Hydrogeological Impact Appraisal

Low Carbon Cement Mill – Newport Docks, Wales

Newminerals ltd

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For:	Newminerals ltd
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EXECUTIVE SUMMARY

General summary

Newminerals proposes temporary dewatering for the buffer tank and drainage excavation and for warehouse foundations at South Dock. The assessment assumes control levels of +5.0 and +6.2 m AOD, maximum active footprints of 1,200 and 10,000 m^2 respectively, staged excavation and a return discharge to South Dock. These are the design parameters appraised; changed locations, simultaneous area, levels, duration or outfall would change the assessment.

The December 2024 ground investigation (GI) found heterogeneous Made Ground over thick alluvial silt and clay, with shallow standing water at +7.3 to +7.7 m AOD. Lower heads of +1.1 to +2.0 m AOD were recorded in two deeper installations, beneath 15–17 m of superficial deposits. The evidence favours predominantly local perched water; a potential shallow connection to dock fill and drainage is included in the conservative dock-fed assessment case.

The 2007 Environment Agency hydrogeological impact appraisal method, which NRW directs civil engineering applicants to use, has 14 steps: Steps 1–12 assess quantity, drawdown and quality; Steps 13–14 address mitigation and monitoring. Section 8 records the finding against every step. The site calculations describe potential pump demand and temporary storage release; steps 4–11 use the conceptual model, receptor pathways and conservative source-allocation cases to assess flow and drawdown effects separately from pump demand.

At assumed central parameters the model gives initial drainable storage of about 600 m^3 at the buffer tank and 2,600 m^3 at the warehouse, and continuing seepage of about 21 and 23 m^3/day respectively. These estimates are sensitive to the unmeasured hydraulic conductivity, connected saturated thickness and active excavation area. The Sichardt distances in Table 13 are retained only as comparative construction estimates and are not used to rule out impacts on the River Usk or to set the HIA search area.

Construction screening metric	**Buffer tank excavation**	**Warehouse**
Central drawdown	2.5 m	1.3 m
Central initial drainable storage	600 m3	2,600 m3
Central continuing seepage	21.4 m3/day	23.2 m3/day
60-day total / average	1,881 m3 / 31.4 m3/day	3,992 m3 / 66.5 m3/day
90-day total / average	2,522 m3 / 28.0 m3/day	4,688 m3 / 52.1 m3/day
Empirical construction influence beyond excavation edge	23.7 m	12.3 m
Indicative installed duty pump	3 L/s + standby	12-15 L/s + standby

With concurrent operation, the central model gives approximately 5,873 m^3 in 60 days and 7,210 m^3 in 90 days; the initial seven-day drawdown averages about 107 and 395 m^3/day at the two areas before direct rainfall. These are screening scenarios, not measured abstraction rates or discharge limitsoverlay.

Final assessment: The ground investigation, conceptual model and assessed source-allocation cases support the conclusion that temporary pumping will principally remove shallow perched water from Made Ground. The thick alluvium and substantially lower heads separate the proposed shallow collection system from the basal gravel and bedrock aquifer. The assessment includes the potential shallow connection to South Dock: even the conservative case attributing all continuing groundwater inflow to the dock predicts negligible net depletion because the collected water is returned to that dock. The available evidence therefore supports a prediction of negligible to absent adverse flow and drawdown effects on South Dock, the River Usk SAC, connected designated waters and the lower aquifer. Monitoring is an operational check of this concluded assessment, not a prerequisite for reaching it. Discharge remains subject to its separate permit.

1 INTRODUCTION

1.1 Purpose

1.1.1 This Hydrogeological Impact Appraisal (HIA) assesses temporary construction dewatering for the Newminerals development at South Dock, Newport. It follows the 14-step approach in Environment Agency Science Report SC040020/SR1 (2007), as directed by NRW for civil engineering dewatering. It informs the transfer abstraction licence, the separate surface-water discharge permit and NRW's Habitats Regulations decision.

1.2 Assessment objectives

- define the excavation and temporary dewatering activities;
- appraise the evidence for the conceptual model and regional water-resource setting;
- establish a GI-informed source-pathway-receptor conceptual model;
- separate finite storage release and pump-sizing estimates from continuing water-feature flow impacts and receptor drawdown;
- assess effects on groundwater, South Dock, River Usk SAC, Severn Estuary designations, infrastructure and water quality;
- state the significance of impacts, the mitigation assumed and the monitoring necessary to enforce it.

1.3 Regulatory framework

Instrument / guidance	Relevance to the works
Water Resources Act 1991 and current NRW construction-dewatering guidance	Control abstraction. Pumping without intervening use is normally a transfer abstraction; limited small-scale construction dewatering criteria may apply only where all conditions are met.
Environmental Permitting (England and Wales) Regulations 2016	Control discharge of pumped water to South Dock as a surface-water activity.
Conservation of Habitats and Species Regulations 2017	Require the competent authority to consider effects on River Usk and Severn Estuary European sites.
NRW civil engineering HIA direction and EA 2007 method	NRW directs applicants to the 2007 EA hydrogeological impact appraisal. Apply all 14 steps, including feature-specific flows, drawdown, quality, mitigation and monitoring.
NRW small-scale construction dewatering criteria	The near-designation daily threshold is 50 m^3/day, subject to duration, conservation and discharge-location conditions. The case assessed exceeds the central initial daily threshold.

2 SITE AND PROPOSED WORKS

2.1 Location and setting

2.1.1 The site is located at South Dock, East Way Road, Alexandra Docks, Newport, South Wales. The project red line covers approximately 4.7 ha of predominantly hard-surfaced reclaimed port land between South Dock and East Way Road. Ground levels are generally about +7.6 to +9.0 m AOD, with much of the site near +8.5 m AOD. The former River Ebbw channel is interpreted to cross beneath the site and may locally contain more permeable fill.

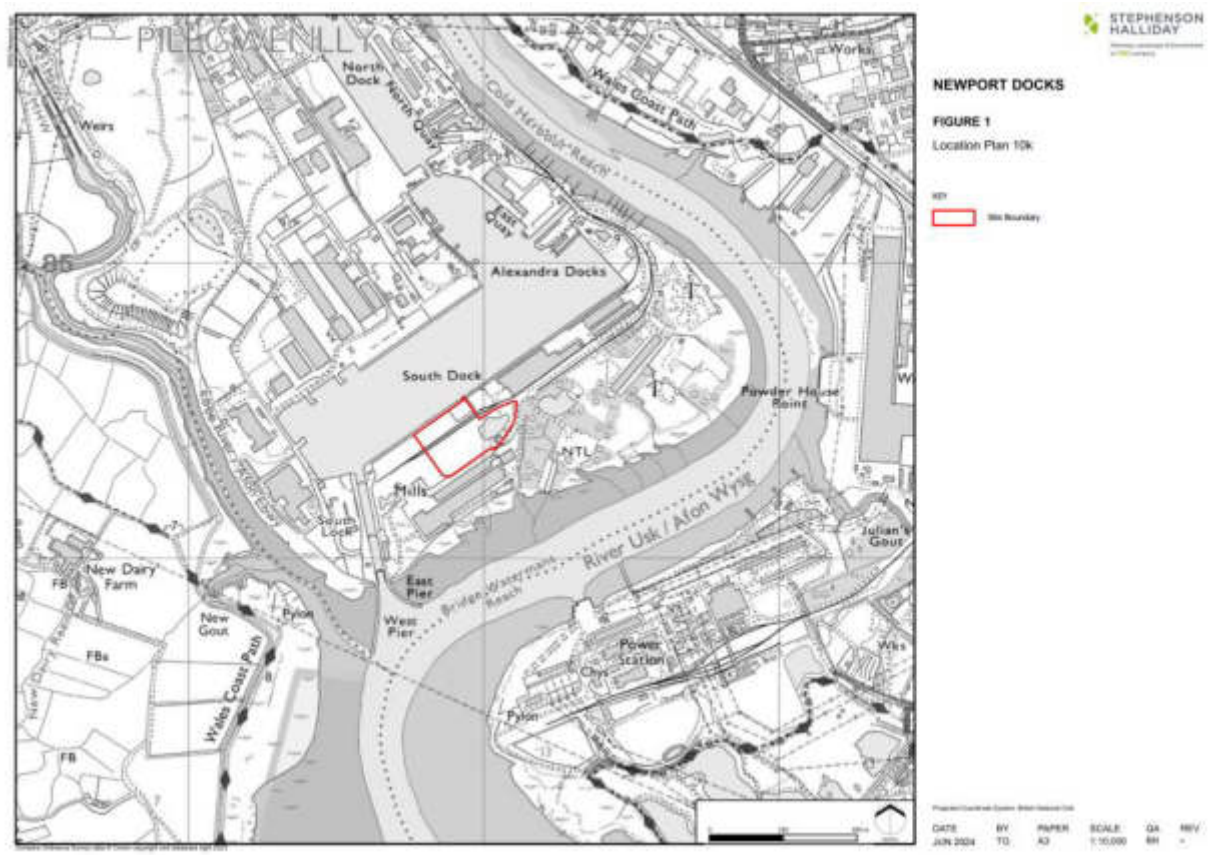


Figure 1. Site location and relationship to South Dock and River Usk (project planning source).

2.2 Proposed excavations

Excavation	Control level	Area used in model	Duration	Construction qualification
Buffer tank	+5.0 m AOD	1,200 m2	2-3 months	Area includes separators and associated drainage components.
Warehouse foundations	+6.2 m AOD	10,000 m2	2-3 months; potentially 4-5 months	Conservative single active footprint; works may be sequential approximately 15 m-wide trenches.

2.2.1 The stated control levels are 0.5 m below the buffer tank base and 0.4 m below the top of warehouse piles in the Architects design note (Appendix 5). The warehouse is represented as a conservative 10,000 m^2 simultaneous footprint although 15 m-wide sequential trenches are described. The appraisal adopts the full 10,000 m^2 warehouse footprint as a conservative maximum active area; the described sequential trenches operate within that assessed envelope. The assessment evaluates this maximum open area and also considers staging as an operational control.

2.3 Assumed dewatering system

2.3.1 The system is assessed as shallow filtered sumps, drains or wellpoints targeting Made Ground, with metering, settlement treatment, emergency storage and discharge to South Dock. The assessed method uses shallow filtered collection, metered pumping, baffled settlement and buffer storage, followed by return discharge to South Dock. Collection points and penetrations maintain separation from the lower aquifer.

3 INFORMATION REVIEWED AND EVIDENCE QUALITY

Source	Use	Evidence status
ABO, Ground Investigation - Land at South Docks, Newport	Intrusive investigation, stratigraphy, monitoring, laboratory chemistry and risk conclusions.	Primary factual base of site conditions – see appendix 4
Arcade 6023-ARC-XX-XX-RP-ARG-3001 dewatering note	Excavation levels, areas, durations and earlier +7.3 m AOD water assumption.	Primary base of design – see appendix 4
Cemminerals Newport CEMP v7, 5 May 2026	Construction programme, drainage, pollution prevention and environmental controls.	Reviewed.
Newport City Council planning approval, 23 Dec 2025	Planning conditions and approved-document context.	Reviewed.
Planning statements and approved layout/elevation drawings	Site history, development layout, levels and designated-site context.	Reviewed.

3.1 GI scope

- 15 windowless boreholes were attempted (WS1-WS15); WS8 was not completed and several holes terminated on shallow obstruction/refusal.
- Two light cable-percussion boreholes, LCP1 and LCP2, extended through the alluvium to the basal gravel/sandstone interface.
- Eight CPTs assessed the thickness and geotechnical character of the superficial deposits.
- Shallow piezometers were installed at WS3, WS4, WS11, WS14 and WS15; LCP1 and LCP2 were also installed for deeper monitoring.
- Groundwater levels were recorded on 30 July and 11 September 2024. Five groundwater samples and one dock-water sample were collected on 11 September 2024.

4 GROUND INVESTIGATION FINDINGS

4.1 Ground profile

Unit	GI evidence	Hydrogeological significance
Hardstanding	Concrete/asphalt/tarmac generally about 0.3-0.5 m; locally over 1 m in the north.	Restricts direct recharge where intact;
Made Ground	Variable gravel, crushed tarmac, brick, coal gravel, sand and clay; 0.65-3.7 m thick in windowless holes; 0.75 m at LCP1 and 1.4 m at LCP2.	Heterogeneous shallow storage unit; local granular pockets and buried drainage may transmit standing / percolating water.
Tidal Flat Deposits / alluvium	Very soft to locally stiff silty clay/sandy silt. Extends to 15.3 m bgl at LCP1 and 16.9 m bgl at LCP2.	Low-permeability aquitard beneath shallow standing water
Basal gravel	Sandy cobbly gravel 15.3-15.8 m bgl at LCP1 and 16.9-17.2 m bgl at LCP2.	Thin lower water-bearing horizon, far below proposed formation.
Bedrock	Sandstone/refusal from 15.8 m bgl at LCP1 and 17.2 m bgl at LCP2; regional Mercia Mudstone Group mapping.	Secondary B aquifer designation reported by GI; not directly intersected by works.

4.1.1 At the proposed ground elevations, the buffer tank +5.0 m AOD level is likely to enter alluvium over most of its footprint. The warehouse +6.2 m AOD level may lie in deeper Made Ground or shallow alluvium depending on location. Once low-permeability alluvium forms the excavation side and base, continuing inflow should reduce relative to the homogeneous Made Ground screening model.

4.2 Groundwater occurrence and monitoring

Installation	Ground level	30 Jul 2024	11 Sep 2024	Interpretation
WS15	+8.662 m AOD	1.3 m bgl / +7.4 m AOD	1.2 m bgl / +7.5 m AOD	Shallow standing water
WS14	+8.106 m AOD	0.8 m bgl / +7.3 m AOD	Not available	Shallow standing water
WS11	+8.019 m AOD	0.5 m bgl / +7.5 m AOD	0.3 m bgl / +7.7 m AOD	Shallow standing water
WS4	+8.751 m AOD	1.3 m bgl / +7.5 m AOD	1.3 m bgl / +7.5 m AOD	Shallow standing water
LCP1	+7.993 m AOD	6.5 m bgl / +1.5 m AOD	6.9 m bgl / +1.1 m AOD	Lower-head installation
LCP2	+8.956 m AOD	7.0 m bgl / +2.0 m AOD	7.2 m bgl / +1.8 m AOD	Lower-head installation

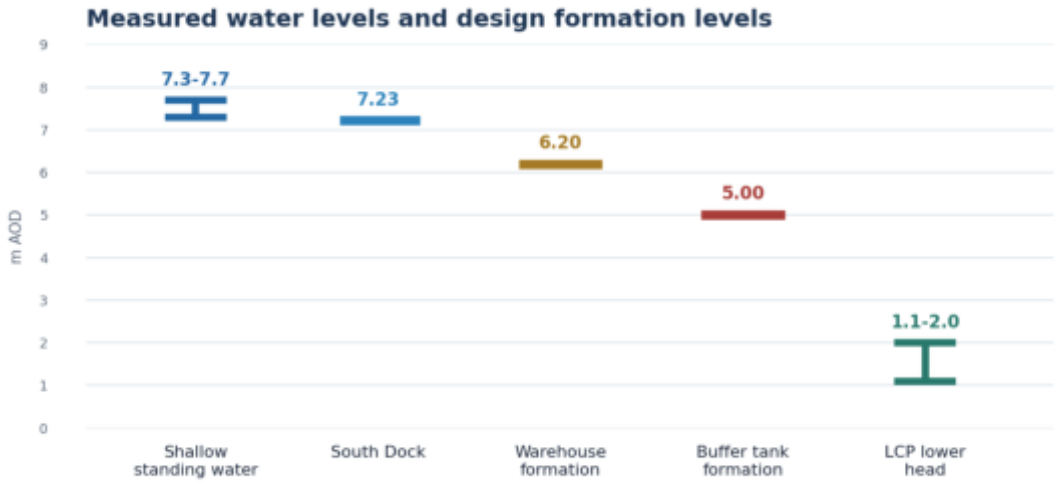


Figure 2. Measured shallow and lower heads compared with proposed excavation control levels.

4.2.1 Shallow levels of +7.3 to +7.7 m AOD have been observed in two rounds; +7.5 m AOD is used for the central construction calculation The shallow observations support a perched-water dominated conceptual model. Potential local transmission through granular fill, service corridors and former channel fill is included in the conservative connected-feature assessment in Chapter 8.

4.2.2 The GI interprets LCP1/LCP2 water levels as the first/deeper groundwater horizon and suggests a gradient away from South Dock toward the River Usk. The recorded heads are far below both excavation levels.

4.3 Groundwater chemistry

4.3.1 Groundwater samples WS4, WS11 and WS15 represent the shallow unit. CP1 and CP2 correspond to the cable-percussion installations. Key results from 11 September 2024 are summarised below. Results marked below detection are not listed individually.

Parameter	Shallow WS4/WS11/WS15	CP1/CP2	Assessment relevance
pH	7.3-7.4	7.6-7.8	Near neutral; verify in situ before discharge.
Sulphate	21.9-282 mg/L	141-189 mg/L	Variable shallow concentration; assess against dock baseline and permit limits.
TOC	4.9-13 mg/L	8.45-9.94 mg/L	May influence treatment (currently not required) and metal bioavailability.
Dissolved arsenic	1.2-6.02 ug/L	27.1-35.6 ug/L	Higher in lower installations; which is not a likely source of the pumped water

Dissolved copper	2.5-13 ug/L	1.3-3 ug/L	GI BLM assessment reported no bioavailable EQS exceedance.
Dissolved nickel	2-6.1 ug/L	2.6-3 ug/L	Low in sampled water.
Dissolved zinc	3.5-25 ug/L	2.9-6.3 ug/L	GI BLM assessment reported no bioavailable EQS exceedance.
TPH / PAH / VOC / cyanide / phenols	Below reporting limits	Below reporting limits	No evidence of dissolved hydrocarbon impact; this tallies with the analytical data for the soil samples.

4.4 Soil contamination and excavation watching brief

4.4.1 The GI did not identify soil contaminant concentrations above its industrial-use generic assessment criteria. One shallow sample, WS9.S1 at 0.10 m in the scrap processing area, was classified as hazardous waste because of mineral oil and hazardous-property screening. It represents a thin disturbed layer above older hardstanding rather than widespread groundwater contamination. Affected material should be segregated, and any staining, odour, sheen, asbestos fragment or unexpected fill should trigger stop-work sampling and separate water management.

5 ENVIRONMENTAL SETTING AND RECEPTORS

5.1 Surface water and designated sites

5.1.1 South Dock adjoins the northern site boundary and was reported near +7.23 m AOD at the GI visit. It connects via locks to the tidal River Usk. The GI and planning material report the Usk about 200–250 m from the site and a SAC boundary about 150 m southwest; neither distance substitutes for an abstraction-point and hydraulic-pathway overlay. Severn Estuary designations are downstream of the receiving system.

5.1.2 The River Usk / Afon Wysg SAC (UK0013007) is designated for river habitat and species including sea, brook and river lamprey, twaite and allis shad, Atlantic salmon and otter. Water quality, quantity, sediment and migratory passage are relevant attributes. The formal conservation-objective screening is for NRW as competent authority.

5.2 Receptor schedule

Receptor	Relationship	Sensitivity	Potential pathway
River Usk SAC	Approximately 210m from nearest dewatering, approx. 790m downstream from discharge point	Very high	Potential flow or drawdown pathway, dependent on hydraulic connection; dock-mediated return discharge.
Severn Estuary designations	Downstream/connected estuarine receiving environment; approx. 210m in straight line, approx. 790m downstream from discharge point	Very high	South Dock discharge and tidal exchange.
South Dock	Immediately adjacent north of the site, approx. 92 m from nearest dewatering	Medium	Permitted discharge; possible constant-head or local recharge boundary.
Shallow standing water	Within Made Ground beneath works	Medium	Temporary local drawdown and induced contaminant migration.
Lower groundwater horizon	About 15-17 m bgl; measured lower heads	Medium	No credible direct intersection
Third-party abstractions / water features	None reported within 1 km by GI desk study	n/a	GI desk study did not find abstraction within 1 km

5.3 Water features and cumulative activity

5.3.1 The GI desk study records no licensed groundwater abstractions within 1 km and no source protection zone.

6 GI-INFORMED CONCEPTUAL HYDROGEOLOGICAL MODEL

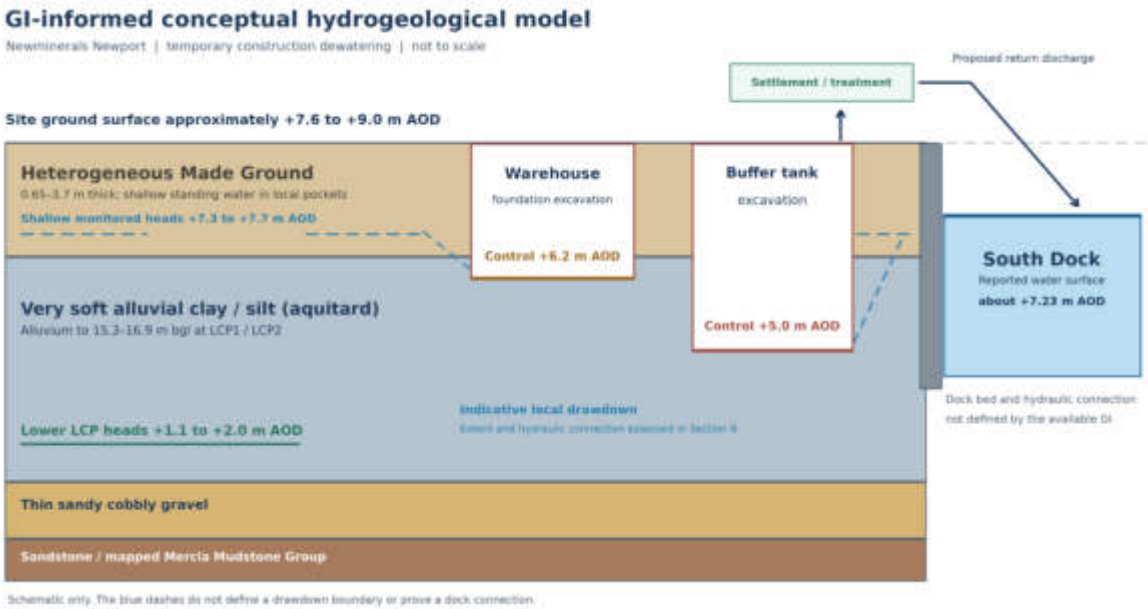


Figure 3. GI-informed conceptual model for temporary dewatering; its indicated local drawdown is schematic, not a mapped impact boundary.

6.1 Conceptual model

6.1.1 Shallow water within variable Made Ground is initially removed from storage inside the active excavation. Continuing pumping must be balanced by captured recharge or water otherwise moving toward a connected feature, induced inflow from a feature such as South Dock, or leakage through an established pathway. The evidence favours predominantly local shallow storage and recharge. Chapter 8 also assesses the conservative case in which all continuing groundwater inflow is dock-derived; both cases support negligible adverse effects on the dock and Usk.

6.1.2 Thick alluvium and lower heads below formation argue against direct deep aquifer inflow and basal uplift under the stated shallow installation. The assessed shallow collection system maintains the alluvial separation. The observed lower heads and alluvial thickness support absent to negligible flow and drawdown effects in the lower aquifer.

6.2 Source-pathway-receptor model

Source / pressure	Pathway	Receptor	Primary control
Pumping shallow standing water	Local Made Ground / buried granular features	Shallow groundwater, dock, water features	Stage works; cap rate and drawdown; sentinel monitoring.
Direct rainfall/runoff	Open excavation and sumps	Pump/settlement treatment; dock	Clean-water diversion; emergency storage; rainfall allowance.
Historical contamination	Induced shallow flow to sumps	Pumped water and dock	Hotspot overlay; controlled ramp; field/lab checks

Pumped water discharge	Outfall to South Dock and tidal exchange	Usk/Severn designated features	Separate permit; settlement treatment; flow and quality limits.
Lower water-bearing horizon	Leakage through piles/defects	Excavation base	Confirm pile method and seals; observe base; deeper monitoring if evidence changes.

