silty fine sand or very sandy silt with rare flints.
- London Clay Formation (weathered), across the entire site, between 0.40m bgl to 3.30m bgl, generally comprising firm, orangish brown and light grey mottled sandy silt clay.
- London Clay Formation, across the entire site, between 0.40m bgl and up to a maximum depth of 25.50m bgl, generally comprising firm, orangish brown and light grey mottled sandy silt clay. Becoming stiff with depth.

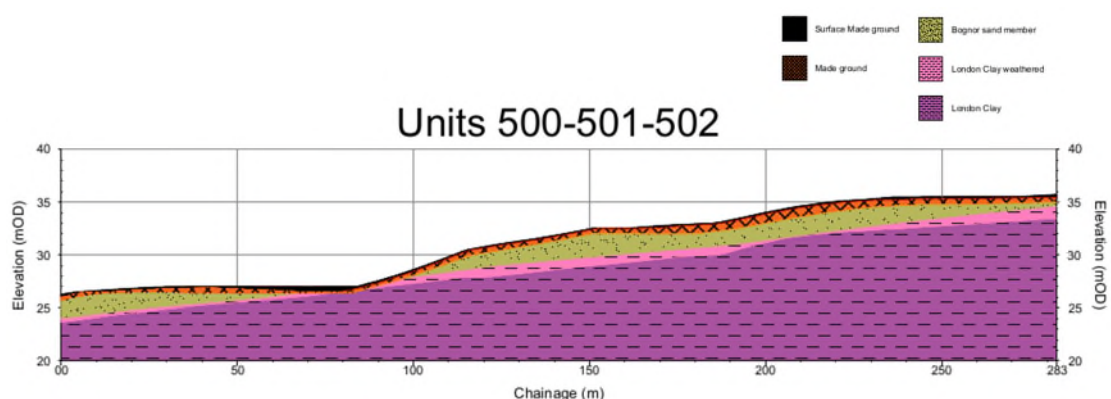


Figure 2.1: Indicative geological cross section (extracted from CSM drawing reference 19453-HYD-XX-XX-DR-GE-1006)

2.12.2 Groundwater

Groundwater was encountered at depths between 1.20m bgl and 3.00m bgl within the trial pits and the windowless sampler boreholes, and at 5.50m bgl, 8.50m bgl and 10.70m bgl within the cable percussive boreholes. Details of groundwater occurrence during site works are summarised in Table 2.1

Table 2.1: Groundwater occurrence

Stratum	Date	Location	Fieldwork				Comment
			Groundwater observation		Rose to after 20 min		
			m bgl	m AOD	m bgl	m AOD	
Unit 500							
London Clay Formation	16/08/21	BH5.05	8.50	18.07	8.20	18.37	Slow seepage
	16/08/21	BH5.05	10.70	15.87	10.50	16.07	Slow seepage
	11/08/21	BH5.04	5.50	21.20	5.40	21.30	Slow seepage
	11/08/21	BH5.04	10.10	16.60	9.70	17.00	Slow seepage
Unit 501							
Bognor Sand Member	27/07/21	WS5.05	1.20	30.85	-	-	Soil recovered wet.
London Clay Formation	10/08/21	BH5.02	8.50	24.18	8.10	24.58	Slow seepage
	12/08/21	BH5.03	5.50	25.21	5.20	25.51	Slow seepage
	12/08/21	BH5.03	8.80	21.91	8.50	22.21	Slow seepage
Unit 502							
London Clay Formation (Weathered)	21/07/21	TP5.02	3.00	32.6	-	-	Slow seepage
London Clay Formation	27/07/21	WS5.02	1.85	33.35	-	-	Soil recovered wet.
	09/08/21	BH5.01	8.50	26.84	8.20	27.14	Slow seepage

Water levels recorded post-fieldwork ranged from 0.86m bgl to 1.98m bgl in plot 500; between 0.34m bgl to 2.69m bgl in plot 501; and between 1.58m bgl to 4.00m bgl in plot 502. Groundwater levels recorded during post-fieldwork monitoring are summarised in Table 2.2.

Table 2.2: Groundwater level data summary

Stratum*	Date range	Location	Post-fieldwork monitoring	
			Depth to groundwater (range) (m bgl)	Groundwater elevation (range) (m OD)
Unit 500				
London Clay Formation (weathered) / London Clay Formation	27/08/21 - 24/09/21	BH5.05	1.78 - 1.98	24.59 - 24.79
	11/08/21 - 24/09/21	WS5.08	0.86 - 1.55	25.18 - 25.87
Unit 501				
Bognor Sand Member / London Clay Formation (weathered)	11/08/21 - 24/09/21	WS5.04	2.06 - 2.47	28.33 - 28.73
Bognor Sand Member	11/08/21 - 24/09/21	WS5.05	1.54 - 2.20	29.85 - 30.51

Stratum*	Date range	Location	Post-fieldwork monitoring	
			Depth to groundwater (range) (m bgl)	Groundwater elevation (range) (m OD)
London Clay Formation (weathered)	27/08/21 - 24/09/21	BH5.02	2.49 - 2.69	29.99 - 30.19
London Clay Formation	11/08/21 - 24/09/21	BH5.03	0.34 - 0.75	29.96 - 30.37
Unit 502				
London Clay Formation (weathered)	27/08/21 - 24/09/21	BH5.01	1.58 - 2.00	33.34 - 33.76
London Clay Formation	11/08/21 - 24/09/21	WS5.02	3.56 - 4.00	31.20 - 31.64

*Stratum in which groundwater was encountered during monitoring visits.

In summary, there is shallow groundwater within the Bognor Sand Member, London Clay Formation (weathered) and the sandy fraction of the London Clay Formation. A deeper groundwater unit is present at approximately 10m below ground level (bgl) within the London Clay Sand Beds.

2.12.3 Ground gas

Records from the gas monitoring boreholes undertaken are summarised in Table 2.3.

Table 2.3: Range of ground gas data

Location and Geology	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Steady flow rate (l/hr)	Comment
BH5.01					
London Clay Weathered/ London Clay Formation	ND	0.1 – 0.7	7.5 – 19.7	0.0 – 7.0	Concentration of methane were below detection limit. Concentrations of carbon dioxide readings are below 1%.
BH5.02					
London Clay Weathered/ London Clay Formation	ND – 1.0	ND – 0.1	4.6 – 20.3	ND – 0.0	A concentration of methane at 1% was detected in 1 out of 7 occasions. Concentrations of carbon dioxide readings are below 0.1%.
BH5.03					
London Clay Formation	ND	0.1	18.9 – 20.8	-11.7 to 4.5	Concentration of methane were below detection limit. Concentrations of carbon dioxide readings are below 0.1%. Ground gas monitoring could not be done on last visit due to well being flooded.
BH5.05					
London Clay Weathered/	ND	0.2 – 1.1	3.3 – 19.7	0.0 - 0.1	Concentration of methane were below detection limit. Concentrations of carbon

Location and Geology	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Steady flow rate (l/hr)	Comment
London Clay Formation					dioxide readings are below 1.1%.
WS5.02					
Made Ground/ London Clay Weathered/ London Clay Formation	ND to 41.3	ND to 0.1	0.3 to 20.4	ND to 0.0	Concentrations of methane above 1% were detected on 7 out of 9 occasions (between 2.6% and 41.3%). Concentrations of carbon dioxide readings are below 0.1%.
WS5.04					
Bognor Sand Member/ London Clay Weathered/ London Clay Formation	ND to 4.2	ND to 0.2	4.4 to 20.4	-6.4 to 0.0	Concentration of methane above 1% was recorded at 1 out of 9 occasions. Concentrations of carbon dioxide were below 0.2%.
WS5.05					
Bognor Sand Member/ London Clay Formation	ND	ND to 1.3	1.4 to 20.3	-11.7 to 9.2	Concentration of methane were below detection limit. Concentrations of carbon dioxide were below 1.3%. Variable gas flow rate noted.
WS5.08					
London Clay Weathered/ London Clay Formation	ND	ND to 0.1	14.4 to 20.5	-4.8 to 4.1	Concentration of methane were below detection limit. Concentrations of carbon dioxide were below 1.3%. Variable gas flow rate noted.
ND denotes Not Detected.					

3. CONTAMINATION RISK ASSESSMENT REVIEW

3.1 Geo-environmental exposure model

This section summarises the risk assessment findings as presented in Hydrock's Supplementary Ground Investigation Reports (references 19453-HYD-XX-XX-RP-GE-1004 and 19453-HYD-XX-XX-RP-GE-1006).

Further details on the risk assessment procedures, averaging areas, chemical testing results and assessments are included in the Hydrock's Ground Investigation Reports mentioned above.

A summary of the plausible linkages is presented on the Conceptual Model provided in Appendix A. (Hydrock Drawing 19453-HYD-XX-XX-DR-GE-1008).

3.1.1 *Potential sources of contaminants*

3.1.1.1 *Potential on-site sources of contamination*

- Made Ground, associated earthworks/construction works, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S01).
- Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / earthworks / construction works (S02).

3.1.1.2 *Potential off-site sources of contamination*

- Made Ground, associated with landfill, historical mining activities (old clay pit, brick and tile works) in the north of the site, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S03).
- Made Ground, associated with earthworks for the construction of A3 (M) in the west boundary of the site, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S04).
- Hydrocarbon vapours from potential VOC and petroleum hydrocarbon spillages/leaks from unspecified tank located at 110m N of the site. (S05).
- Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / landfill / backfilled clay pits/brick works. (S06).

3.1.2 *Potential receptors*

The following potential receptors in relation to the proposed land use have been identified.

- People (neighbours, site end users) (R01).
- Development end use (buildings, utilities) (R02).
- Groundwater: Secondary A aquifer status of the Bognor Sand Member (R03).
- Surface water: off-site Hermitage Stream approximately 75m to the south of the site (R04).
- Plant life / Soft landscaping areas (R05)
- Ecology: Habitat Creation Area at the west side of the site (R06).

- Ecology: Designated Ancient and Seminal Woodland / Ancient Replanted Woodland in the surrounding areas of the site (R07).
- Aquatic ecosystem in the Hermitage Stream (R08).

3.1.3 *Potential pathways*

- Ingestion, skin contact, inhalation of dust and outdoor air by people (P01).
- Direct contact with substances deleterious to building materials (P02).
- Ground gas (Methane, carbon dioxide, etc.) ingress via permeable soils and/or construction gaps (P03).
- VOC and petroleum hydrocarbon vapour ingress via permeable soils and/or construction gaps (P04).
- Root uptake by plant (P05).
- Migration of contaminant via leachate migration through the unsaturated zone in Bognor Sand Member (P06).
- Surface water via overland flow (P07).
- Surface water via drainage discharge (P08).
- Surface water via base flow from groundwater (P09).

3.2 Human Health risk assessment

3.2.1 *Metals*

No exceedances were detected in Made Ground or Natural soils.

3.2.2 *Asbestos*

No visual evidence of Asbestos Containing Materials (ACM) was encountered in any of the exploratory hole locations during intrusive ground investigation works. The laboratory results confirm the absence of Asbestos Containing Materials (ACM) or fibres in all samples submitted for testing.

3.2.3 *Petroleum Hydrocarbons*

No evidence of the presence of petroleum hydrocarbons was encountered during intrusive ground investigation works. Laboratory testing confirmed the absence of petroleum hydrocarbons on all samples submitted for testing.

3.3 Plant life risk assessment

No exceedances were detected in any of the samples submitted for laboratory testing. Therefore, no further considerations are required in relation to chemicals of potential concern to plant life.

3.4 Controlled waters assessment

A hotspot of ammonium, ammoniacal nitrogen, phenol and aromatic petroleum hydrocarbons band EC7-EC8 in groundwater at location WS5.02. The risk assessment concluded that as contaminants in groundwater at location WS5.02 are not showing evidence of migration to other

nearby monitoring well positions or the Hermitage Stream, Hydrock does not believe this hotspot poses a significant risk to Controlled Waters and no mitigation measures are required regarding controlled waters.

3.5 Ground gas

Concentrations of methane above 1% were detected at locations WS5.02 and WS5.04. The risk assessment indicates that the site was classified as CS1, with the exception of Plot 502 which was classified as CS3 due to consistently high concentrations of methane at WS5.02. Additional ground gas risk assessment was undertaken as discussed in Section 3.8.

3.6 Water Pipelines

The site is previously undeveloped, with some recent earthwork and terracing across the site. The preliminary risk assessment and ground investigation has indicated no plausible contaminant sources. It is envisaged that standard pipework will be suitable for the site. However, confirmation should be sought from the water supply company at the earliest opportunity.

3.7 Waste assessment

According to the WAC testing undertaken during previous ground investigation works, one out of four samples is classed as 'stable non-reactive hazardous waste in non-hazardous landfill' due to high concentrations of Total Dissolved Solids (TDS) (6,200mg/kg compared to the threshold concentration of 4,000mg/kg) at location WS5.09 at 0.30m bgl (in the southwest corner of Plot 500 building). The remaining three samples were considered suitable for disposal at an inert landfill.

In addition, WAC test results for location WS5.06 at 1.50m bgl (west car park area of Plot 500) indicates concentration of selenium of 0.10mg/kg, which is the upper limit concentration for non-hazardous waste. Advice should be sought from the receiving landfill to confirm disposal suitability.

Based on Hydrock's HazWasteOnline™ assessment, results indicate that one out of 18 samples (SA101 at 0.30m bgl) is classed as 'Hazardous' due to high pH (11.5), hazard properties 'HP 8: corrosive, waste which on application can cause skin corrosion'.

3.8 Additional controlled waters and ground gas risk assessment conclusions (Hydrock Report Reference: 19453-HYD-XX-XX-RP-GE-1006)

The controlled waters risk assessment concluded that as contaminants in groundwater at location WS5.02 are not showing evidence of migration to other nearby monitoring well positions or the Hermitage Stream, Hydrock does not believe this hotspot poses a significant risk to Controlled Waters and no mitigation measures are required in relation to controlled waters.

The gas risk assessment states that the site was classified as CS1, with the exception of Plot 502 which was classified as CS3 due to consistently high concentrations of methane at WS5.02; however, based on a cut and fill analysis (Hydrock drawing ref: DP-HYD-00-ZZ-DR-C-7400-P03, presented in Appendix A), it was determined that the area in the vicinity of Plot 502 will be subject to significant cut/fill (up to around 2.5-3.0m) which would remove all Made Ground and part of the underlying London Clay Formation. It is considered that this will remove the source of

the ground gas and therefore, no additional gas mitigation is considered necessary for Plots 500-502 of the development.

To confirm removal of the Made Ground and upper horizons of the London Clay Formation, a site inspection by a suitably competent geo-environmental engineer should be undertaken following completion of the earthworks cut in the vicinity of WS5.02 (Plot 502).

3.9 Summary

The source-pathway-receptor linkages are presented in Section 3.1, following the risk evaluation process, require mitigation by the remediation works described herein. Risks requiring mitigation are presented in Table 3.1

Table 3.1: Residual risks following risk evaluation

Contaminant Linkage				Comments
Pollutant Linkage	Sources	Pathways	Receptors	Mitigation
P 1 L	Concentrations of methane up to 41.3% at WS5.02	Migration through soils or groundwater to indoor air.	End users of new buildings (asphyxiation).	The site was classified as CS1, with the exception of Plot 502 which was classified as CS3 due to consistently high concentrations of methane at WS5.02. However, the cut and fill analysis indicate the area in the vicinity of Plot 502 will be subject to significant cut/fill (up to around 2.5-3.0m) which would remove all Made Ground and part of the underlying London Clay Formation. It is considered likely that this will remove the source of the ground gas and therefore, no gas mitigation is considered necessary for Plots 500-502 of the development.
			New buildings (damage by explosion).	
			Neighbouring properties (damage by explosion).	

4. REMEDIATION OPTIONS APPRAISAL

4.1 Preliminary Assessment

Investigation and risk assessment have concluded that the site will require remediation in order to mitigate the risk from ground gas (methane) at WS5.02. The objectives of the remediation are to sever one or more of the linkages within the source-pathway-receptor (S-P-R) model. Hydrock would consider the objectives of the remediation works to be as follows:

- To prevent the creation of a potential linkage between ground gas (methane) at WS5.02 and receptors (end users and buildings).

This Remediation Options Appraisal has been undertaken in general accordance with Land contamination: risk management (LCRM) (Environment Agency, 2021). It will inform the remediation of the site and reduce / control the risks associated with relevant pollutant linkages to an acceptable level.

The initial screening process considers the available remedial techniques based on the following key criteria:

- Effectiveness. The strategy must work within the context of the site and be effective in the removal of contamination linkages.
- Practicality. The strategy has to have been successfully used in similar situations on other sites and readily available within the UK market. Novel solutions or those still in the research stage are not considered here.
- Durability. The strategy needs to be durable and not reliant on ongoing maintenance to continue being effective.
- Environmental impact. The remediation treatment should not affect the quality of the environment during or following remediation.
- Relative Cost. The strategy must not entail excessive cost.
- Relative Operational Time: The strategy should work in a feasible and realistic time scale.
- Sustainability. More sustainable options are preferred.

4.2 Viable Options

In accordance with LCRM (2021), the first stage of an options assessment is to select feasible remediation techniques which can be applied to achieve a site which is suitable for the proposed development.

Table 4.1 summarises the accepted remedial techniques readily available in the UK and assesses each against the key parameters listed above.

Initially the effectiveness at treating the contamination is assessed. This is broken down into: effective (Y), partially effective (P) or ineffective (N).

Previous site experience, technical literature and Hydrock's in house knowledge have been used to reject impractical and or unsuitable remediation options. The primary reasons for rejection of an option are due to the ongoing operational constraints, the cost and the inability to treat all the required contaminants. If an option is deemed impractical, it is noted in the comments.

The durability of each of the remediation options is assessed as either: durable (D) i.e. providing a long-term solution; durable with maintenance requirements (D-M) e.g. gas venting trenches or permeable reactive groundwater barrier, which may require inspections and maintaining; or temporary (T) i.e. providing a short-term solution, but not necessarily effective in the long term e.g. groundwater pump and treat without source removal.

The environmental impact is then assessed as: Low (L), Moderate (M) or High (H).

The listed techniques are then assessed in terms of relative cost ranging from: low cost (£), moderately expensive (££), expensive (£££), to prohibitively expensive for the site under consideration (£££+).

Timescale over which the remediation technique is operational has been broadly assessed in units of weeks (W), months (M), years (Y) and decades (D). If for example a given technique is only effective over a period in the order of years to decades then its overall feasibility is diminished.

Sustainability is assessed based on a relative comparison of: Sustainable (S) or Unsustainable (U).

Table 4.1: Applicability of Remediation Options

Method	Remediation options	Effectiveness				Durability	Environmental Impact	Relative Cost	Relative Time	Sustainability	Comments
		Metals	PAH	TPH	Ground gas						
Civil Engineering	Cover System	Y	Y	Y	N	D	L	£-££	W	U	Not considered suitable for mitigation of gas risk. Not feasible.
	Excavation and Disposal	Y	Y	Y	Y	D	M	££	W	S	Will effectively remove the source of the contamination and earthworks cut is an integral part of the proposed development. Would need to be undertaken in association with a Materials Management Plan (MMP) prepared in accordance with the CL:AIRE: Definition of Waste Code of Practice (DowCop) and signed off by a Qualified Person. Feasible.

Physical	In-situ soil remediation	N	P	P	N	D	M	££	W	U	In-situ soil remediation via excavation and processing for reuse is unlikely to mitigate the ground gas risk. Not feasible.
	Ex-situ soil remediation	Y	Y	Y	N	D	M	£££	M	U	Ex-situ soil remediation via excavation and processing for reuse is unlikely to mitigate the ground gas risk. In addition, it is expensive and not sustainable. Not feasible.
	Materials Management (Excavation and Re-Use of Suitable Materials)	Y	N	N	N	D	L	££	W	U	Will effectively remove the source of the contamination and earthworks cut is an integral part of the proposed development. Would need to be undertaken in association with a Materials Management Plan (MMP) prepared in accordance with the CL:AIRE: Definition of Waste Code of Practice (DowCop) and signed off by a Qualified Person. Cut soils will representing a gas risk will need to be placed in a manner that will not introduce a new gas risk in the area of placement. Feasible.
	Soil washing	N	Y	Y	N	D	H	£££	M	U	Not considered suitable for mitigation of gas risk. Not feasible

Stabilisation and solidification	Hydraulic binders	Y	N	Y	N	D	M	££ £££	W	S	Feasible, although there are other techniques which may be preferable and pre-treatment may be necessary. Mixing of additives into soils to prevent release of methane may be possible although not a standard practice. Additives may include binding agents for organics and cementitious materials. Feasible.
	Biopiles										
Biological	Windrow Turning										
	Windrow Turning with addition of additives to stimulate aerobic microbial activity	N	N	Y	N	D	L	£££	M	U	Not considered suitable for mitigation of gas risk. Not feasible.