6.3 Model assumptions and confidence

Assumption	Evidence	Confidence / treatment
Central shallow head +7.5 m AOD; range +7.3 to +7.7	Two GI monitoring rounds at four shallow installations.	Medium; use observed maximum for compliance envelope and log continuously.
Alluvium is the effective hydraulic base	Logs show soft clay/silt beneath Made Ground and to >15 m bgl.	High at LCP points; confirm at excavation footprints.
Central Made Ground k = 1 x 10^-5 m/s	Plausible screening value for mixed granular/fine fill.	Medium; sensitivity 1 x 10^-6 to 1 x 10^-4 and intial calibration.
Specific yield = 0.20	No direct measurement; screening value for heterogeneous fill.	Medium; range 0.10-0.30 and calibrate storage.
No direct deep inflow	Lower heads below formation plus thick alluvium.	Medium-high; verify installation details and absence of short circuits.
No major dock connection	Standing water in made ground overlaying impermeable geological strata	Medium; test with 15-minute level/EC logging.

7 QUANTITATIVE DEWATERING ASSESSMENT

7.1 Method

7.1.1 A screening equivalent-excavation method has been used to provide a transparent licence envelope. Each excavation is represented by equivalent radius re = sqrt(A/pi). Radius of influence beyond the edge is estimated using L = 3000.s.sqrt(k). The outer radius is R = re + L. Continuing unconfined seepage is estimated as Q = pi.k.s^2 / ln(R/re), converted to m3/day. Initial drainable storage is V = A.s.Sy. Total groundwater volume over t days is V_total = V + Q.t.

7.1.2 The calculations assume uniform unconfined Made Ground, constant head difference and no explicit rainfall, dock, drainage or alluvium leakage boundary. Direct rainfall and run-off affect pumping and discharge but are not automatically groundwater abstraction. Chapter 8 bounds the source allocation using a predominantly shallow-source case and a conservative wholly dock-fed case, and assesses the resulting feature-flow effects.

7.2 Calculation inputs

Parameter	Buffer tank	Warehouse	Basis
Central water level	+7.5 m AOD	+7.5 m AOD	Midpoint of observed shallow +7.3 to +7.7 m AOD.
Control level	+5.0 m AOD	+6.2 m AOD	Architect dewatering note.
Central drawdown s	2.5 m	1.3 m	Calculated.
Active area (A)	1,200 m2	10,000 m2	Architect note; warehouse is conservative.
Equivalent radius (re)	19.5 m	56.4 m	sqrt(A/pi).
Specific yield (Sy)	0.20	0.20	Range 0.10-0.30.
Hydraulic conductivity (k)	1 x 10^-5 m/s	1 x 10^-5 m/s	Range 1 x 10^-6 to 1 x 10^-4 m/s.

7.3 Initial drainable storage

Excavation	Saturated bulk volume	Central drainable storage	Full head / Sy sensitivity
Buffer Tank	3,000 m3	600 m3	276-972 m3
Warehouse	13,000 m3	2,600 m3	1,100-4,500 m3

7.3.1 The storage range combines observed shallow heads with assumed Sy of 0.10–0.30 and treats the whole drawdown interval as saturated, drainable Made Ground. It is an upper-side construction allowance wherever alluvium occurs above formation. The calculation describes a transient release from local storage, not an equal continuous reduction in a river or dock flow.

7.4 Indicative seepage and empirical distance for construction planning

k	Buffer tank seepage	Buffer tank influence	Warehouse seepage	Warehouse influence	Combined
1 x 10^-6 m/s	5.2 m3/day	7.5 m	6.9 m3/day	3.9 m	12.1 m3/day
1 x 10^-5 m/s	21.4 m3/day	23.7 m	23.2 m3/day	12.3 m	44.6 m3/day
1 x 10^-4 m/s	107.6 m3/day	75.0 m	87.3 m3/day	39.0 m	194.9 m3/day

7.4.1 Table 13 compares the assumed permeability cases and their calculated pump inflows. Its 3.9–75 m empirical edge distances do not establish the limit of flow capture or the extent of drawdown at a receptor. The River Usk SAC cannot be screened out simply because its mapped boundary is approximately 150 m away. The HIA search area follows connected features and their pathways (Steps 3 and 7).

7.5 Pumped groundwater volumes

Excavation	Duration	Continuing seepage	Total groundwater	Period average
Buffer tank	60 days	21.4 m3/day	1,881 m3	31.4 m3/day
Buffer tank	90 days	21.4 m3/day	2,522 m3	28.0 m3/day
Warehouse	60 days	23.2 m3/day	3,992 m3	66.5 m3/day
Warehouse	90 days	23.2 m3/day	4,688 m3	52.1 m3/day
Warehouse	120 days	23.2 m3/day	5,384 m3	44.9 m3/day
Warehouse	150 days	23.2 m3/day	6,080 m3	40.5 m3/day

7.6 CONCURRENT OPERATION

7.6.1 The central combined construction volumes are 5,873 m^3 in 60 days or 7,210 m^3 in 90 days if both areas operate for the whole period. Simultaneous operation can raise instantaneous abstraction and discharge; staged footprints reduce peak demand. These are construction pump-demand scenarios. Chapter 8 separately assesses dock and Usk effects using the source-allocation bounds and return discharge.

7.7 Initial drawdown, rainfall and pump capacity

Excavation	7-day drawdown	14-day drawdown	Maintenance seepage	3 mm/day rainfall	50 mm event
Buffer tank	107 m3/day	64 m3/day	21.4 m3/day	3.6 m3/day	60 m3
Warehouse	395 m3/day	209 m3/day	23.2 m3/day	30 m3/day	500 m3

7.7.1 Indicative installed pump duties of 3 L/s at the buffer tank and 12–15 L/s at the warehouse, each with standby, include design rainfall and contingency. Pump duty is not the groundwater flow effect. The 50 mm rainfall volumes in Table 15 are direct precipitation on open areas and must be distinguished in water-balance records from groundwater and other run-off.

8 HYDROGEOLOGICAL IMPACT APPRAISAL: FOURTEEN-STEP ASSESSMENT

This appraisal considers the proposed temporary dewatering of the buffer tank and warehouse excavations, with collected water treated and discharged to South Dock. The evidence indicates that the pumped groundwater will come predominantly from shallow perched water in the Made Ground. On the assessed construction method, adverse flow and drawdown effects at South Dock and the River Usk are predicted to be negligible to absent. The basal gravel and underlying bedrock aquifer are not expected to be affected.

8.1 Step 1: Regional water resource status

8.1.1 The works will remove shallow water from Made Ground for a limited construction period. They will not abstract directly from the basal gravel or underlying bedrock aquifer, and the collected water will be returned to South Dock without intervening use. The GI records no licensed groundwater abstraction within 1 km and places the site outside a source protection zone. The scheme therefore presents no material demand on the regional groundwater resource. Its relevant effects are local and temporary.

8.2 Step 2: Conceptual model

8.2.1 Shallow standing water occurs in variable Made Ground at approximately +7.3 to +7.7 m AOD. The proposed control levels of +5.0 m AOD at the buffer tank and +6.2 m AOD at the warehouse require this water to be removed from the excavation areas. Initial pumping drains local shallow storage; subsequent inflow is expected to arise principally from recharge and drainage within the same shallow system.

8.2.2 Thick, predominantly clayey and silty alluvium separates the works from the basal gravel and bedrock. Heads measured in the lower installations, at approximately +1.1 to +2.0 m AOD, are well below both excavation control levels. The dewatering collection system is shallow and does not provide a hydraulic connection to the lower horizon. A connection between parts of the shallow Made Ground and South Dock through granular fill or drainage is possible, but is unlikely to make dock water the principal source of pumping.

8.3 Step 3: Water features susceptible to flow impacts

8.3.1 The relevant features are shallow water within the Made Ground, local drainage, South Dock and, through dock exchange, the River Usk and downstream designated waters. South Dock is approximately 90–100 m from the excavation footprints. The River Usk SAC is farther away, with no identified direct groundwater pathway from the shallow excavations through the intervening low-permeability deposits.

8.3.2 South Dock remains within the assessment because shallow dockside fill or drainage could transmit some induced inflow. The River Usk remains within it because South Dock is connected to the tidal river. These pathways have been assessed; neither is expected to sustain a material adverse change in flow from the proposed temporary works. The lower aquifer is considered separately and is not a source of the proposed abstraction.

8.4 Step 4: Apportion gross flow impacts

8.4.1 The vast majority of water pumped from the excavations and discharged to South Dock is expected to originate from the shallow perched-water system within the Made Ground. Both excavations intersect that water directly. The central calculation estimates initial drainage of 600 m^3 from the buffer tank excavation and 2,600 m^3 from the warehouse excavation. These are temporary releases from local storage, not continuing reductions in flow from South Dock or the River Usk.

8.4.2 Estimated continuing groundwater inflows are 21.4 and 23.2 m^3/day respectively, or 44.6 m^3/day if both full footprints are open together. Local recharge and shallow drainage are expected to supply most of that continuing inflow. An allocation wholly to local shallow water is an idealised representation of the most likely source balance. Allocating all continuing inflow to induced South Dock water is retained only as a conservative bound for dock-flow assessment; it is not an equally likely source model. The high-permeability calculation of 194.9 m^3/day combined is likewise a sensitivity case, not a predicted sustained dock abstraction.

8.4.3 No material contribution from the basal gravel or bedrock aquifer is expected. Direct rainfall and run-off may add to the volume pumped during wet weather and are accounted for separately from groundwater inflow.

8.5 Step 5: Account for return discharge

8.5.1 The collected water will undergo physical settlement, without chemical dosing, before discharge to South Dock under the separate discharge permit. Water originating in local shallow storage or recharge is therefore transferred to the dock. Any water induced from the dock through a shallow connection is returned to the same water body after pumping and settlement. In either case, a material net depletion of South Dock is not predicted.

8.5.2 Temporary storage and the timing of discharge are operational matters accounted for in the water balance. Rainfall and surface run-off entering an excavation are recorded separately so that they are not mistaken for groundwater abstraction or a loss from a water feature.

8.6 Step 6: Significance of net flow effects

8.6.1 The predicted net effect on South Dock flow and level is negligible. The most likely source of pumping is local shallow perched water, while the proposed return discharge adds that water to the dock. Even under the deliberately conservative wholly dock-fed case, return to the same dock substantially offsets the gross induced inflow. The temporary scale and controlled operation of the works do not provide a credible mechanism for a material reduction in River Usk flow through dock exchange.

8.6.2 A direct flow effect on the River Usk SAC or downstream Severn Estuary designations is therefore predicted to be absent; any indirect net effect through South Dock is predicted to be negligible. The lower aquifer has no predicted abstraction or flow depletion under the assessed shallow collection design.

8.7 Step 7: Define the drawdown search area

8.7.1 The drawdown assessment covers the development site, the intervening dockside ground and infrastructure, South Dock, potential preferential shallow pathways, the River Usk SAC and the underlying aquifer. This includes the relevant receptors without treating the empirical Sichardt distances as a boundary beyond which effects are automatically impossible.

8.7.2 The physically credible drawdown pathway is within the shallow Made Ground around the active excavations. Distance, heterogeneous fill and the absence of an identified continuous high-transmissivity pathway make a material drawdown response at South Dock or the Usk unlikely. The thick alluvium interrupts a drawdown pathway to the basal gravel and bedrock.

8.8 Step 8: Identify features within the search area

8.8.1 Features considered are shallow groundwater and drainage; dockside ground and structures; nearby rail, roads, services and foundations; South Dock; the River Usk SAC and connected designated waters; and the basal gravel and bedrock aquifer. The GI identifies no licensed groundwater abstraction within 1 km and no source protection zone.

8.8.2 Shallow groundwater and nearby construction infrastructure are the features most capable of responding locally to pumping. The dock and designated waters have been retained as sensitive receptors, but are not expected to experience material drawdown. The lower aquifer is protected by the alluvial separation and the shallow collection method.

8.9 Step 9: Predict drawdown at each feature

8.9.1 The design drawdown at the excavation is approximately 2.5 m at the buffer tank and 1.3 m at the warehouse, measured from the central shallow head of +7.5 m AOD to the respective control levels. These are excavation targets, not drawdowns predicted at remote receptors.

8.9.2 Drawdown will be greatest at the active excavation and diminish through the variable shallow Made Ground. A local response in nearby shallow drainage, services or dockside fill is possible. A material water-level change at South Dock, approximately 90–100 m from the footprints, is not predicted. No discernible drawdown at the more distant River Usk SAC is expected. Because the collection system does not draw from the lower horizon and the intervening alluvium remains intact, drawdown in the basal gravel and bedrock aquifer is predicted to be absent to negligible.

8.10 Step 10: Mitigate drawdown

8.10.1 The assessed construction method limits the simultaneous open excavation area, uses shallow filtered collection, lowers water levels progressively and avoids using the lower horizon as a drainage route. Piles and other penetrations are formed and sealed so that they do not act as hydraulic short circuits through the alluvium. Excavation levels, pumping rates and duration are controlled within the authorised scheme.

8.10.2 These measures confine the principal drawdown to the working area. Groundwater, dock-level and infrastructure monitoring provide operating triggers for reducing or stopping pumping if the observed response departs from that assessment.

8.11 Step 11: Significance of net drawdown

8.11.1 Temporary drawdown of shallow perched water within and close to the excavations is the intended construction effect. With the stated controls, adverse effects on nearby infrastructure are expected to be local and manageable. Material consolidation caused by dewatering the lower water-bearing horizon is not predicted because that horizon is not pumped.

8.11.2 Net drawdown effects at South Dock and the River Usk are predicted to be negligible to absent. Drawdown effects in the basal gravel and underlying bedrock aquifer are likewise predicted to be absent to negligible. There is consequently no predicted material groundwater-level effect on the Usk SAC or connected downstream designated habitats.

8.12 Step 12: Water quality impacts

8.12.1 The proposed pumping will principally collect shallow water from Made Ground. The September 2024 shallow-water samples did not identify TPH, PAHs, VOCs, cyanide or phenols above their reporting limits. The local WS9 mineral-oil finding is in shallow soil and does not establish contamination of the water to be pumped. The water will not be used for a process, and no chemicals will be added to it. The existing evidence does not identify a site-derived specific substance likely to require further pollutant-specific screening or modelling.

8.12.2 Suspended solids mobilised during excavation and pumping are the principal identifiable discharge-quality risk. Pumped water will pass through contained, baffled settlement equipment; settlement is the only treatment, with no chemical dosing. The final discharge will be sampled and metered before it crosses the railway to South Dock. Water affected by a spill or contact with fresh concrete will be isolated rather than passed through the normal settlement system. The separate Surface Water Pollution Risk Assessment addresses the dock discharge in detail and concludes that Parts 2–4 of its specific-substances approach are not relevant on the existing evidence. With the stated controls, no material deterioration of South Dock or connected receiving waters is predicted

8.13 Step 13: Revise mitigation where impacts remain

8.13.1 The source, pathway and receptor assessment does not identify a material residual impact requiring a different dewatering concept. Staged excavation, shallow collection, protection of the alluvial separation, flow control, settlement treatment and controlled return to South Dock form part of the assessed method.

8.13.2 If pumped water is unusually turbid, its flow through the settlement tank will be reduced or held while accumulated sediment is removed; water affected by a spill or fresh concrete will be isolated from the discharge system. If a receptor-facing groundwater or movement trigger is reached, the relevant pumping is reduced or stopped. These are operating controls within the assessed scheme, not evidence that significant effects are expected.

8.14 Step 14: Monitoring and reporting strategy

8.14.1 The monitoring programme records shallow groundwater levels at background and receptor-facing positions, lower-horizon levels where relevant, dock and tidal levels, pump and discharge volumes, rainfall, discharge quality and movement of nearby infrastructure. Baseline, active pumping and recovery records allow the observed response to be compared with the predicted local shallow effect.

8.14.2 Amber and red triggers require investigation, rate reduction, containment or suspension where appropriate. Monitoring verifies that dewatering remains within the shallow system and that the controlled discharge meets its permit requirements. It also confirms the predicted negligible-to-absent effects at South Dock, the River Usk and the underlying aquifer throughout the works.

8.15 Overall appraisal finding.

8.15.1 The proposed temporary works primarily drain shallow perched water in the Made Ground. The thick alluvium, low lower-horizon heads, limited duration, shallow collection design and controlled return discharge together support a prediction of negligible-to-absent adverse hydrogeological effects on South Dock, the River Usk and its connected designated waters, and the underlying basal gravel and bedrock aquifer. Local shallow drawdown is an intended and managed construction effect.

9 MITIGATION, MONITORING AND MANAGEMENT

9.1 Operational controls and assessment conditions

- The alluvium and Made Ground overlay, final excavation footprint, depths, collection and outfall locations must match the parameters assessed in Sections 2 and 8; a material departure changes the applicability of this appraisal.
- Apply the maximum simultaneous open area, pump-rate and duration restrictions specified in the issued NRW permissions and contractor method statement.
- Check the inventory of shallow wells, land drains, dock structures and concurrent dock works against the Step 8 receptor search area before works begin.
- Install background, dock-facing and Usk/pathway-facing sentinel points and maintain the lower installations where needed to verify that pumping remains in Made Ground.
- Log shallow groundwater and dock/tide levels at 15-minute intervals for a baseline period sufficient to distinguish normal dock operations and rainfall responses; collect manual checks and conductivity in parallel.
- Obtain pre-discharge baseline quality in shallow groundwater and South Dock with the suite in Section 9.4, and test pumped and treated water at the stated frequency.
- Operate abstraction and South Dock discharge only within NRW's final authorisations.

9.2 Dewatering design and operation

- Use filtered sumps/drains or shallow wellpoints that target Made Ground and avoid penetrating the basal gravel or bedrock.
- Lower water levels in controlled stages; record rates and receptor response so the pumping sequence remains within authorised and geotechnical limits.
- Sequence warehouse trenches and avoid concurrent buffer tank/warehouse lowering where practicable.
- Divert clean surface runoff around excavations and separately estimate direct rainfall in meter records.
- Provide duty/standby pumps, independent high-level alarms, backup power and lined emergency storage.
- Pass water through settlement.
- Install calibrated flow meters at the abstraction system and final discharge; record daily total and maximum rate.
- Stop or reduce pumping and isolate discharge on a visible plume or sheen, an exceedance of a discharge limit, failure of settlement, insufficient receiving capacity or a defined receptor trigger.

9.3 Level, flow and movement monitoring

Parameter	Baseline	Initial drawdown	Maintenance	Recovery
Groundwater level / EC	15-min logger + weekly manual for >=4 weeks	Continuous; manual daily	Continuous; manual twice weekly	Continuous >=2 weeks or to 90% recovery
Pump volume / rate	n/a	Continuous meter; daily total/max	Continuous; daily record	Final cumulative reading
Dock/tide level	Synchronous record	Compare daily	Compare daily or after dock events	Not normally required
Weather / rainfall	Site gauge available	Daily and event total	Daily	Close-out

9.4 Water-quality monitoring

Location	Field parameters	Laboratory suite	Minimum frequency
Shallow piezometers	pH, EC, temperature, turbidity, DO, appearance/odour	TSS; alkalinity; chloride; sulphate; ammonia/nutrients; dissolved/total metals; TPH/PAH;	Two baseline rounds; immediate resample on trigger
Pumped water before settlement	Each shift during start-up, then daily		first 48 h; then weekly; then risk-based
Final discharge	Continuous or each shift as permit requires		Permit frequency; immediate sample on exceedance
South Dock background / near outfall	pH, EC, turbidity, DO		Two baseline rounds; start-up and trigger-led

9.5 Adaptive triggers

Indicator	Amber trigger	Red trigger	Response
Sentinel drawdown	Baseline envelope or receptor-specific alert level	Receptor action level or unexplained response; suspend affected pumping	Check data and dock/tide context; reduce rate at amber, stop at red and assess receptor. Numerical limits require receptor-specific basis.
Daily groundwater volume	>80% of licence limit	Licence limit reached or exceeded	Change sequence/rate; prevent exceedance; notify as permit/licence requires.
Turbidity / suspended solids	Rising trend or interim >10 NTU above background	visible plume	Optimise settlement treatment; stop discharge and contain at red.
pH / EC / chloride	>20% departure from baseline envelope or adverse trend	abrupt unexplained change	Investigate dock/saline/chemical pathway; stop where compliance uncertain.
Hydrocarbons / contamination	Odour, staining or laboratory trend	Visible sheen, unexpected contamination	Isolate, stop affected discharge, sample/treat and notify as required.
Movement	Geotechnical alert level	Action level or visible distress	Reduce/stop pumping and implement geotechnical response plan.

9.6 Completion

9.6.1 At completion, cease pumping under a controlled sequence, monitor groundwater recovery and dock levels, decommission or seal temporary penetrations and issue a close-out water balance. Reconcile measured abstraction and discharge against rainfall and run-off; present receptor hydrographs, water chemistry, trigger actions and infrastructure survey results. The close-out record documents compliance with the assessed operating envelope and the observed receptor response.

10 CONCLUSIONS

10.1 Final appraisal finding

10.1.1 The 14-step appraisal identifies shallow standing water in variable Made Ground above a thick alluvial barrier. The proposed excavations intersect the shallow water; the substantially lower heads recorded beneath the alluvium show that the basal gravel and bedrock aquifer are not a material source for the assessed shallow collection system.

10.1.2 At the adopted shallow head of +7.5 m AOD, the required excavation drawdown is approximately 2.5 m at the buffer tank and 1.3 m at the warehouse. The central construction calculation estimates initial releases of approximately 600 m^3 and 2,600 m^3 from shallow storage and continuing groundwater inflows of approximately 21 and 23 m^3/day respectively. The parameter ranges and upper permeability case have been considered as sensitivities; they do not change the assessment of effects on the identified receptors.

10.1.3 The evidence indicates that most pumped groundwater will come from shallow perched water and local recharge. A shallow connection to South Dock remains within the conceptual model and has also been assessed using the conservative assumption that all continuing groundwater inflow originates there. Return of the collected water to South Dock means that neither source case predicts material net dock depletion or a material flow effect on the River Usk or connected designated waters.

10.1.4 The drawdown assessment includes South Dock, dockside ground and infrastructure, the River Usk SAC and the lower aquifer. It does not use the empirical Sichardt distance to exclude receptors. The available geological, groundwater-level, pathway and distance evidence supports a prediction that drawdown will be concentrated around the active excavations, with negligible to absent adverse drawdown at South Dock and the River Usk and absent to negligible drawdown in the lower aquifer.

10.1.5 Existing groundwater analyses do not identify the specified organic contaminants in the sampled shallow water. The principal foreseeable discharge-quality issue is suspended solids, addressed by settlement and operational controls. Water is not used in a process and no chemicals are added or dosed. Unexpected visibly affected water is isolated and managed separately from the permitted discharge.

10.1.6 Overall suitability finding: On the evidence presently available, the stated shallow, staged dewatering scheme and controlled return discharge are assessed to have negligible to absent adverse hydrogeological effects on South Dock, the River Usk SAC, connected designated waters and the underlying aquifer. Local shallow drawdown is the intended, managed construction effect. Operational monitoring checks performance against this completed appraisal; it does not defer the impact finding. The discharge requires its separate NRW authorisations.

11 REFERENCES

- Environment Agency (2007). Hydrogeological impact appraisal for dewatering abstractions, Science Report SC040020/SR1.
- Environment Agency (2026). Preparing a hydrogeological impact assessment, published 20 July 2026.
- Natural Resources Wales (accessed 25 August 2026). Find out if you need a licence for civil engineering dewatering.
- Natural Resources Wales (accessed 25 August 2026). Find out if you need a permit for discharges to surface water and groundwater.
- Environment Agency / NRW (updated April 2026). Temporary dewatering from excavations to surface water: RPS 261; NRW applies the England guidance in Wales.
- Joint Nature Conservation Committee (accessed 25 August 2026). River Usk / Afon Wysg SAC, UK0013007.
- Conservation of Habitats and Species Regulations 2017 (as amended); Environmental Permitting (England and Wales) Regulations 2016 (as amended); Water Resources Act 1991 (as amended).