4.3 Selected Option

The selected most appropriate remediation option includes the excavation and reuse of soils from WS.502 under a MMP as part of site earthworks cut and fill programme. Soils excavated from this area for reuse must be placed in a manner that will not introduce a new gas risk in the area of placement.

More details are provided in Section 5.

5. REMEDIATION STRATEGY AND VERIFICATION PLAN

5.1 Overview

The Remediation Strategy and Verification Plan is presented in the following sections. In addition to this document, all works shall be completed in accordance with a suitable geotechnical specification which will specify the requirements for any backfilling works.

5.2 General Compliance Issues

The implementation of the remediation strategy shall be in accordance with documented quality assurance procedures to be prepared by the remediation contractor. These will include the following:

- Remediation Strategy and Verification Plan – (this document) which sets out the requirements of remediation and the requirements for gathering data to demonstrate that the remediation objectives as detailed in this report are met.
- Verification Report – this will provide a record of the remediation activities undertaken at the site and the data collected as part of the verification plan to support compliance with remediation objectives and criteria. It will also include descriptions of the works with associated ‘as built’ drawings and details of any unforeseen conditions encountered during the works and how they were dealt with.

5.3 Summary of Remediation Stages

Based upon the findings of the ground investigation and risk assessment and the Remediation Options Appraisal (presented in Section 4), the following works will be undertaken to create a site which is suitable for its proposed end use.

It should be noted that if soils are to be reused on site, which is anticipated, works will need to be completed in accordance with the ‘CL:AIRE Definition of Waste Development Industry Code of Practice, 2nd Edition’. The Contractor shall produce an appropriate Material Management Plan and provide a ‘Qualified Person (QP) Declaration’ covering all aspects of the works. Submission of an MMP validation report to CL:AIRE on completion of the works shall also be a responsibility of the appointed contractor.

The following remedial activities will be required to deliver the site Suitable for Use (SFU) for the

The remediation works should aim to maximise the reuse of soils on site and minimise off-site disposal, whilst recognising the end goals of the various Specifications.

The site remediation plan (reference 19453-HYD-500-XX-DR-GE-1010) is presented in Appendix A.

5.3.1 Pre-works Phase

The following works are considered necessary during the Pre-works Phase of the project:

- Task 1: Project setup and management including liaison with the Local Authority, Environment Agency and Health and Safety Executive, where necessary, with appropriate permits / licences / consents / approvals granted.
- Task 2: Appointment of an appropriate contractor and appropriate permits / licences / consents / approvals.
- Task 3: Pre-works air quality boundary monitoring for dust before earthworks commence and during the earthworks.

5.3.2 Enablement Phase

The following works are considered necessary during the Enablement Phase of works:

- Task 4: Excavation to the required formation level (including removal of hotspots), examination and validation of soils below known hotspots following excavation and stockpile testing.
- Task 5: disposal of excess soils to appropriate off-site facilities.
- Task 6: Reuse and placement of soils (materials management).
- Task 7: Off-site disposal of waste material.
- Task 8: Decommission of historical boreholes.
- Task 9: Validation during Enablement Works.

It is anticipated the Enablement Phase of work will be undertaken by a single Contractor, referred to as the Enablement Contractor.

5.3.3 Construction Phase

The Construction Phase of works will either be undertaken by a separate Contractor, or the same Enablement Works Contractor. The Contractor shall undertake:

- Task 10: Installation of pipe for potable water supplies (type to be confirmed by the regulator, however it is unlikely that barrier pipe will be required).
- Task 11: Placement of clean site-won material in landscaped areas.
- Task 12: Validation during Construction Works.

5.3.4 General Note

The Contractors for each stage of works must manage the risks in accordance with their legal requirements and will need to prepare appropriate health and safety documentation and obtain appropriate approvals, licences, consents and permits prior to commencement. In addition, appropriate working methods, monitoring and reassurance testing will need to be undertaken during the works.

All works on site during any phase of work will require the use of suitable air, dust and noise monitoring, personal protective equipment (PPE) as required by current guidance, practice guidance and legislation. Information is provided in Appendix D to assist. However, it should be noted that the guidance provided in Appendix D is considered to be the minimum standards to be met by the Contractors and it is the Contractors responsibility to ensure works are undertaken in line with the above. Please refer to Appendix D for additional information and general requirements.

All works need to be undertaken in accordance with the Remediation Method Statement (this document) and a Materials Management Plan with a QP Declaration and all remediation works are to be overseen by suitably experienced site staff and a site watching brief or periodic visits will be made by Hydrock Consultants, to undertake the necessary verification.

6. REMEDIATION STRATEGY - PRE-WORKS PHASE

6.1 Task 1: Project set-up

Prior to commencement of site activities, detailed planning of the project shall be undertaken including liaison with relevant stakeholders. This report, along with copies of previous environmental reports regarding the Site, should be submitted to the Local Authority and the Environment Agency where required for comment.

The project is to be operated under the Construction, Design and Management (CDM) Regulations, (2015).

6.2 Task 2: Contractor appointment

Under the CDM regulations, Portsmouth City Council should appoint a Principal Designer, who would provide the Pre-construction Information Report (PCIR) and a Principal Contractor who would provide a site-specific Construction Phase Health and Safety Plan (CPHASP) prior to works commencing. If the client does not appoint a Principal Designer, they will assume the role.

The Principal Designer will review the CPHASP and notify the local office of the Health and Safety Executive (HSE) of the works prior to commencing (via form F10).

The Principal Contractor must manage the risks in accordance with the requirements outlined in this document and will need to prepare appropriate health and safety documentation and obtain appropriate approvals, licences, consents and permits prior to commencement.

The Principal Contractor will be responsible for implementing any MMP for the site developed by a suitably qualified and experienced consultant.

The Contractors will need to have suitable experience working in a similar setting, with similar ground conditions and with the Contaminants of Concern present at the site.

6.3 Task 3: Air quality boundary monitoring for dust

Air quality and dust monitoring stations will be set up and monitored by the Contractor to record the dust concentrations during the works as required.

7. REMEDIATION STRATEGY - ENABLEMENT PHASE

The Enablement Contractor will undertake the following works.

7.1 Task 4: Excavation to required formation level (including removal of hotspots), examination and validation of soils below known hotspots following excavation and stockpile testing

Soils on site will be excavated to reach the required formation level. Specifically for plot 502, it is known from cut and fill analysis that excavations up to 3.0m bgl will take place, where a hotspot of methane has been identified as contaminated at the southeast corner (location WS5.02). Removal and reuse of these soils requires to be in accordance with MMP and/or disposed off-site to an appropriate facility. Reuse of the soils must involve appropriate placement in a manner that will not introduce a new gas risk.

Impacted soils removal (as a part of earthworks) will be undertaken by excavation of soils from areas of contamination encountered during remediation (both known and unknown). The Enablement Contractor will need to have an experienced Geo-environmental Engineer present during excavation of identified hotspot areas to inspect for suspect material and oversee effective segregation, stockpiling and validation of soils. In addition, Hydrock will undertake a watching brief and the Enablement Contractor is to inform Hydrock prior to hotspot excavations.

The delineation of the full extent of all hotspots or contamination has not been undertaken during the works to date. Delineation will be required by the Enablement Contractor during remediation to define the extents of all hotspots and contamination encountered. Any drawings indicating the extent of contamination are schematic. The contractor is to satisfy itself with regards to volumes of soil to be excavated, remediated or disposed of and replaced. Hydrock Consultants accept no liability with regards to volume estimates calculated.

The soils below/around all hotspots or areas of visual/olfactory evidence of hydrocarbon contamination uncovered during enablement works shall be inspected, tested and validated by chemical testing.

Validation of the removal of the methane gas risk in the vicinity of WS5.02 through the earthworks cut should be undertaken via watching brief inspection.

Validation of the removal of any unexpected hotspots should be via the chemical analysis of samples recovered from the sides and base of hotspot excavations. For large excavations in excess of 100m², a 5m validation grid (on all sides and base) is proposed.

Validation is to be undertaken by an experienced geo-environmental engineer (working on behalf of the contractor or the Client) in accordance with the remedial target values (RTVs) described below and as detailed in Table 7.1. If hotspots for other contaminants of concern (CoC) are identified during further investigation works, RTVs will be developed for the relevant CoC.

The chemical criteria presented in Table 7.1 shall be used for excavation validation and re-use criteria with respect to petroleum hydrocarbon contamination. Additionally, materials shall comply with the following:

- no visual contamination (oil staining etc.);
- limited deleterious material (organics, wood, metal etc.), in accordance with any geotechnical specification;

Once impacted soils have been removed, tested and assessed to confirm that they comply with the relevant RTV, materials excavated from the hotspots can be reused on site when in accordance with an approved Materials Management Plan.

Once the excavation has been validated, the excavations are to be backfilled in accordance with the Geotechnical Design Report and Earthworks Specification, where required.

Table 7.1: Contaminant validation criteria – commercial GAC (1% SOM)

Contaminant	RTV (mg/kg)	Contaminant	RTV (mg/kg)
Arsenic	250	Acenaphthene	84000
Beryllium	390	Acenaphthylene	83000
Boron	3*	Anthracene	520000
Cadmium	220	Benz(a)anthracene	86
Chromium (III)	400*	Benzo(a)pyrene	14
Chromium (VI)	25*	Benzo(b)fluoranthene	97
Copper	200*	Benzo(ghi)perylene	630
Lead	2330	Benzo(k)fluoranthene	140
Mercury, inorganic	3600	Chrysene	140
Nickel	110*	Dibenz(a,h)anthracene	12
Selenium	13000	Fluoranthene	23000
Vanadium	9000	Fluorene	63000
Zinc	300*	Indeno(1,2,3,cd)pyrene	58
Cyanide (free)	16000	Naphthalene	190
Phenol (total)	760	Phenanthrene	22000
Asbestos w/w (%)	Nil	Pyrene	54000
Total TPH	100	Total PAH	50
Where Total TPH >100mg/kg the following applies:			
Aliphatics EC5-EC6	300	Aromatics EC5-EC7	1200
Aliphatics >EC6-EC8	140	Aromatics >EC7-EC8	870
Aliphatics >EC8-EC10	78	Aromatics >EC8-EC10	610
Aliphatics >EC10-EC12	48	Aromatics >EC10-EC12	360
Aliphatics >EC12-EC16	24	Aromatics >EC12-EC16	36000
Aliphatics >EC16-EC35	1000000	Aromatics >EC16-EC21	28000
Aliphatics >EC35-EC44	1000000	Aromatics >EC21-EC35	28000
		Aromatics >EC35-EC44	28000
If not marked, denotes protective of human health.			
*denotes protective of plant life.			
Based on GAC for commercial use (1% SOM) for Human Health and pH 7 for plant life.			

Any areas of unexpected contamination encountered during excavation works should be dealt with in line with the Discovery Strategy in Appendix C. If required, this RSVP will be updated to describe the remediation necessary to remove the risk.

7.2 Task 5: disposal of excess hotspot soils to appropriate off-site facilities

With regard to off-site disposal of hotspot soils:

- Where recorded concentrations are greater than the RTV, they shall be excavated and removed from site to a licenced treated or disposal facility; and
- If free product is present, this is to be removed.
- Any Asbestos Containing Material (ACM) encountered during the works is to be removed (as far as reasonably practicable) during the excavation and placement works.

7.3 Task 6: Reuse and placement of soils (materials management).

Reuse of soils is to be undertaken in accordance with the CL:AIRE 'Development Industry Code of Practice - Definition of Waste' i.e. in accordance with an approved Materials Management Plan (MMP).

If reuse of soils in accordance with a MMP is proposed, segregation and stockpiling of soils will be based on the following suitability criteria:

- Soils potentially suitable for reuse on site (e.g. natural soils).
- Soils unsuitable for use (none anticipated e.g. untreated petroleum hydrocarbon hotspots or soils containing gross ACM. These will be disposed of off-site).

Soils that are to be reused on site will be recorded in a MMP/site waste management plan and accompanied with supporting excavation and placement logs.

The reuse of soils on site and material management is discussed further in Section 9.

7.4 Task 7: Off-site disposal of waste material.

Any surplus (i.e. soils which cannot be reused on site due to volumes), or unsuitable soils (i.e. soils which fail the RTVs and cannot be reused in an appropriate location), or are not geotechnically suitable, shall be disposed of by the Contractor at the Contractor's cost. If the material is not suitable for use, the Contractor is to remove and dispose of it in accordance with the RSVP.

Any Made Ground to be removed from site are to be removed to a licensed waste management facility. The waste is to be taken by a registered waste carrier in accordance with applicable Waste Management Regulations.

Waste consignment / transfer notices will be required and are to be retained by the Contractor. Copies of all waste consignment / transfer notices are to be provided for inclusion in the Validation Report.

Any soils deemed hazardous waste for whatever reason will require representative samples to be collected and chemical analysis for Waste Classification and Waste Acceptance Criteria (WAC) testing prior to acceptance of the waste at a licensed hazardous waste landfill.

7.5 Task 8: Decommission of boreholes.

A number of site investigation boreholes are present within the site boundary, potentially acting as pathway for contamination. These are to be decommissioned in line with EA guidance (Good practice for decommissioning redundant boreholes and wells, 2012) to ensure no contamination pathways between the shallow and deep groundwater are present.

7.6 Task 9: Validation criteria during enablement works

The following sections detail validation criteria to be used during the enablement works.

7.6.1 Testing

All sampling, logging and testing of soils shall be undertaken in accordance with BS 5930:2015 'Code of Practice for Site Investigations' and BS 10175:2011+A2:2017 'Investigation of Potentially Contaminated Sites – Code of Practice'.

The Contractor shall undertake all testing at a laboratory which holds UKAS and MCERTS accreditation for the specific tests. Where it is not possible to obtain the testing of a material for a specific property

to a UKAS or MCERTS accredited method, the Contractor shall obtain permission from the Consultant for the test to be completed at the proposed laboratory before the test is undertaken.

The results of all testing undertaken (and a copy of the test certificates), shall be submitted to the Consultant as soon as they are reported, and no more than one day after issue of the test certificate to the Contractor. It is recognised that different tests may take different time to complete. However, the Contractor shall advise the Consultant of any delay that they are aware of regarding the completion of any tests (e.g. a sample is being retested and the report will be delayed). The Consultant shall be given sufficient time to review the content of the testing and the associated test results.

The Contractor is to make available on site at all times a file containing all test certificates in addition to the testing summary, for inspection by the Consultant.

Test results are to be summarised in a single master spreadsheet (which contains all data) and is to be in a format agreed with the Consultant. Data that does not meet the specification shall be highlighted and include details of what works were undertaken to address the non-compliance. The master spreadsheet, results of chemical testing and drawings shall be maintained and kept up to date. Updated versions of these documents are to be provided to the Consultant by 10:00am every Monday morning throughout the Contract.

7.6.2 *Enablement Contractor's Verification Reports*

The Contractor will provide the following validation reports:

- Materials Management Validation Report;
- Remediation Validation Report.

All reports provided by the Enablement Contractor shall be available in Adobe pdf format which has been digitally bookmarked at each section heading. All chemical data is also required in Excel format.

Materials Management validation report

The Materials Management Validation Report is to document the validation of the approved Materials Management Plan and will include the validation of imported soils, site won soils and placed soils. A separate MMP may be required for any import of subsoil and/or topsoil.

As a minimum the Materials Management Validation Report is to include:

- Details of the import mechanisms for each material source;
- Detailing the testing (chemical and geotechnical) of imported materials to prove each source is suitable for use;
- Detailing the testing (chemical and geotechnical) of site won materials to prove each source is suitable for use;
- Records of material movement, including:
 - » stockpile inspection records;
 - » stockpile reuse appraisal record;
 - » volumes, origin and placement location of soils referenced to field results and inspections;
 - » details and quantities of excavated, screened, treated, imported and reused soils; and

- Records of earthworks excavations including as built drawings, photographs, quantities of materials and records of progress.

Remediation validation report

The Enablement Contractor will maintain records of the works and a Validation Report shall be prepared by the Enablement Contractor on those aspects of the works it has completed and is responsible for.

The Validation Report will provide a complete record of the remediation activities undertaken at the site and the data collected to support compliance with remediation objectives and criteria. It will also include descriptions of the works with associated 'as built' drawings and details of any unforeseen conditions encountered during the works and how they were dealt with.

This Validation Report shall incorporate a summary of and commentary on:

- Site stripping and clearance activities.
- Details of obstructions encountered but not removed.
- Records of excavations, including:
 - » Ordnance Datum survey of extents and depth;
 - » Ordnance Datum survey of extents and depth of any residual features;
 - » record of decisions for over-excavation;
 - » photographic record of each excavation; and
 - » records of inspection and final extents of validation.
- Records of laboratory analytical and in situ field test results, including:
 - » laboratory results and location plan for each analytical test;
 - » field test kit results and particulars of monitoring (e.g. date, location, personnel);
 - » laboratory measurements of accuracy and precision;
 - » calibration data for field measurement equipment in accord with manufacturers guidance; and
 - » Chain of Custody forms.
- Waste classification and management documentation, including:
 - » copies of all consignment notes, in particular those relating to the hazardous waste regulations; and
 - » details of waste facilities where materials were disposed of.
- Stockpile plan of all stockpiles generated by the works and remaining on site.
- Copies of chemical testing of the stockpiles.
- Final as-built survey of the as excavated voids.
- Final as-built survey of the site (in AutoCAD format).
- Confirmation that site levels are as required by the structural design and Geotechnical Design Report.

Information associated with regulatory health and safety, control of noise, nuisance, dust, and waste will be excluded from the technical validation reporting and will be submitted as separate documentation. This

separation is made to differentiate between technical remediation requirements stated herein and operational controls of work.

7.7 Mitigation measures during enablement works

7.7.1 Control of risk from dust emissions

Dust suppression

To reduce the potential for the generation of dust, it is recommended that double handling of soils is kept to a minimum and soils are disposed of by direct transfer to wagons and measures to minimise dust (e.g. wind or plant / vehicle movements) should be undertaken.

Appropriate risk assessment and mitigation measures should be in place throughout the development. As a minimum, this should include damping down of the site surface, excavations and stockpiles to prevent the generation of dust, additional measures may include:

- stockpiles (if any are created) should be kept to a minimum to reduce 'wind whip' causing potentially hazardous material to be blown from the pile;
- air quality and dust monitoring stations will be set up and monitored by the contractor to record the dust concentrations during the works;
- stockpiles shall be placed on a suitable and robust polythene membrane or hardstanding to prevent any cross contamination;
- care should be taken not to pierce the sheeting when placing the bulky elements of the material;
- stockpiles should be dampened down or covered to prevent dust - whilst the Contractor, based on site constraints, should make the final choice, the options may include covering with plastic/polythene membrane, or by a layer of clean soil material;
- plant will be appropriately loaded to prevent spillages;
- the drop distance from excavator bucket to stockpile/process plant will be kept as short as reasonably practicable to reduce dust; and
- appropriate signage should be displayed so that site workers/visitors are alerted to the potential hazards associated with the material to be stored on site, and roadways within the site will be kept moist by spraying from a water bowser.

Vehicle movements

Risks associated with the transport of soils that potentially contain asbestos fibres, such as dust emission, should be appropriately managed.

The works could create mud from vehicle movements and subsequent tracking off site on vehicle tyres. This will be managed during the works to prevent off site mud transfer. Measures to control these issues may include the provision of a wheel wash facility and when necessary a mechanical road sweeper to further ensure that the road is kept clean.

Personal monitoring

As a matter of good practice, construction workers and services personnel should follow guidance stated in 'HSG 66 Protection of Workers and the General Public during Redevelopment of Contaminated Land' during development works. Adequate standard personal protective equipment and the implementation of basic hygiene measures will be necessary.

Ground workers and sub-surface maintenance workers should be made aware of the possibility of encountering contaminants within Made Ground soils or groundwater at the site through 'toolbox' talks.

Safe working procedures should be implemented in accordance with CIRIA132, good standards of personal hygiene should be observed, and appropriate levels of PPE provided and utilised.

Eating, drinking and smoking should be strictly prohibited in the development site other than in designated mess areas.

Ground operatives must be provided with access to a combination of suitable personal protective equipment (PPE) and respiratory protective equipment (RPE) for immediate use if required. When working in known area of risk, groundworkers are to have appropriate personal UKAS accredited air monitoring to monitor for the presence of airborne asbestos fibres and assess the suitability of the RPE provided. The monitoring should be carried out to provide proof that control measure effective in reducing fibre liberation as far as reasonably practicable and that provided PPE/RPE are sufficient. However, constant personal monitoring throughout the remediation process is not required.

Management of groundwater

There will be a requirement to appropriately manage any accumulation of groundwater in excavations. The Contractor will be required to make arrangements for the treatment and disposal of accumulated groundwater during excavation works.

If treatment of groundwater is required it is the Contractor's responsibility to obtain all relevant licences and consents.

7.7.2 Earthworks Re-use Criteria

Please refer to the Geotechnical Design (19453-HYD-XX-XX-RP-GE-2004) for more detail and supporting geotechnical requirements.