Appendix 1 Plans

Alexandra Docks Newport
NP20 2WE - NP20 2NQ

Newminerals Cement Mill

Dewatering
Excavations requireing dewatering + RoI

Site Boundary

Excavations that require dewatering

Dewatering Combined Radius of Influece

ROI for k = 10^-6 m/s

ROI for k = 10^-5 m/s

ROI for k = 10^-4 m/s

Settlement tank

Discharge: Dewatering effluent

Inflow in settlement tank

sampling point and flow measurement

0 50 100 150 200 250 m

1:1,200

RCS Environmental Solutions

Drawing: Jan De Vos	Project Manager: Jan De Vos
Date: 18/09/2026	Refnr:



0 50 100 150 200 250 m

Alexandra Docks Newport
NP20 2WE - NP20 2NQ

Newminerals Cement Mill

Dewatering
Excavations requireing dewatering + RoI

Site Boundary

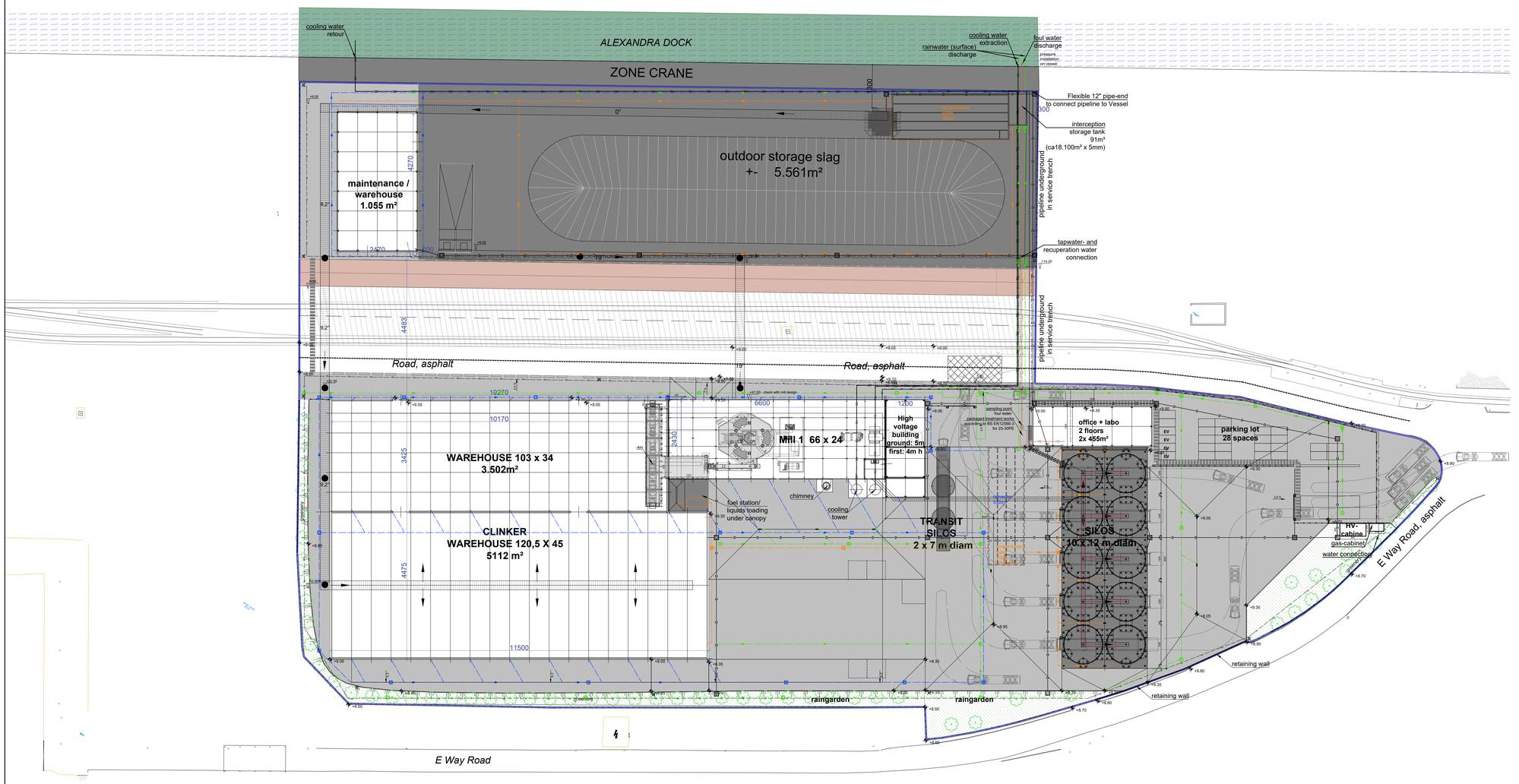
Excavations that require dewatering

Dewatering Combined Radius of Influece
ROI for k = 10^-6 m/s
ROI for k = 10^-5 m/s
ROI for k = 10^-4 m/s

RCS Environmental Solutions

Drawing: Jan De Vos	Project Manager: Jan De Vos
Date: 18/09/2026	Refnr:

1:5,000



LEGEND:

- sewers - rainwater roofs
- sewers - rainwater surface
- sewers - rainwater contaminated
- inspection manhole
- foul water drain
- watermain
- firewatermain
- grease
- empty ducts and pits
- concrete pavement (in situ)
- asphalt pavement
- new greenery
- fence
- crushed material / made ground (to be removed)
- tarmac to be demolished
- concrete to be demolished

arcade

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ARCHITECT -

INDEX	DATUM	TEKENAAR	WIJZIGING
F	21-05-2026	JS	position of millbuilding
G	03-06-2026	JS	underground
H	09-06-2026	JS	underground
I	11-06-2026	JS	HV-building and chimney position
J	19-06-2026	JS	update
K	30-06-2026	JS	update
L	30-06-2026	JS	update silo's

SITE PLAN
MASTERPLAN

DATUM	
23-03-2026	Architecture - Tender
1/500	6023-ARC-XX-XX-DR-ARG-3011

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Appendix 2 Calculation details and sensitivity

Equations and units

Symbol	Definition	Units
A	Maximum simultaneous active excavation area	m2
s	Required drawdown from adopted shallow head to control level	m
k	Hydraulic conductivity of shallow Made Ground	m/s
r_e	Equivalent circular excavation radius, sqrt(A/pi)	m
L	Empirical engineering comparison only; not an HIA search area	m
R	Outer radius used for construction inflow screening only	m
S_y	Specific yield / drainable porosity	dimensionless
Q	Continuing groundwater seepage	m3/day
V	Initial drainable storage, A s S_y	m3

Sensitivity interpretation

Scenario	Head / storage	k	Purpose
Low	+7.3 m AOD; S_y 0.10	1 x 10^-6 m/s	Lower screening bound for compartmentalised, finer Made Ground.
Central	+7.5 m AOD; S_y 0.20	1 x 10^-5 m/s	Central construction comparison; not field calibrated or a receptor-impact forecast.
Upper	+7.7 m AOD; S_y 0.30	1 x 10^-4 m/s	Stress test for granular connectivity; not adopted as expected condition.

The low, central and high scenarios are pump-demand sensitivities, not calibrated estimates of capture from any receptor. Storage release and continuing inflow have different time scales; a high Sy and high k cannot be presented as one measured forecast. Drainable thickness is bounded by actual saturated Made Ground where alluvium enters the excavation. These limitations are addressed for impact appraisal by the conceptual pathway assessment and source-allocation bounds in Steps 3–11; they do not defer the receptor-impact conclusion

Model qualification

- The Sichardt expression is shown to explain the construction calculation only. The uploaded 2007 guidance discourages its use as an HIA radius: recharge boundaries and the water features identified in Steps 3–4 must determine the drawdown search area.
- The equivalent-well approach does not represent perched compartments, dock recharge, lock exchange, preferential drains or the former Ebbw channel, and does not predict water levels at individual receptors.
- Assumed storage depends on the maximum simultaneous excavation area. Staged trenches alter peak pumping and drawdown; the 10,000 m² warehouse case is an assumed full-footprint comparison.
- Record precipitation, surface run-off, groundwater abstraction, storage, and discharge separately to test the operating water balance.

Appendix 3 Monitoring schedules and field records

Daily dewatering record

Field	Record
Date / shift / weather / rainfall	
Active excavation, area and formation level	
Pump start/stop times and maximum rate	
Opening and closing abstraction meter readings	
Daily groundwater abstraction volume	
Estimated direct rainfall / runoff component	
Discharge meter reading and emergency storage level	
Piezometer levels and manual checks	
pH, EC, turbidity, temperature, DO	
Appearance, odour, oil/sheen and settlement treatment condition	
Settlement / infrastructure observations	
Trigger exceedances, incidents and corrective action	
Operator / Site Manager sign-off	

Close-out dataset

- licensed and actual start/end dates;
- maximum daily, instantaneous and total groundwater abstraction;
- total discharge and estimated rainfall/runoff contribution;
- drawdown and recovery hydrographs with dock/tide comparison;
- water-quality results and permit compliance record;
- trigger events, incidents and corrective actions;
- settlement/infrastructure monitoring; and
- decommissioning, settlement-residue disposal and reinstatement records

Appendix 4 Ground Investigation report dd. 12/2024

GROUND INVESTIGATION

LAND AT SOUTH DOCKS, NEWPORT

PHASE II ENVIRONMENTAL SITE INVESTIGATION AND RISK ASSESSMENT



DRAFT REPORT

Report by:

Building 3, Chiswick Park,
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December 2024

Template
S_MVL_R.1_v3

Versions		
Version	Date	Status
v1	31/12/2024	First draft

Project team		
Function	**Name**	**Signature**
Project Manager	Jan De Vos	
QC & Director	Patrick Hambach	

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1 INTRODUCTION

1.1 SCOPE

AUTHORITY

ABO was instructed to conduct a Ground Investigation by Cemminerals, on July 3rd 2024.

LOCATION

The site is located in the port of Newport with the following address: South Dock, Alexandra Docks, Newport, NP20 2WE / NP20 2NQ.

The site covers an area of approx. 52 hectares (12.8 acres).



FIGURE 1 LOCATION OF THE SITE (RED OUTLINE)

PROPOSED DEVELOPMENT

The site is proposed to be redeveloped as a cement terminal.

OBJECTIVES

The object of this ground investigation is to provide information on the physical characteristics of the ground in order to establish any contamination which may need to be addressed. In case contamination is detected, the risks posed by this contamination will be assessed.

SCOPE OF WORK

This ground investigation has the following scope:

- Summarize and update existing phase I desk study
- Site walkover to update ground investigation strategy
- Detailed UXO Risk assessment and screening for underground utilities
- Perform shallow boreholes for
    - Identifying superficial site geology
    - Collection of samples for chemical analyses to determine possible contamination
    - Installation of inspection wells for groundwater and ground gas monitoring
- Perform deep boreholes for:
    - Identifying deeper site geology
    - Installation of inspection wells for groundwater monitoring
- CPT probing to determine geotechnical characteristics
- Reporting:
    - Factual reporting of field work
    - Generic risk assessment, and detailed quantitative risk assessment, when required
    - Waste assessment

1.2 EXISTING REPORTS

The following reports detailing previous works at the site were made available for review:

- Integral Geotechnique (2011). ABP Newport, NRFT Shed - Site Investigation Factual Report. Reference 10887/TD/11 dated September 2011
- BACTEC (2014). Explosive Ordnance Threat Assessment in respect of M4 Corridor Around Newport for Hyder Consulting (UK) Limited. Reference 5750TA dated 21 November 2014
- Extracts of site investigation logs and location plans from RPS (2018a) M4CaN: Docks Enabling Works. Reference JFR8707, dated June 2018
- RPS (2018b) Newport Docks: Port Redevelopment Plan 3D Unexploded Ordnance Contamination Assessment. Reference ABPDK-DJV-EGT-ZG_GEN-AX-EN-0001 Draft dated 19 October 2018
- RSK Geosciences (2023). Phase 1 Desk Study: Proposed Cemminerals Facility, Alexandra Docks 315426 R01 (01). Dated October 2023.

1.3 RELEVANT LEGISLATION AND GUIDANCE

This report has been produced in accordance with:

- DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance(2012);
- Contaminated Land (England) Regulations 2006 (as amended);
- LCRM: Land contamination risk management (Environment Agency, 2020)
- DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012).
- National Planning Policy Framework (2012);
- British Standard requirements for the 'Investigation of potentially contaminated sites - Code of practice' (ref. BS10175:2011);
- British Standard requirements for the 'Code of practice for site investigations' (ref. BS5930:1999).

2 DESK STUDY

A phase I environmental risk assessment, including a desk study, has already been conducted (RSK Geosciences, 2023). The following chapter summarises the findings from the desk study and updates them where relevant.

Relevant figures and drawings from the Phase I risk assessment report are included in APPENDIX 2.

2.1 SITE LOCATION AND DESCRIPTION

LOCATION

The site is located in the south of the port of Newport, at South Dock, Alexandra Docks, Newport, NP20 2WE / NP20 2NQ. The site is currently used for onloading bulk materials (limited to steel slabs, during this site investigation) in the eastern and northwestern section of the site; while the central and southwestern sections of the site are used for processing scrap metal.

The site is approximately rectangular in shape with a projection to the north-east. Access is via East Way Road from the east with a railway siding also giving access to the site. The site is immediately bound to the north by Alexandra Docks and industrial units and open ground to the east. To the south and west are industrial units and areas for bulk storage of materials with the Usk Estuary and lock gates to the south and west respectively.

The site is situated at approx. 8.5m AOD (between 7.6m and 9m AOD). The central point of the side has national grid reference is ST 31929 84421, with 460267 easting and 197801 northing.

SITE HISTORY

The development history of the site and surrounding area based upon assessment of historical plans and records is detailed in Table 1. The historical maps reviewed are shown within the environmental database report in APPENDIX 2.

South Dock formed an extension of the Alexandra Dock and was opened in 1893, and covered an area of nearly 20 acres; the dock was further expanded in 1907 and again in 1914.

TABLE 1 SITE HISTORY

Date from	Date to	Historical site use
1882	1900	The site is largely occupied by the channel of the tidal Ebbw River. In the far south and north are areas of open ground. In the far east of the site is a possible flood defence/ levee with possible agricultural land beyond. No significant contaminative uses are noted on or in the vicinity of the site.
1920	1950	South Dock has been developed and the site is shown to be occupied by a number of structures. The southern half of the site is occupied by large warehousing labelled 'Central Store Depot'. To the north are two transit sheds (Numbers 7 and 8). A number of railway lines cross the site. The possible food defence/ levee is no longer shown in the east of the site.

Date from	Date to	Historical site use
		To the south of the site is the remainder of the 'Central Store Depot' with railway line and the River Usk beyond. To the west an elevated platform is shown with a number of small buildings including an Electric Power Station ((Alexandra Docks Co) 200 m south-west) with South Lock beyond. To the east are further transit sheds and railway lines with rough ground beyond. 200 m to the north east an engine house and hydraulic ram are shown.
1956	1992	No significant changes are noted although the 'Central Store Depot' has been divided into two along the southern site boundary. On-site the building appears to have been further subdivided into three and is labelled as an 'Export Packing Works'. Transit shed No. 8 appears to have been demolished between 1968 and 1992. Adjacent to the southern site boundary the building is labelled as the 'Monmouthshire Board Mills' that possibly produced paper products. A number of tanks (contents not specified) are located to the east of the board mills. A building to the south-west of the board mills has been demolished and a series of flats have been constructed approximately 100 m to the south of the site. A dry dock is shown approximately 150 m to the south-east with an associated travelling crane and electricity sub-station from 1956 to 2010. A roundabout is shown in 1994 adjacent to the north-eastern corner of the site
2001	2018	No significant changes are noted. The transit sheds have been demolished by 2001. Recent aerial photography shows the 'Export Packing Works' to have been demolished between 2006 and 2009. Prior to the demolition of the 'Export Packing Works' the area to the north was being used for the bulk storage of material (likely coal). Following the demolition of buildings on site, the entire area appears to have been used for the storage of bulk materials (possibly coal) until around 2018 when the southern part appears disused and overgrown in places with occasional ponds The flats to the south-west are no longer shown
2023	-	The buildings previously labelled as an 'Export Packing Works' have been demolished

No specific contaminative uses associated with the site have been identified however the following is considered:

- the potential for Made Ground to be present as a result of the construction of South Dock
- the potential for metalliferous contaminants to be present as a result of the use of the site for the reconditioning of shell casts during World War 1
- the potential for contaminants to be present e.g. asbestos as a result of the demolition of historical buildings
- spills and leaks from any on-site tanks e.g. heating oil tanks

DEVELOPMENT

The proposed development will comprise industrial plant for the manufacture of cement substitute from recycled waste products. The operation involves the importing of raw materials

(slag / clinker / fly ash) which are crushed, ground/milled to a very fine powder and then blended to produce a cementitious product which can then be sold to market in bulk. The construction will include additional dockside unloading equipment, storage of bulk raw materials, vertical roller mill and storage silos. No details of the proposed ground levels have been provided therefore for the purpose of this report it has been assumed that the current levels will remain unchanged.

A draft design of the future development is included in APPENDIX 1.

2.2 INFORMATION FROM ENVIRONMENTAL DATABASE REPORT

Relevant environmental permits and incidents detailed within the environmental database report (see APPENDIX 2) are summarised below in Table 2.

TABLE 2 INFORMATION FROM ENVIRONMENTAL DATABASE REPORT

Data Type	Entries on-site	Entries <250m from site	Entries >250m from site	Details
Permits and licensed activities				
Environmental permits – incorporating Environmental Permitting Regulations (EPR) and/ or Pollution Prevention and Control (PPC) permits; former Integrated Pollution Controls (IPC), Local Authority Pollution Control (LAPC)	0	0	1	1 No. 325 m southwest Severn Sands Ltd, extant licensed pollutant release (Part A(2)/B) permit for use of bulk cement under permit type B
Enforcement and prohibition notices	0	0	0	-
Pollution incidents to controlled waters, Prosecutions relating to controlled waters, Substantiated pollution incident register, Water Industry Act referrals	0	2	None of relevance	157 m south-east, Water Impact Category 2 (Significant) from oils and fuel (03/01/2018) 248 m east, Land Impact category 4 (No Impact) Air Impact category 3 (Minor) from construction and demolition materials and wastes
Discharge consents	0	12	None of relevance	54 m north-east to 212 m east. Extant consents are associated with the docks or premises at the docks with effluent types stated as Unspecified, Sewage, Trade Discharges and not given. The receiving waters include South Dock, River Usk (Usk Estuary) and the Severn Estuary.
Registered radioactive substances	0	0	0	-
Landfills and waste				
Active landfills	0	0	0	-
Historical landfills	0	2	None of relevance	132 m to 239 m east a number of Refuse Tips are noted. 167 m east a historical landfill is noted that was permitted to take industrial and household waste under site reference 039/86. The licence was first recorded 30/04/1986 and last recorded 30/04/1990.
Other waste management licences	0	1	None of relevance	83 m west, a Physical Treatment Facility is recorded under EPR Licence CB3295FG for South West Wood Products Ltd issued on 29/09/2021.
	Several waste exemptions are recorded within 250 of the site including Storage of waste in a secure place, Use of waste in construction, Manual treatment of waste, Use of waste for a Specified Purpose, Use of waste to manufacture finished goods, Use of mulch and Recovery of			

Data Type	Entries on-site	Entries <250m from site	Entries >250m from site	Details
	scrap metal.			
Potentially in-filled land (pit, quarry, pond, marsh, river, stream, dock etc)	The site and it's immediate surroundings have been subject to ground workings to infill the historical course of the Ebbw River and construct South Dock.			
Hazardous substances/ industrial land uses				
Control of Major Accident Hazards (COMAH) sites	0	0	0	-
Explosives sites, Notification of Installations Handling Hazardous Substances (NIHHS), Planning hazardous substance consents/ enforcements	0	0	0	-
Contaminated land Part 2A register entries and notices	0	0	0	-
Contemporary trade directory entries	0	15	-	35 m south-east - electricity substation 64 m north-east - electricity substation 80 m south-east - WEEE recycling plant 82 m south-west – tank 118 m south-east – tank 140 m south-west - electricity substation 199 m east - electricity
Fuel station entries	0	0	0	-

The data contained in Table 2 has not highlighted any specific contaminative uses of the site or its immediate surroundings. Also noted are a number of historical waste tips and landfill to the east of the site. These could have the potential to give rise to contaminated leachate and generation of bulk gases (carbon dioxide and methane).

2.3 INFORMATION FROM PREVIOUS INVESTIGATIONS

A summary of pertinent information from previous investigations is included in the tables below. Relevant information relating to the identified ground and groundwater conditions has not been included within the table below but has been incorporated into the relevant parts of the following chapters.

Report	1. Integral Geotechnique (2011). ABP Newport, NRFT Shed - Site Investigation Factual Report. Reference 10887/TD/11 dated September 2011
Site coverage	The report provides desk based information covering the majority of the site with the exception of the far east. The report also presents intrusive investigation information in the area of the historical No. 7 Transit Shed, located adjacent to South Dock in the north-east of the site.
Summary scope of works	The scope comprised: o Presentation of an Environmental Database o six window sample boreholes o two cable percussion boreholes o seven cone penetrometer tests o Laboratory chemical analysis of soil samples for heavy metals, pH, PAH, total cyanide, total sulphate, water soluble sulphate, sulphide and phenol index.
Does the client has reliance upon the report?	No. Report was commissioned by ABP.
Key findings	o Made Ground comprising generally granular (sand or gravel) layers with anthropogenic input including concrete, ash, slag, wood and coal to depths of between 1.0 m bgl and 2.0 m bgl o up to 0.9 m of tarmac over concrete encountered in BH8 o in window sample boreholes the Made Ground was underlain by grey brown slightly sandy silty Clay occasional layers/pockets/lenses of gravel or sand, with a proven thickness of 3.3 m o in the cable percussion boreholes: • BH3 encountered a gravel and cobbles layer of 2.5 m in thickness at 9.1 m bgl • a basal layer of sandy Gravel with occasional cobbles and boulders was encountered at 16.1 m bgl in boreholes BH3 and BH5 proven to 19.8 and 20.3 m bgl respectively o no significant olfactory or visual evidence of contamination was noted within the logs groundwater was not encountered in the window sample boreholes but was encountered in the cable percussion boreholes:

Report	1. Integral Geotechnique (2011). ABP Newport, NRFT Shed - Site Investigation Factual Report. Reference 10887/TD/11 dated September 2011
	• BH3 struck at 9.10 m bgl rising to 1.60 m bgl • BH5 struck at 14.8 m bgl rising to 12.2 m bgl. o Bedrock was not proven.

Report	2. BACTEC (2014). Explosive Ordnance Threat Assessment in respect of M4 Corridor Around Newport for Hyder Consulting (UK) Limited. Reference 5750TA dated 21 November 2014
Site coverage	The report covers the site along with the wider port area and proposed motorway corridor to the east and west.
Summary scope of works	Desk based Explosive Ordnance Threat Assessment.
Does the client has reliance upon the report?	No. Report was commissioned by Hyder Consulting (UK) Limited.
Key findings	The area of site covered by the report is considered to lie within the 'Medium-High Risk Zone' for UXO.