All earthworks shall be undertaken in accordance with BS6031:2009, Code of practice for earthworks, BS EN 16907-1 to BS EN 16907-5: 2018 Earthworks, and the contract specific earthworks specification. The type of testing, the frequency of testing and the compliance limits are defined in table 6/1 of the SHW. This is accompanied by a contract specific appendix 1/5, which defines the testing to be undertaken by the contractor.

Reuse of soils is allowed and will need to be undertaken in accordance with the Contaminated Land: Applications In Real Environments (CL:AIRE) document: 'The Definition of Waste: Development Industry Code of Practice' (Version 2) (CoP), dated March 2011.

The supervising consultant or enabling works contractor is responsible for producing a MMP signed off by a QP. For further details with regards to materials management, please refer to Section 9.

Testing

All treated materials re-used on site shall be tested and assessed prior to the re-use. Any unsuitable materials shall be removed from site in accordance with this remediation strategy.

All testing during the enabling works shall be undertaken by the enabling works contractor and all sampling, logging and testing of soils shall be undertaken in accordance with BS 5930:2015 'Code of

Practice for Site Investigations' and BS 10175+A2:2017 'Investigation of Potentially Contaminated Sites – Code of Practice'.

The contractor shall undertake all testing at a laboratory which holds UKAS and MCERTS accreditation for the specific tests.

Remediation Target Values / Reuse Criteria

All soils to be reused on site must meet the criteria in Table 7.1 and the following:

- no visual contamination (oil staining etc.);
- limited deleterious material (organics, wood, metal etc.), in accordance with any geotechnical specification;

8. REMEDIATION STRATEGY - CONSTRUCTION PHASE

The following will be undertaken during the Construction Phase of Works either by the Enablement Contractors or a separate Ground Works Contractor.

8.1 Task 10: Installation of barrier pipe

If recommended by the water supply company, the Contractor is to install Protectaline (or similar) pipework for potable water supply. This is to be validated by the Contractor by the provision of delivery tickets showing Protectaline (or similar) has been delivered to site and by photographic proof provided by the Contractor to the Client and the Consultant that Protectaline pipework or similar has been installed.

Where barrier pipework is required, it is to be validated by the Contractor.

8.2 Task 11: Placement of clean site-won material in landscaped areas.

Where soft landscaping is proposed, i.e. grass or planting, clean material will need to be installed as a growing medium. There is limited Topsoil available on site for reuse and it is anticipated that imported clean Topsoil will be required.

In order to ensure compliance with any proposed MMP it is necessary for imported material to be sourced in line with Section 8.2.1 and to achieve both the physical and chemical properties stipulated in Sections 8.2.3 and 8.2.4.

8.2.1 *Sourcing of Material*

The criteria for imported subsoil and Topsoil is detailed in Sections 8.2.3 and 8.2.4. Any imported soils should be from a natural source not expected to be contaminated.

Prior to importation of Topsoil or Subsoil from a commercial supplier, certification should be obtained from the supplier detailing the source site, its previous and current land use and relevant test results. A copy of this should be forwarded to Hydrock Consultants for review and comparison against the import criteria.

If the proposed source is not from a commercial supplier, Hydrock recommend that the source is tested prior to import to confirm it is appropriate for use within the cover system. Material which is imported and subsequently found to fail the criteria will need to be removed from site to an appropriate facility with all costs borne by the contractor.

Following import to site (regardless of the source), chemical testing of the imported soils will be required to confirm the soils imported are the same as those sampled at the donor site. See Section 8.2.4 for quantities of testing and testing schedules.

8.2.2 *Stockpiling of Materials for the Landscaped Areas*

On importation of Topsoil and other materials, the materials should be stockpiled at a suitable location on site. Copies of the carrier's consignment notes should be retained and a copy forwarded to Hydrock and be available on request.

Topsoil and Subsoil should be stockpiled separately and away from areas designated for storing other materials or potential sources of contamination. Soils may be stockpiled on geotextile separator layers to prevent cross contamination should substances of concern be identified on site. Site-won material

should be stockpiled away from imported material until it is deemed suitable for use following additional testing.

Separate stockpiles should also be created for each different source. Topsoil stockpiles to be kept below 2m in height at all times and traffic on the stockpile to be minimised.

All stockpiles should be identified with clear signs and each stockpile of material should be given a clear reference number and designated sheet recording the following:

- identification reference (e.g. Stockpile A, B, C etc.);
- material type (e.g. Topsoil);
- source site;
- the carrier's consignment notes reference numbers;
- the approximate volume (number of loads); and
- which plots the material is to be used on and where.

Each entry shall be signed and dated by the Site Manager or their Assistant. A template form is provided in Appendix B. Other templates or documentation may be used. These sheets should be available for inspection by the Client, the Consultant, Local Authority staff and others involved with this development. A copy should also be given to the Consultant when verification visits are made.

8.2.3 *Physical Requirements of Soils for Landscaped Areas*

Imported topsoil should conform to the requirements of BS 3882:2015 (Specification for Topsoil and requirements for use), or as agreed with the Client.

If the Client agrees that Topsoil does not need to conform to BS 3882:2015, it should comprise chalk, clay and/or sand and should have a maximum of 60% of fragments in excess of 2mm, a maximum of 30% in excess of 20mm and a maximum of 10% in excess of 50mm, with nothing in excess of 75mm. It should be noted that clay soils are not recommended as they are likely to become waterlogged during handling and placement. The imported material is to be confirmed by visual inspection of the material by a suitably qualified Geo-environmental Engineer on behalf of the Consultant and if necessary, by laboratory Particle Size Distribution assessment.

Imported soils should be free of asbestos, metal, plastic, wood, glass, tarmac, brick, paper, concrete or other potentially hazardous foreign material which could cause injury. In addition, all materials must be free from aggressive / invasive weeds (especially Japanese Knotweed and Giant Hogweed) and bulk vegetative growth, in order to ensure negligible risk of subsequent weed problems.

8.2.4 *Chemical Requirements of Soils for Landscaped Areas*

For all soils imported for use in areas of soft landscaping, certification from the commercial supplier should be reviewed prior to import, or if not a commercial supplier then the soils should be tested at source.

Chemical testing will then be required once the material arrives at site. Testing should be undertaken at a rate of one test per 250m³, with a minimum of four tests per import round.

Depending on the source or variability of imported material, the Consultant may, at their discretion, request additional testing to be undertaken. If constant sources are used for the Topsoil and Subsoil and

the results recorded are consistently acceptable, consideration may be given to reducing the number of samples tested.

The results of chemical testing of all material to be used in landscaped areas are to be compared with the import criteria presented in Table 8.1. If any of these thresholds are exceeded the material shall be considered to be unsuitable and disposed of off-site.

Testing should be carried out for the following general suite of contaminants and the results compared to Table 8.1:

- As, B (water soluble), Be, Cd, Cr (total), Cr(VI), Cu, Hg, Ni, Pb, S (elemental), Se, V, Zn, cyanide (total), sulfide, pH, asbestos screen, speciated polycyclic aromatic hydrocarbons (PAH, by GC-FID), total phenols and fraction of organic carbon; and
- total TPH.

Table 8.1: Import and Reuse Criteria

Contaminant	RTV (mg/kg)	Contaminant	RTV (mg/kg)
Arsenic	250*	Acenaphthene	84000
Beryllium	390	Acenaphthylene	83000
Boron	3*	Anthracene	520000
Cadmium	220	Benz(a)anthracene	86
Chromium (III)	400*	Benzo(a)pyrene	14
Chromium (VI)	25*	Benzo(b)fluoranthene	97
Copper	200*	Benzo(ghi)perylene	630
Lead	2330	Benzo(k)fluoranthene	140
Mercury, inorganic	3600	Chrysene	140
Nickel	110*	Dibenz(a,h)anthracene	12
Selenium	13000	Fluoranthene	23000
Vanadium	9000	Fluorene	63000
Zinc	300*	Indeno(1,2,3,cd)pyrene	58
Cyanide (free)	16000	Naphthalene	190
Phenol (total)	760	Phenanthrene	22000
Asbestos w/w (%)	Nil	Pyrene	54000
Total TPH	100	Total PAH	50
Where Total TPH >100mg/kg the following applies:			
Aliphatics EC5-EC6	300	Aromatics EC5-EC7	1200
Aliphatics >EC6-EC8	140	Aromatics >EC7-EC8	870
Aliphatics >EC8-EC10	78	Aromatics >EC8-EC10	610
Aliphatics >EC10-EC12	48	Aromatics >EC10-EC12	360
Aliphatics >EC12-EC16	24	Aromatics >EC12-EC16	36000
Aliphatics >EC16-EC35	1000000	Aromatics >EC16-EC21	28000
Aliphatics >EC35-EC44	1000000	Aromatics >EC21-EC35	28000
		Aromatics >EC35-EC44	28000
If not marked, denotes protective of human health.			
*denotes protective of plant life.			
Based on GAC for commercial use (1% SOM) for Human Health and pH 7 for plant life.			

8.3 Task 12: Validation during Construction Works

8.3.1 *Protectaline Pipework*

Where Protectaline pipework (or similar) is required to be installed (to be confirmed by the water supply company), the Contractor will validate by the provision of delivery tickets showing Protectaline (or similar) has been delivered to site and by providing photographic proof to the Client and the Consultant that Protectaline pipework or similar has been installed and Hydrock will collate into the Verification Report.

8.3.2 *Materials movement*

Hydrock will undertake a visiting watching brief with regard to materials movement and earthworks.

On the provision of validation reports from the Contractor (see Section 7.6.2), to demonstrate that all of the works have been undertaken in accordance with the RSVP and the MMP, Hydrock Consultants will provide a Verification Report.

Verification may be undertaken in Phases (or parts of Phases).

The report will be prepared by Hydrock Consultants, will provide a summary of the key elements of work and will be referenced to the agreed redevelopment strategy and planning requirements with supporting information presented within appendices. This report will be based on CLR 11, output 5 and specifically will incorporate a summary and commentary of:

- details of methodology (key documents) and programme;
- decision records covering agreements with regulators;
- records of works undertaken and associated validation and monitoring records obtained from the Contractor (specified above e.g. chemical testing data);
- specialist Contractors' validation reports for particular elements of work;
- supporting data (e.g. as built drawings);
- final status of remediation and achievement of remedial objectives to satisfy the planning conditions; and
- additional risk assessments/non-scheduled reactive works undertaken.

On completion of the verification works the appropriate verification documentation will be forwarded to the Client, for forwarding to the Warranty Provider and the Local Authority.

9. REUSE OF SOILS ON SITE AND MATERIAL MANAGEMENT

9.1 Waste Management Background

In line with the European Waste Framework Directive, any material excavated on site will be classified as waste as soon as it is excavated, unless there is a clear plan in place for the re-use of soils at the site. One of the ways a suitable plan can be achieved is set out in the Contaminated Land: Applications In Real Environments (CL:AIRE) document: The Definition of Waste: Development Industry Code of Practice (Version 2), dated March 2011. The handling, re-use or disposal of waste is regulated by the Environment Agency. The Agency will take into account the use of the CoP in deciding whether to regulate materials as waste.

If materials are dealt with in accordance with the CoP, the Environment Agency considers that those materials are unlikely to be waste at the point when they are to be used for the purpose of land development. This is because the materials were never discarded in the first place, or because they have been submitted to a recovery operation and have been completely recovered so that they have ceased to be waste. It should be noted that use of material as fill which should be classified as waste is illegal and it is possible that proceedings will be undertaken in the case of such activity.

The procedures to be followed for the production of the MMP are outlined as 'Route B' – Design Statement (as outlined by CL:AIRE) for the re-use of materials on the site of origin (ref CL:AIRE Code of Practice, Annex1).

The MMP will be prepared by Hydrock Consultants. The Contractor is responsible for complying with and managing the MMP during the works and providing validation information to Hydrock. The Contractor may instruct the Consultant to undertake the management of the MMP on their behalf as a separate commission.

9.2 Material Suitability

9.2.1 Chemical Suitability

The following section is a summary of chemical suitability with regards to materials management, based on the site investigation works undertaken at the site.

Hotspots

Soils in the vicinity of WS5.02 found to generate concentrations of methane gas are to be removed as part of the earthworks cut. The reuse and placement of soils should be done in such a manner that a new gas risk is not introduced in the area of placement.

If encountered, any unexpected hotspots which fail the RTVs in Table 7.1 will be excavated and either reused on site following ex situ remediation or disposed of off-site.

Made Ground

The majority of Made Ground in the north of the site (Plot 502) will be excavated as part of the cut and fill works. Testing is required for reuse as earthworks fill (as detailed in the GDR and EWS).

Topsoil

Topsoil is only present in limited extent on the western side of the site. Imported topsoil for use as part of soft landscaping areas will be required.

Subsoil

Subsoil will be required to backfill voids and to alter site levels to create the design levels. Subsoil materials considered suitable for reuse on site will require confirmatory testing following excavation in accordance with the criteria in Table 7.1.

Topsoil and imported soils

Soils imported to site shall be tested by Hydrock at a rate of 1 test per 250m³.

All testing shall be undertaken at a UKAS accredited laboratory for the following general suite of contaminants:

- As, B (water soluble), Be, Cd, Cr (total), Cr (VI), Cu, Hg, Ni, Pb, S (elemental), Se, V, Zn, cyanide (total), sulfide, pH, asbestos fibres, speciated polycyclic aromatic hydrocarbons (PAH, by GC-FID), total phenols and fraction of organic carbon;
- total TPH and (if required) speciated TPH (TPH-CWG); and

The test data are to be compared to the values indicated in Table 7.1.

If soil is to be imported, it shall be from a source not expected to be contaminated and meet both physical and chemical criteria, as detailed below.

Prior to importation of Topsoil from a commercial supplier, certification shall be obtained from the supplier detailing the source site, the previous land use and relevant test results. A copy of this information shall be forwarded to Hydrock for review and comparison against the import criteria. If the Topsoil is sourced from a recognised commercial supplier of natural Topsoil (e.g. British Sugar, Freeland Horticultural, etc.), no further testing (prior to import) is required.

If the proposed Topsoil or Subsoil import source is not a commercial supplier, the Ground Works Contractor is to provide Hydrock with copies of the site investigation, confirming the soils are naturally occurring and uncontaminated. Hydrock recommend that the source is tested to confirm it is appropriate for use, prior to import. If any of these thresholds are exceeded, the material shall be considered to be unsuitable and is not to be imported.

Following import, soils are to be stockpiled on a Terram separator layer and additional chemical testing be undertaken and assessed in accordance with the criteria set out above (to ensure the imported material is the same as that for which chemical analysis has been provided). If suitable, the imported soils are to remain stockpiled for later reuse during construction. If unsuitable, or excess to the quantity requirements, it is to be disposed off-site.

If soils are imported and placed directly, without stockpiling and testing, these works will be deemed to be undertaken at the Ground Works Contractor's risk and if the soils are later proven not to be suitable for use, the Ground Works Contractor is to meet all associated excavation, disposal and replacement costs (including additional costs from the nominated Consultant).

Material for Off-Site Disposal

Materials found to be out of specification are to remain on site in segregated stockpiles until they can be disposed of to a suitably licenced waste disposal facility.

It is the responsibility of the Contractor to ensure adequate and appropriate disposal, including testing to satisfy the proposed waste facility.

Records of the removal of material off site shall be maintained by the Contractor, including details of the disposal or treatment site to which they have been taken. These details are to be passed to Hydrock to form part of the Verification Report.

Appropriate precautions shall be taken by the Contractor to ensure that the stockpiled material does not result in risks to neighbouring land users.

9.2.2 *Physical requirements of soils*

Soil used in general earthworks, are to conform to the requirements of the GDR and EWS.

Imported Topsoil should conform to the requirements of BS 3882:2015 'Specification for Topsoil and requirements for use', unless otherwise agreed with the Client.

If the Client agrees that Topsoil and Subsoil do not need to conform to BS 3882:2015 and/or BS 8601:2013, they shall comprise chalk, clay or sand with a maximum of 60% of fragments in excess of 2mm, a maximum of 30% in excess of 20mm and a maximum of 10% in excess of 50mm, with nothing in excess of 75mm.

If the use of soils with a high clay content are proposed, their use is to be agreed by the Client.

Topsoil and Subsoil used as part of the upper 1,000mm shall be free of asbestos, metal, plastic, wood, glass, tarmac, brick, paper, concrete or other potentially hazardous foreign material which could cause injury.

In addition, all materials must be free from aggressive/invasive weeds and bulk vegetative growth, in order to ensure negligible risk of subsequent weed problems.

9.2.3 *Geotechnical suitability*

A review of GDR (report reference 19453-HYD-XX-XX-RP-GE-2004), indicates that:

- Made Ground (gravel cover and general) may be unsuitable for reuse as general fill due to its heterogeneity and organic content, and it can only be used in areas which are not sensitive to settlement (e.g. landscaping).
- Made Ground (Engineering Fill) may be suitable as Class 1 - General Fill, subject to further de-tailed design and testing, in accordance to the Specification for Highways Works (SHW).
- Bognor Sand Member soils may be suitable for use as Class 1A/ 1B General Fill in external areas and as Class 6 - Structural Fill, below structures.
- Soils from London Clay Formation (weathered and non-weathered) may be suitable for use as Class 2A General Fill in external areas; and as Class 9 - Structural Fill, below structures, as long as it is treated with hydraulic binders to form a suitable Class 9 fill. The exact sub-class under Class 9 will depend on the hydraulic binder used. This will be subject to detailed design by a specialist Contractor.

Fill is to be placed in accordance with the GDR and EWS.

Roads and pavements are to be placed as per the civil engineering design.

The Enablement Contractor will be responsible for undertaking the required processing, treatment, modification, geotechnical testing and placing the material to the Earthworks Formation level in accordance with the GDR and EWS.

9.2.4 *Certainty of Use and Quantity of Material*

There will be an opportunity to reuse soils at the site following excavation and processing. Any excess or unsuitable soils shall be disposed of off-site. The following excavation, treatment and placement is proposed during the enablement works:

- excavate hotspots and dispose of/stockpile for reuse as appropriate;
- excavate Made Ground and natural soils as per the structural design;
- placement of suitable soils and/or imported soils to formation level; and
- placement of granular soils in road and pavements and as working platforms.

Materials excavated during the Demolition and Enablement Works will be able to be reused on site as levels and the soil characteristics allow.

Following the Enablement Works the following will be required during the Construction Phase:

- excavation of foundations;
- placement of sub-grade in accordance with the pavement design;
- placement of the engineered cover system where Made Ground remains at formation level.

Materials excavated during the Construction Phase will need to be disposed of off-site.

There will be a requirement for clean Subsoil and Topsoil to be imported for the engineered cover system and clean granular (Type 1, 6F2/6F5) material for pavement construction.

Volumes of the separate material types are to be determined as part of the MMP.

Only materials deemed suitable for use by an appropriately qualified person will be utilised on site. Any out of specification material obtained from the site which is not deemed suitable for use will, if appropriate, be classified as waste and shall be disposed of or recovered in the proper manner and in accordance with waste legislation.

Material reused or imported to site shall be subject to the necessary testing/review and comparison to the RSVP and the Earthworks Specification prior to reuse or delivery to site to minimise the risk of the importation of unsuitable material. Any material deemed unsuitable upon arrival at the site shall be rejected.

Only sufficient material required on site for the purposes of raising levels in accordance with the pre-determined proposals (planning conditions and drainage strategy) shall be imported or reused on site. Any surplus material or material which does not meet the required specification shall be disposed of off-site. It is the responsibility of the Contractor at each stage of the works to have checked all volume calculations and have allowed for disposal of unsuitable or excess materials.

Any materials considered suitable for reuse will require confirmatory testing following excavation or processing. Where confirmed following additional testing, these materials are considered suitable for reuse within garden and landscaped areas.

All testing is to be undertaken in accordance with a QP approved MMP.

9.3 On Site Material Management

9.3.1 Stockpiles

Site won material for potential reuse shall be stored on site in stockpiles. The stockpiles are to be managed by the Contractors during the relevant phase of work and will be subject to operational constraints at the time of stockpiling.

Stockpile locations shall be clearly marked and documented on working drawings maintained in the site office.

The Contractor for each phase of works is to take appropriate mitigation measures and environmental precautions as considered necessary at storage locations. However, as a minimum, stockpiles shall be compacted to prevent dust and kept wet in periods of dry weather.

During the works, materials shall be excavated and consolidated into designated stockpiles, with the different soil types stockpiled in different clearly marked stockpiles.

Topsoil, Subsoil and Made Ground should be stockpiled separately and away from areas designated for storing other materials or potential sources of contamination. Soils proposed for use in the works should be stockpiled on a membrane to prevent cross contamination.

A record of the excavated quantities and reuse locations shall also be maintained on site. A copy of all tracking forms used for transportation of soils to site shall be held at the site office. Example tracking forms are presented in Appendix B.