Report	3. Extracts of site investigation logs and location plans from RPS (2018a) M4CaN: Docks Enabling Works. Reference JFR8707, dated June 2018
Site coverage	Investigation work covered the southern half of the site.
Summary scope of works	Records of three boreholes, one window sample borehole, one trial pit and one CPT undertaken in the southern half of site were made available
Does the client has reliance upon the report?	No. The investigation was commissioned by the Welsh Government
Key findings	o Made Ground comprising variably granular or cohesive layers with anthropogenic input including brick, concrete, ash, slag, coal and wood to depths of between 1.2 m bgl and 4.0 m bgl o TFD comprising grey silty Clay or clayey Silt with occasional slightly sandy layers and occasional organic material with a proven thickness of approximately 12 m o Glaciofluvial Deposits comprising sandy Gravel, Sand and Gravel, gravelly Sand and rarely sandy gravelly Clay. A low cobble content was noted in some horizons. This stratum had proven thicknesses of between 6 m and 8 m o MMG comprising stiff or very stiff red brown silty Clay proven to a maximum of 1.4 m thickness a strong hydrocarbon odour in WS-M4ABP-Z05-04 was noted between 2.0 and 2.8 m bgl above the TFD

Report	3. Extracts of site investigation logs and location plans from RPS (2018a) M4CaN: Docks Enabling Works. Reference JFR8707, dated June 2018
	○ perched water was noted in two locations within the Made Ground ○ groundwater was generally struck in the boreholes at the top of the Glaciofluvial Deposits.

Report	4. RPS (2018b) Newport Docks: Port Redevelopment Plan 3D Unexploded Ordnance Contamination Assessment. Reference ABPDK-DJV-EGT-ZG_GEN-AX-EN-0001 Draft dated 19 October 2018
Site coverage	The report covers the wider dock area including the majority of the subject site with the exception of the western quarter of the site.
Summary scope of works	Desk based 3D Unexploded Ordnance Contamination Assessment
Does the client has reliance upon the report?	No. Report commissioned by the Welsh Government
Key findings	The area of site covered by the report is considered to have 'Low UXO Risk'.

2.4 GEOLOGY

Published records (British Geological Survey (BGS) website https://geologyviewer.bgs.ac.uk/ (2023)) for the area indicates the geology of the site to be characterised by the succession recorded in Table 3. There are no publicly available BGS historical boreholes located on or within 250 m of the site.

As noted by the BGS, the site is indicated to be underlain by Tidal Flat Deposits over bedrock of the Mercia Mudstone Group. The Tidal Flat Deposits are described by the BGS as 'unconsolidated sediment, mainly mud and/ or sand'.

The two previous investigations (Integral Geotechnique (2011) and RPS (2018a)) identified a basal layer of granular material (sand, gravel and cobbles) up to 8 m thickness. RPS (2018a) have interpreted this material as Glaciofluvial Deposits.

TABLE 3 GEOLOGY

Strata	Description	Estimated thickness	Permeability
Made Ground	Variable but upper layers could comprise granular material as a result of prior uses of the site including possible demolition material	2m to 5m	-

Strata	Description	Estimated thickness	Permeability
	from the removal of buildings. Beneath this layer Made Ground may comprise natural material used to raise site levels when South Dock was constructed.		
Tidal Flat Deposits	Unconsolidated sediment, mainly mud and/ or sand above a basal layer of sand gravel and cobbles. Peat may also be present in the fine grained soils.	18m to 20.3m	Very low to high
Mercia Mudstone Group	Dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halitebearing units in some basin areas. Thin beds of gypsum/ anhydrite are widespread; thin sandstones are also present.	Up to 1350m	Low

With reference to the historical data there have clearly been several phases of construction and demolition on the site and therefore the presence of Made Ground should be expected.

2.5 HYDROGEOLOGY

A summary of the hydrogeological setting of the site, with respect to the anticipated geological sequence set out in §2.4 is presented below in Table 4.

TABLE 4 HYDROGEOLOGY

Condition	Description
Aquifer characteristics	The site is underlain by unproductive strata relating to the TFD and secondary B aquifer of the MMG. The presence of low permeability clay at relatively shallow depths beneath the site, while restricting downwards migration, may increase the potential for lateral migration of shallow groundwater (and therefore mobile contamination, if present). Groundwater quality beneath the site is likely to be affected by saline intrusion
Depth of groundwater and flow	The anticipated depth to the groundwater table is in the order of 2 m to 4 m below ground level based on local experience. Shallow groundwater in the site area is anticipated to flow in a southerly direction towards the River Usk but is likely to be tidally influenced. Shallow water may be present in any Made Ground deposits present on-site
Groundwater recharge / attenuation	The majority of the site is hardstanding although that in the south of the site is in places in poor condition. This will limit infiltration to ground and groundwater recharge, except where SUDS are present.
Relevant	The site lies directly above the former course of the Ebbw River. The Ebbw River was re-routed at the time

Condition	Description
historical characteristics	the docks were constructed. There is the potential that the former course of the Ebbw River could provide a preferential pathway for groundwater movement.
Licensed groundwater abstractions	The environmental database report indicates that there are no groundwater abstractions within a 1 km radius of the site.
Source zone protection zones	Information available in the Environmental Database indicates that the site does not lie within a currently designated groundwater Source Protection Zone (SPZ).

2.6 HYDROLOGY

A summary of the hydrology within the site area is summarised in Table 5

TABLE 5 HYDROLOGY

Condition	Description
Surface watercourses / features	There are no ponds, streams or drainage ditches on site although transient ponds have been noted on historical mapping and aerial photography in the north-east of the site, a possible indication of slightly lower topography. The nearest identified surface water feature is the South Dock that lies immediately adjacent to the northern site boundary. Water in the dock is held at around 7.23 m OD but can fluctuate dependent on the draft of vessels, wet weather and volume impounded. The dock is connected to the River Usk via lock gates approximately 200 m to the south-west. The River Usk (tidal) is located approximately 250 m to the south-south-east
Surface water abstractions	There are no surface water abstractions identified by the environmental database, within a 1 km radius of the site.
Site drainage	It is not clear where surface water drains to with transient ponds evident from recent aerial photography. Evidence from historical maps indicates that the Ebbw River formerly crossed the site. This feature has been infilled as part of the construction of the docks and the raising of site levels. A preferential pathway for the migration of contamination in the sub-surface may therefore exist beneath the site
Preliminary flood risk assessment	The indicative floodplain map for the area (https://flood-riskmaps.naturalresources.wales/?locale=en) shows that the site is at low risk with respect to flooding from the sea. It should be noted that a flood risk assessment (FRA) is outside the scope of this report.

2.7 SENSITIVE LAND USES

Table 6 provides a summary of any environmentally sensitive areas identified within 250 m of the site based on the environmental database report.

TABLE 6 SENSITIVE LAND USES

Feature	<250m from site	Details	Likely pathways from site
International designations – Ramsar wetland, Special Area of Conservation (SAC), Special	Yes	River Usk is a designated SAC 150 m to the south of the site.	Potentially located hydraulically down gradient of the site.

Feature	<250m from site	Details	Likely pathways from site
Protection Area (SPA)			
National designations – Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), ancient woodland	Yes	River Usk is a designated SSSI 150 m to the south of the site.	Potentially located hydraulically down gradient of the site.
Local designations – Local Nature Reserve, Site of Importance for Nature Conservation (SINC)	No	-	-
Nearest high sensitivity development, e.g. residential	n/a	-	-

2.8 RADON

The environmental database report indicates that the site is not located within an 'Affected Area'. An 'Affected Area' is one with 1% or more homes above the radon Action Level of 200 Bq m-3, and therefore the risk of significant ingress of radon into structures on-site is considered low and protection measures are not necessary in the construction of nondomestic buildings.

Although the radon data used in production of the UK radon indicative atlas comes from measurements in homes, the maps indicate the likely extent of the local radon hazard in all buildings.

2.9 ASBESTOS

Asbestos is a known carcinogen, and if present could pose a health risk to the site occupiers if inappropriately controlled. It was used extensively as a building material in the UK from the 1950's through to the mid 1980's. It is considered possible that the structures and soils could potentially contain ACM.

3 PRELIMINARY CONCEPTUAL MODEL

In the UK land contamination is assessed using a risk-based approach taking account of the magnitude (severity of the hazard) and likelihood (probability) of occurrence. A 'receptor' is something that could be adversely affected by contamination (e.g. people, an ecological system, property or a water body). A 'pathway' is a route or means by which a receptor is or could be exposed to or affected by a contaminant. A 'contaminant source' is a hazard but it can only pose a risk to a receptor where a pathway is present. The relationship between sources, pathways and receptors are referred to as a conceptual site model. A risk can only be realised where a contaminant source, pathway and receptor are all in place, referred to as a 'pollutant or contaminant linkage'. In line with LCRM (Environment Agency, 2021a) and BS 10175: 2011 + A2 2017 (BSI, 2017), RSK has used information in the preceding sections to identify hazards (sources of contaminants), receptors that may be impacted and plausible linking pathways. Where all three are present this is termed a potentially complete contaminant linkage and a qualitative risk estimation is made.

3.1 POTENTIAL SOURCES OF CONTAMINATION

The potential sources of soil and groundwater contamination are linked to the current and past land uses on and adjacent to the site. This is summarised in Table 7.

TABLE 7 POTENTIAL CONTAMINATION SOURCES – SOIL AND GROUNDWATER

Land Uses	Potential soil and groundwater contaminants
On site	
Made ground (i.e. fill material) Associated with construction of the dock and historical uses including railway lines crossing the site.	Contaminants related to unknown fill material: o Hydrocarbons (oils and fuels) o Metals and metalloids o PAHs (Polycyclic Aromatic Hydrocarbons) o Asbestos
Historical (former warehousing) storage/ use of oils/ chemicals onsite. Current use of site for aggregate mineral storage - leaks and spills from vehicles/ machinery during maintenance/ re-fuelling	o Hydrocarbons (oils and fuels) o Metals and metalloids o PAHs (Polycyclic Aromatic Hydrocarbons)
Shallow/ perched groundwater contaminated by deleterious material in Made Ground and leaks/ spills of hydrocarbons.	o Hydrocarbons (oils and fuels) – dissolved or in free phase (LNAPL). o Metals and metalloids o PAH

Land Uses	Potential soil and groundwater contaminants
Off-site	
Historical landfill (167 m east) mid-1960s to early 1990s	○ Hydrocarbons (oils and fuels) – dissolved or in free phase (LNAPL) ○ Metals and metalloids ○ PAHs (Polycyclic Aromatic Hydrocarbons)

Risk from historical adjacent sites are only likely to be realised through the migration of contaminants via groundwater. On site groundwater is considered a potential source in its own right and therefore the migration onto site of contaminants is deemed to be covered by the on-site linkages.

The potential sources of ground gas are linked to the current and past land uses on and adjacent to the site. This is summarised in Table 8.

TABLE 8 POTENTIAL GROUND GAS SOURCES

Land Uses	Ground gas generation potential	Additional information
On site		
Natural soil strata with a low degradable organic content, e.g. alluvium, peat	Very low	Site is underlain by TFD which could contain peat deposits.
Made ground with low degradable organic content (e.g. up to 5% organic material and no easily degradable waste).	Very low	Site is likely to be underlain by a significant thickness of Made Ground.
Off-site		
Historical landfill mid-1960s to early 1990s	High	Landfill located approximately 167 m to the east of the site.

3.2 POTENTIAL RECEPTORS

The sensitive receptors for soil and groundwater contamination have been identified and are summarized in Table 9.

TABLE 9 POTENTIAL RECEPTORS - SOIL AND GROUNDWATER CONTAMINATION

Type	Receptor
Human	○ Current and future site users – industrial workers ○ Current and future adjacent site users – industrial users
Ecology	○ the River Usk approximately 150 m to the south is designated a SAC and SSSI

Type	Receptor
Controlled waters	○ groundwater in secondary B aquifer within the MMG bedrock ○ surface waters of South Dock and River Usk situated adjacent and 150 m to the south respectively

Please note that construction workers and future maintenance workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures according to the CDM Regulations.

Where there are potential instances that construction methods may result in short term environmental impacts, these will need to be assessed at design stage, within a construction phase environmental management plan and where required, mitigation measures put in place.

The sensitive receptors for ground gas have been identified and are summarized in Table 10.

TABLE 10 POTENTIAL GROUND GAS RECEPTORS

Type	Receptor
Human	○ Current and future site users – industrial workers ○ Current and future adjacent site users – industrial users
Buildings	○ Current and future buildings and services

3.3 POLLUTANT LINKAGES

The pollutants that relate to the potential sources of soil and groundwater contamination have potential linkages with the identified receptors. The table below summarises these potential pollutant linkages.

TABLE 11 POTENTIAL POLLUTANT LINKAGES – SOIL AND GROUNDWATER

Type	Receptor	Potential Linkages
Human	Current and future site users – industrial workers	oral, dermal and inhalation exposure with impacted soil, soil vapour and dust, inhalation of vapours from groundwater and / or NAPL if present
	Current and future adjacent site users – industrial users	migration of contamination via dust/fibre deposition, vapour or groundwater migration combined with inhalation
Ecology	the River Usk approximately 150 m to the south is designated a SAC and SSSI	lateral migration of dissolved phase/ NAPL / site run-off/ drainage/dust deposition

Type	Receptor	Potential Linkages
Controlled waters	groundwater in secondary B aquifer within the MMG bedrock	leaching from soils/percolation to aquifer/ lateral migration of dissolved phase/ NAPL
	surface waters of South Dock and River Usk situated adjacent and 150 m to the south respectively	lateral migration of dissolved phase/ LNAPL / site run-off/ drainage

The identified potential ground gas sources have potential linkages with the identified receptors. The table below summarises these potential pollutant linkages.

TABLE 12 POTENTIAL POLLUTANT LINKAGES - GROUND GAS

Type	Receptor	Potential Linkages
Human	Current and future site users – industrial workers	o Made Ground that could be permeable o building foundations, piled foundations and vibro-stone columns o construction joints and cracks within building structure o utility routes and service penetrations into buildings.
	Current and future adjacent site users – industrial users	
Ecology	the River Usk approximately 150 m to the south is designated a SAC and SSSI	

3.4 PRELIMINARY RISK ASSESSMENT

The preliminary risk assessment findings and potentially complete contaminant linkages are shown in Table 14. The risk classification based on the combination of hazard consequence and probability using the risk matrix from CIRIA C552. This relates to Tier 1 preliminary risk assessment in LCRM (Environment Agency, 2021a).

TABLE 13 PRELIMINARY RISK ASSESSMENT – RISK MATRIX

Source	Receptor	Pathway	Likelihood	Severity	Potential risk	Explanation
On-site: Made ground (i.e. fill material) including that contaminated by hydrocarbons. Brick, ash and clinker and containing toxic and phytotoxic metals, inorganics, PAHs, asbestos, lube oil, diesel, kerosene, VOCs	Current and future site users – industrial workers	Oral, dermal and inhalation exposure with impacted soil and dust	Unlikely	Medium	Low	Made Ground is likely to be present on site to a significant depth with the potential to contain deleterious contaminants. Future industrial development likely to comprise hard standing mitigating the potential for direct contact with contaminants.
		Inhalation exposure with impacted soil vapour	Low likelihood	Medium	Moderate / low	Made Ground is likely to be present on site to a significant depth with the potential to contain deleterious contaminants that could give rise to soil vapour. However, there is no evidence of bulk fuel storage or similar although strong hydrocarbon odours were noted in one historical investigation location. Future industrial development likely to comprise hard standing that will help to mitigate vapour migration.
	Current and future adjacent site users – industrial workers	Oral, dermal and inhalation exposure with impacted soil and dust	Unlikely	Medium	Low	Made Ground is likely to be present on site to a significant depth with the potential to contain deleterious contaminants. Future industrial development likely to comprise hard standing mitigating the potential for direct contact with contaminants.
		Inhalation exposure with impacted soil vapour	Low likelihood	Medium	Moderate / low	Made Ground is likely to be present on site to a significant depth with the potential to contain deleterious contaminants that could give rise to soil vapour. However, there is no evidence of bulk fuel storage or similar although strong hydrocarbon odours were noted in one historical investigation location. Future industrial development likely to comprise hard standing that will help to mitigate vapour migration.
	Future buildings and services	Direct contact and permeation of potable water supply pipes	Likely	Medium	Moderate	Made Ground is likely to be present on site to a significant depth with the potential to contain deleterious contaminants with the potential to permeate potable water supply pipes
	Groundwater	Leaching and downward	Low	Mild	Low	Made Ground is likely to be present on site to a significant depth

Source	Receptor	Pathway	Likelihood	Severity	Potential risk	Explanation
		migration of contaminants	likelihood			with the potential to contain deleterious contaminants with the potential to leach. However, up to 12 m thickness of TFD (silt/ clay) is likely to retard any significant downward migration of contamination. As piles are likely to be a foundation solution then these may provide preferential pathways to the downward migration of contaminants.
	Surface waters of South Dock	Leaching and downward migration to water table followed by lateral migration	Unlikely	Mild	Very Low	Made Ground is likely to be present on site to a significant depth with the potential to contain deleterious contaminants with the potential to leach. However, lateral migration of groundwater is likely to be inhibited by the clayey TFD; with the waters of South Dock further protected by the dock wall construction.
	Surface waters of the River Usk		Low likelihood	Mild	Low	Made Ground is likely to be present on site to a significant depth with the potential to contain deleterious contaminants with the potential to leach. However, lateral migration of groundwater is likely to be inhibited by the clayey TFD; with the waters of the River Usk being over 150m away from the site.
	Ecological receptors (SAC and SSSI associated with the River Usk)	Leaching and downward migration to water table followed by lateral migration	Low likelihood	Mild	Low	Made Ground is likely to be present on site to a significant depth with the potential to contain deleterious contaminants with the potential to leach. However, lateral migration of groundwater is likely to be inhibited by the clayey TFD; with the waters of the River Usk being over 150m away from the site.
		Direct contact with contaminated wind-blown dust migrating from site.	Unlikely	Mild	Very Low	Made Ground is likely to be present on site to a significant depth with the potential to contain deleterious contaminants. Future industrial development likely to comprise hard standing mitigating the potential for migration of dust off-site.

Source	Receptor	Pathway	Likelihood	Severity	Potential risk	Explanation
Groundwater containing toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons (dissolved or non-aqueous phase liquids (NAPL)).	Current and future site users – industrial workers	Oral, dermal and inhalation exposure with impacted groundwater	Unlikely	Medium	Low	Groundwater is likely to be present at shallow depth with the potential to contain contaminants to contain deleterious contaminants. Future industrial development likely to comprise hard standing mitigating the potential for direct contact with groundwater.
		Inhalation exposure with vapour from impacted groundwater	Low likelihood	Medium	Moderate / low	Groundwater is likely to be present at shallow depth with the potential to contain contaminants to contain deleterious contaminants that could give rise to vapour. However, there is no evidence of bulk fuel storage or similar; although strong hydrocarbon odours were noted in one historical investigation location.
	Current and future adjacent site users – industrial workers	Inhalation exposure with vapour from impacted groundwater migrating from the site	Unlikely	Medium	Low	Groundwater is likely to be present at shallow depth with the potential to contain contaminants to contain deleterious contaminants that could give rise to vapour. However, there is no evidence of bulk fuel storage or similar; although strong hydrocarbon odours were noted in one historical investigation location. However, lateral migration of groundwater is likely to be inhibited by the clayey TFD that will help to mitigate groundwater and vapour migration.
	Future buildings and services	Direct contact and permeation of potable water supply pipes	Low likelihood	Medium	Moderate	Groundwater is likely to be present at shallow depth with the potential to contain contaminants to contain deleterious contaminants with the potential to permeate potable water supply pipes.
	Groundwater	Downward and lateral migration of contaminants to the wider aquifer	Low likelihood	Mild	Low	Groundwater is likely to be present at shallow depth with the potential to contain contaminants leached from Made Ground. However, up to 12 m thickness of TFD (silt/ clay) is likely to retard any significant downward migration of contamination. As piles are likely to be a foundation solution then these may provide preferential pathways to the downward migration of

Source	Receptor	Pathway	Likelihood	Severity	Potential risk	Explanation
						contaminants.
	Surface waters of South Dock	Lateral migration of contaminated groundwater	Unlikely	Mild	Very Low	Groundwater is likely to be present at shallow depth with the potential to contain contaminants leached from Made Ground. However, lateral migration of groundwater is likely to be inhibited by the clayey TFD; with the waters of South Dock further protected by the dock wall construction.
	Surface waters of the River Usk		Low likelihood	Mild	Low	Groundwater is likely to be present at shallow depth with the potential to contain contaminants leached from Made Ground. However, lateral migration of groundwater is likely to be inhibited by the clayey TFD; with the waters of the River Usk being over 150m away from the site.
	Ecological receptors (SAC and SSSI associated with the River Usk)		Low likelihood	Mild	Low	Groundwater is likely to be present at shallow depth with the potential to contain contaminants leached from Made Ground. However, lateral migration of groundwater is likely to be inhibited by the clayey TFD; with the waters of the River Usk being over 150m away from the site.
Off-site: Historical landfill (167 m east) mid-1960s to early 1990s.	Current and future site users – industrial workers	Inhalation exposure with impacted soil vapour	Low likelihood	Medium	Low	Given the clayey nature of the TFD there is considered a low likelihood for leachate to migrate beneath the site.
		Migration of ground gas into enclosed spaces with the potential for asphyxiation/ explosion	Low likelihood	Severe	Moderate	Landfill is considered to have a high generation potential for ground gas. Ground gas migration likely to be mitigated through the presence of clayey TFD.
	Groundwater	Migration via groundwater to impact aquifer beneath the site	Low likelihood	Mild	Very low	Given the clayey nature of the TFD there is considered a low likelihood for leachate to migrate beneath the site.
	Future buildings and services	Migration of ground gas into enclosed spaces with the potential for explosion	Low likelihood	Severe	Moderate	Landfill is considered to have a high generation potential for ground gas. Ground gas migration likely to be mitigated through the presence of clayey TFD.

Source	Receptor	Pathway	Likelihood	Severity	Potential risk	Explanation
Ground gas (carbon dioxide and methane): Made Ground on site and natural soils containing organic material	Current and future site users – industrial workers	Migration of ground gas into enclosed spaces with the potential for asphyxiation/ explosion	Unlikely	Severe	Moderate / low	Made Ground and natural soils are considered to have a very low generation potential for ground gas.
	Current and future adjacent site users – industrial workers	Migration of ground gas into enclosed spaces with the potential for asphyxiation/ explosion	Unlikely	Severe	Moderate / low	Made Ground and natural soils are considered to have a very low generation potential for ground gas.
	Future buildings and services	Migration of ground gas into enclosed spaces with the potential for explosion	Unlikely	Severe	Moderate / low	Made Ground and natural soils are considered to have a very low generation potential for ground gas.

The risks are assessed according to the following table.

Risk classification		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate / low
	Likely	High	Moderate	Moderate / low	Low
	Low likelihood	Moderate	Moderate / low	Low	Very low
	Unlikely	Moderate / low	Low	Very low	Very low

Potentially complete contaminant linkages with a potential risk of moderate / low or higher identified in Table 13 comprise:

- inhalation exposure with impacted soil vapour/ vapour from impacted groundwater by future site users
- direct contact by potable water supply pipes with contaminated soils and groundwater
- risk to future users, adjacent users and buildings from asphyxiation/ explosion risk through the migration and build-up of ground gases (carbon dioxide and methane) in enclosed spaces

These potentially complete contaminant linkages need to be assessed further through appropriate site investigation to target the identified sources of potential contamination and assess the feasibility of identified pathways. It is also recommended that investigations are undertaken to confirm the very low or low risk ranking apportioned to the majority of linkages.

4 INTRUSIVE SITE INVESTIGATION

4.1 OBJECTIVES

An intrusive site investigation was performed. Objectives were to identify the presence of potential land contamination to enable a quantitative risk assessment.

4.2 PREPARATIONS

4.2.1 SITE VISIT

Preparatory site visits was conducted on 8 July and 17 July 2024. The aim was to confirm the findings from the desk study, identify constraints for the intrusive ground investigation and liaise with site owners and operators.