All stockpiles should be identified with clear signs and each stockpile of imported material should be given a clear reference number and designated sheet recording the following:

- identification reference (e.g. Stockpile A, B, C etc.);
- material type (e.g. Topsoil);
- source site;
- the carrier's consignment notes reference numbers;
- the approximate volume (number of loads); and
- which plots the material is to be used on and where (i.e. Plot number and front or rear garden).

Each entry shall be signed and dated by the Site Manager or their Assistant. An example template form is provided in Appendix B. Other templates or documentation may be used. These sheets should be available for inspection by the Client, the Consultant, Warranty Provider's Inspectors, Local Authority staff and others involved with this development. A copy should also be given to the Consultant when verification visits are made.

10. SUPERVISION, VERIFICATION AND REPORTING

Necessary changes to the agreed Implementation Plan, arising during the course of the works, are to be agreed in writing with the Local Authority and the Environment Agency as required prior to being undertaken on site.

It is advised (although not required by the regulators) that details of the environmental works undertaken, the rationale and design for the implementation of this strategy and verification details of the works undertaken are appended to the deeds for the property to ensure the site is sold with full knowledge of the works undertaken and the ground conditions present.

10.1 Site Supervision

All remediation works are to be undertaken with a site watching brief by Hydrock Consultants (The Consultant).

The Enablement Contractor is to provide appropriate Geo-environmental Engineer supervision during any excavation and validation works.

10.2 Collection of Samples

All samples are to be taken in accordance with relevant guidance (e.g. BS 10175). Soils for inorganic analysis will be sealed in air-tight polythene tubs.

Soils for organic analysis will be sealed in amber glass jars with the minimal practicable headspace.

Groundwater samples will be collected in suitable containers and with the correct preservatives, as provided by the laboratory.

Testing is to be in accordance with information provided in Section 9.2.

All samples shall be scheduled on Chain of Custody forms prior to being dispatched to the UKAS accredited laboratory for analysis. All testing will be MCERTS accredited where available.

On completion of the verification works the appropriate verification documentation will be forwarded to the client and the Local Authority.

10.3 Enablement Phase Verification

Upon the provision of a Validation Report from the Enablement Contractor (see Section 7.6.2), to demonstrate that all of the remediation works have been undertaken in accordance with the Remediation Method Statement, Hydrock Consultants will provide a Verification Report.

The report will be prepared by Hydrock Consultants and will provide a summary of the key elements of work and will be referenced to the agreed redevelopment strategy and planning requirements with supporting information presented within appendices.

This shall be based upon LCRM (Environment Agency, 2021) and will incorporate a summary and commentary of, where applicable:

- background information on the site;
- statutory and regulatory requirements;
- details of the remediation required;

- decision records covering agreements with regulators;
- records of works undertaken including photos and associated validation and monitoring records obtained from the Contractor (specified above e.g. chemical testing data);
- specialist Contractors validation reports for relevant elements of work;
- supporting data (e.g. as built drawings);
- final status of remediation and achievement of remedial objectives to satisfy the planning conditions; and
- additional risk assessments/non-scheduled reactive works undertaken.

On completion of the verification works the appropriate documentation will be forwarded to the client and the Local Authority.

Details of verification works during enablement phase are presented in Section 7.6.

10.4 Construction Phase Verification

The verification works during the construction phase will involve:

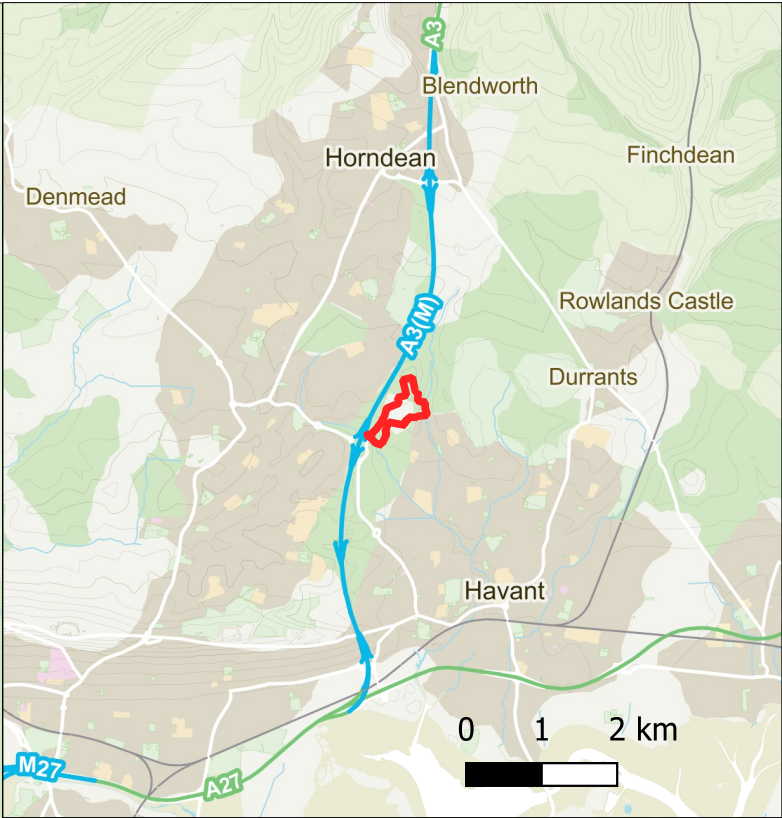
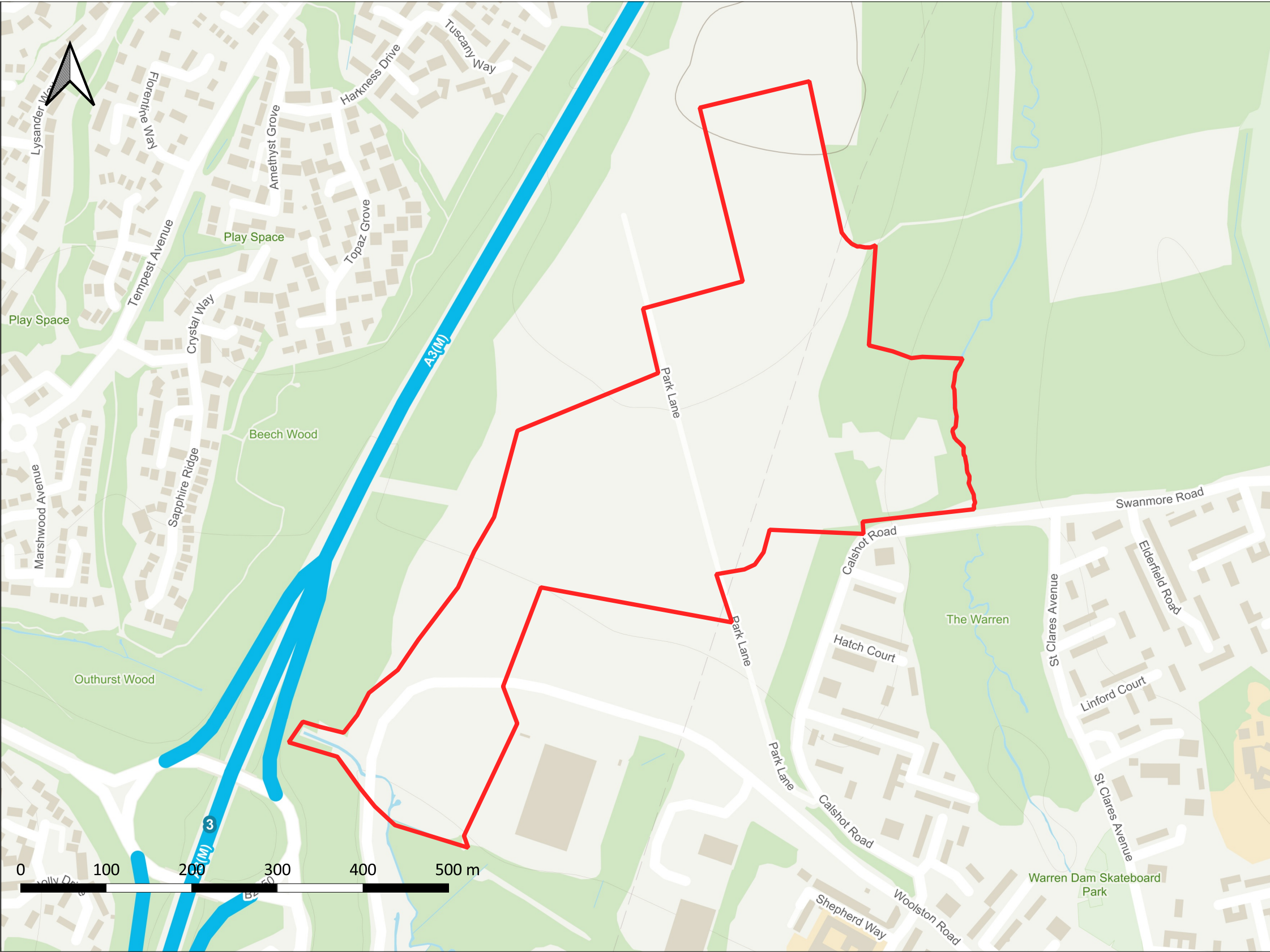
- Validation of Protectaline pipework installation if required following discussions with the water supply company; and
- Material movement, involving watching brief visits with regard to materials movement and earthworks.

Details of these activities are presented in Section 8.3

11. REFERENCES

- ASSOCIATION OF GROUND INVESTIGATION SPECIALISTS. 2006. Guidelines for Good Practice in Site Investigation. Issue 2. AGS, Beckenham.
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- MINISTRY OF HOUSING, COMMUNITIES and LOCAL GOVERNMENT. 12 June 2014. Land affected by contamination. Planning Policy Guidance Reference ID: 33-007-20140612.
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Appendix A Drawings



KEY PLAN	
Site Boundary	

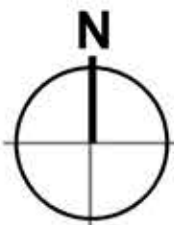
NOTES	
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REVISIONS				
P01	FIRST ISSUE EXAMPLE			
	DRAWN BY YP	CHECKED BY AJ	APPROVED BY AJ	03/06/2021
REV.	REVISION NOTES/COMMENTS			
	DRAWN BY YP	CHECKED BY AJ	APPROVED BY AJ	03/06/2021

 White Building 1-4 Cumberland Place Southampton Hampshire SO15 2NP Tel: +44(0)2382140907 www.hydrock.com	CLIENT Portsmouth City Council	
	PROJECT DUNSBURY PARK, PORTSMOUTH	

TITLE Site Location Plan		
HYDROCK PROJECT NO. 19453-GELO		SCALE @ A3 1:1
PURPOSE OF ISSUE SUITABLE FOR INFORMATION		STATUS S2
DRAWING NO. 19453-HYD-XX-XX-DR-GE-1001		REVISION P01

Dimensions are in millimeters, unless stated otherwise.
It is the recipient's responsibility to print this document to the correct scale.
All relevant drawings and specifications should be read in conjunction with this drawing.



SCHEDULE OF ACCOMMODATION (Gross Internal Area)

PLOT 1

Unit 100	-	29,000 sq ft (2,694m ²)
Warehouse Area	-	6,000 sq ft (557m ²)
Office (2 storey)	-	35,000 sq ft (3,251m ²)
Total Area	-	41,000 sq ft (3,811m ²)

Level Access	-	4
Car Parking	-	40

Plot 1 Area	-	2.52 Acres (1.02 Hectares)
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PLOT 4

Unit 400	-	141,750 sq ft (13,169m ²)
Warehouse Area	-	7,460 sq ft (693m ²)
Office (First Floor)	-	141,750 sq ft (13,169m ²)
(Incl. GF Core)	-	149,210 sq ft (13,862m ²)
Total Area	-	149,210 sq ft (13,862m ²)

Level Access	-	2
Dock Loading	-	14
HGV Parking	-	34
Car Parking	-	155

Plot 4 Area	-	8.05 Acres (3.26 Hectares)
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PLOT 5

Unit 500	-	39,110 sq ft (3,633m ²)
Total Area	-	39,110 sq ft (3,633m ²)

Unit 501	-	25,000 sq ft (2,323m ²)
Total Area	-	25,000 sq ft (2,323m ²)

Unit 502	-	17,760 sq ft (1,650m ²)
Total Area	-	17,760 sq ft (1,650m ²)

Plot 5a & b Area	-	4.85 Acres (1.96 Hectares)
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PLOT 6

Unit 600	-	21,750 sq ft (2,021m ²)
Warehouse Area	-	2,415 sq ft (224m ²)
Office (First Floor)	-	21,750 sq ft (2,021m ²)
(Incl. GF Core)	-	24,165 sq ft (2,245m ²)
Total Area	-	24,165 sq ft (2,245m ²)

Level Access	-	3
Car Parking	-	36

Unit 601	-	95,000 sq ft (8,826m ²)
Warehouse Area	-	5,000 sq ft (465m ²)
Office (First Floor)	-	95,000 sq ft (8,826m ²)
(Incl. GF Core)	-	100,000 sq ft (9,290m ²)
Total Area	-	100,000 sq ft (9,290m ²)

Loading Docks	-	8
Level Access	-	2
Car Parking	-	100

Plot 6 Area	-	7.62 Acres (3.08 Hectares)
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PLOT 7

Unit 700	-	142,500 sq ft (13,239m ²)
Warehouse Area	-	7,500 sq ft (697m ²)
Office (Two Storey)	-	142,500 sq ft (13,239m ²)
(Incl. GF Core)	-	150,000 sq ft (13,935m ²)
Total Area	-	150,000 sq ft (13,935m ²)

Level Access	-	2
Dock Loading	-	15
HGV Parking	-	28
Car Parking	-	178

Plot 7 Area	-	18.42 Acres (7.46 Hectares)
-------------	---	-----------------------------

Total GIA	-	540,245 sq ft (50,189m ²)
-----------	---	---------------------------------------

Total Plot Area	-	41.46 Acres (16.78 Hectares)
-----------------	---	------------------------------

OPTION 07

rev	amendments	by	ckd	date
-----	------------	----	-----	------

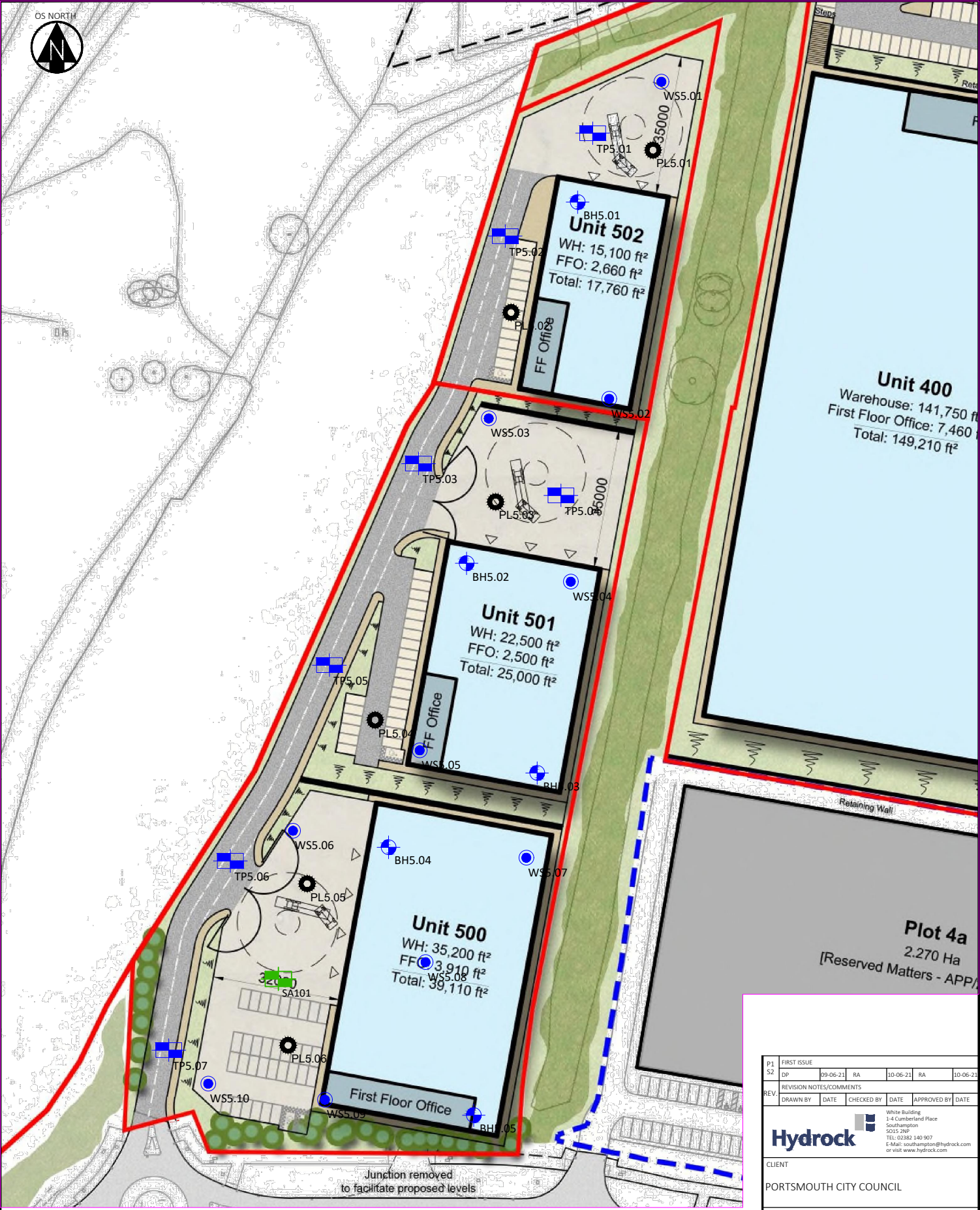
Dunsbury Park Masterplan,
Portsmouth
Masterplan



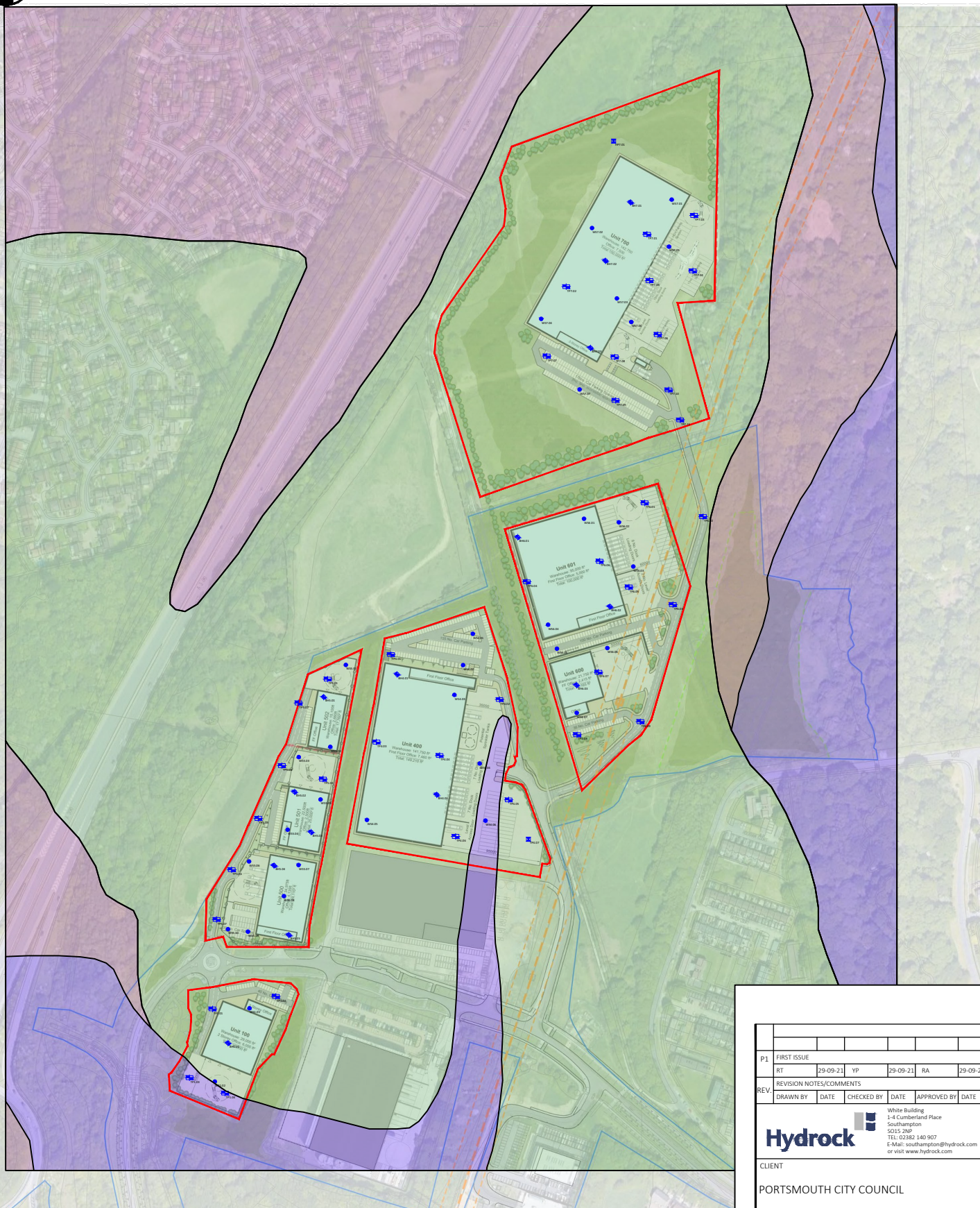
Newark, Broom, Calford Way, Newark, Nottinghamshire NG24 2TN
+44 (0)1636 653227 info@umcarchitects.com

Drawing Status:	Feasibility
Drawn / Checked:	DS / MDS
Date:	14.06.2021
Scale:	1:1,500 A0

Drawing no:	Revision:
20179 F0009	A



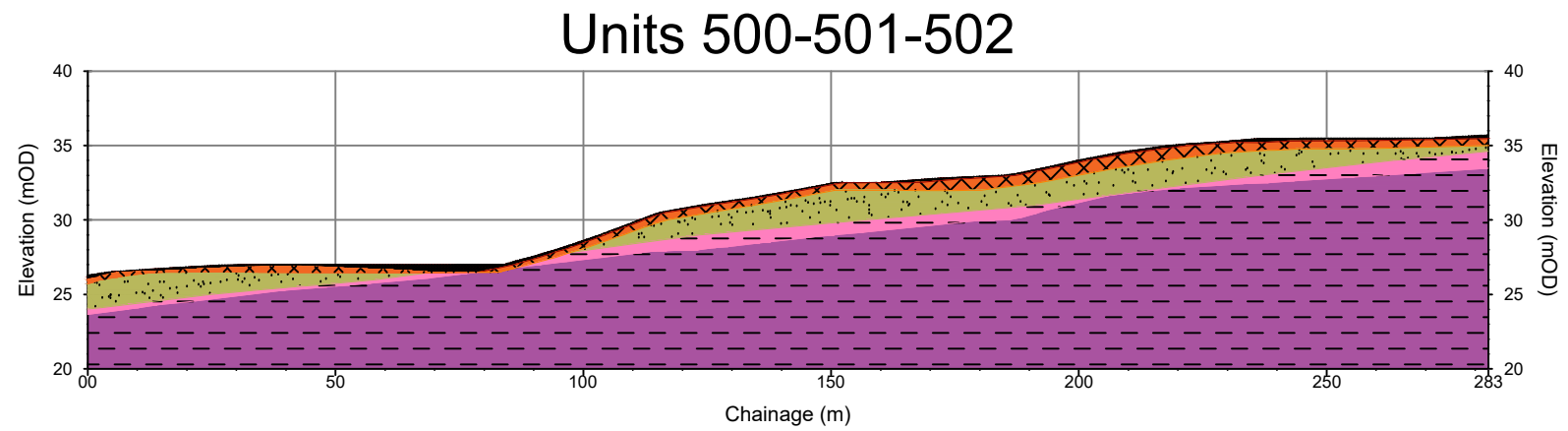
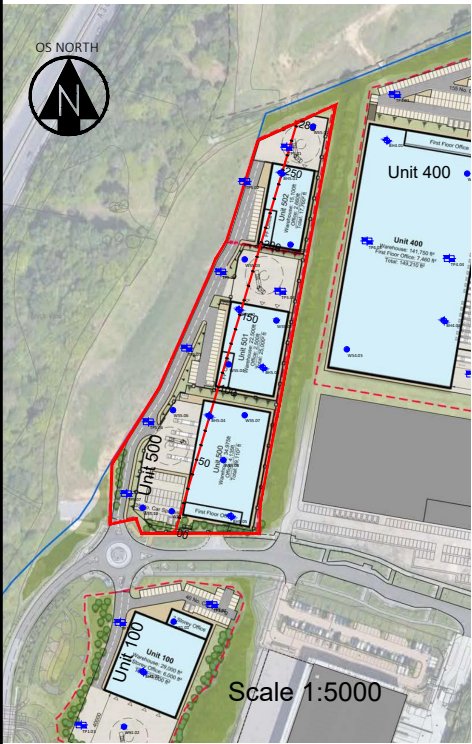
P1	FIRST ISSUE					
S2	DP	29-06-21	RA	10-06-21	RA	10-06-21
REVISION NOTES/COMMENTS						
REV.	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
 White Building 1-4 Cumberland Place Southampton SO15 2NP TEL: 02382 140 907 E-Mail: southampton@hydrock.com or visit www.hydrock.com						
CLIENT						
PORTSMOUTH CITY COUNCIL						
PROJECT						
DUNSBUARY PARK						
TITLE						
EXPLORATORY HOLE LOCATION PLAN - Plot 500-502						
HYDROCK PROJECT NO.			SCALE @ A4			
19453			NTS			
PURPOSE OF ISSUE					STATUS	
SUITABLE FOR INFORMATION					S2	
DRAWING NO. (PROJECT - ORIGINATOR/VOLUME-LEVEL-TYPE-ROLE-NUMBER)					REVISION	
19453-HYD-XX-XX-DR-GE-1002					P1	



Key:

- | | |
|------------------------------------|--------------------|
| Borehole | Head |
| Windowless sampler borehole | Bognor sand member |
| Trial pit - mechanically excavated | London Clay |
| Trial pit - hand dug pit | |

P1	FIRST ISSUE				
RT	29-09-21	YP	29-09-21	RA	29-09-21
REV	REVISION NOTES/COMMENTS				
DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
White Building 1-4 Cumberland Place Southampton SO15 2NP TEL: 02382 140 907 E-Mail: southampton@hydrock.com or visit www.hydrock.com					
CLIENT					
PORTSMOUTH CITY COUNCIL					
PROJECT					
DUNSBUARY PARK					
TITLE					
GEOLOGICAL MAP - BGS					
HYDROCK PROJECT NO. 19453			SCALE @ A4 1:5000		
PURPOSE OF ISSUE SUITABLE FOR INFORMATION					STATUS S2
DRAWING NO. (PROJECT - ORIGINATOR/VOLUME LEVEL-TYPE-ROLE-NUMBER) 19453-HYD-XX-XX-DR-GE-1007					REVISION P1



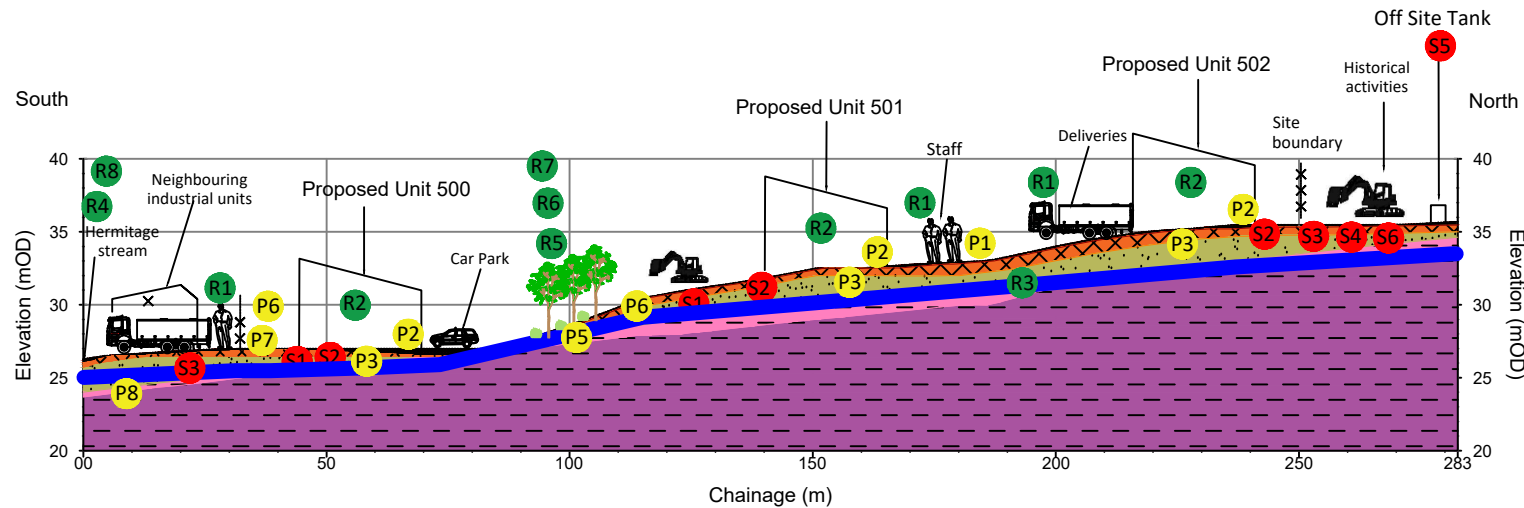
Key:

- BH## Borehole
- WS## Windowless sampler borehole
- TP## Trial pit - mechanically excavated

- Surface Made ground
- Made ground
- Bognor sand member
- London Clay weathered
- London Clay

P1	FIRST ISSUE				
S2	RT	28-09-21	YP	28-09-21	RA 10-06-21
REVISION NOTES/COMMENTS					
REV.	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY DATE
Hydrock White Building 1-4 Cumberland Place Southampton SO15 2NP TEL: 02382 140 907 E-Mail: southampton@hydrock.com or visit www.hydrock.com					
CLIENT					
Portsmouth City Council					
PROJECT					
Dunsbury Park					
TITLE					
INDICATIVE CROSS SECTION - Plot 500					
HYDROCK PROJECT NO. 19453			SCALE @ A4 1:1500		
PURPOSE OF ISSUE SUITABLE FOR INFORMATION					STATUS S2
DRAWING NO. 19453-HYD-XX-XX-DR-GE-1006					REVISION P1

Unit 500-501-502



LEGEND

- S SOURCE
- P PATHWAY
- R RECEPTOR

NOTE

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.

2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

3. This drawing is indicative only.

Potential on-site sources of contamination

- Made Ground, associated with current earthworks/construction works, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S01).
- Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / earthworks (S02).

Potential off-site sources of contamination

- Made Ground, associated with historical mining activities (old clay pit, brick and tile works), possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S03).
- Made Ground, associated with earthworks for the construction of A3 (M) in the west boundary on the site, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S04).
- Hydrocarbon vapours from potential VOC and petroleum hydrocarbon spillages/leaks from unspecified tank located at 110m N of the site. (S05).
- Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / backfilled clay pits/brick works. (S06).

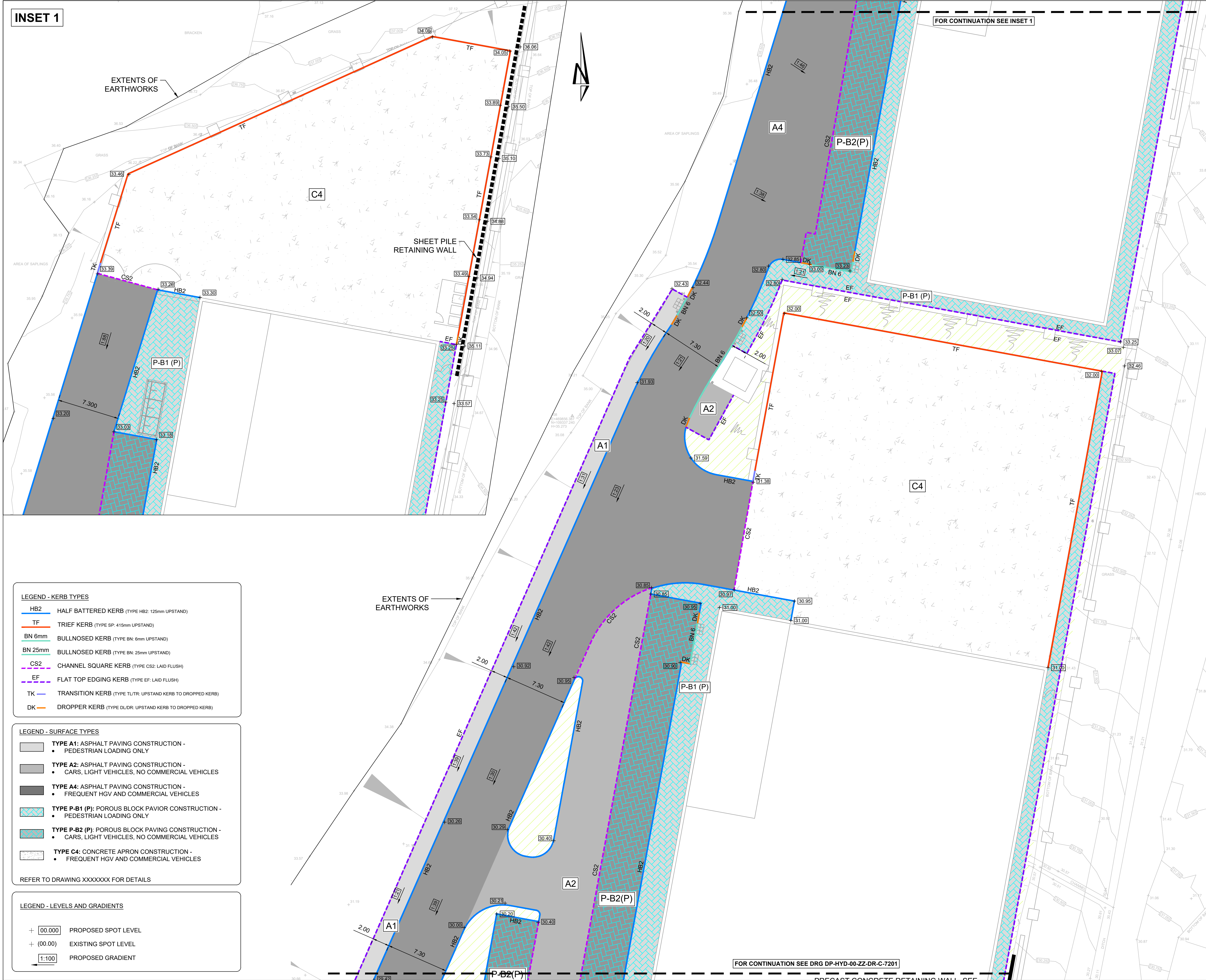
Potential receptors

- People (neighbours, site end users) (R01).
- Development end use (buildings, utilities) (R02).
- Groundwater: Secondary A aquifer status of the Bognor Sand Member (R03).
- Surface water: off-site Hermitage Stream at south east of the site (R04).
- Soft landscaping areas (R05)
- Ecology: Habitat Creation Area at the west side of the site (R06).
- Ecology: Designated Ancient and Seminal Woodland / Ancient Replanted Woodland in the surrounding areas of the site (R07).
- Aquatic ecosystem in the Hermitage Stream (R08).

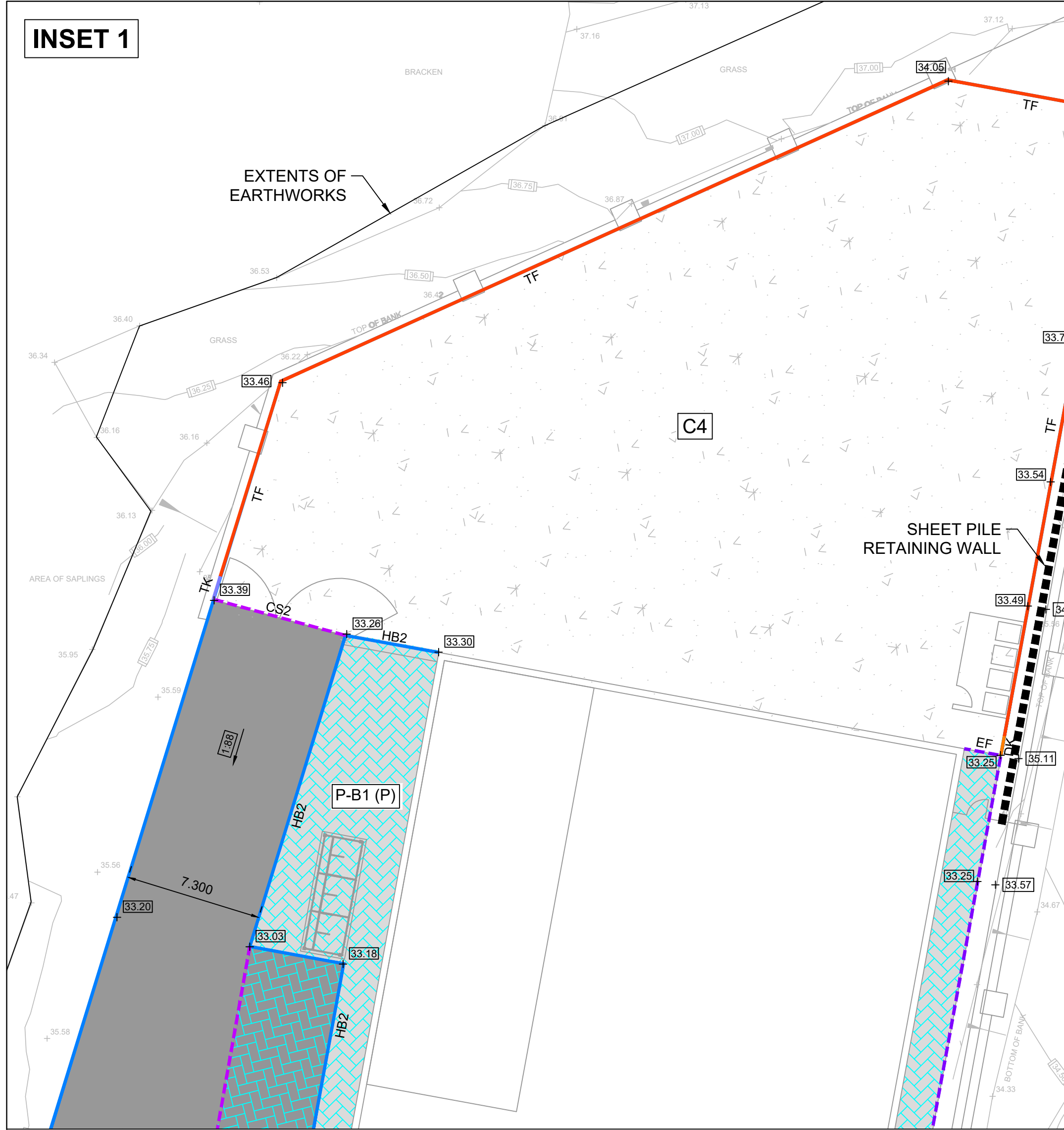
Potential pathways

- Ingestion, skin contact, inhalation of dust and outdoor air by people (P01).
- Direct contact with substances deleterious to building materials (P02).
- Ground gas (Methane, carbon dioxide, etc.) ingress via permeable soils and/or construction gaps (P03).
- Root uptake by plant (P05).
- Migration of contaminant via leachate migration through the unsaturated zone in Bognor Sand Member (P06).
- Surface water via overland flow (P07).
- Surface water, via drainage discharge (P08).
- Surface water via base flow from groundwater (P09).

P1	FIRST ISSUE				
S2	YP	28-09-21	AJ	28-09-21	AJ
REV.	REVISION NOTES/COMMENTS				
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY
Hydrock White Building 1-4 Cumberland Place Southampton SO15 2NP TEL: 02382 140 907 E-Mail: southampton@hydrock.com or visit www.hydrock.com					
CLIENT Portsmouth City Council					
PROJECT Dunsbury Park					
TITLE Conceptual Site Model - Plot 500					
HYDROCK PROJECT NO. 19453			SCALE @ A4 1:1500		
PURPOSE OF ISSUE SUITABLE FOR INFORMATION					STATUS S2
DRAWING NO. 19453-HYD-XX-XX-DR-GE-1008					REVISION P1



INSET 1



LEGEND - KERB TYPES	
HB2	HALF BATTERED KERB (TYPE HB2: 125mm UPSTAND)
TF	TRIEF KERB (TYPE SP: 415mm UPSTAND)
BN 6mm	BULLNOSED KERB (TYPE BN: 6mm UPSTAND)
BN 25mm	BULLNOSED KERB (TYPE BN: 25mm UPSTAND)
CS2	CHANNEL SQUARE KERB (TYPE CS2: LAID FLUSH)
EF	FLAT TOP EDGING KERB (TYPE EF: LAID FLUSH)
TK	TRANSITION KERB (TYPE TL/TR: UPSTAND KERB TO DROPPED KERB)
DK	DROPPER KERB (TYPE DL/DR: UPSTAND KERB TO DROPPED KERB)

LEGEND - SURFACE TYPES	
	TYPE A1: ASPHALT PAVING CONSTRUCTION - • PEDESTRIAN LOADING ONLY
	TYPE A2: ASPHALT PAVING CONSTRUCTION - • CARS, LIGHT VEHICLES, NO COMMERCIAL VEHICLES
	TYPE A4: ASPHALT PAVING CONSTRUCTION - • FREQUENT HGV AND COMMERCIAL VEHICLES
	TYPE P-B1 (P): POROUS BLOCK PAVIOR CONSTRUCTION - • PEDESTRIAN LOADING ONLY
	TYPE P-B2 (P): POROUS BLOCK PAVING CONSTRUCTION - • CARS, LIGHT VEHICLES, NO COMMERCIAL VEHICLES
	TYPE C4: CONCRETE APRON CONSTRUCTION - • FREQUENT HGV AND COMMERCIAL VEHICLES
REFER TO DRAWING XXXXXXX FOR DETAILS	

LEGEND - LEVELS AND GRADIENTS	
+ [00.000]	PROPOSED SPOT LEVEL
+ (00.00)	EXISTING SPOT LEVEL
	PROPOSED GRADIENT

KEY PLAN

NOTES

- All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
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- All levels are shown in metres above Ordnance Datum (m AOD).
- In the event of any contradiction between this drawing and the specification, then the contractor shall seek clarification from the engineer before proceeding.
- Refer to landscape architects drawings for extent of external surfaces and kerbing.
- The works on site affect statutory undertakers apparatus, where the contractor is required to verify the location and depth of all such apparatus prior to commencement of work and to take any precautions necessary when working in the vicinity of apparatus.