The following relevant observations were made during the site visits:

- The northern section of the site, in between the railway and South Docks, was used for offloading steel slabs from cargo vessels, temporary storage of these slabs and loading the slabs onto cargo trains. The situation on the site appeared subject to sudden changes. While most of the time there was little activity, stockpiles of steel slabs could be moved without any notice, making previously accessible areas inaccessible. This complicated selection of clear borehole locations. During the loading of trains and the offloading of vessels, there was significant activity, but this was contained on this specific part of the site. Proper communication with port operations was deemed a requirement for the fieldwork, to schedule this when no loading of offloading would take place. This part of the site is operated by ABP.
- The eastern section of the site south of the railway, was mostly disused. This area was for a large part flooded. The reason given by port operations was a leak in a nearby underground water pipe. It was possible to clear the area for the most part by pumping out the standing water. However, due to operational requirements, this area became then also used for storage of steel slabs, complicating the selection of clear borehole locations. This part of the site is operated by ABP.
- The western section of the site south of the railway, was used as a scrap metal processing yard. The situation on the site appeared subject to sudden changes. While most of the time there was little activity, stockpiles of different types of scrap metal would suddenly be shifted. This complicated selection of clear borehole locations. This part of the site is operated by a third party (scrap processing company). Contact details were obtained and the necessary arrangements made for access.
- The optimal location for site welfare was agreed with ABP.
- The site appears to be near completely covered by hard standing. Local patches might exist where the hard standing has been removed, but more than 99% of the site is estimated to be had standing. This will require concrete coring to be performed before

borehole can be carried out and hence limits the flexibility to move borehole locations during field work.

A photo report of the site visits is attached in APPENDIX 3.

4.2.2 UNDERGROUND UTILITIES SURVEY

A survey of underground utilities was carried out to ascertain whether the borehole locations were safe to drill. The survey was carried out in 4 stages:

- Desktop study of available drawings
- Initial survey of the borehole locations according to location plan drafted after the first site visit
- Second survey after pumping of the ponded water in eastern section of the site (was not cleared on first visit)
- Third survey to move certain borehole locations that were no longer accessible due to operational constraints

Where necessary, borehole locations were moved slightly during the survey, to guarantee a safe drilling location. The correct location was marked on the site and accurately measured with dGPS.

The report of the underground utilities survey is attached in APPENDIX 10.

4.2.3 UXO RISK ASSESSMENT

As advised in the preliminary UXO risk assessment (see §2.3), a detailed UXO risk assessment was carried out.

The detailed UXO risk assessment concluded that there was a low overall risk of unexploded ordnances and no further on site mitigation measures were advised.

The preliminary and detailed UXO risk assessments are attached in APPENDIX 9.

4.3 DESCRIPTION OF SITE INVESTIGATION WORKS

4.3.1 BOREHOLES – WINDOWLESS SAMPLING

15 windowless sampling percussion boreholes were attempted, to gain insight in the superficial soil characteristics of the site and collect samples for chemical analysis. The boreholes were completed between 23 – 26 July 2024.

The borehole logs are attached in APPENDIX 4. The location of the boreholes are show on the drawings in APPENDIX 1.

Several boreholes had to be discontinued at shallow depth due to solid obstructions. Furthermore, one borehole (WS8) could not be performed because the wider area became inaccessible.

Borehole	Comments	Piezometer
WS1	Originally planned further to the west, at the boundary of the target site, but had to be moved slightly to the east because the original location was not accessible due to large scrap metal stockpiles. Discontinued at 0.45m bgl due to refusal on buried obstruction	No
WS2	-	No
WS3	Discontinued at 1m bgl due to refusal on buried obstruction	Yes
WS4	-	Yes
WS5	-	No
WS6	Discontinued at 1m bgl due to refusal on buried obstruction	No
WS7	Discontinued at 1m bgl due to refusal on buried obstruction	No
WS8	Not performed. Originally planned close to the western boundary of the site, was moved further south because the location became the original location was not accessible due to large scrap metal stockpiles. The altered location likewise became inaccessible due to movements of the scrap stockpiles.	No
WS9	-	No
WS10	-	No
WS11	-	Yes
WS12	-	No
WS13	Discontinued at 0.65m bgl due to refusal on buried obstructions	No
WS14	-	Yes
WS15	-	Yes

In 5 of the boreholes piezometers were installed for the purpose of groundwater and ground gas monitoring.

In summary the boreholes show:

- Hard standing present over the entirety of the site: tarmac and/or concrete. The hard standing is significantly thicker on the northern section of the site (approx. 50cm, but locally >1m), compared to the southern section (approx. 30cm). At a few locations the hardstanding has been locally removed, though in general the site can be considered full covered.
- Top layer of made ground till a depth of 0.65 m bgl – 3.7 m bgl. The made ground is highly variable ranging from pure gravel, to silty clay with minor inclusions of brick and tarmac. The most remarkable made ground include locations where:
    - a relatively pure black gravel was encountered in the west of the northern section of the site, probably crushed tarmac
    - high amount of inclusion of a more coaly black gravel at some locations in the southern/easter section of the site.
- Soft alluvium (clay – silt) underlies the made ground

4.3.2 BOREHOLES – CABLE PERCUSSION DRILLING

Two cable percussion boreholes were performed to gain insight in the deeper geological characteristics of the site. One borehole was located in the eastern section and one in the western section of the site. The boreholes were completed between 23 – 26 July 2024.

In both the CP boreholes piezometers were installed for the purpose of groundwater monitoring.

The borehole logs are attached in APPENDIX 4. The location of the boreholes are show on the drawings in APPENDIX 1.

In summary the boreholes show:

- Tarmac hardstanding
- Top layer of made ground of 0.75 – 1.4 m bgl
- Very soft alluvium (clay – silt) until 15.3 m bgl (east) – 16.9 m bgl (west)
- Thin sandy gravel layer underneath soft alluvium
- Sandstone starting at 15.8 m bgl (east) – 17.2 m bgl (west) – Refusal

SPT penetration tests were performed throughout the borehole, the results are reported on the borehole logs.

4.3.3 CPT TESTS

8 cone penetrations tests (CPTs) were performed, to gain insight in the geotechnical characteristics of the soil. The locations were selected mainly in the eastern section of the site, as the current design plans the heaviest construction in this area. 6 CPT's were conducted in the eastern section of the site, with one CPT more centrally located, and one CPT further to the western side. The CPT's were completed between 29 – 30 July 2024.

The detailed report of the tests is attached in APPENDIX 11. The location of the CPTs are show on the drawings in APPENDIX 1.

In summary, the CPTs show:

- Variable resistance in the soil in the top layers, corresponding to the made ground that was identified in the boreholes and the top of the alluvium.
- Very soft deposits until approx. 15.1 – 17.4 m bgl. This corresponds to the clay and silt alluvium that was identified in the boreholes
- Gradually increasing bearing capacity between 12.9 – 18.2m bgl. Most likely sandy, gravelly layer under the soft alluvium.
- Very hard, impenetrable layer, starting at 15.8 – 18.2 m bgl. This corresponds to the sandstone identified in the boreholes.

The detailed CPT data can be used to inspire foundation design (this is not part of the scope of this study).

4.3.4 WATER SAMPLING

Water samples were collected on 11 September 2024. Water levels were also recorded shortly after piezometer installation, on 30 July 2024.

The water level measurements are summarized in Table 14 and Table 15.

TABLE 14 GROUNDWATER LEVEL MEASUREMENTS – 30 JULY 2024

	Groundwater				Elevation	
WS15	1.3	mbgl	7.4	AOD	8.662	AOD
WS14	0.8	mbgl	7.3	AOD	8.106	AOD
WS11	0.5	mbgl	7.5	AOD	8.019	AOD
WS4	1.3	mbgl	7.5	AOD	8.751	AOD
LCP1	6.5	mbgl	1.5	AOD	7.993	AOD
LCP2	7	mbgl	2.0	AOD	8.956	AOD

TABLE 15 GROUNDWATER LEVEL MEASUREMENTS – 11 SEPTEMBER 2024

	Groundwater				Elevation	
WS15	1.2	mbgl	7.5	AOD	8.662	AOD

WS14	-				8.106	AOD
WS11	0.3	mbgl	7.7	AOD	8.019	AOD
WS4	1.3	mbgl	7.5	AOD	8.751	AOD
LCP1	6.9	mbgl	1.1	AOD	7.993	AOD
LCP2	7.2	mbgl	1.8	AOD	8.956	AOD

The water levels show a large discrepancy between the levels in the shallow piezometers and the levels in the deeper piezometers. This confirms that the water in the shallow piezometers comprises standing water and not an aquifer. The water in the deeper piezometers comprises the first aquifer (secondary B aquifer).

It is not expected that any clear groundwater flow is present in the standing water. The deeper aquifer seems to show a gradient away from South dock, in the direction of the river Usk.

4.3.5 GROUND GAS MONITORING

Ground gas monitoring was performed on 30 July 2024 and 11 September 2024. Gas monitoring has been undertaken during periods of atmospheric pressure ranging from 1,014mb to 1,012mb, with the first round occurring during falling pressure conditions and the second round during rising pressure conditions.

TABLE 16 GAS MONITORING RESULTS

Location	Range of values encountered during the monitoring campaigns					
	O2 (%)	CO2 (%)	CH4 (%)	CO (ppm)	H2S (ppm)	Flow rates (l/h)
WS15	17.2 - 19.3	0.2-0.5	0	0	0	0.1
WS14	16.3 – 20.4	0.1 – 0.4	0	0	0	0.0 – 0.1
WS11	15.9 – 18.7	0.2 – 0.5	0	0	0	-0.1 – 1
WS4	17.4 – 17.6	0.3 – 0.4	0	0	0	0 – 0.1
WS3	18.5	0.1	0	0	0	0.1

CIRIA C665 Method

Guidance and methodology for assessing the risks posed by ground gases are presented in the report 'Assessing Risks Posed by Hazardous Ground Gases to Buildings (revised) (Report C665 CIRIA December 2007)'. Previous guidelines all used a method, based on both gas concentrations and borehole flow rates to define a characteristic situation for a site based on the limiting borehole gas volume flow for methane and carbon dioxide.

In the new guidance, the limiting borehole gas volume flow is now renamed as the Gas Screening Value (GSV) and can be calculated as follows:

- GSV (l of gas per hr) = borehole flow rate (l/hr) × gas concentration (%) /100

There are two methods of assessment which depend on the proposed land use type and if residential what type of buildings are planned. The two situations assessed for are:

- Situation A – All development types except those in Situation B
- Situation B – Low rise housing with a ventilated underfloor void (min 150mm)

As the current use as well as the proposed development comprises of industrial use a "Situation A" assessment has been undertaken.

British Standard (BS 8485:2019) Method

An alternative standard for guidance and methodology for assessing the risks posed by ground gases is presented within the report 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' (BS 8485:2019 BSI British Standard Publication). This approach is based on the method described in the CIRIA C665 report, however has a slightly different take on prevention measures.

The site is assigned a Characteristic Gas Situation (CS) for methane and carbon dioxide separately, which ranges between CS1 (very low hazard potential) to CS6 (very high hazard potential). The CS value is used for the design of gas protection measures from the refined conceptual design model after an adequate and sufficient site investigation, monitoring carbon dioxide and methane flow rates and concentrations has been completed.

A summary of the ground gas results are presented in Table 16. Based on these results, the worst case Gas Screening Value (GSV) for carbon dioxide and methane are 0.001l/hr and 0.0002l/hr, respectively. Based on this, the 'Characteristic Situation' has been determined to be 'Characteristic Situation 1' 'very low' risk classification. According to the CIRIA C665 report, a commercial 'Characteristic Situation 1' development does not require special precautions with regard to ground gas protection measures.

As such, based on the gas monitoring results obtained no site or development specific protection measures are required with respect to Carbon Dioxide and Methane ground gases.

Carbon monoxide concentrations have been recorded below LOQ. According to the Environmental Hygiene Report EH40/2005 Workplace Exposure Limits, the long-term and short-term workplace exposure limit for carbon monoxide is 30ppm and 200ppm respectively. Hence, the levels of carbon monoxide are within the work place exposure limits and therefore, it is considered that no protection with regards to this are required to be incorporated into the design of the substructure of the buildings on site for this ground gas.

4.3.6 LABORATORY TESTING

The certificates of analysis are attached in APPENDIX 5.

SOIL

26 samples were selected and analysed for the potential contaminants:

- Asbestos, cyanide, phenols, heavy metals and metalloids, PAH, TPH, VOC

WATER:

5 groundwater samples were collected, for the following analyses:

- VOCs, PAH, TPH, heavy metals and metalloids, cyanide, phenols, sulphate

1 sample of the South Dock was collected, to enable bioavailability correction on any potential metal contamination. For this purpose the following analysis were scheduled:

- pH, DOC, heavy metals and metalloids, calcium

4.4 DESCRIPTION OF ANALYTICAL RESULTS

The results of the soil and groundwater analyses are compared to generic assessment criteria (GAC), to assess whether there is any contamination present. The selection of the GAC and the comparison tables are included in APPENDIX 6.

4.4.1 SOIL

Asbestos

Asbestos was detected I two samples: WS12.3 and WS15.2. In both samples it relates to trace asbestos which remained below the quantification limit (0.001%) and hence below the GAC for industrial land.

Cyanide

No cyanide was detected above the limit of quantification (LOQ).

Phenols

No phenols were detected above the limit of quantification (LOQ).

Heavy metals

Low concentrations of heavy metals were detected throughout the site. However, in all cases did these concentrations remain well below the GAC for industrial land.

PAH

Low concentrations of PAH was detected throughout the site. However, in all cases did these concentrations remain well below the GAC for industrial land.

TPH

Low concentrations of TPH was detected throughout the site. However, in all cases did these concentrations remain well below the GAC for industrial land.

VOCs

No VOCs were detected above the limit of quantification (LOQ).

In summary, it can be concluded that no contaminants were detected in the soil above the generic assessment criteria.

4.4.2 GROUNDWATER

PAH

No elevated concentrations of PAH were detected, all remained below the LOQ.

TPH

No elevated concentrations of TPH were detected, all remained below the LOQ.

VOCs

No elevated concentrations of VOCs were detected, all remained below the LOQ.

Cyanide

No cyanide was detected above the limit of quantification (LOQ).

Phenols

No phenols were detected above the limit of quantification (LOQ).

Heavy metals

A first screening of the heavy metals against the standard GAC (Environmental Quality Standard, or EQS) showed a potential exceedance of the GAC for copper (max. concentration 13 µg/l and lead (max. concentration 25 µg/l).

A correction was made for the bioavailability of the metals, using the Biotic Ligand Model (BLM) of BioMet. This showed that when the bioavailability of the metals is accounted for, the EQS is not exceeded.

In summary, it can be concluded that no contaminants were detected in the groundwater above the generic assessment criteria.

5 CONTAMINATED LAND RISK ASSESSMENT

5.1 GENERIC QUANTITATIVE RISK ASSESSMENT

The Preliminary Risk Assessment (see §3.4) identified potential pollutant linkages.

The next stage in the risk assessment is the generic quantitative risk assessment (GQRA), where the results of the soil and groundwater analyses are compared to generic assessment criteria (GAC).

Exceedance of the GAC for a specific contaminant means that there is a potential risk to human receptors. This might then be further investigated in a more site specific detailed risk assessment. Contaminants that are present in concentrations below the GAC do not pose a potential risk. The GAC for the land use 'industrial' is deemed the most appropriate for this evaluation, as it is the most realistic land use at the moment as well as after development of the site.

The comparison of the laboratory result with the GAC has already been described in §4.4. It can be concluded that no GAC are exceeded for any potential pollutant. A detailed quantitative risk assessment is not required.

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5.2 RISK EVALUATION

Based on the risk assessment a risk evaluation is performed for the conceptual model. This starts from the risk matrix produced as part of the preliminary risk assessment and updates this based on the new information obtained during the intrusive investigation and GQRA.

Source	Receptor	Pathway	Likelihood	Severity	Potential risk	Explanation
On-site: Made ground (i.e. fill material) including that contaminated by hydrocarbons. Brick, ash and clinker and containing toxic and phytotoxic metals, inorganics, PAHs, asbestos, lube oil, diesel, kerosene, VOCs	Current and future site users – industrial workers	Oral, dermal and inhalation exposure with impacted soil and dust	Unlikely	Medium	Low	Made Ground is present on site to a significant depth, but does not contain any contaminants above the GAC for industrial use.
		Inhalation exposure with impacted soil vapour	**Unlikely**	Medium	**Low**	Made Ground is present on site to a significant depth, but does not contain any contaminants above the GAC for industrial use.
	Current and future adjacent site users – industrial workers	Oral, dermal and inhalation exposure with impacted soil and dust	Unlikely	Medium	Low	Made Ground is present on site to a significant depth, but does not contain any contaminants above the GAC for industrial use.
		Inhalation exposure with impacted soil vapour	**Unlikely**	Medium	**Low**	Made Ground is present on site to a significant depth, but does not contain any contaminants above the GAC for industrial use.
	Future buildings and services	Direct contact and permeation of potable water supply pipes	Unlikely	Medium	**Low**	Made Ground is present on site to a significant depth, but does not contain any contaminants above the GAC for industrial use.
	Groundwater	Leaching and downward migration of contaminants	**Unlikely**	Mild	**Very low**	Made Ground is present on site to a significant depth, but does not contain any contaminants above the GAC for industrial use. Furthermore, no groundwater contamination was detected.
	Surface waters of South Dock	Leaching and downward migration to water table followed by lateral migration	Unlikely	Mild	Very Low	Made Ground is present on site to a significant depth, but does not contain any contaminants above the GAC for industrial use. Furthermore, no groundwater contamination was detected.
	Surface waters of the River Usk		**Unlikely**	Mild	**Very low**	Made Ground is present on site to a significant depth, but does not contain any contaminants above the GAC for industrial use. Furthermore, no groundwater contamination was detected.
	Ecological receptors	Leaching and downward	**Unlikely**	Mild	**Very low**	Made Ground is present on site to a significant depth, but does not

Source	Receptor	Pathway	Likelihood	Severity	Potential risk	Explanation
	(SAC and SSSI associated with the River Usk)	migration to water table followed by lateral migration				contain any contaminants above the GAC for industrial use. Furthermore, no groundwater contamination was detected.
		Direct contact with contaminated wind-blown dust migrating from site.	Unlikely	Mild	Very Low	Made Ground is present on site to a significant depth, but does not contain any contaminants above the GAC for industrial use. Furthermore, no groundwater contamination was detected. Current site layout and future industrial development comprise >99% hard standing, completely mitigating the potential for migration of dust off-site.
Groundwater containing toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons (dissolved or non-aqueous phase liquids (NAPL)).	Current and future site users – industrial workers	Oral, dermal and inhalation exposure with impacted groundwater	Unlikely	Medium	Low	Both superficial standing water and deeper groundwater was present on the site. However, no contamination above the GAC was present.
		Inhalation exposure with vapour from impacted groundwater	**Unlikely**	Medium	**Low**	Both superficial standing water and deeper groundwater was present on the site. However, no contamination above the GAC was present.
	Current and future adjacent site users – industrial workers	Inhalation exposure with vapour from impacted groundwater migrating from the site	Unlikely	Medium	Low	Both superficial standing water and deeper groundwater was present on the site. However, no contamination above the GAC was present. Furthermore, lateral migration of groundwater is likely to be inhibited by the clayey TFD that will help to mitigate groundwater and vapour migration.
	Future buildings and services	Direct contact and permeation of potable water supply pipes	**Unlikely**	Medium	**Low**	Both superficial standing water and deeper groundwater was present on the site. However, no contamination above the GAC was present.
	Groundwater	Downward and lateral migration of contaminants to the wider aquifer	**Unlikely**	Mild	**Very low**	Both superficial standing water and deeper groundwater was present on the site. However, no contamination above the GAC was present.
	Surface waters of South	Lateral migration of contaminated	Unlikely	Mild	Very Low	Both superficial standing water and deeper groundwater was present on the site. However, no contamination above the GAC

Source	Receptor	Pathway	Likelihood	Severity	Potential risk	Explanation
	Dock	groundwater				was present.
	Surface waters of the River Usk		**Unlikely**	Mild	**Very low**	Both superficial standing water and deeper groundwater was present on the site. However, no contamination above the GAC was present.
	Ecological receptors (SAC and SSSI associated with the River Usk)		**Unlikely**	Mild	**Very low**	Both superficial standing water and deeper groundwater was present on the site. However, no contamination above the GAC was present.
Off-site: Historical landfill (167 m east) mid-1960s to early 1990s.	Current and future site users – industrial workers	Inhalation exposure with impacted soil vapour	**Unlikely**	Medium	**Low**	Given the clayey nature of the TFD there is considered a low likelihood for leachate to migrate beneath the site. No evidence of contaminated groundwater reaching the site has been detected.
		Migration of ground gas into enclosed spaces with the potential for asphyxiation/ explosion	**Unlikely**	Severe	**Moderate / low**	Landfill is considered to have a high generation potential for ground gas. Ground gas migration likely to be mitigated through the presence of clayey TFD. No evidence of landfill-generated ground gas reaching the site has been detected.
	Groundwater	Migration via groundwater to impact aquifer beneath the site	**Unlikely**	Mild	**Very low**	Given the clayey nature of the TFD there is considered a low likelihood for leachate to migrate beneath the site. No evidence of contaminated groundwater reaching the site has been detected.
	Future buildings and services	Migration of ground gas into enclosed spaces with the potential for explosion	**Unlikely**	Severe	**Moderate / low**	Landfill is considered to have a high generation potential for ground gas. Ground gas migration likely to be mitigated through the presence of clayey TFD. No evidence of landfill-generated ground gas reaching the site has been detected.

Source	Receptor	Pathway	Likelihood	Severity	Potential risk	Explanation
Ground gas (carbon dioxide and methane): Made Ground on site and natural soils containing organic material	Current and future site users – industrial workers	Migration of ground gas into enclosed spaces with the potential for asphyxiation/ explosion	Unlikely	Severe	Moderate / low	Made Ground and natural soils are considered to have a very low generation potential for ground gas. No evidence of significant ground gas has been detected.
	Current and future adjacent site users – industrial workers	Migration of ground gas into enclosed spaces with the potential for asphyxiation/ explosion	Unlikely	Severe	Moderate / low	Made Ground and natural soils are considered to have a very low generation potential for ground gas No evidence of significant ground gas has been detected.
	Future buildings and services	Migration of ground gas into enclosed spaces with the potential for explosion	Unlikely	Severe	Moderate / low	Made Ground and natural soils are considered to have a very low generation potential for ground gas. No evidence of significant ground gas has been detected.

Compared to the potentially complete contaminant linkages with a potential risk of moderate / low or higher identified in the Preliminary Risk Assessment, the following risks are no longer pertinent:

- inhalation exposure with impacted soil vapour/ vapour from impacted groundwater by future site users – no longer relevant since no contamination has been detected in soil or groundwater
- direct contact by potable water supply pipes with contaminated soils and groundwater - no longer relevant since no contamination has been detected in soil or groundwater

The following contaminant linkages remain with a potential risk of moderate/low:

- risk to future users, adjacent users and buildings from asphyxiation/ explosion risk through the migration and build-up of ground gases (carbon dioxide and methane) in enclosed spaces

However, since the potential severity of the risk is classed as severe, the potential risk can never be classed any lower then moderate/low. Because of the site monitoring data showing the absence of ground gas, in this case the potential risk can be disregarded.

6 WASTE ASSESSMENT

6.1 PRELIMINARY WASTE CLASSIFICATION

During the development works on the site it is likely that groundworks will be required. Any material that arises from excavation works on the site needs to be treated as potential waste and classified according to the relevant guidance.

Based on the findings of the ground investigation we foresee the following possible waste streams:

- Removed concrete hardstanding
- Removed asphalt hardstanding – EWC
- Gravel, crushed concrete – EWC
- Made ground – EWC
- Virgin subsoil - EWC

The distinction between the hazardous and non-hazardous waste codes for soil can have large cost implications. Non-hazardous soil qualifies for the lower rate landfill tax which currently stands at £3.30 per tonne (planned to rise to £4.05 per tonne in April 2025). Hazardous soil incurs the standard rate landfill tax which currently stands at £103.70 per tonne (planned to rise to £126.15 per tonne in April 2025).