NOTE A
Proposed spot levels have been determined from tie in levels provided by Murphy Geospatial MGS42248-T-01 dated 06/07/21. The contractor is responsible for the coordination of the off-site tie in levels and to advise Hydrock of any variations/discrepancies

NOTE B
Prior to commencement of remediation/overlay works the contractor is to undertake a full service/utilities scan to establish details of existing utilities in the vicinity of the works. The contractor is responsible for the co-ordination/alterations of such utilities with the proposed works.

P04	AMENDED TO SUIT ARCHITECT SURFACING LAYOUT	A. TODD	31/01/22	A. TODD	31/01/22	J. MAGEE	31/01/22
P03	ACCESS ROAD DIMENSION AND GRADIENTS ADDED	A. TODD	24/01/22	A. TODD	24/01/22	J. MAGEE	24/01/22
P02	PRELIMINARY ISSUE	R. IRONS	14/12/21	A. TODD	14/12/21	J. MAGEE	14/12/21
P01	PRELIMINARY ISSUE	R. IRONS	05/11/21	A. TODD	05/11/21	J. MAGEE	05/11/21
REV	REVISION NOTES/COMMENTS	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT

PORTSMOUTH CITY COUNCIL

PROJECT

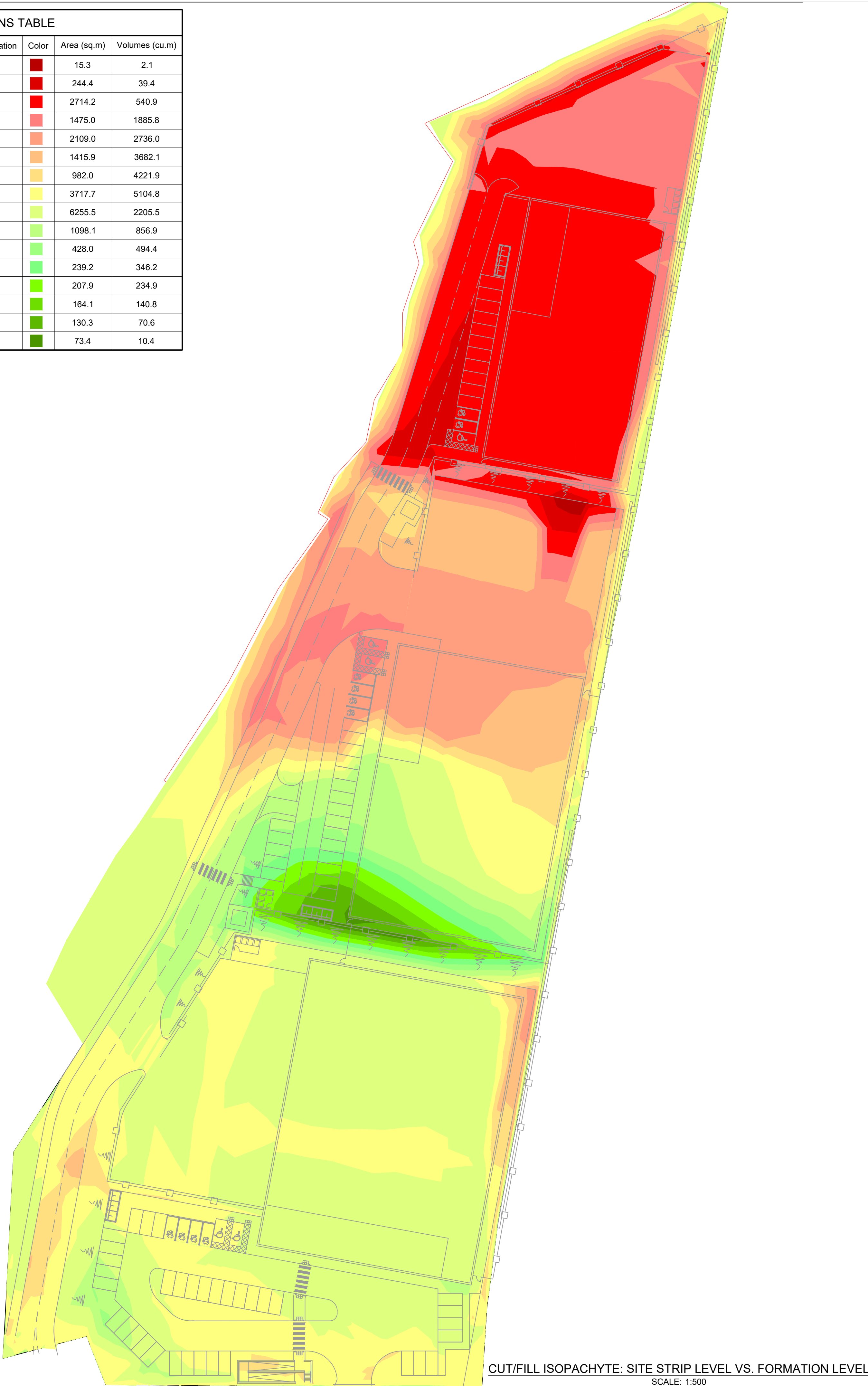
DUNSBUARY PARK
UNITS 500, 501 & 502

TITLE

EXTERNAL WORKS

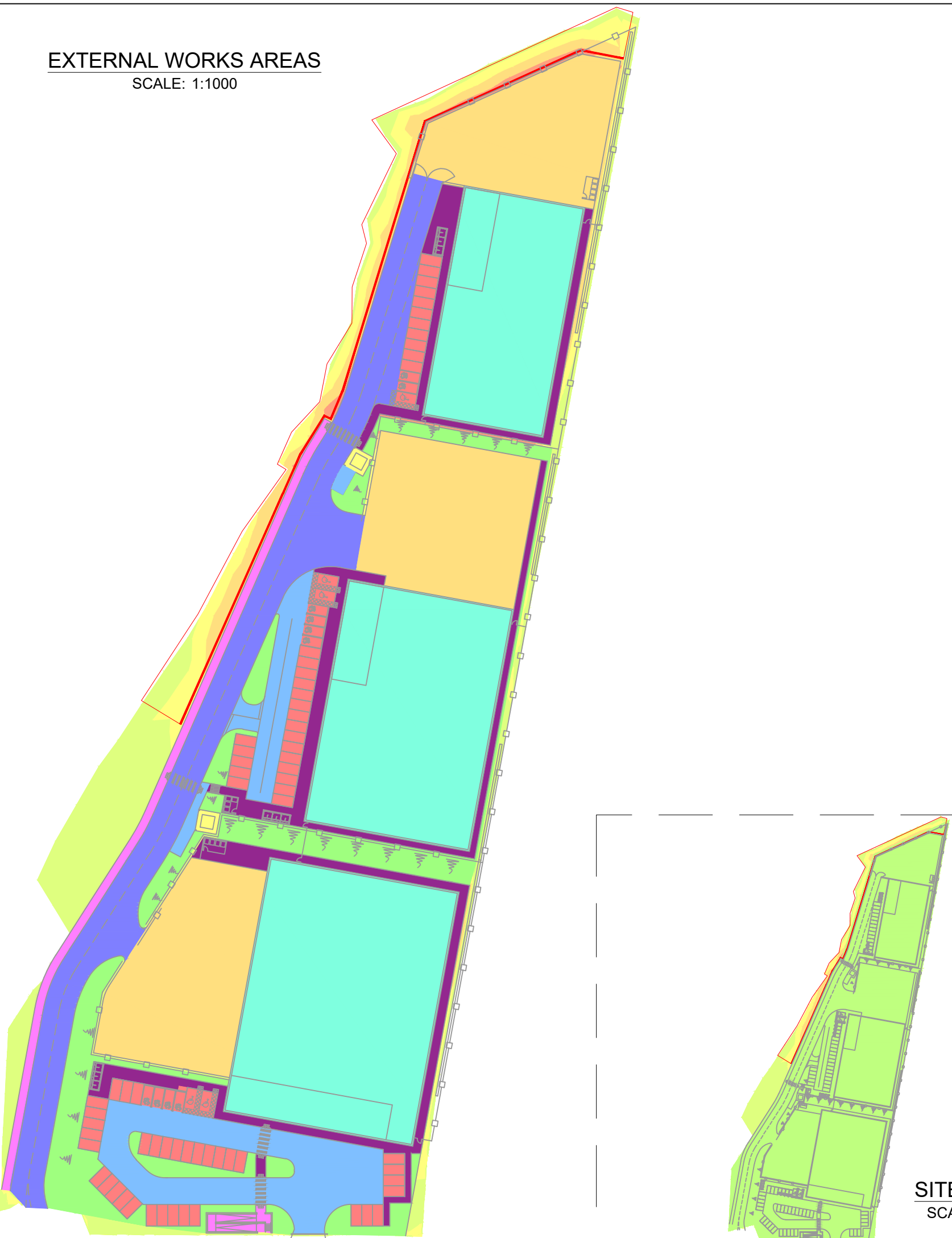
HYDROCK PROJECT NO.	SCALE @ A1
C-19453-C	1:200
STATUS DESCRIPTION	STATUS
SUITABLE FOR INFORMATION	S2
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
DP-HYD-00-ZZ-DR-C-7200	P04

ELEVATIONS TABLE					
Number	Minimum Elevation	Maximum Elevation	Color	Area (sq.m)	Volumes (cu.m)
1	-4.000	-3.500	■	15.3	2.1
2	-3.500	-3.000	■	244.4	39.4
3	-3.000	-2.500	■	2714.2	540.9
4	-2.500	-2.000	■	1475.0	1885.8
5	-2.000	-1.500	■	2109.0	2736.0
6	-1.500	-1.000	■	1415.9	3682.1
7	-1.000	-0.500	■	982.0	4221.9
8	-0.500	0.000	■	3717.7	5104.8
9	0.000	0.500	■	6255.5	2205.5
10	0.500	1.000	■	1098.1	856.9
11	1.000	1.500	■	428.0	494.4
12	1.500	2.000	■	239.2	346.2
13	2.000	2.500	■	207.9	234.9
14	2.500	3.000	■	164.1	140.8
15	3.000	3.500	■	130.3	70.6
16	3.500	4.000	■	73.4	10.4



CUT/FILL ISOPACHYTE: SITE STRIP LEVEL VS. FORMATION LEVEL
SCALE: 1:500

EXTERNAL WORKS AREAS
SCALE: 1:1000



SITE STRIP AREA = 19,643m²
SITE STRIP DEPTH = 100mm
TOTAL VOLUME = 2100m³ CUT

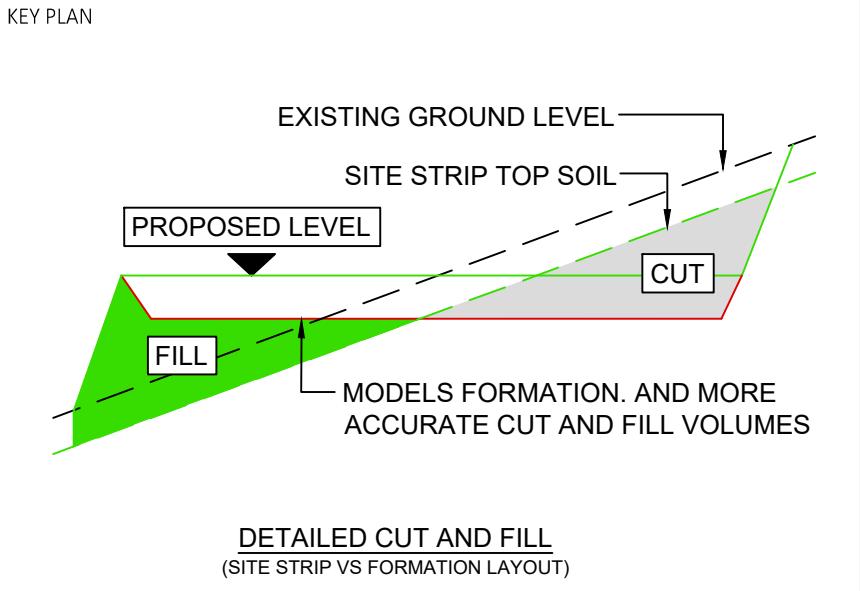
TABLE A - CONSTRUCTION BUILD-UPS	DEPTH	EXTERNAL WORKS:	DEPTH
EXTERNAL WORKS:			
AREA 1: BUILDINGS	400mm	AREA 6: BLOCK PAVING (LIGHT)	400mm
AREA 2: ASPHALT (PEDESTRIAN)	220mm	AREA 7: CONCRETE (SUBSTATION)	300mm TBC
AREA 3: BLOCK PAVING (PEDESTRIAN)	220mm	AREA 8: CONCRETE (HEAVY)	350mm
AREA 4: ASPHALT (LIGHT)	315mm	AREA 9: LANDSCAPING	300mm TBC
AREA 5: ASPHALT (HEAVY)	465mm		

TABLE B - SURFACE COMPARISON
VOLUME: BASE SURFACE: SITE STRIP LEVEL COMPARISON SURFACE: PROPOSED FORMATION LEVELS CUT VOLUME: 18,368m³ FILL VOLUME: 4108m³ NET VOLUME: 14,260m³ CUT

TABLE C - ADDITIONAL EXCAVATIONS (NOT ACCOUNTED IN SURFACE COMPARISON)	VOLUME
BELOW GROUND DRAINAGE / SERVICES TBC SUBJECT DETAILED DESIGN	1200m³
FOUNDATIONS TBC SUBJECT DETAILED DESIGN	550m³
TOTAL	1750m³

SUBSOIL CUT/FILL SUMMARY
SURFACE COMPARISON (SEE TABLE B) VS ADDITIONAL EXCAVATIONS (SEE TABLE C) 14,260m³ CUT 1750m³ CUT

TOTAL ESTIMATED VOLUME
SITE STRIP & SUBSOIL SUMMARY 2100m³ CUT 16,010m³ CUT



- NOTES
- All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
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 - All levels are shown in metres above Ordnance Datum (m AOD).
 - Cut and fill isopachytes shown on this drawing are calculated from site strip to proposed formation levels. As such, they include existing construction thicknesses unless noted otherwise. They do not include the proposed new construction thicknesses.
 - The cut and fill exercise does not allow for a bulking factor.
 - The cut and fill isopachytes and volumes assume that all cut material are suitable to be re-used as fill material.
 - The site strip thicknesses and volumes shown on this drawing are assumed and to be confirmed on site.
 - Additional testing of head deposits is required to certain areas of the site and a volume of material may need to be stabilised prior to reuse as fill material.
 - For the purposes of the cut / fill exercise the cut has been assumed as reusable fill material to a CBR of 5% in pedestrian areas, further testing required in vehicle areas. this is subject to confirmation of the onsite ground conditions and is confirmed as suitable re-use for fill material.**
 - All earthworks are to be undertaken in conjunction with Hydrock Consulting NBS Specification. Full method statement to be provided for approval by the Engineer prior to any work commencing on site.
 - All cut and fill quantities are preliminary and are to be verified by quantity surveyor for cost estimating purposes.
 - Refer to construction build ups for depth to formation.
 - Volumes above are approx only, the contractor should make their own assessment on their accuracy and highlight any discrepancies where necessary.

A PRELIMINARY CBR VALUE OF 5% HAS BEEN TAKEN. TO BE CONFIRMED BY GIR

CUT = MATERIAL TO EXPORT FROM SITE
FILL = MATERIAL TO IMPORT TO SITE

ARCHITECT LAYOUT UPDATED					
P03	A.TODD	01/02/22	A.TODD	01/02/22	J.MAGEE 01/02/22
SURFACE BUILD-UPS UPDATED, BELOW GROUND EXCAVATIONS UPDATED					
P02	A.TODD	31/01/22	A.TODD	31/01/22	J.MAGEE 31/01/22
PRELIMINARY ISSUE					
P01	A.TODD	05/11/21	A.TODD	05/11/21	J.MAGEE 05/11/21
REVISION NOTES/COMMENTS					
REV	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY DATE

Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
PORTSMOUTH CITY COUNCIL

PROJECT
DUNSBUARY PARK
UNITS 500-502

TITLE
CUT AND FILL ANALYSIS

HYDROCK PROJECT NO. C-19453-C	SCALE @ A1 AS SHOWN	
STATUS DESCRIPTION PRELIMINARY		STATUS S2
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) DP-HYD-00-ZZ-DR-C-7400		REVISION P03

LEGEND - KERB TYPES

- HB2 HALF BATTERED KERB (TYPE HB2: 125mm UPSTAND)
- TF TRIEF KERB (TYPE SP: 415mm UPSTAND)
- BN 6mm BULLNOSED KERB (TYPE BN: 6mm UPSTAND)
- BN 25mm BULLNOSED KERB (TYPE BN: 25mm UPSTAND)
- CS2 CHANNEL SQUARE KERB (TYPE CS2: LAID FLUSH)
- EF FLAT TOP EDGING KERB (TYPE EF: LAID FLUSH)
- TK TRANSITION KERB (TYPE TL/TR: UPSTAND KERB TO DROPPED KERB)
- DK DROPPER KERB (TYPE DLDR: UPSTAND KERB TO DROPPED KERB)

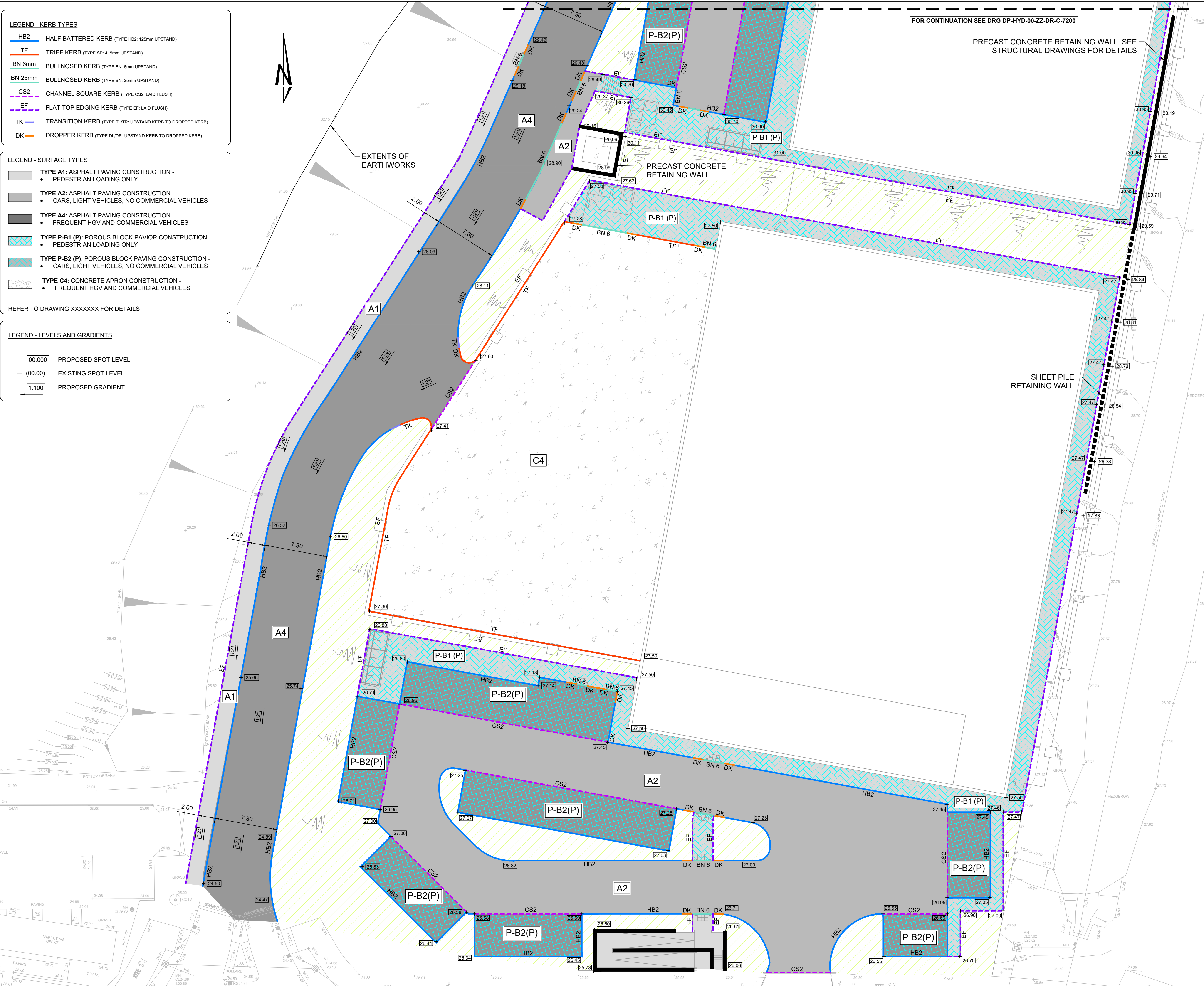
LEGEND - SURFACE TYPES

- TYPE A1: ASPHALT PAVING CONSTRUCTION -
 - PEDESTRIAN LOADING ONLY
- TYPE A2: ASPHALT PAVING CONSTRUCTION -
 - CARS, LIGHT VEHICLES, NO COMMERCIAL VEHICLES
- TYPE A4: ASPHALT PAVING CONSTRUCTION -
 - FREQUENT HGV AND COMMERCIAL VEHICLES
- TYPE P-B1 (P): POROUS BLOCK PAVIOR CONSTRUCTION -
 - PEDESTRIAN LOADING ONLY
- TYPE P-B2 (P): POROUS BLOCK PAVING CONSTRUCTION -
 - CARS, LIGHT VEHICLES, NO COMMERCIAL VEHICLES
- TYPE C4: CONCRETE APRON CONSTRUCTION -
 - FREQUENT HGV AND COMMERCIAL VEHICLES

REFER TO DRAWING XXXXXX FOR DETAILS

LEGEND - LEVELS AND GRADIENTS

- + 00.000 PROPOSED SPOT LEVEL
- + (00.00) EXISTING SPOT LEVEL
- 1:100 PROPOSED GRADIENT



FOR CONTINUATION SEE DRG DP-HYD-00-ZZ-DR-C-7200

PRECAST CONCRETE RETAINING WALL. SEE STRUCTURAL DRAWINGS FOR DETAILS

SHEET PILE RETAINING WALL

KEY PLAN

NOTES

- All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
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- All levels are shown in metres above Ordnance Datum (m AOD).
- In the event of any contradiction between this drawing and the specification, then the contractor shall seek clarification from the engineer before proceeding.
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- The works on site affect statutory undertakers apparatus, where the contractor is required to verify the location and depth of all such apparatus prior to commencement of work and to take any precautions necessary when working in the vicinity of apparatus.