An initial attempt has been made to classify potential waste. The screening is attached in APPENDIX 8. The following can be concluded:

- In only one of the samples, contamination was found that classifies the material as hazardous waste. This involves a minor exceedance for mineral oil at 0.1m depth (at the scrap processing location). This is a thin layer of waste/disturbed soil that appears to be situated on top of old hardstanding.
- All other samples can be classified as non-hazardous waste.
- It is recommended to assume that this thin top layer of waste/disturbed soil at the scrap processing location will need to be disposed of as hazardous waste if excavation is required.
- Although the coal gravel is classified as non-hazardous waste, the Waste Acceptance Criteria (WAC) test on sample WS12.1 indicates that this material has a very high Loss on Ignition (LOI). As a result, this material may not be suitable for landfill. Another waste code might be more suitable for this material.
- For the rest of the site, it can currently be assumed that the soil can be classified as non-hazardous waste.

Given the size of the site, it is recommended to conduct more targeted additional investigations just before starting the earthworks to refine processing/disposal options

6.2 PRELIMINARY WASTE ACCEPTANCE CRITERIA (WAC) SCREENING

For non-hazardous waste, there are two realistic options: a landfill for non-hazardous waste or a landfill for inert waste if the WAC criteria for inert landfills are met. 3 samples were analysed to determine the disposal options. The detailed results are shown in APPENDIX 8. The following can be concluded:

- WS9.3: The clay qualifies for disposal at an inert landfill.
- WS15.1: The "standard" made ground (without significant mixing of coal or asphalt) qualifies chemically for disposal at an inert landfill. However, acceptance will depend on the appearance of the soil once excavated. If there are excessive waste inclusions (brick, asphalt, …), the material will not be accepted, regardless of favourable chemical results.
- WS5.2: The made ground mixed with asphalt qualifies chemically for disposal at an inert landfill. However, acceptance will depend on the appearance of the soil once excavated. If there are excessive waste inclusions (brick, asphalt, …), the material will not be accepted, regardless of favourable chemical results.

Given the size of the site, it is recommended to conduct more targeted additional investigations just before starting the earthworks to refine processing/disposal options

7 REMEDIATION STRATEGY

The Quantitative Risk Assessment did not find any relevant pollutant linkages; a remediation is not required based on these findings.

However, given the industrial history of the site, it is recommended to conduct any groundworks under a watching brief and take the necessary health and safety precautions for construction works involved in the groundworks.

7.1 WATCHING BRIEF

A watching brief should be maintained during all groundworks at the site to ensure that activities were conducted safely, in compliance with environmental and health and safety legislation, and to monitor for unexpected contamination or other risks.

The watching brief should be undertaken by a suitably qualified and experienced contaminated land specialist, whose role included real-time monitoring, recording ground conditions, and ensuring adherence to the agreed risk assessment and method statement (RAMS).

7.2 CONSIDERATIONS REGARDING CONSTRUCTION WORKERS

While the detailed quantitative risk assessment did not find a risk for construction workers, best practices do require some precautionary measures to be put in place. 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”. In summary, the following measures are suggested to provide a minimum level of protection:

- All ground workers should be issued with the relevant protective clothing, footwear and gloves. These protective items should not be removed from the site and personnel should be instructed as to why and how they are to be used.
- Hand-washing and boot-washing facilities should be provided. Care should be taken to minimise the potential for off-site migration of contamination by the provision of dust suppression control and wheel cleaning equipment during the construction works.
- Good practices relating to personal hygiene should be adopted on the site.
- The contractor shall satisfy the Health and Safety Executive with regard to any other matters concerning the health, safety and welfare of persons on the site.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 SUMMARY OF FINDINGS

The ground investigation at the land at South Docks, Newport, was conducted to assess soil, groundwater, and potential contamination risks. The investigation included a desk top study, site visits, borehole drilling, groundwater and ground gas sampling, and laboratory analysis. Key findings are as follows:

Contaminant Levels: No significant contaminants exceeded the Generic Assessment Criteria (GAC) for industrial land use, including heavy metals, PAHs, TPHs, VOCs, and asbestos.

Groundwater Quality: Groundwater analysis revealed no elevated concentrations of contaminants, with all results below the thresholds.

Pollutant Linkages: No complete pollutant linkages were identified that pose significant risk to human health, controlled waters, or ecological receptors under current site conditions and proposed industrial land use.

Made Ground and Waste Classification:

- Most samples were classified as non-hazardous waste.
- One sample, from the scrap processing area, contained mineral oil levels above the hazardous waste threshold.
- Coal gravel, while non-hazardous, may face disposal limitations due to high Loss on Ignition (LOI).

8.2 RECOMMENDATIONS

Waste Management

- Hazardous Waste: The thin layer of waste/disturbed soil at the scrap processing location should be treated as hazardous waste if excavation is necessary. Segregate and dispose of this material in compliance with hazardous waste disposal regulations.
- Non-Hazardous Waste: Ensure appropriate classification and disposal of made ground and other materials in line with Waste Acceptance Criteria (WAC). Plan for inert waste disposal options for clean subsoil and other qualifying materials.
- Further Investigations Conduct targeted investigations before earthworks to confirm waste classification and refine disposal options, especially for areas with potential waste inclusions (e.g., coal gravel and asphalt).

Watching Brief

A qualified contaminated land specialist should maintain a watching brief during all groundworks to monitor for unexpected contamination, such as asbestos fragments or hydrocarbon-impacted

soils, and provide immediate guidance on the segregation and disposal of any newly identified contamination.

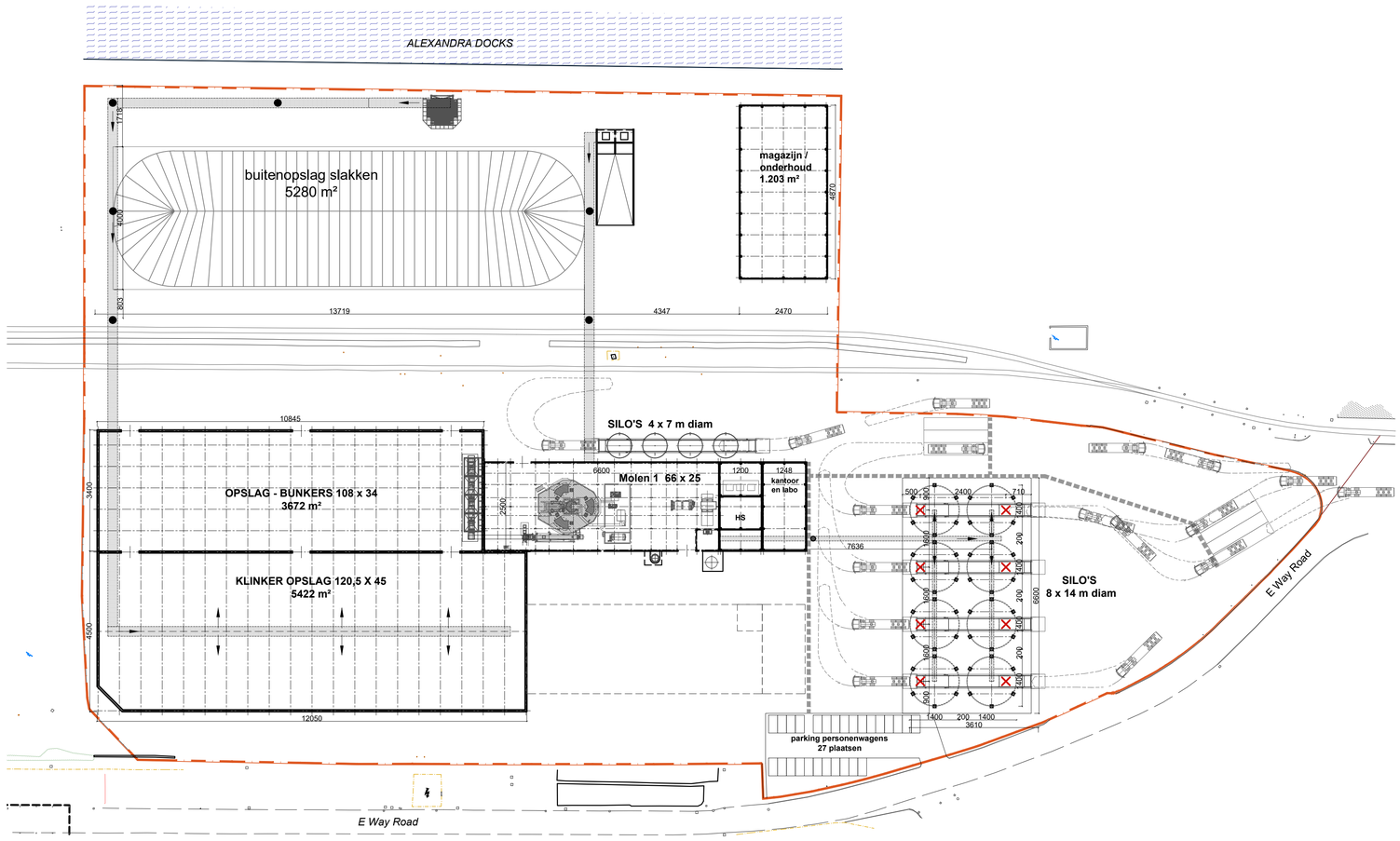
Construction Safety

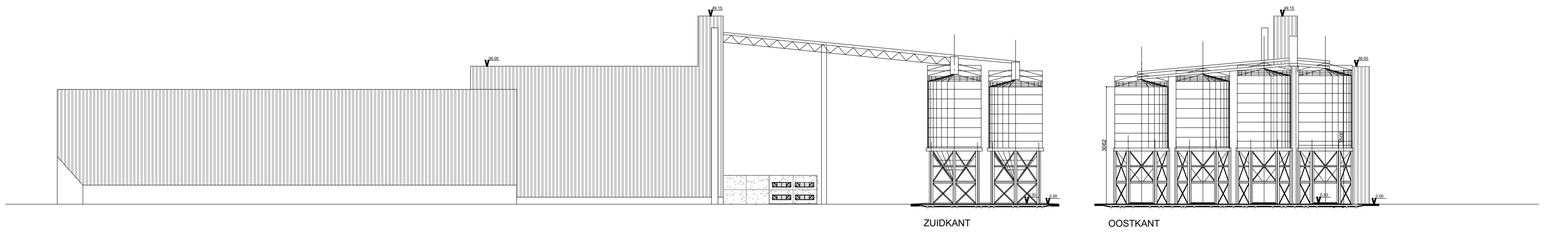
Implement health and safety measures for construction workers in accordance with HSE guidelines.

8.3 Conclusion

The investigation has demonstrated that contamination risks at the site are manageable under proposed industrial land use scenarios. No remediation is required beyond standard construction and waste management practices. Continued adherence to health and safety protocols and monitoring during groundworks will ensure compliance with environmental and regulatory standards

APPENDIX 1 DRAWINGS





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- CONSTRUCTION SITE
Alexandra Docks - New Port - Wales

CLIENT -
Cemminerals N.V.
Christoffel Columbusstraat 37 - 9042 Gent

ARCHITECT -

INDEX	DATE	DRAWN BY	CHANGE
A	03-11-2023	EW	aanpassing
B	22-11-2023	EW	aanpassing
C	01-12-2023	EW	aanpassing
D	16-02-2024	EW	aanpassing
E	26-02-2024	EW	aanpassing
F	07-03-2024	EW	aanpassing

SITE PLAN

DATE
04-10-2023

1/1000

Architecture - Preliminary Draft

6023UK - AR - 1001 - F

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Alexandra Docks Newport

NP20 2WE - NP20 2NQ

Location Boreholes
Amended proposal v2

SiteBoundary

Shallow BH (5m bgl)

Light Cable Percussion (23 m bgl)

CPT (15-30 m bgl)

ABO nv
Kontichsesteenweg 38
2630 Aartselaar

Drawing: Jan De Vos	Project Manager: Jan De Vos
Date: 12/07/2024	Refnr: 61169

1:1,250



0 50 100 150 200 250 m

Alexandra Docks Newport

NP20 2WE - NP20 2NQ

Location Boreholes
Final

SiteBoundary

Shallow BH (5m bgl)

Light Cable Percussion (23 m bgl)

CPT (15-30 m bgl)

Piezometer installs

Boreholes non started

ABO nv
Kontichsesteenweg 38
2630 Aartselaar

Drawing: Jan De Vos	Project Manager: Jan De Vos
Date: 05/08/2024	Refnr: 61169

1:1,250

APPENDIX 2 ENVIRONMENTAL DATABASE REPORT

Groundsure
LOCATION INTELLIGENCE

Enviro+Geo Insight

ALEXANDRA DOCKS, NEWPORT, NP20 2WF

Order Details

Date: 29/09/2023

Your ref: P02141599

Our Ref: GS-TKB-C4U-EPC-X1O

Site Details

Location: 331887 184431

Area: 6.54 ha

Authority: Casnewydd - Newport City Council ↗



Summary of findings p. 2 >

Aerial image p. 9 >

OS MasterMap site plan p.14 >

groundsure.com/insightuserguide ↗

Contact us with any questions at:
info@groundsure.com ↗
01273 257 755

Certified B Corporation

Summary of findings

Page	Section	Past land use >	On site	0-50m	50-250m	250-500m	500-2000m
15 >	1.1 >	Historical industrial land uses >	25	4	30	48	-
19 >	1.2 >	Historical tanks >	0	1	6	0	-
20 >	1.3 >	Historical energy features >	0	0	10	0	-
21	1.4	Historical petrol stations	0	0	0	0	-
21 >	1.5 >	Historical garages >	0	0	0	1	-
21	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped >	On site	0-50m	50-250m	250-500m	500-2000m
22 >	2.1 >	Historical industrial land uses >	30	5	36	55	-
27 >	2.2 >	Historical tanks >	0	2	12	0	-
28 >	2.3 >	Historical energy features >	0	0	21	4	-
29	2.4	Historical petrol stations	0	0	0	0	-
29 >	2.5 >	Historical garages >	0	0	0	1	-
Page	Section	Waste and landfill >	On site	0-50m	50-250m	250-500m	500-2000m
30	3.1	Active or recent landfill	0	0	0	0	-
30	3.2	Historical landfill (BGS records)	0	0	0	0	-
31 >	3.3 >	Historical landfill (LA/mapping records) >	0	0	3	0	-
31 >	3.4 >	Historical landfill (EA/NRW records) >	0	0	1	3	-
32 >	3.5 >	Historical waste sites >	0	0	0	2	-
33 >	3.6 >	Licensed waste sites >	0	0	1	11	-
36 >	3.7 >	Waste exemptions >	0	5	10	14	-
Page	Section	Current industrial land use >	On site	0-50m	50-250m	250-500m	500-2000m
40 >	4.1 >	Recent industrial land uses >	0	3	12	-	-
41	4.2	Current or recent petrol stations	0	0	0	0	-
42	4.3	Electricity cables	0	0	0	0	-
42	4.4	Gas pipelines	0	0	0	0	-
42	4.5	Sites determined as Contaminated Land	0	0	0	0	-

42 >	4.6 >	Control of Major Accident Hazards (COMAH) >	0	0	0	2	-
43	4.7	Regulated explosive sites	0	0	0	0	-
43	4.8	Hazardous substance storage/usage	0	0	0	0	-
43	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
43	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
43 >	4.11 >	Licensed pollutant release (Part A(2)/B) >	0	0	0	2	-
44	4.12	Radioactive Substance Authorisations	0	0	0	0	-
44 >	4.13 >	Licensed Discharges to controlled waters >	1	1	15	12	-
48	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
48	4.15	Pollutant release to public sewer	0	0	0	0	-
48	4.16	List 1 Dangerous Substances	0	0	0	0	-
48	4.17	List 2 Dangerous Substances	0	0	0	0	-
48 >	4.18 >	Pollution Incidents (EA/NRW) >	0	0	2	3	-
49	4.19	Pollution inventory substances	0	0	0	0	-
49	4.20	Pollution inventory waste transfers	0	0	0	0	-
50	4.21	Pollution inventory radioactive waste	0	0	0	0	-

Page	Section	Hydrogeology >	On site	0-50m	50-250m	250-500m	500-2000m
51 >	5.1 >	Superficial aquifer >	Identified (within 500m)				
52 >	5.2 >	Bedrock aquifer >	Identified (within 500m)				
54 >	5.3 >	Groundwater vulnerability >	Identified (within 50m)				
55	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
55	5.5	Groundwater vulnerability- local information	None (within 0m)				
56	5.6	Groundwater abstractions	0	0	0	0	0
57 >	5.7 >	Surface water abstractions >	0	0	0	0	2
57	5.8	Potable abstractions	0	0	0	0	0
58	5.9	Source Protection Zones	0	0	0	0	-
58	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-

Page	Section	Hydrology >	On site	0-50m	50-250m	250-500m	500-2000m
59 >	6.1 >	Water Network (OS MasterMap) >	0	0	20	-	-

61 >	6.2 >	Surface water features >	1	1	10	-	-
61 >	6.3 >	WFD Surface water body catchments >	1	-	-	-	-
62 >	6.4 >	WFD Surface water bodies >	0	0	1	-	-
62 >	6.5 >	WFD Groundwater bodies >	1	-	-	-	-
Page	Section	River and coastal flooding >	On site	0-50m	50-250m	250-500m	500-2000m
63 >	7.1 >	Risk of flooding from rivers and the sea >	High (within 50m)				
64	7.2	Historical Flood Events	0	0	0	-	-
64	7.3	Flood Defences	0	0	0	-	-
64	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
64	7.5	Flood Storage Areas	0	0	0	-	-
65 >	7.6 >	Flood Zone 2 >	Identified (within 50m)				
66 >	7.7 >	Flood Zone 3 >	Identified (within 50m)				
Page	Section	Surface water flooding >					
67 >	8.1 >	Surface water flooding >	1 in 30 year, 0.1m - 0.3m (within 50m)				
Page	Section	Groundwater flooding >					
69 >	9.1 >	Groundwater flooding >	Negligible (within 50m)				
Page	Section	Environmental designations >	On site	0-50m	50-250m	250-500m	500-2000m
70 >	10.1 >	Sites of Special Scientific Interest (SSSI) >	0	0	1	1	4
71 >	10.2 >	Conserved wetland sites (Ramsar sites) >	0	0	0	0	1
73 >	10.3 >	Special Areas of Conservation (SAC) >	0	0	1	0	1
73 >	10.4 >	Special Protection Areas (SPA) >	0	0	0	0	1
74 >	10.5 >	National Nature Reserves (NNR) >	0	0	0	1	0
74	10.6	Local Nature Reserves (LNR)	0	0	0	0	0
74 >	10.7 >	Designated Ancient Woodland >	0	0	0	0	3
75	10.8	Biosphere Reserves	0	0	0	0	0
75	10.9	Forest Parks	0	0	0	0	0
75	10.10	Marine Conservation Zones	0	0	0	0	0
75	10.11	Green Belt	0	0	0	0	0
76	10.12	Proposed Ramsar sites	0	0	0	0	0

76	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
76	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
76	10.15	Nitrate Sensitive Areas	0	0	0	0	0
77	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
78 >	10.17 >	SSSI Impact Risk Zones >	1	-	-	-	-
79	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
80	11.1	World Heritage Sites	0	0	0	-	-
80	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
80	11.3	National Parks	0	0	0	-	-
80	11.4	Listed Buildings	0	0	0	-	-
81	11.5	Conservation Areas	0	0	0	-	-
81	11.6	Scheduled Ancient Monuments	0	0	0	-	-
81	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations >	On site	0-50m	50-250m	250-500m	500-2000m
82 >	12.1 >	Agricultural Land Classification >	Grade 4 (within 250m)				
83 >	12.2 >	Open Access Land >	0	0	1	-	-
83	12.3	Tree Felling Licences	0	0	0	-	-
84	12.4	Environmental Stewardship Schemes	0	0	0	-	-
84	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
85	13.1	Priority Habitat Inventory	0	0	0	-	-
85	13.2	Habitat Networks	0	0	0	-	-
85	13.3	Open Mosaic Habitat	0	0	0	-	-
85	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale >	On site	0-50m	50-250m	250-500m	500-2000m
86 >	14.1 >	10k Availability >	Identified (within 500m)				
87	14.2	Artificial and made ground (10k)	0	0	0	0	-
88 >	14.3 >	Superficial geology (10k) >	0	0	0	1	-

89	14.4	Landslip (10k)	0	0	0	0	-
90 >	14.5 >	Bedrock geology (10k) >	0	0	0	1	-
91	14.6	Bedrock faults and other linear features (10k)	0	0	0	0	-
Page	Section	Geology 1:50,000 scale >	On site	0-50m	50-250m	250-500m	500-2000m
92 >	15.1 >	50k Availability >	Identified (within 500m)				
93	15.2	Artificial and made ground (50k)	0	0	0	0	-
93	15.3	Artificial ground permeability (50k)	0	0	-	-	-
94 >	15.4 >	Superficial geology (50k) >	1	0	1	1	-
95 >	15.5 >	Superficial permeability (50k) >	Identified (within 50m)				
95	15.6	Landslip (50k)	0	0	0	0	-
95	15.7	Landslip permeability (50k)	None (within 50m)				
96 >	15.8 >	Bedrock geology (50k) >	1	0	0	0	-
97 >	15.9 >	Bedrock permeability (50k) >	Identified (within 50m)				
97	15.10	Bedrock faults and other linear features (50k)	0	0	0	0	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
98	16.1	BGS Boreholes	0	0	0	-	-
Page	Section	Natural ground subsidence >					
99 >	17.1 >	Shrink swell clays >	Low (within 50m)				
100 >	17.2 >	Running sands >	Moderate (within 50m)				
101 >	17.3 >	Compressible deposits >	Moderate (within 50m)				
102 >	17.4 >	Collapsible deposits >	Negligible (within 50m)				
103 >	17.5 >	Landslides >	Low (within 50m)				
105 >	17.6 >	Ground dissolution of soluble rocks >	Negligible (within 50m)				
Page	Section	Mining and ground workings >	On site	0-50m	50-250m	250-500m	500-2000m
107 >	18.1 >	BritPits >	0	0	1	1	-
108 >	18.2 >	Surface ground workings >	10	1	12	-	-
109	18.3	Underground workings	0	0	0	0	0
109	18.4	Underground mining extents	0	0	0	0	-
109	18.5	Historical Mineral Planning Areas	0	0	0	0	-

110	18.6	Non-coal mining	0	0	0	0	0
110	18.7	JPB mining areas	None (within 0m)				
110	18.8	The Coal Authority non-coal mining	0	0	0	0	-
110	18.9	Researched mining	0	0	0	0	-
111	18.10	Mining record office plans	0	0	0	0	-
111	18.11	BGS mine plans	0	0	0	0	-
111	18.12	Coal mining	None (within 0m)				
111	18.13	Brine areas	None (within 0m)				
111	18.14	Gypsum areas	None (within 0m)				
112	18.15	Tin mining	None (within 0m)				
112	18.16	Clay mining	None (within 0m)				
Page	Section	Ground cavities and sinkholes	On site	0-50m	50-250m	250-500m	500-2000m
113	19.1	Natural cavities	0	0	0	0	-
113	19.2	Mining cavities	0	0	0	0	0
113	19.3	Reported recent incidents	0	0	0	0	-
113	19.4	Historical incidents	0	0	0	0	-
114	19.5	National karst database	0	0	0	0	-
Page	Section	**Radon** >					
115 >	**20.1** >	**Radon** >	Less than 1% (within 0m)				
Page	Section	**Soil chemistry** >	On site	0-50m	50-250m	250-500m	500-2000m
117 >	**21.1** >	**BGS Estimated Background Soil Chemistry** >	6	0	-	-	-
117	21.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
118	21.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	**Railway infrastructure and projects** >	On site	0-50m	50-250m	250-500m	500-2000m
119	22.1	Underground railways (London)	0	0	0	-	-
119	22.2	Underground railways (Non-London)	0	0	0	-	-
120	22.3	Railway tunnels	0	0	0	-	-
120 >	**22.4** >	**Historical railway and tunnel features** >	17	3	21	-	-
122	22.5	Royal Mail tunnels	0	0	0	-	-

122	22.6	Historical railways	0	0	0	-	-
122 >	**22.7 >**	**Railways >**	1	2	4	-	-
123	22.8	Crossrail 1	0	0	0	0	-
123	22.9	Crossrail 2	0	0	0	0	-
123	22.10	HS2	0	0	0	0	-

Recent aerial photograph



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Capture Date: 14/04/2020

Site Area: 6.54ha

Recent site history - 2017 aerial photograph



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Capture Date: 25/05/2017

Site Area: 6.54ha

Recent site history - 2014 aerial photograph



Capture Date: 23/07/2014

Site Area: 6.54ha

Recent site history - 2009 aerial photograph



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Capture Date: 12/10/2009

Site Area: 6.54ha

Recent site history - 2000 aerial photograph



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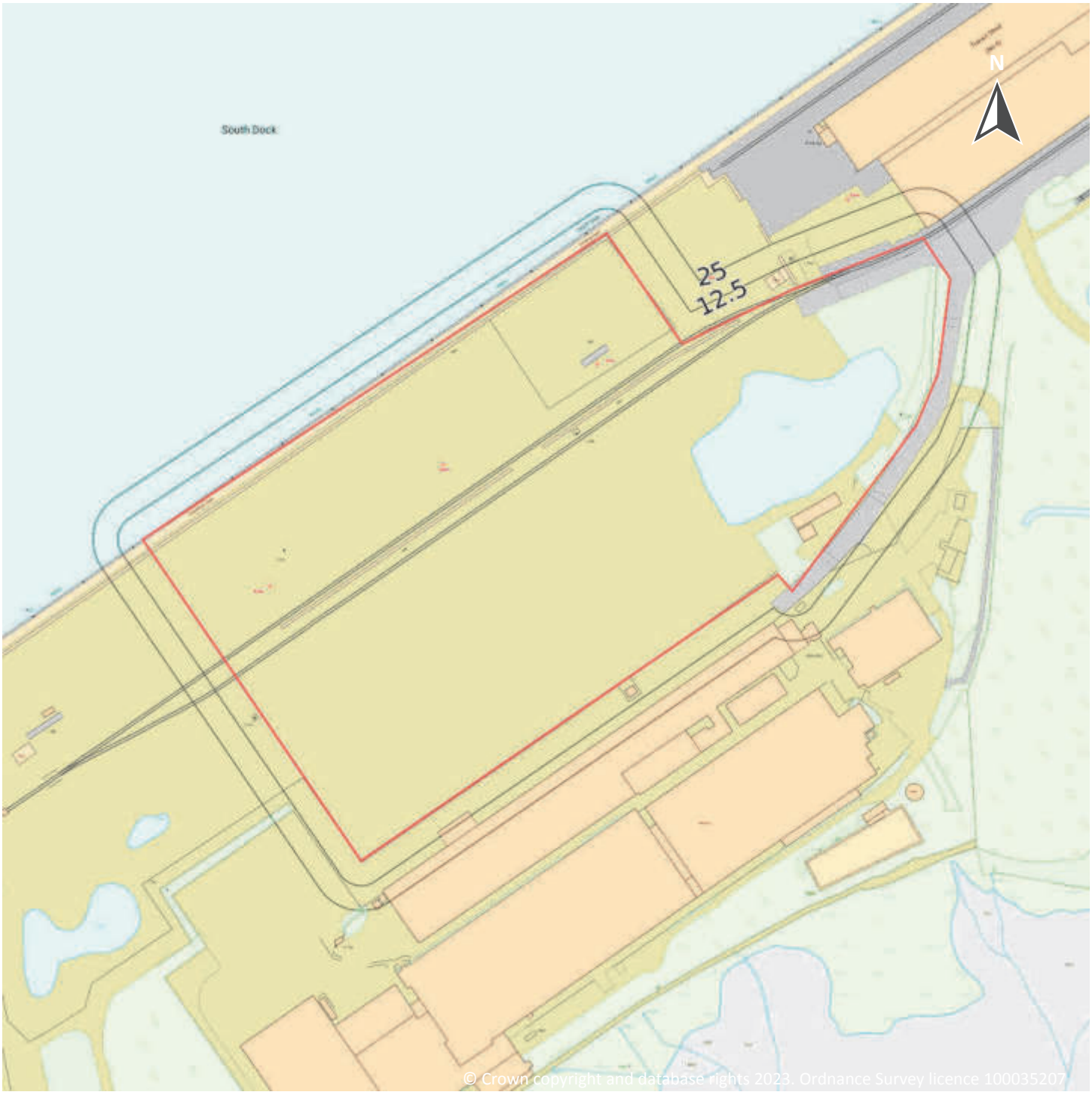
Capture Date: 06/10/2000

Site Area: 6.54ha

OS MasterMap site plan



Site Area: 6.54ha

1 Past land use



Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

Historical garages

1.1 Historical industrial land uses

Records within 500m	107

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 15 >**

ID	Location	Land use	Dates present	Group ID
1	**On site**	**Unspecified Mills**	**1956**	**1164943**

ID	Location	Land use	Dates present	Group ID
2	**On site**	**Railway Building**	**1922**	**1172479**
3	**On site**	**Railway Sidings**	**1956**	**1190125**
4	**On site**	**Dock**	**1922**	**1198907**
5	**On site**	**Store Depot**	**1950**	**1256036**
A	**On site**	**Railway Sidings**	**1949**	**1191872**
A	**On site**	**Unspecified Heap**	**1900**	**1163118**
A	**On site**	**Quay**	**1956**	**1164889**
A	**On site**	**Unspecified Level**	**1949**	**1213343**
A	**On site**	**Unspecified Level**	**1885 - 1900**	**1215289**
A	**On site**	**Railway Sidings**	**1916**	**1265591**
A	**On site**	**Railway Sidings**	**1885**	**1269301**
B	**On site**	**Railway Buildings**	**1956**	**1181817**
B	**On site**	**Transit Shed**	**1922**	**1190325**
B	**On site**	**Transit Shed**	**1922 - 1950**	**1208217**
C	**On site**	**Railway Buildings**	**1956**	**1181818**
C	**On site**	**Transit Shed**	**1922**	**1207429**
C	**On site**	**Transit Shed**	**1922 - 1950**	**1269010**
D	**On site**	**Docks**	**1922**	**1157146**
D	**On site**	**Docks**	**1922**	**1157151**
E	**On site**	**Unspecified Works**	**1956**	**1178970**
E	**On site**	**Railway Sidings**	**1950**	**1190082**
E	**On site**	**Store Depot**	**1922**	**1200332**
F	**On site**	**Railway Sidings**	**1920 - 1949**	**1203016**
G	**On site**	**Railway Sidings**	**1922**	**1271261**
6	0m W	Docks	1922	1258080
A	1m E	Railway Building	1885	1203471
A	2m E	Railway Building	1922 - 1949	1208339
A	2m E	Railway Building	1916	1258556

ID	Location	Land use	Dates present	Group ID
F	52m NE	Railway Building	1922	1255398
F	54m NE	Railway Building	1956	1230175
H	60m NE	Dock	1920	1190067
H	60m NE	Dock	1949	1190068
H	60m NE	Dock	1949	1190069
F	61m NE	Transit Shed	1920 - 1922	1250095
F	63m NE	Unspecified Heap	1900	1163117
F	72m NE	Railway Sidings	1949	1195459
F	72m NE	Railway Sidings	1920	1210842
I	77m SE	Railway Building	1885	1242659
I	79m SE	Railway Building	1922	1214682
I	79m SE	Railway Building	1949	1218121
I	80m SE	Railway Building	1916	1236057
9	87m NE	Unspecified Ground Workings	1900	1160913
I	113m SE	Railway Building	1885	1243513
I	113m SE	Railway Building	1949	1199268
I	113m SE	Railway Building	1922	1267834
I	113m SE	Railway Building	1916	1255371
D	115m W	Railway Building	1956	1172480
G	171m NE	Railway Sidings	1900	1238919
12	188m E	Unspecified Ground Workings	1956	1160912
G	191m NE	Railway Buildings	1956	1181816
13	198m N	Unspecified Heap	1900	1163113
L	203m NE	Pumping Station	1900	1174161
L	203m NE	Engine House	1920 - 1922	1219028
M	212m SW	Railway Sidings	1956	1195033
M	212m SW	Dock	1956	1260805
N	219m SW	Electric Power Station	1922	1198445

ID	Location	Land use	Dates present	Group ID
14	238m SW	Unspecified Pit	1922	1268170
15	243m SW	Unspecified Pit	1922	1260461
O	251m NW	Docks	1920	1197679
16	258m N	Engineering and Ship Repairing Works	1900	1222520
G	260m NE	Railway Building	1956	1268314
G	264m NE	Railway Building	1922	1204833
O	272m NW	Railway Sidings	1922	1190018
O	272m NW	Railway Sidings	1922	1190019
O	272m NW	Railway Sidings	1922	1190020
O	272m NW	Railway Sidings	1922	1190021
P	272m NW	Coal Hoists	1922	1197986
P	274m NW	Coal Hoist	1922	1184700
O	276m NW	Railway Sidings	1949	1233464
O	276m NW	Railway Sidings	1920	1256077
Q	276m NW	Coal Hoists	1949	1191845
Q	276m NW	Coal Hoists	1920	1251177
Q	279m NW	Coal Hoists	1922	1219565
P	279m NW	Railway Sidings	1950	1189964
17	281m E	Unspecified Ground Workings	1956	1160174
R	284m N	Coal Hoist	1922	1184699
18	285m NW	Dock	1949	1190066
19	285m NW	Coal Hoists	1949	1268571
Q	287m NW	Coal Hoists	1949	1263001
R	289m N	Coal Hoists	1949	1196663
G	292m NE	Railway Building	1956	1172478
S	308m W	Coal Hoist	1922 - 1950	1196003
S	309m W	Coal Hoists	1922	1183863
20	315m W	Railway Sidings	1950	1189963

ID	Location	Land use	Dates present	Group ID
G	316m NE	Railway Building	1956	1172477
T	326m N	Coal Hoists	1922	1267676
T	326m N	Coal Hoists	1949	1214905
21	333m N	Railway Sidings	1900	1157726
H	340m NE	Railway Building	1956	1172476
H	341m NE	Transit Shed	1920 - 1922	1222557
H	341m NE	Transit Shed	1949	1231698
22	343m N	Dock	1900	1259206
23	344m W	Railway Sidings	1950	1189962
U	437m N	Coal Hoists	1920	1212652
V	439m N	Coal Hoists	1949	1191012
V	440m N	Coal Hoists	1922	1243446
W	453m N	Dock	1973 - 1981	1207789
W	453m N	Dock	1963	1265819
X	453m N	Docks	1973 - 1985	1192432
X	453m N	Docks	1963	1243996
24	454m N	Unspecified Commercial/Industrial	1963	1260917
U	454m N	Railway Sidings	1963	1212723
U	491m N	Coal Hoists	1922	1226155
U	492m N	Coal Hoists	1949	1233542
25	493m N	Dock	1900	1245100
U	493m N	Railway Sidings	1970 - 1985	1209979

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m	7

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or

succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 15 >**

ID	Location	Land use	Dates present	Group ID
7	14m E	Unspecified Tank	1956	179499
I	67m SE	Unspecified Tank	1956	181432
8	79m N	Unspecified Tank	1921	173568
I	114m SE	Unspecified Tank	1956	184357
10	168m N	Unspecified Tank	1921	173567
J	204m SW	Unspecified Tank	1955 - 1989	185475
J	206m SW	Unspecified Tank	1920	185566

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m	**10**

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 15 >**

ID	Location	Land use	Dates present	Group ID
F	60m NE	Electricity Substation	1971 - 1994	110724
G	67m NE	Electricity Substation	1994	97666
F	76m NE	Electricity Substation	1956	107622
J	155m SW	Power Station	1968	113484
11	181m E	Electricity Substation	1956	113397
K	202m E	Electricity Substation	1992 - 1994	110937
K	203m E	Electricity Substation	1956 - 1971	102703
N	223m SW	Power Station	1955 - 1989	105879
N	224m SW	Power Station	1989	100292

ID	Location	Land use	Dates present	Group ID
N	224m SW	Electric Power Station	1920	99470

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m	0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m	1

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 15 >**

ID	Location	Land use	Dates present	Group ID
W	477m N	Ship Repair and Oil Tanker Cleansing Depot	1986	34096

This data is sourced from Ordnance Survey / Groundsure.

1.6 Historical military land

Records within 500m	0

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey / Groundsure / other sources.

2 Past land use - un-grouped



Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

Historical garages

2.1 Historical industrial land uses

Records within 500m	126

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 22 >**

ID	Location	Land Use	Date	Group ID
1	**On site**	**Unspecified Mills**	**1956**	**1164943**
2	**On site**	**Dock**	**1922**	**1198907**
3	**On site**	**Railway Sidings**	**1956**	**1190125**

ID	Location	Land Use	Date	Group ID
4	On site	Railway Building	1922	1172479
A	On site	Railway Sidings	1949	1191872
A	On site	Railway Sidings	1885	1269301
A	On site	Unspecified Level	1949	1213343
A	On site	Unspecified Level	1885	1215289
A	On site	Unspecified Level	1900	1215289
A	On site	Railway Sidings	1916	1265591
A	On site	Unspecified Heap	1900	1163118
A	On site	Quay	1956	1164889
B	On site	Transit Shed	1950	1269010
B	On site	Transit Shed	1922	1207429
B	On site	Railway Buildings	1956	1181818
B	On site	Transit Shed	1922	1269010
C	On site	Transit Shed	1950	1208217
C	On site	Transit Shed	1922	1208217
C	On site	Railway Buildings	1956	1181817
C	On site	Transit Shed	1922	1190325
D	On site	Railway Sidings	1950	1190082
D	On site	Railway Sidings	1922	1203016
D	On site	Unspecified Works	1956	1178970
D	On site	Railway Sidings	1922	1203016
D	On site	Store Depot	1922	1200332
E	On site	Store Depot	1950	1256036
E	On site	Store Depot	1922	1200332
F	On site	Railway Sidings	1922	1271261
G	On site	Docks	1922	1157146
G	On site	Docks	1922	1157151
5	0m W	Docks	1922	1258080

ID	Location	Land Use	Date	Group ID
A	1m E	Railway Building	1885	1203471
A	2m E	Railway Building	1949	1208339
A	2m E	Railway Building	1922	1208339
A	2m E	Railway Building	1916	1258556
I	52m NE	Railway Building	1922	1255398
I	54m NE	Railway Building	1956	1230175
J	60m NE	Railway Sidings	1920	1203016
J	60m NE	Railway Sidings	1949	1203016
K	60m NE	Dock	1920	1190067
K	60m NE	Dock	1949	1190068
I	61m NE	Transit Shed	1922	1250095
I	62m NE	Transit Shed	1920	1250095
I	63m NE	Unspecified Heap	1900	1163117
I	72m NE	Railway Sidings	1920	1210842
L	77m SE	Railway Building	1885	1242659
I	78m NE	Railway Sidings	1949	1195459
L	79m SE	Railway Building	1949	1218121
L	79m SE	Railway Building	1922	1214682
L	80m SE	Railway Building	1916	1236057
7	87m NE	Unspecified Ground Workings	1900	1160913
8	100m SE	Railway Sidings	1922	1203016
L	113m SE	Railway Building	1885	1243513
L	113m SE	Railway Building	1949	1199268
L	113m SE	Railway Building	1922	1267834
L	113m SE	Railway Building	1916	1255371
G	115m W	Railway Building	1956	1172480
F	171m NE	Railway Sidings	1900	1238919
10	188m E	Unspecified Ground Workings	1956	1160912

ID	Location	Land Use	Date	Group ID
F	191m NE	Railway Buildings	1956	1181816
11	198m N	Unspecified Heap	1900	1163113
P	203m NE	Engine House	1920	1219028
P	203m NE	Engine House	1922	1219028
P	203m NE	Pumping Station	1900	1174161
Q	212m SW	Dock	1956	1260805
Q	212m SW	Railway Sidings	1956	1195033
R	219m SW	Electric Power Station	1922	1198445
R	226m SW	Electric Power Station	1922	1198445
T	238m SW	Unspecified Pit	1922	1268170
T	238m SW	Unspecified Pit	1922	1268170
12	243m SW	Unspecified Pit	1922	1260461
U	251m NW	Docks	1920	1197679
13	258m N	Engineering and Ship Repairing Works	1900	1222520
F	260m NE	Railway Building	1956	1268314
F	264m NE	Railway Building	1922	1204833
U	272m NW	Railway Sidings	1922	1190018
V	272m NW	Coal Hoists	1922	1197986
V	274m NW	Coal Hoist	1922	1184700
V	276m NW	Railway Sidings	1922	1190020
U	276m NW	Railway Sidings	1920	1256077
W	276m NW	Coal Hoists	1920	1251177
W	279m NW	Coal Hoists	1922	1219565
V	279m NW	Railway Sidings	1950	1189964
14	281m E	Unspecified Ground Workings	1956	1160174
X	284m N	Coal Hoist	1922	1184699
15	285m NW	Coal Hoists	1949	1268571
16	285m NW	Dock	1949	1190066

ID	Location	Land Use	Date	Group ID
U	285m NW	Railway Sidings	1949	1233464
W	287m NW	Coal Hoists	1949	1263001
X	289m N	Coal Hoists	1949	1196663
F	292m NE	Railway Building	1956	1172478
V	303m NW	Coal Hoists	1949	1191845
Y	308m W	Coal Hoist	1922	1196003
Y	309m W	Coal Hoists	1922	1183863
Z	312m W	Railway Sidings	1922	1190019
Y	315m W	Coal Hoist	1950	1196003
Z	315m W	Railway Sidings	1950	1189963
F	316m NE	Railway Building	1956	1172477
AA	319m W	Railway Sidings	1922	1190021
AB	326m N	Coal Hoists	1922	1267676
AB	326m N	Coal Hoists	1949	1214905
17	333m N	Railway Sidings	1900	1157726
AC	340m NE	Railway Building	1956	1172476
AC	341m NE	Transit Shed	1920	1222557
AC	341m NE	Transit Shed	1922	1222557
AC	341m NE	Transit Shed	1949	1231698
18	343m N	Dock	1900	1259206
AA	344m W	Railway Sidings	1950	1189962
AD	437m N	Coal Hoists	1920	1212652
AE	439m N	Coal Hoists	1949	1191012
AE	440m N	Coal Hoists	1922	1243446
AF	453m N	Dock	1981	1207789
AF	453m N	Dock	1963	1265819
AF	453m N	Dock	1973	1207789
AG	453m N	Docks	1985	1192432

ID	Location	Land Use	Date	Group ID
AG	453m N	Docks	1981	1192432
AG	453m N	Docks	1963	1243996
AG	453m N	Docks	1973	1192432
19	454m N	Unspecified Commercial/Industrial	1963	1260917
AD	454m N	Railway Sidings	1963	1212723
AD	491m N	Coal Hoists	1922	1226155
AD	492m N	Coal Hoists	1949	1233542
20	493m N	Dock	1900	1245100
AD	493m N	Railway Sidings	1985	1209979
AD	493m N	Railway Sidings	1981	1209979
AD	493m N	Railway Sidings	1973	1209979

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m	**14**

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 22 >**

ID	Location	Land Use	Date	Group ID
H	14m E	Unspecified Tank	1956	179499
H	14m E	Unspecified Tank	1956	179499
L	67m SE	Unspecified Tank	1956	181432
L	68m SE	Unspecified Tank	1956	181432
6	79m N	Unspecified Tank	1921	173568
L	114m SE	Unspecified Tank	1956	184357
L	114m SE	Unspecified Tank	1956	184357
9	168m N	Unspecified Tank	1921	173567
M	204m SW	Unspecified Tank	1955	185475

ID	Location	Land Use	Date	Group ID
M	204m SW	Unspecified Tank	1968	185475
M	204m SW	Unspecified Tank	1968	185475
M	204m SW	Unspecified Tank	1955	185475
M	205m SW	Unspecified Tank	1989	185475
M	206m SW	Unspecified Tank	1920	185566

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m **25**

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 22 >**

ID	Location	Land Use	Date	Group ID
I	60m NE	Electricity Substation	1971	110724
I	60m NE	Electricity Substation	1994	110724
I	60m NE	Electricity Substation	1992	110724
F	67m NE	Electricity Substation	1994	97666
I	76m NE	Electricity Substation	1956	107622
I	76m NE	Electricity Substation	1956	107622
M	155m SW	Power Station	1968	113484
N	181m E	Electricity Substation	1956	113397
N	183m E	Electricity Substation	1956	113397
O	202m E	Electricity Substation	1994	110937
O	202m E	Electricity Substation	1992	110937
O	203m E	Electricity Substation	1971	102703
O	203m E	Electricity Substation	1956	102703
O	204m E	Electricity Substation	1956	102703
R	223m SW	Power Station	1968	105879

ID	Location	Land Use	Date	Group ID
R	223m SW	Power Station	1955	105879
R	224m SW	Power Station	1989	100292
R	224m SW	Power Station	1955	105879
R	224m SW	Electric Power Station	1920	99470
S	237m S	Power Station	1989	105879
S	237m S	Power Station	1989	105879
S	252m SW	Power Station	1956	105879
S	252m SW	Power Station	1965	105879
S	252m SW	Power Station	1956	105879
S	252m SW	Power Station	1966	105879

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m	**0**

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m	**1**

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 22 >**

ID	Location	Land Use	Date	Group ID
AF	477m N	Ship Repair and Oil Tanker Cleansing Depot	1986	34096

This data is sourced from Ordnance Survey / Groundsure.

3 Waste and landfill



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Site Outline

Search buffers in metres (m)

Historical landfill (EA/NRW)

Historical landfill (LA/OS)

Historical waste sites

Licensed waste sites

Waste exemptions

3.1 Active or recent landfill

Records within 500m	0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m	0

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	3

Landfill sites identified from Local Authority records and high detail historical mapping.

Features are displayed on the Waste and landfill map on **page 30 >**

ID	Location	Site address	Source	Data type
D	132m E	Refuse Tip	1956 mapping	Polygon
D	181m E	Refuse Tip	1956 mapping	Polygon
E	239m E	Refuse Tip	1956 mapping	Polygon

This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.

3.4 Historical landfill (EA/NRW records)

Records within 500m	4

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

Features are displayed on the Waste and landfill map on **page 30 >**

ID	Location	Details		
E	167m E	Site Address: South Dock Phase 1, South Dock, Newport, Gwent Licence Holder Address: -	Waste Licence: Yes Site Reference: 039/86 Waste Type: Industrial, Household Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 14/04/1986 Licence Surrender: -	Operator: - Licence Holder: Coslett Contractors Limited First Recorded 30/04/1986 Last Recorded: 30/04/1990
H	333m NW	Site Address: South Dock, Eastern Wharf, Newport Licence Holder Address: -	Waste Licence: Yes Site Reference: 004/77 Waste Type: Inert, Industrial Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 21/01/1977 Licence Surrender: 31/12/1990	Operator: - Licence Holder: Gwent Haulage Company Limited First Recorded 31/01/1976 Last Recorded: 31/12/1990

ID	Location	Details		
H	334m NW	Site Address: Old Coal Sidings, Newport South Dock, Newport Licence Holder Address: -	Waste Licence: Yes Site Reference: 015/77 Waste Type: Inert, Industrial Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 22/04/1977 Licence Surrender: -	Operator: - Licence Holder: H Wessen First Recorded 31/12/1970 Last Recorded: 31/12/1983
3	386m E	Site Address: South Dock Phase 2, Land adjoining Sheds, South Dock, Newport, Gwent Licence Holder Address: -	Waste Licence: Yes Site Reference: 061/90 Waste Type: Industrial, Household, Liquid sludge Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 01/11/1990 Licence Surrender: 29/04/1994	Operator: - Licence Holder: Cosslett Contractors Limited First Recorded 01/11/1990 Last Recorded: 29/04/1994

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m	**2**

Waste site records derived from Local Authority planning records and high detail historical mapping.