NOTE A

Proposed spot levels have been determined from tie in levels provided by Murphy Geospatial MGS42248-T-01 dated 06/07/21. The contractor is responsible for the coordination of the off-site tie in levels and to advise Hydrock of any variations/discrepancies

NOTE B

Prior to commencement of remediation/overlay works the contractor is to undertake a full service/utilities scan to establish details of existing utilities in the vicinity of the works. The contractor is responsible for the co-ordination/alterations of such utilities with the proposed works.

PD4	AMENDED TO SUIT ARCHITECT SURFACING LAYOUT					
	A. TODD	31/01/22	A. TODD	31/01/22	J. MAGEE	31/01/22
P03	ACCESS ROAD DIMENSION AND GRADIENTS ADDED					
	A. TODD	24/01/21	A. TODD	24/01/21	J. MAGEE	24/01/21
P02	PRELIMINARY ISSUE					
	R. IRONS	14/12/21	A. TODD	14/12/21	J. MAGEE	14/12/21
P01	PRELIMINARY ISSUE					
	R. IRONS	05/11/21	A. TODD	05/11/21	J. MAGEE	05/11/21
REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

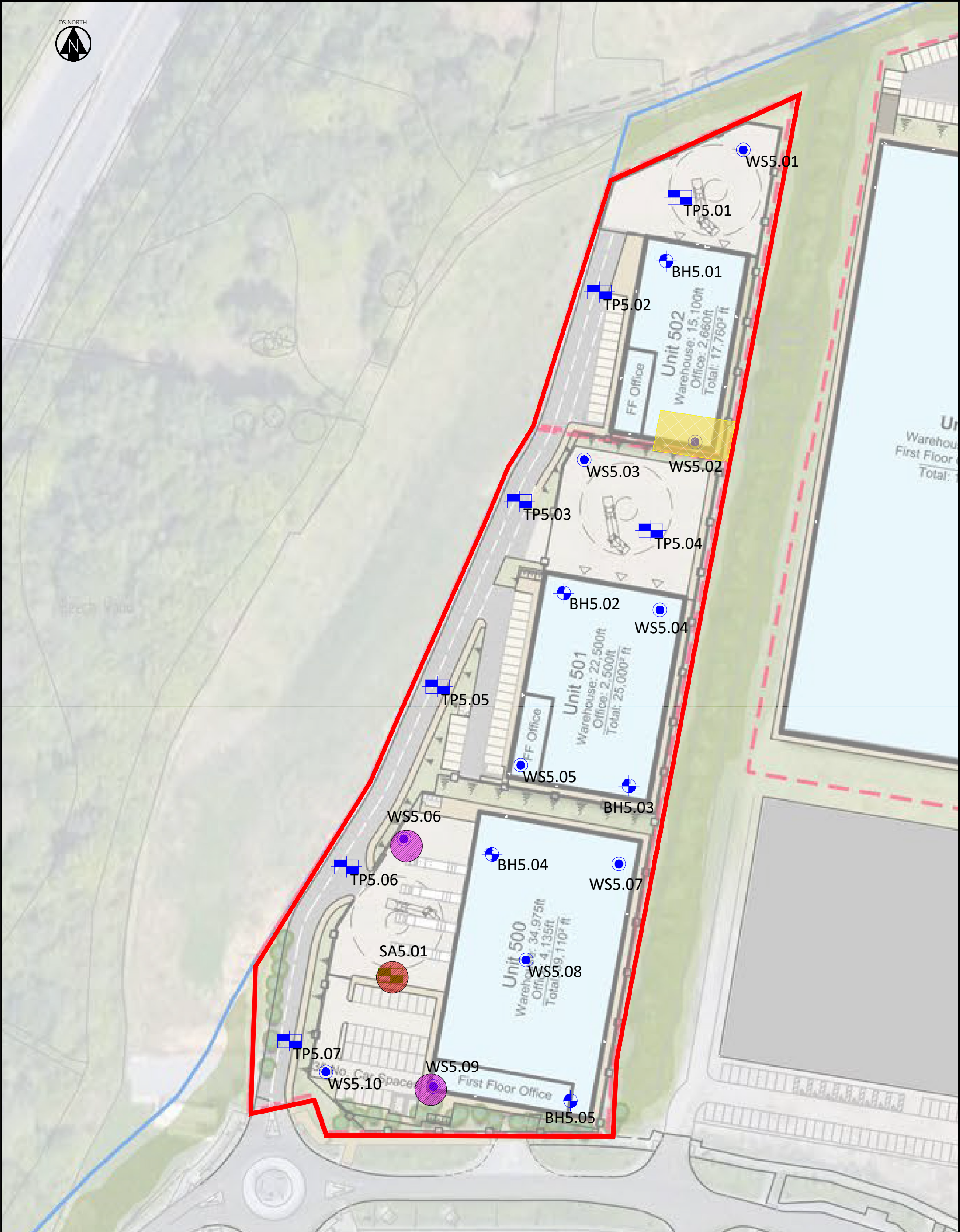
Hydrock Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
PORTSMOUTH CITY COUNCIL

PROJECT
DUNSBURY PARK
UNITS 500, 501 & 502

TITLE
EXTERNAL WORKS

HYDROCK PROJECT NO. C-19453-C		SCALE @ A1 1:200	
STATUS DESCRIPTION SUITABLE FOR INFORMATION			STATUS S2
DRAWING NO. (PROJECT CODE-ORIGINATOR ZONE-LEVEL-TYPE-ROLE-NUMBER) DP-HYD-00-ZZ-DR-C-7201			REVISION P04



KEY		NOTES																				TITLE																												
Borehole Windowless sampler borehole Trial pit - mechanically excavated Trial pit - hand dug pit Areas of hazardous waste Areas of stable non-reactive hazardous waste in non-hazardous landfill Area to be excavated under supervision																					SITE REMEDIATION PLAN Plots 500-502																													
											CLIENT										HYDROCK PROJECT NO. 19453-GELO										SCALE @ A3 NTS																			
											PORTSMOUTH CITY COUNCIL																																							
	P1										FIRST ISSUE										PROJECT										PURPOSE OF ISSUE										STATUS									
											YP13/04/21AJ13/04/21AJ13/04/21										DUNSBURY PARK										SUITABLE FOR INFORMATION										REVISION									
REV.										REVISION NOTES/COMMENTS																				DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) 19453-HYD-500-XX-DR-GE-1010										P1										
										DRAWN BYDATECHECKED BYDATEAPPROVED BYDATE																																								

Appendix B Form Template

Dunsbury Park, Plots 500-502

Imported Soil Documentation Form

Stockpile identification reference	
Material type	
Source site	
Consignment note reference numbers	
Volume of stockpile (or number of loads)	
Plots material to be used in	

Sketch Plan of Stockpile Location and Sample Points:

Signed_____

Name_____

Company_____

Position_____

Date_____

Appendix C Discovery Strategy

DISCOVERY REMEDIATION STRATEGY

CONTAMINATED MATERIALS

DISPLAY AND AWARENESS

This Discovery Strategy shall be placed on the Health and Safety Notice Board and/or displayed in a prominent area where all site staff are able to consult the document at any time.

Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination, and this Discovery Strategy.

HOW TO IDENTIFY POTENTIAL CONTAMINATED MATERIAL

- Looks oily and has an oily odour.
- Solvent type of odour.
- Any other odours.
- Man-made materials in fill such as paint cans, car parts, glass fragments, plastic, metal...
- Contains asbestos sheeting, coal/coke clinker.
- Sand, aggregate and or/ subsurface concrete structures.
- Asbestos cement / lagging.

(Examples only – this list is not exhaustive. If in any doubt ask the Site Manager).

PROCEDURE

If unexpected evidence of contamination is found the following procedures shall be adhered to:

All site works at the position of the suspected contamination should stop.

Site Personnel to inform the Site Manager / Agent.

Notification of evidence of contamination of the condition of the ground and the extent of contamination should be given to Hydrock Consultants within 24 hours. Should the contamination be likely to affect controlled waters Hydrock and the Ground Worker shall inform the Environment Agency shall be informed.

In the presence of a suitably qualified geo-environmental engineer, investigation works shall commence to recover samples for testing and, using visual and olfactory observations of the condition of the ground, delineate the area over which contaminated materials are present.

Hydrock deem it appropriate, the affected material may be excavated and placed in a stockpile on a suitable impermeable surface. This should be suitably quarantined with no addition to, or removal of, the stockpile while chemical analysis is being undertaken. Alternatively, the material should remain in situ and suitably managed to prevent further disturbance until laboratory test results have been obtained.

A photographic record should also be made of relevant observations, along with sketches.

Hydrock will determine the in situ laboratory testing suite based on visual and olfactory observations.

Test results will be compared against assessment criteria suitable to maintain safe working conditions and for the future use of the area of the site affected.

If after testing the ground is found to be contaminated, Hydrock will determine the remediation strategy as appropriate. This may include removal for disposal to a licensed waste management facility or remediated to an agreed clean-up criterion. Hydrock will determine whether the Local Authority, Warranty Provider and if necessary, the Environment Agency shall be notified, following consultation with Hydrock.

UNEXPECTED TANKS

Although unlikely, there is a possibility that underground tanks, which have not been identified by the investigations to date, may be present. The following procedures are to be adhered to if tanks are identified:

All site works at the position of the tanks should stop. Health and Safety assessment to be undertaken.

A description of the tank (material, size, condition, content) should be made by Hydrock including; condition and surround, along with visual and olfactory observations should any contents in the tank and details of any associated pipework. A photographic record should also be made of relevant observations.

The tank's position and depth shall be marked on a plan of the site.

Notification shall be given to Hydrock Consultants within 24 hours.

Under the supervision of Hydrock, investigation works should be undertaken to obtain samples of any liquid or sludge contents and to establish dimensions of the tank.

Testing will be determined based by Hydrock Consultants.

Test results will be compared against assessment criteria and proposals for disposal of any contents determined in agreement with the appropriate Regulatory Parties.

Emptying the tank and disposal of contents to a suitable licenced disposal facility by a suitably licensed Contractor.

Once the tank has been emptied in accordance with the above proposals, it is to be removed for disposal to a licensed waste management facility by a suitably licensed Contractor. Copies of the relevant waste consignment notes are to be forwarded to Hydrock Consultants.

Excavation and remediation of any contaminated soils in accordance with the RSVP.

Samples of the base and sides of the resultant hole will be sampled as per Hydrock's instructions and an assessment as to whether this may have been a source for groundwater contamination made.

A report will be prepared by Hydrock and submitted to the regulatory parties, the Local Authority and where groundwater may potentially have been impacted the Environment Agency.

Appendix D General Requirements

Compliance with Legislation and Standards

The works are to be undertaken in compliance with all relevant British Standards, codes of practice, regulations, guidance and legislation.

Whilst not an exhaustive list, works shall be in compliance with the latest revision of all relevant legislation, HSE Guidelines and good working practice including, but not be limited to, the following:

- The Health and Safety at Work etc. Act 1974;
- Construction Health Safety and Welfare Regulations 1996;
- Health and Safety Executive 'Protection of Workers and the General Public during Redevelopment of Contaminated Land' HS (G) 66, HMSO 1991;
- The Construction, Design and Management Regulations 2015;
- The Control of Substances Hazardous to Health Regulations 2002 (COSHH Regulations); and
- The Control of Asbestos Regulations, 2012.
- BS6187:2011 "Code of Practice for Full and Partial Demolition".
- The Contractor is responsible for obtaining all necessary approvals, licences, consents and permits from regulatory bodies and third parties prior to commencement.

Licences, Permits and Consents

Any conditions associated planning permission should be addressed prior to carrying out the works.

It will be the responsibility of the Contractor (to be appointed) to obtain any of the necessary permits and undertake the appropriate notifications and assessments.

The Contractor should only expect approvals have been sought by others where explicitly provided to the Contractor or advised in writing.

If treatment of the soils is to be undertaken, it will need to be undertaken in accordance with an appropriate Environmental Permit.

Any reuse of soils will need to be undertaken in accordance with the 'Definition of Waste: Development Industry Code of Practice - Definition of Waste. Development Industry Code of Practice', Version 2 2011 i.e. in accordance with an approved Materials Management Plan and Qualified Person Declaration.

Health and Safety Requirements

The Principal Contractor must manage the risks in accordance with their legal requirements and all works are to be undertaken in compliance with all relevant regulations, guidance and legislation.

A Construction Phase Plan (CPP) will need to be submitted to the CDM co-ordinator, the Client and the LPA in advance of mobilisation to site. The CPP will be passed to the Site Manager who will implement all Health and Safety measures on site. The Site Manager will fully induct the Site Operatives prior to commencement of any works. The CPP will be kept as an open document and will be adapted as required to during the project. This will (as a minimum) include:

- welfare arrangements, storage and security;
- air monitoring requirements (and action levels);
- traffic management plan;

- segregation of working areas and site welfare (and decontamination units if required);
- site inductions, daily safety briefings and toolbox talks;
- activity specific risk assessments;
- method statement briefings;
- daily inspection records; and
- permits to work.

During the works it will be necessary to protect the health and safety of the site personnel. General guidance on these matters is given in the Health and Safety Executive (HSE) document 'Protection of Workers and the General Public during the Redevelopment of Contaminated Land' HS (G) 66. In summary, the following measures are suggested to provide a minimum level of protection:

- all ground workers should be issued with protective clothing (including high visibility clothing), hard hats, footwear and gloves, personnel instructed as to how it should be used;
- all personnel shall wear hard hats, high visibility clothing and protective footwear at all times;
- ensure that everyone on site complies with the health and safety plan;
- take reasonable steps to ensure that only authorised persons are allowed on site (or part thereof as the case may be);
- display, where they can be easily read, any notification that has been sent to the Health and Safety Executive;
- hand washing and boot cleaning facilities shall be provided;
- no smoking except in designated areas;
- good practices relating to personal hygiene shall be adopted;
- prepare method statements for operations as required by the CDM Co-ordinator; and
- provide the CDM Co-ordinator with any other relevant information.

Before site operations are commenced, the necessary COSHH Assessments, Method Statements and Health and Safety Plans should be completed, approved to the CDM Coordinator's satisfaction and issued in accordance with the CDM Regulations.

- The Health and Safety Plan should pay particular attention to the following hazards which may be encountered:
- potentially hazardous or contaminated materials used or encountered on site;
- deep excavations;
- the potential for ground gases and risks on confined spaced entry (limited risk based on monitoring data);
- working in the vicinity of existing underground or overhead services;
- working in confined spaces;
- working on, or in the vicinity of highways;
- working with materials which have the potential to contain asbestos and the risk of inhalation of asbestos fibres;
- manual handling;

- the potential for fire;
- working with electrical apparatus in the vicinity of mobile plant and the potential presence of water;
- poor lighting;
- the potential for falling/slipping/tripping and sustaining injury;
- the possibility for biological agents to be present, including, but not limited to: psittacosis, leptospirosis (Weill's disease), tetanus, legionella, human waste; and
- working in the vicinity of voids and openings.

The Contractor shall take all necessary safety precautions throughout the ground treatment operations and shall comply with the Health and Safety at Work Act 1974 or any subsequent re-enactment thereof.

The Contractor shall submit for approval all necessary method statements to the Supervising Engineer prior to commencing the works.

The Contractor shall provide details of emergency procedures. Emergency services shall be informed of the site operations prior to commencement.

All statutory records to be kept in the site manager's office and these may include (not an exhaustive list):

- ASB NNLW1 – Notification of non-licensed asbestos work if the work is deemed not be requiring a licence;
- Appropriate licence with regards to CAR 1012 if the work is deemed to require a licence;
- HSE Notification F10;
- Pre-Construction Information Pack;
- Construction Phase Health and Safety Plan;
- Method Statements and Risk Assessments;
- Environmental Permit deployment form and associated paperwork;
- Discharge Consents for disposal of groundwater;
- Competence records (including asbestos awareness training and face-fit test records);
- Service records;
- Plant and machinery maintenance records;
- Duty of Care paperwork.

Site Establishment and Security

Prior to the commencement of any works, the contractor, in conjunction with the Client, shall establish the boundaries of the site and working areas.

The Contractor shall make adequate provision to secure the site boundary and prevent unauthorised access onto the site during the course of the works.

Prior to the commencement of any works, the contractor, shall undertake a dilapidation survey of all adjacent features/construction including but not limited to boundary walls/ fences, adjacent footpath and road constructions etc. The survey is to be agreed with the Client or their representative prior to commencing any work on site.

The Contractor shall be responsible for all costs associated with rectification of damage to adjacent features/construction including but not limited to boundary walls/ fences, adjacent footpath and road constructions etc. resulting from the demolition works.

The Contractor is to provide surveying capability as set out in this document to facilitate the above.

Prior to the completion of the works the Contractor is to discuss the continuation of the site security, including the fences, with the client and acceptable arrangements for continued security are to be agreed prior to the removal of the contractor's security provision.

Traffic Safety and Management

The Contractor shall comply in all respects with Chapter 8 of the Traffic Signs Manual for works on or affected the public highway and/or private roads forming the highway access to/from the site. The Enabling Works Contractor shall obtain all necessary consents from the Local Highway Authority for works on the public highway.

On-site access and haul routes should be provided and maintained by the Enabling Works Contractor in such a manner so as not to endanger either the user, those working in the vicinity of such accesses/haul routes and or the Works.

Access to the site will be agreed with the Clients prior to commencement.

Suitable precautions shall be taken to prevent the spread of mud and debris on the public highways. Regular inspections of the public highway adjacent to the site shall be carried out. If deemed necessary by the Contractor, the Client or the Supervising Engineer, the highway shall be swept regularly to remove any mud, slurry or dust deposited by vehicles entering or departing the site. If the Supervising Engineer considers that significant amounts of any detritus have been deposited on the public highway then operations shall be temporarily suspended until appropriate cleaning operations have been undertaken.

The Contractor is to co-operate with other Contractors if they are present during the works.

The proposed works will generate a number of vehicle movements associated with the removal of soils and delivery to site of materials. Consideration should be given to the route and the timing of these vehicle movements, to minimise risk and disturbance to sensitive locations (such as schools, residential areas).

Risks associated with the transport of soils that are potentially containing contaminated, such as dust emission, should be appropriately managed.

Welfare Facilities

Site cabins and welfare facilities should be established at a location to be agreed with the Client.

The Contractor is deemed to have made provision and arrangements for all temporary services associated with the welfare facilities.

Working Hours

Noisy operations i.e. the use of hydraulic breakers shall be restricted to operating times as specified by the Client and by the Planning permission.

Prior to commencement the Contractor is to make contact with the Council to establish if any further restrictions apply.

Mobile Plant

Mobile plant shall be operated by suitably trained and qualified operators experienced for each item of plant. When not in use all plant shall be locked to prevent unauthorised operation.

All traffic entering or working on site shall obey a maximum 10 mph speed limit.

Fuelling of any plant shall be undertaken in a designated area and all above ground fuel storage tanks shall comply with the requirements of the Pollution Prevention Guidelines PPG2.

Specifically, any storage tanks used should:

- be sited within an oil-tight secondary containment system such as an impermeable bund;
- the secondary containment must provide storage for at least 110% of the tank's maximum capacity;
- be located within a secure area; and
- all taps and valves should be fitted with a lock and kept locked shut when not in use.

Maintenance of mobile plant should be undertaken in a designated area, unless absolutely necessary.

Waste oil, hydraulic fluid etc. should not be tipped directly or discharged on to site. Such materials shall be stored separately, in a secure bunded area, for off-site disposal. Waste oil may be a special waste and disposal shall be undertaken by a registered carrier in accordance with the Duty of Care Regulations.

A spill kit shall be kept on site in an accessible place adjacent to the designated refuelling area.

Unexploded Ordnance

The specialist UXO risk assessment (produced by 1st Line Defence in July 2021 for Avison Young Holdings Ltd on behalf of Portsmouth City Council) indicates a Low-Medium Risk from items of German aerial delivered UXO and Low from Allied UXO across the site. However, it is recommended that all works have:

- A written site-specific site management plan for UXO.
- Site specific UXO awareness briefings to all personnel conducting intrusive works.

Surveying

The Contractor shall provide full time surveying personnel and equipment to undertake the following activities and any other requirement for topographical information relating to the project that arises through the duration of the enabling works contract. The survey personnel and equipment should be capable of providing accurate levels and co-ordinates in relation to the national grid and topographical survey provided within 1 day of request.

The following key activities are covered by the requirements for surveying:

- confirmation of topographical survey on possession of the site, and setting out of the site boundary;
- confirmation of positions of existing services and site features;

- surveying the base and extent of all excavations and remaining obstructions (to be undertaken prior to backfilling);
- all setting out and levelling relating to delivery of the enabling works;
- the location of sub-structures removed;
- interim surveys to be undertaken during the infilling works to provide information on issues such as depth of excavation, progress of earthwork, quantities of materials etc.;
- the location and elevation of test samples and locations; and
- as built survey information.

A topographical survey of the site is to be provided by the Client in the Site Information. The Contractor is required to undertake all necessary topographical survey works to verify these levels before the commencement of the contract. Should the Contractor find any discrepancies on the drawings they are to refer the matter to the Engineer for verification before proceeding with the part of the works affected.

The Contractor shall undertake a topographical survey following completion of the works.

All topographical surveys shall include levels at maximum 10m spacing and details of any features, changes in slope, structures, services and any other features of interest.

All of the above features shall be surveyed for line and level at the site boundary and marked on a plan. Levels shall be to Ordnance Datum and locations to National Grid. The survey shall be calibrated against existing site surveys and benchmarks in the vicinity of the site.

Testing

The Contractor is responsible for undertaking any geotechnical testing required.

The Consultant shall undertake testing of hotspots to confirm remediation has been successful and shall sample and test imported soils (or those soils proposed for re-use in the cover system or as topsoil to prove suitability for use.

The Contractor shall undertake testing of site won or imported soils proposed for use in the cover system or as topsoil to prove suitability for use.

Off Site Disposal

Materials for offsite disposal shall be sampled and analysed, by the contractor, at rates sufficient to allow the material to be adequately categorised.

Material exported from site to landfill, or other appropriately licensed facility, shall be hauled by a registered waste carrier in accordance with the requirements of the Duty of Care Regulations, 1991 and where appropriate the Special Waste Regulations, 1996. A transfer note shall be completed, signed and retained by all parties involved. The transfer note shall state the volume of waste, the nature of the material and statement to the chemical composition. The waste transfer notes shall be kept by the Contractor for a period of at least 2 years.

Contamination

Contractors should be made aware of the possibility of encountering contaminants within soils or groundwater at the site (specifically including asbestos fibres) through 'toolbox' talks.

Safe working procedures should be implemented in accordance with CIRIA132 and good standards of personal hygiene should be observed and appropriate levels of PPE provided and utilised.

Eating, drinking and smoking should be strictly prohibited in the development site other than in designated mess areas.

Contamination risks to ground workers

Whilst risks to construction workers are not discussed in detail, the following section discusses potential risks that should be considered. Information presented in this document is provided to assist in managing the risk associated with contamination in soil and groundwater at the site but is not definitive. The Contractors are responsible for undertaking their own assessments and assessing what risks are present and what control measures are required.

Task specific risk assessments and method statements should be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate PPE and, if required, RPE should be provided and utilised.

Ground Gas

It is noted that concentrations of carbon dioxide (an asphyxiant) in the soil exceed HSE Workplace Exposure Limits for personnel in the working environment of 0.5% for long term exposure. Furthermore, soil concentrations of oxygen are below the HSE recommendations of 18%.

Soil gas concentrations are not necessarily reflected by those in the breathing zone, as such, all Contractors and maintenance workers should be made aware of the possible presence of carbon dioxide and should take all necessary health and safety precautions when working in trenches or confined spaces.

Asbestos

ACM has not been encountered during the ground investigation.

However, all site staff should be made aware of the possibility to encounter unidentified fragments of asbestos within the Made Ground soils anywhere on the site at any stage of the development. It is advised that the Contractor should consider supplying suitable and sufficient 'Asbestos Awareness' training (specific to asbestos in soils) to all site staff who could foreseeably encounter asbestos containing materials during the course of their work.

The Contractor shall have in place at the start of the contract, work procedures designed to ensure they are working in full compliance of all Health and Safety requirements (including, but not exclusively CAR 2012 and CAR Soils) and that control measures are sufficiently robust to prevent release of airborne asbestos fibres into the surrounding environment.

The Contractor for each stage of works must undertake a suitable and sufficient Risk Assessment in accordance the Regulation 6 of the Control of Asbestos Regulations 2012 (CAR2012). The results of the assessment should be used to compile a methodology in accordance with Regulation 7 of CAR2012, which limits the potential exposure and spread of asbestos fibre. Appropriate training should be provided to all site staff identified within the risk assessment as having the potential to be exposed or encounter asbestos during their work in accordance with Regulation 10 of CAR2012.

It is the responsibility of the Contractor to ensure that mitigation measures are suitable and sufficient to prevent exposure to airborne asbestos so far as is reasonably practicable in accordance with Regulation 11 of CAR2012.

The remediation works are designed to break the source-pathway-receptor linkage with regards to contaminants within the soil. Whilst appropriate measures are required for all contaminants present, the Contractor should note the additional details provided below with regards to asbestos in the soils:

- Asbestos is a hazard to Human Health when airborne fibres are inhaled. Asbestos containing material (ACM) that is in a bound form (such as asbestos cement tiles) is not hazardous where the asbestos fibres cannot become airborne. However, if lagging is present or the ACM is broken or crumbled in a dry condition the asbestos fibres could become airborne and could then be inhaled. When soil with asbestos is covered by hardstanding, buildings or a cover of clean soil or when the soil is kept damp, the asbestos fibres are less likely to become airborne and the risk is greatly reduced.
- The Health and Safety at Work Act 1974 forms the basis of health and safety legislation in the UK. In addition, the Control of Asbestos Regulations 2012 (CAR 2012) applies throughout the UK. CAR 2012 applies if land has significant asbestos content and is relevant to any work conducted on asbestos contaminated land.
- CAR 2012 defines a 'control limit' of 0.1 fibres per cubic centimetre of air averaged over a continuous period of 4 hours. This limit is not risk based and may be much higher than the levels for control of environmental pollution.
- CAR 2012 applies even where exposure to asbestos of employees is sporadic and of low intensity and where exposure to asbestos of any employee will not exceed the control limit. In addition, the work must be of short non-continuous activities where non-friable materials are handled, or removal without deterioration of non-degraded materials in which asbestos fibres are firmly linked in a matrix.
- Lagging, broken fragments of asbestos and loose fibres have the potential to release airborne fibres in dry conditions. In addition, as the ACM and asbestos fibres have been contained in the soil for many years, the likelihood is that they would be degraded to some extent. However, the asbestos fibres detected at the site are within a soil matrix and if this is kept damp, this should assist in minimising the risk of the release of airborne fibres.
- Given the above factors, it is possible that the works being undertaken would not be exempt from CAR 2012 licensing requirements. Therefore, until proven otherwise, Hydrock considers that the contractor should treat the work involving handling of the soils as licensed work as defined in CAR 2012.
- It should be noted that information presented in this document is provided to assist in managing the soil at the site which contains asbestos. Hydrock cannot be held responsible for how the control measures associated with these risks are implemented and recommend that an appropriate asbestos specialist assist with both the preparation of documents and licences and site supervision.

Task specific risk assessments and method statements should be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate PPE and if required RPE should be provided and utilised.

If encountered, visible fragments of suspected asbestos containing materials on the site surface should be handpicked. If hand picking is being undertaken it needs to be undertaken in accordance with and

Environmental Permit and ACM shall be placed in a dedicated covered and lockable skip pending off-site disposal to a suitably licensed facility. Such remediation measures should be undertaken by suitably qualified contractors and in accordance with CAR 2012.

Appropriate mitigation measures (by suitably trained operatives) will need to be designed and put in place by the Contractor during excavation, processing and placement of soils to prevent asbestos fibres becoming airborne. Task specific risk assessments and method statements shall be in place, and risks and required mitigation measures communicated to all relevant personnel, prior to the works commencing. Appropriate PPE, and if required RPE, shall be provided and utilised.

With regard to the excavation of soils, as far as reasonably practicable the removal of easily identifiable ACM is required. It should be noted that:

- In accordance with CAR 2012 (Regulation 16) there remains a duty of the Contractor to 'prevent or reduce the spread of asbestos anywhere where work is being carried out under their control'. Where complete prevention is not reasonably practicable (this would constitute such a case), the regulation requires the Contractor to reduce to the lowest level reasonably practicable level, the spread/potential for asbestos fibre release from any place where work under the Contractor's control is carried out.
- CAR 2012 notes that the Contractor should select and use work methods that will reduce the disturbance and release of asbestos fragments and fibres to minimise the risk of spread, e.g. by removing items intact or whole and by using dust suppression techniques. ACMs must never be left loose, or in a state where they can be trampled on or spread. All asbestos waste should be bagged or wrapped promptly after removal and the waste should be removed from the work area regularly.
- Additionally, where enclosures are not used (and this is one of those instances, as it is not reasonably practicable to do so), the Contractor's risk assessment should establish what will be required to make sure that, as far as is reasonably practicable:
 - the spread of asbestos is prevented (airborne fibres and asbestos in soils);
 - people not involved in the work are excluded from the area;
 - the work area is totally cleaned after work is completed.
- For the proposed activities, there are two activities which could release fibres
- excavation of soils containing gross ACM; and
- placement of soils containing gross ACM.

It is reasonably practicable for visible 'gross'/highly fibrous materials to be handpicked and double bagged at the point of excavation, as this material has then been removed, and the potential to liberate fibre on the second activity (placement) has thus been alleviated or reduced to as low a level as reasonably practicable. As such, in addition to a surface inspection and pick, hand picking of gross ACM is required during excavation and placement activities to ensure that as far as reasonably practicable all visible gross ACM has been removed.

There is a possibility of potentially licensable asbestos being encountered during the remediation works. The Contractor will need to undertake an assessment of the works and provide a written record detailing if it should be considered 'notifiable' or not.

Hand picking needs to be undertaken by suitably qualified personnel (in Hydrock's opinion, Asbestos Awareness is not sufficient) in accordance with HSE guidance and an Environmental Permit. Visible

fragments of suspected asbestos containing materials on the site surface shall be handpicked. In addition to the controls required under CAR 2012, there may be a requirement to deploy an Environmental Permit. The Contractor is to form their own opinion and either:

- deploy a permit; or
- in accordance with the Environment Agencies 'Remediation Position Statements', dated 7/11/2010, notify the Environment Agency of the activity a minimum of 5 days before start. The EA may then request deployment of a MPP.

All ACM shall be placed in a dedicated covered, lockable skip pending off-site disposal to a suitably licensed facility. Such remediation measures shall be undertaken by suitably qualified Contractors in accordance with CAR 2012.

Air monitoring for asbestos is required on an ongoing basis during the works (frequency to be set out in the Asbestos Working Plan) and the results shall be compared with acceptable maximum standards set by the HSE. These air monitoring procedures and limits are given in HSG 248 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures' and CAR 2012. The monitoring should be undertaken by a UKAS accredited laboratory. The limit used is governed by the levels stated in the above guidance documents and the accuracy of the testing used. However, Hydrock recommends using the most stringent limit set by the HSE. Air monitoring results are acceptable only if they fall below this limit and are as low as reasonably practicable. Exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

The Control of Noise, Vibration and Dust Nuisance

The Contractor shall comply with the recommendations for practical measures to reduce noise and vibration set out in BS5228-1:2009 and BS5228-2:2009 and with any specific Principal Contractor requirements.

If necessary, working methods should be altered in order to ensure that the level of noise generated from the works is within published tolerable limits.

The requirements of the LPA are to be sought and undertaken.

General

No fires shall be permitted on site.

Dust Mitigation

Appropriate measures shall be implemented at all times during the demolition and enabling works to minimise any dust emissions.

The Contractor shall take all reasonable measures to prevent dust nuisance from being generated by construction traffic, etc.

Any main temporary haul roads shall, where practical to do so, be constructed of crushed hardcore products. The haul roads shall be maintained for the duration of their use to minimise any build-up of loose spoil etc.

Traffic both entering and working on site shall obey a maximum speed limit of 10 mph.

Mobile water bowsters and sprayers shall be available on site at all times to water unpaved haul roads and working areas. The water spray may include chemical dust suppressants or wetting agents to improve dust control.

Wagons that are to be used for the haulage of any contaminated material from site shall be appropriately sealed or sheeted to prevent the release of fugitive dust.

An adequate supply of water shall be maintained on site at all times to allow for dust suppression activities to be carried out at short notice.

Where mobile water bowsters are not effective in suppressing dust then vapour masts shall be used. Such vapour masts shall be deployed at 20m centres on the downwind side of haul roads or excavations giving rise to significant dust or emissions of odour.

Air quality and dust monitoring stations should be set up and monitored by the Contractor to record the dust concentrations, including the presence of asbestos fibres during the works.

With regards to stockpiles:

- stockpiles should be kept to a minimum to reduce 'wind whip' causing potentially hazardous material to be blown from the pile;
- stockpiles should be placed on a suitable polythene membrane to prevent any cross contamination and care should be taken not to pierce the sheeting when placing the bulky elements of the material;
- stockpiles should be dampened down or covered to prevent dust, whilst the final choice should be made by the Contractor based on site constraints, but the options include covering with plastic/polythene membrane, or by a layer of clean soil material; and
- the drop distance from excavator bucket to stockpile should be kept as short as reasonably practicable to reduce dust.

Odour

In general terms the excavation works are not considered likely to give rise to any significant odour problems. However, possible odours cannot be discounted during excavation of Made Ground materials and it is advised that odours are formally assessed by twice daily inspections of all site boundaries when excavation works in Made Ground materials are undertaken.

If highly odorous materials are encountered, which may give rise to nuisance to neighbouring properties, appropriate vapour masts shall be deployed to provide suitable odour control. Any odorous materials shall be covered at the end of each working day and any stockpiles should be located away from any sensitive areas.

Plant and machinery shall be serviced regularly to ensure that exhaust fumes are compliant with best practice and relevant regulations.

Noise

The requirements of the Local Planning Authority and BS 5228: 1997 'Noise and vibration control on construction sites' shall be adhered to at all times.

All machinery shall be fitted with effective silencers and shall be serviced at regular intervals. No items of plant shall be operated with engine covers raised.

The location of any crushing plant shall take into consideration the location of neighbouring properties and other noise sensitive receptors and shall be located away from these areas and located adjacent to proposed stockpile locations where possible.

Water Quality Controls

The Contractor shall provide for such measures as may be necessary to ensure that water, whether ground water, from precipitation or any other source does not accumulate in excavations or on sub-grades.

Adequate drainage sumps should be installed during works and cut off trenches/dewatering measures will be used as required to manage surface water run-off, to prevent any water from entering watercourses, either directly as surface water run-off, or indirectly via the surface water drainage systems;

If materials escape, appropriate the Contractor is to undertake (at their cost) appropriate remedial action as soon as possible.

Services

Prior to site work commencing, the Contractors shall establish the position of all services. The locations should be confirmed on site by appropriate investigation, observations and survey.

Damage to Property

All works are to be undertaken in accordance with the Party Wall etc. Act 1996.

The Contractor shall ensure that all precautions are taken in order to avoid any damage to existing property arising from the Works and shall be responsible for same in the event that any damage should arise from his failure to exercise due care.

Any adjacent structures, services and the like shall be inspected prior to commencement of the Works for evidence of existing defects and, if necessary, a dilapidation survey shall be carried out by the contractor, with the agreement of the Client and/or the Supervising Engineer, prior to works commencing on site. A re-inspection shall take place on completion of the Contract to verify that no damage or deterioration of the said structure, service or apparatus has occurred as a result of the Works. A schedule of the findings of this re-inspection shall be circulated to all parties concerned for their records.

The Contractor shall execute the works with care so as to avoid damage to existing structures and drains or other services to be retained.

All fences, trees, paths, shrubs, grassed areas and other surfaces required to be retained shall be protected by the Contractor from spillage and damage caused by site operations and upon completion of the works they shall be handed over in an undamaged and proper state to the satisfaction of the Engineer.

Refer to landscape architect drawings and specifications that define the areas that require protection. The Contractor shall not raise or lower the ground level beneath the spread of the branches of any tree to be retained without the approval of the Engineer.

Drawings and Supplied Information

Whilst efforts have been made to ensure that the information provided to the Contractor is correct and current, the Contractor is responsible for corroborating the existing information with the benefit of their site presence and to report any discrepancies encountered or anticipated to the Supervising Engineer immediately.

Photographs

A detailed dilapidation survey shall be undertaken of the site and adjacent properties including joint site boundaries, in conjunction with adjacent land owners. Such survey shall include roads, footpaths, street lighting and road signs. A copy of the survey, including record photographs shall be provided to the Client within seven days of commencement of site works.

The Contractor is to provide on-site, a digital camera and e-mail facilities to enable electronic transfer of site photographs and other information for the full duration of the contract.

Progress photographs are to be taken at least weekly across all parts of the site for inclusion within the contractor's report. Photographs are to be made available to the Engineer/Client in electronic format should they be requested during the contract. Record photographs should be provided as part of the validation information.

Appendix E Roles and Responsibilities

Table E.1 provides a summary of works and responsibilities required during the Works. Table E.1 should not be used as a separate document. In addition, whilst every effort to summarise the responsibilities has been made, the main document takes priority and omission from the summary table is not a valid reason for not undertaking works as detailed in the Specification. All works summarised below are to be undertaken in accordance with the relevant Specifications.

Table E.1: Summary of roles and responsibilities

WORK ACTIVITY	RESPONSIBILITY
Pre- Contract	
Remediation Strategy and Verification Plan (this document)	Consultant
Regulatory discussion and agreement.	Consultant
Pre- Commencement	
H&S risk assessments and working methods.	Contractor
Obtaining any licenses and / or permits considered necessary.	Contractor
Materials Management Plan and Qualified Person declaration.	Consultant
Construction works	
Review of levels and delineation of Made Ground.	Contractor
Watching brief during hotspots excavation.	Consultants
Inspection of hotspot excavations in accordance with the RSVP.	Consultants
Excavation and reuse (cut to fill) of soils as appropriate to the required levels in accordance with the RSVP and MMP and placement to the Earthworks Specification (including earthworks testing).	Contractor
Appropriate management, stockpiling and materials tracking of soils as per the RSVP and MMP	Contractor
Watching brief during excavation and re-use of soils and earthworks.	Consultant
Import and stockpiling of topsoil.	Contractor
Provision of test data to the Consultant, prior to import.	Contractor
Provision of evidence of barrier pipe installation to the Consultant (if required).	Contractor
Testing of any site won or imported soils (as required).	Consultant
Disposal of unsuitable material.	Contractor
Provision of all validation data / requirements as per the RSVP and MMP (and the GDR).	Contractor
Inspection of soils as necessary.	Consultant
Chemical testing of soils as necessary.	Consultant/Contractor
Verification Report	Consultant