Features are displayed on the Waste and landfill map on **page 30 >**

ID	Location	Address	Further Details	Date
4	408m N	Site Address: Atlantic Shipbuilding Site, NEWPORT, Gwent	Type of Site: Scrap Metal Processing Yard Planning application reference: 93/0291/F Description: Scheme proposes a scrap metal yard with a portable building. An application (ref: 93/0291/F) for Detailed Planning permission was submitted to Newport B.C. on 7th April 1993. Data source: Historic Planning Application Data Type: Point	-
J	464m W	Site Address: North Dock,Alexandra Dock, Newport Docks, NEWPORT, Gwent, NP20 2NP	Type of Site: Waste Transfer Station (Conversion) Planning application reference: 05/1155/F Description: Scheme comprises change of use to a waste transfer station with associated wood chipping plant. An application (ref: 05/1155/F) for Detailed Planning permission was submitted to Newport B.C. on 22nd August 2005. Data source: Historic Planning Application Data Type: Point	-

This data is sourced from Ordnance Survey/Groundsure and Local Authority records.

3.6 Licensed waste sites

Records within 500m	12

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

Features are displayed on the Waste and landfill map on **page 30 >**

ID	Location	Details		
C	83m W	Site Name: - Site Address: Coal Terminal, South Dock, East Way Road, Newport Docks, Newport, NP20 2WE Correspondence Address: -	Type of Site: Physical Treatment Facility Size: - Environmental Permitting Regulations (Waste) Licence Number: CB3295FG EPR reference: - Operator: South West Wood Products Limited Waste Management licence No: - Annual Tonnage: 250000	Issue Date: 29/09/2021 Effective Date: 29/09/2021 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Effective
J	439m W	Site Name: Sims Newport Site Address: South Dock, Westway Road, Newport Docks, Newport, Gwent, NP20 2WE Correspondence Address: -	Type of Site: Metal Recycling Site (mixed MRS's) Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: SIM009 EPR reference: TP3495FK/S005 Operator: Sims Group U K Ltd Waste Management licence No: 30273 Annual Tonnage: 0	Issue Date: 28/02/2003 Effective Date: - Modified: 27/10/2010 Surrendered Date: 2.01507e+016 Expiry Date: 0 Cancelled Date: 0 Status: Surrendered
J	440m W	Site Name: - Site Address: Sims Newport, Newport Docks, Newport, Gwent, NP20 2WE Correspondence Address: -	Type of Site: Metal Recycling Site (mixed MRS's) Size: - Environmental Permitting Regulations (Waste) Licence Number: TP3495FK EPR reference: - Operator: Sims Group U K Ltd Waste Management licence No: - Annual Tonnage: 0	Issue Date: 28/02/2003 Effective Date: 28/02/2003 Modified: - Surrendered Date: 23/07/2015 Expiry Date: - Cancelled Date: - Status: Surrender

ID	Location	Details		
J	440m W	Site Name: - Site Address: Sims Newport, Newport Docks, Newport, Gwent, NP20 2WE Correspondence Address: -	Type of Site: Metal Recycling Site (mixed MRS's) Size: - Environmental Permitting Regulations (Waste) Licence Number: TP3495FK EPR reference: - Operator: Sims Group U K Ltd Waste Management licence No: - Annual Tonnage: 0	Issue Date: 28/02/2003 Effective Date: 28/02/2003 Modified: - Surrendered Date: 23/07/2015 Expiry Date: - Cancelled Date: - Status: Surrender
J	440m W	Site Name: - Site Address: Sims Newport, Newport Docks, Newport, Gwent, NP20 2WE Correspondence Address: -	Type of Site: Metal Recycling Site (mixed MRS's) Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: TP3495FK EPR reference: - Operator: - Waste Management licence No: 30273 Annual Tonnage: 0	Issue Date: 28/02/2003 Effective Date: 28/02/2003 Modified: - Surrendered Date: 23/07/2015 Expiry Date: - Cancelled Date: - Status: Surrender
J	440m W	Site Name: Sims Newport Site Address: South Dock, Westway Road, Newport Docks, Newport, Gwent, NP20 2WE Correspondence Address: -	Type of Site: Metal Recycling Site (mixed MRS's) Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIM009 EPR reference: TP3495FK/V004 Operator: Sims Group U K Ltd Waste Management licence No: 30273 Annual Tonnage: 24999	Issue Date: 28/02/2003 Effective Date: - Modified: 27/10/2010 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified
J	440m W	Site Name: Sims Group U K Ltd (fridge Storage) Site Address: Land/ Premises At, Westway Road, South Dock, Newport, Gwent, NP20 2WE Correspondence Address: -	Type of Site: Metal Recycling Site (mixed MRS's) Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIM009 EPR reference: TP3495FK/V002 Operator: Sims Group U K Ltd (fridge Storage) Waste Management licence No: 30273 Annual Tonnage: 25000	Issue Date: 28/02/2003 Effective Date: - Modified: 14/06/2004 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified

ID	Location	Details		
J	440m W	Site Name: - Site Address: Sims Newport, Newport Docks, Newport, Newport, NP20 2WE Correspondence Address: -	Type of Site: - Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: TP3495FK EPR reference: - Operator: Sims Group U K Ltd Waste Management licence No: 0 Annual Tonnage: 0	Issue Date: 28/02/2003 Effective Date: 28/02/2003 Modified: - Surrendered Date: 23/07/2015 Expiry Date: - Cancelled Date: - Status: Surrendered
J	440m W	Site Name: - Site Address: Sims Newport, Newport Docks, Gwent, Newport, Newport, NP20 2WE Correspondence Address: -	Type of Site: - Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: TP3495FK EPR reference: - Operator: Sims Group U K Ltd Waste Management licence No: 30273 Annual Tonnage: 0	Issue Date: 28/02/2003 Effective Date: 28/02/2003 Modified: - Surrendered Date: 23/07/2015 Expiry Date: - Cancelled Date: - Status: Surrender
J	456m W	Site Name: Sims Group Uk Ltd Site Address: Sims Group Uk Ltd, North Side, South Dock, Alexandra Dock, Newport, Gwent, NP20 2WE Correspondence Address: -	Type of Site: Metal Recycling Site (mixed MRS's) Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIM011 EPR reference: CP3595FW/S002 Operator: Sims Group U K Ltd Waste Management licence No: 30305 Annual Tonnage: 1355	Issue Date: 30/01/2004 Effective Date: - Modified: - Surrendered Date: 2.00502e+016 Expiry Date: 0 Cancelled Date: 0 Status: Surrendered
J	457m W	Site Name: Sims Group U K Ltd Site Address: North Quay, South Dock, Westway Road, Newport Docks, Newport, NP9 2WE Correspondence Address: Sims Group U K Ltd, Long Marston, Stratford Upon Avon, Warwickshire, CU37 8AG	Type of Site: Metal Recycling Site (mixed MRS's) Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIM009 EPR reference: - Operator: Sims Group U K Ltd (Newport) Waste Management licence No: 30273 Annual Tonnage: 24999.9	Issue Date: 28/02/2003 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued

ID	Location	Details		
J	460m W	Site Name: Newport Weee Facility (weee) Site Address: West Quay, Westway Road, South Dock, Newport, Gwent, NP20 2WE Correspondence Address: -	Type of Site: Metal Recycling Site (mixed MRS's) Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: SIM062 EPR reference: BP3992SG/S003 Operator: Sims Group U K Ltd Waste Management licence No: 100605 Annual Tonnage: 0	Issue Date: 28/10/2008 Effective Date: - Modified: 21/02/2011 Surrendered Date: 2.01507e+016 Expiry Date: 0 Cancelled Date: 0 Status: Surrendered

This data is sourced from the Environment Agency and Natural Resources Wales.

3.7 Waste exemptions

Records within 500m **29**

Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

Features are displayed on the Waste and landfill map on **page 30 >**

ID	Location	Site	Reference	Category	Sub-Category	Description
A	16m W	Atlas Commodities Limited, Associated British Ports, Alexandra Docks, Newport, Newport, NP20 2UW	NRW-WME083363	Storing waste exemption	Not on a farm	Storage of waste in a secure place
A	16m W	Atlas Commodities Limited, Associated British Ports, Alexandra Docks, Newport, Newport, NP20 2UW	NRW-WME083363	Treating waste exemption	Not on a farm	Recovery of scrap metal
A	16m W	Anglo Atlas Limited, Associated British Ports, Alexandra Docks, Newport, Newport, NP20 2UW	NRW-WME083366	Storing waste exemption	Not on a farm	Storage of waste in a secure place
A	16m W	Anglo Atlas Limited, Associated British Ports, Alexandra Docks, Newport, Newport, NP20 2UW	NRW-WME083366	Treating waste exemption	Not on a farm	Recovery of scrap metal
1	29m NE	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, NP20 2UW	NRW-WME075145	Storing waste exemption	Not on a farm	Storage of waste in a secure place

ID	Location	Site	Reference	Category	Sub-Category	Description
B	80m SE	Scott Timber Ltd, Scott Pallets, Tom Lewis Way, Newport, Newport, NP202WF	NRW-WME028654	Treating waste exemption	Not on a farm	Manual treatment of waste
B	80m SE	Scott Timber Ltd, Scott Pallets, Tom Lewis Way, Newport, Newport, NP202WF	NRW-WME028654	Using waste exemption	Not on a farm	Use of waste for a specified purpose
B	80m SE	Scott Timber Ltd, Scott Pallets, Tom Lewis Way, Newport, Newport, NP202WF	NRW-WME028654	Using waste exemption	Not on a farm	Use of waste to manufacture finished goods
B	80m SE	Road Maintenance Services Limited, TOM LEWIS WAY, ALEXANDRA DOCK, NEWPORT, NP202WF	NRW-WME036256	Using waste exemption	Not on a farm	Use of waste in construction
B	80m SE	Road Maintenance Services Limited, TOM LEWIS WAY, NEWPORT, NP202WF	NRW-WME036259	Storing waste exemption	Not on a farm	Storage of waste in a secure place
C	99m W	Metal & Waste Recycling Limited, Associated British Ports, Alexandra Docks, Newport, Newport, NP20 2UW	NRW-WME083364	Treating waste exemption	Not on a farm	Recovery of scrap metal
C	99m W	Metal & Waste Recycling Limited, Associated British Ports, Alexandra Docks, Newport, Newport, NP20 2UW	NRW-WME083364	Storing waste exemption	Not on a farm	Storage of waste in a secure place
D	213m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME053378	Using waste exemption	Not on a farm	Use of mulch
D	233m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME053379	Using waste exemption	Not on a farm	Use of mulch

ID	Location	Site	Reference	Category	Sub-Category	Description
D	244m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME053384	Using waste exemption	Not on a farm	Use of mulch
D	257m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME053383	Using waste exemption	Not on a farm	Use of mulch
E	284m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, NP20 2UW	NRW-WME053373	Using waste exemption	Not on a farm	Use of mulch
E	288m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME053374	Using waste exemption	Not on a farm	Use of mulch
E	311m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, NP20 2UW	NRW-WME049631	Using waste exemption	Not on a farm	Use of mulch
F	317m SW	Speedy Asset Services Limited, Tom Lewis Way, West Side, South Dock, Newport, Newport, NP20 2WZ	NRW-WME042270	Storing waste exemption	Waste Exemption - Agricultural and Non-Agricultural	Storage of waste in secure containers
F	317m SW	Speedy Asset Services Limited, Tom Lewis Way, West Side, South Dock, Newport, Newport, NP20 2WZ	NRW-WME042270	Storing waste exemption	Not on a farm	Storage of waste in a secure place
G	331m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME049637	Using waste exemption	Not on a farm	Use of mulch
G	334m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME049636	Using waste exemption	Not on a farm	Use of mulch

ID	Location	Site	Reference	Category	Sub-Category	Description
I	364m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME053375	Using waste exemption	Not on a farm	Use of mulch
2	379m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME049635	Using waste exemption	Not on a farm	Use of mulch
I	401m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME053376	Using waste exemption	Not on a farm	Use of mulch
I	402m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME049632	Using waste exemption	Not on a farm	Use of mulch
I	430m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME053377	Using waste exemption	Not on a farm	Use of mulch
I	473m E	Associated British Ports, Associated British Ports, Alexandra Docks, Newport, Newport, Newport, NP20 2UW	NRW-WME049633	Using waste exemption	Not on a farm	Use of mulch

This data is sourced from the Environment Agency and Natural Resources Wales.

4 Current industrial land use



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Site Outline

Search buffers in metres (m)

Recent industrial land uses

Control of Major Accident Hazards

Licensed pollutant release (Part A(2)/B)

Licensed Discharges to controlled waters

Pollution Incidents (EA/NRW)

4.1 Recent industrial land uses

Records within 250m	15

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on page 40 >

ID	Location	Company	Address	Activity	Category
A	2m N	Travelling Crane	Gwent, NP20	Travelling Cranes and Gantries	Industrial Features
2	5m W	Travelling Crane	Gwent, NP20	Travelling Cranes and Gantries	Industrial Features
3	35m SE	Electricity Sub Station	Gwent, NP20	Electrical Features	Infrastructure and Facilities

ID	Location	Company	Address	Activity	Category
5	64m NE	Electricity Sub Station	Gwent, NP20	Electrical Features	Infrastructure and Facilities
B	80m SE	Sims Recycling Solutions Newport Weee Recycling Plant	South Dock, Alexandra Docks, Newport, Gwent, NP20 2WE	Recycling, Reclamation and Disposal	Recycling Services
B	81m SE	Saica	South Dock, Alexandra Docks, Newport, Gwent, NP20 2WE	Packaging	Industrial Products
6	82m SW	Tank	Gwent, NP20	Tanks (Generic)	Industrial Features
D	111m NE	Mooring Posts	Gwent, NP20	Moorings and Unloading Facilities	Water
C	118m SE	Tank	Gwent, NP20	Tanks (Generic)	Industrial Features
8	140m SW	Electricity Sub Station	Gwent, NP20	Electrical Features	Infrastructure and Facilities
9	141m NW	South Dock	Gwent, NP20	Moorings and Unloading Facilities	Water
G	194m E	Travelling Crane	Gwent, NP20	Travelling Cranes and Gantries	Industrial Features
12	199m E	Electricity Sub Station	Gwent, NP20	Electrical Features	Infrastructure and Facilities
G	209m E	Dry Dock	Gwent, NP20	Moorings and Unloading Facilities	Water
H	246m NE	Travelling Crane	Gwent, NP20	Travelling Cranes and Gantries	Industrial Features

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m	0

Open, closed, under development and obsolete petrol stations.

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m	2

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

Features are displayed on the Current industrial land use map on **page 40 >**

ID	Location	Company	Address	Operational status	Tier
24	336m NW	Mole Valley Forage Services Limited	Mole Valley Forage Services Limited, Newport, 8 shed, North Side, South Dock, Alexandra Docks, Newport, Gwent, NP20 2NQ	Current COMAH Site	COMAH Lower Tier Operator
26	388m NW	Origin UK Operations Limited	Origin UK Operations Limited, Alexandra Dock, West Way Road, South Dock, Newport, Gwent, NP9 2WZ	Current COMAH Site	COMAH Lower Tier Operator

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m	0

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m	0

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m	0

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.10 Licensed industrial activities (Part A(1))

Records within 500m	0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m	2

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 40 >**

ID	Location	Address	Details	
20	316m SW	Lafarge Aggregates, Lockhead, Alexandra Dock, Newport, South Wales, NP20 2WZ	Process: Use of Bulk Cement Status: Historical Permit Permit Type: Part A2 & B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified
23	325m SW	Severn Sands Ltd, North Dock, East Way Road, Lockhead, Alexandra Docks, Newport, South Wales, NP20 2WZ	Process: Use of Bulk Cement Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m **0**

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.13 Licensed Discharges to controlled waters

Records within 500m **29**

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

Features are displayed on the Current industrial land use map on **page 40 >**

ID	Location	Address	Details	
1	**On site**	**NEWPORT DOCKS**	**Effluent Type: UNSPECIFIED** **Permit Number: AN0033341** **Permit Version: 1** **Receiving Water: SEVERN ESTUARY**	**Status: CONSENT EXPIRED - TIME LIMIT** **Issue date: 10/09/1987** **Effective Date: 10/09/1987** **Revocation Date: 07/10/1992**
A	12m N	NEWPORT DOCKS	Effluent Type: UNSPECIFIED Permit Number: AN0033340 Permit Version: 1 Receiving Water: SEVERN ESTUARY	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 10/09/1987 Effective Date: 10/09/1987 Revocation Date: 07/10/1992
4	54m NE	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT DOCKS, NEWPORT, NEWPORT CBC, NP20 2NP	Effluent Type: - Permit Number: AN0033339 Permit Version: 0 Receiving Water: SOUTH DOCK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -

ID	Location	Address	Details	
C	95m SE	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT, GWENT, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033330 Permit Version: 0 Receiving Water: RIVER USK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
7	108m W	NEWPORT DOCKS	Effluent Type: UNSPECIFIED Permit Number: AN0033342 Permit Version: 1 Receiving Water: SEVERN ESTUARY	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 10/09/1987 Effective Date: 10/09/1987 Revocation Date: 06/03/1995
D	114m NE	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT, GWENT, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033338 Permit Version: 0 Receiving Water: SOUTH DOCK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
E	139m S	SCA PACKAGING ALEXANDRA DOCKS, SCA PACKAGING NEWPORT, ALEXANDRA DOCKS, NEWPORT, WALES	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: AB0041901 Permit Version: 0 Receiving Water: RIVER USK ESTUARY	Status: Effective Issue date: 10/11/1964 Effective Date: 27/06/2000 Revocation Date: -
10	152m SE	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT, NEWPORT CBC, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033331 Permit Version: 0 Receiving Water: RIVER USK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
F	168m S	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT DOCKS, NEWPORT, NEWPORT CBC, NP20 2NP	Effluent Type: - Permit Number: AN0033365 Permit Version: 0 Receiving Water: RIVER USK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
11	174m NE	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT, NEWPORT CBC, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033337 Permit Version: 0 Receiving Water: SOUTH DOCK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
F	179m S	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT, NEWPORT CBC, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033332 Permit Version: 0 Receiving Water: RIVER USK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
E	184m S	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT, NEWPORT CBC, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033366 Permit Version: 0 Receiving Water: RIVER USK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
C	193m SE	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT, NEWPORT CBC, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033364 Permit Version: 0 Receiving Water: RIVER USK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -

ID	Location	Address	Details	
13	199m SE	ALEXANDRA DOCKS NEWPORT, ALEXANDRA DOCKS, NEWPORT, NEWPORT CBC, WALES	Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: AN0267401 Permit Version: 0 Receiving Water: USK ESTUARY	Status: Effective Issue date: 17/10/1996 Effective Date: 17/10/1996 Revocation Date: -
14	212m S	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT DOCKS, NEWPORT, NEWPORT CBC, NP20 2NP	Effluent Type: - Permit Number: AN0033333 Permit Version: 0 Receiving Water: RIVER USK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
15	228m E	NEWPORT DOCKS	Effluent Type: UNSPECIFIED Permit Number: AN0033363 Permit Version: 1 Receiving Water: SEVERN ESTUARY	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 10/09/1987 Effective Date: 10/09/1987 Revocation Date: 07/10/1992
16	245m S	NEWPORT DOCKS	Effluent Type: UNSPECIFIED Permit Number: AN0033367 Permit Version: 1 Receiving Water: SEVERN ESTUARY	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 10/09/1987 Effective Date: 10/09/1987 Revocation Date: 07/10/1992
H	256m NE	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT, GWENT, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033336 Permit Version: 0 Receiving Water: SOUTH DOCK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
I	279m NW	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPRT, GWENT, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033303 Permit Version: 0 Receiving Water: SOUTH DOCK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
I	281m NW	METAL RECYCLING SITE SIMS GROUP UK, METAL RECYCLING SITE, SIMS GROUP UK LTD, NORTH SIDE SOUTH DOCK, ALEXANDRA DOCKS, NP20 2WE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: AN0364401 Permit Version: 0 Receiving Water: NORTH SIDE SOUTH DOCK	Status: Effective Issue date: 12/06/2004 Effective Date: 12/06/2004 Revocation Date: -
18	303m NE	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT DOCKS, NEWPORT, NEWPORT CBC, NP20 2NP	Effluent Type: - Permit Number: AN0033335 Permit Version: 0 Receiving Water: SOUTH DOCK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
J	309m NW	NEWPORT DOCKS	Effluent Type: UNSPECIFIED Permit Number: AN0033301 Permit Version: 1 Receiving Water: SEVERN ESTUARY	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 10/09/1987 Effective Date: 10/09/1987 Revocation Date: 06/03/1995

ID	Location	Address	Details	
J	311m NW	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT, GWENT, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033302 Permit Version: 0 Receiving Water: SOUTH DOCK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
21	320m SW	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT, NEWPORT CBC, WALES, NP20 2NP	Effluent Type: - Permit Number: AN0033334 Permit Version: 0 Receiving Water: RIVER USK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -
22	323m N	NEWPORT DOCKS	Effluent Type: UNSPECIFIED Permit Number: AN0033304 Permit Version: 1 Receiving Water: SEVERN ESTUARY	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 10/09/1987 Effective Date: 10/09/1987 Revocation Date: 11/12/1992
25	377m SW	New Plasterboard Manufacturing Plant, Tom Lewis Way, ABP Alexandra Docks, Newport, NP20 2WZ	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: CB3291CD Permit Version: 0 Receiving Water: Ebbw River	Status: Effective Issue date: 06/08/2021 Effective Date: 06/08/2021 Revocation Date: -
27	400m SW	NEWPORT DOCKS ACCOMMODATION AT SOUT, NEWPORT DOCKS ACCOMMODATION AT S, ACCOMMODATION AT SOUTH LOCKS	Effluent Type: UNSPECIFIED Permit Number: AC0133601 Permit Version: 1 Receiving Water: UNSPECIFIED	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 20/11/1981 Effective Date: 20/11/1981 Revocation Date: 25/09/1992
28	406m N	SOUTH DOCK (NORTH SIDE) NEWPORT, SOUTH DOCK (NORTH SIDE), ALEXANDRA DOCKS, NEWPORT, NEWPORT CBC	Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: AN0261501 Permit Version: 1 Receiving Water: ESTUARIAL WATERS OF SOUTH DOCK	Status: SURRENDERED UNDER EPR 2010 Issue date: 06/12/1995 Effective Date: 06/12/1995 Revocation Date: 04/06/2014
30	443m N	PREMISES AT NEWPORT DOCKS, PREMISES AT NEWPORT DOCKS, NEWPORT DOCKS, NEWPORT, NEWPORT CBC, NP20 2NP	Effluent Type: - Permit Number: AN0033305 Permit Version: 0 Receiving Water: SOUTH DOCK	Status: Effective Issue date: 03/11/1992 Effective Date: 03/02/1993 Revocation Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

4.14 Pollutant release to surface waters (Red List)

Records within 500m	0

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to public sewer

Records within 500m	0

Discharges of Special Category Effluents to the public sewer.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 List 1 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 2 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.18 Pollution Incidents (EA/NRW)

Records within 500m	5

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on **page 40 >**

ID	Location	Details	
C	157m SE	Incident Date: 03/01/2018 Incident Identification: 1800060 Pollutant: Oils and Fuels Pollutant Description: Gas and Fuel Oils	Water Impact: Category 2 (Significant) Land Impact: No Details Air Impact: No Details
17	248m E	Incident Date: 10/02/2014 Incident Identification: 1205350 Pollutant: Inert Materials and Wastes Pollutant Description: Construction and Demolition Materials and Wastes	Water Impact: - Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
19	313m SE	Incident Date: 05/01/2014 Incident Identification: 1190480 Pollutant: - Pollutant Description: -	Water Impact: - Land Impact: - Air Impact: -
29	423m SE	Incident Date: 06/11/2014 Incident Identification: 1292405 Pollutant: - Pollutant Description: -	Water Impact: - Land Impact: - Air Impact: -
31	484m N	Incident Date: 17/12/2015 Incident Identification: 1395242 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: - Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution inventory substances

Records within 500m	0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.20 Pollution inventory waste transfers

Records within 500m	0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

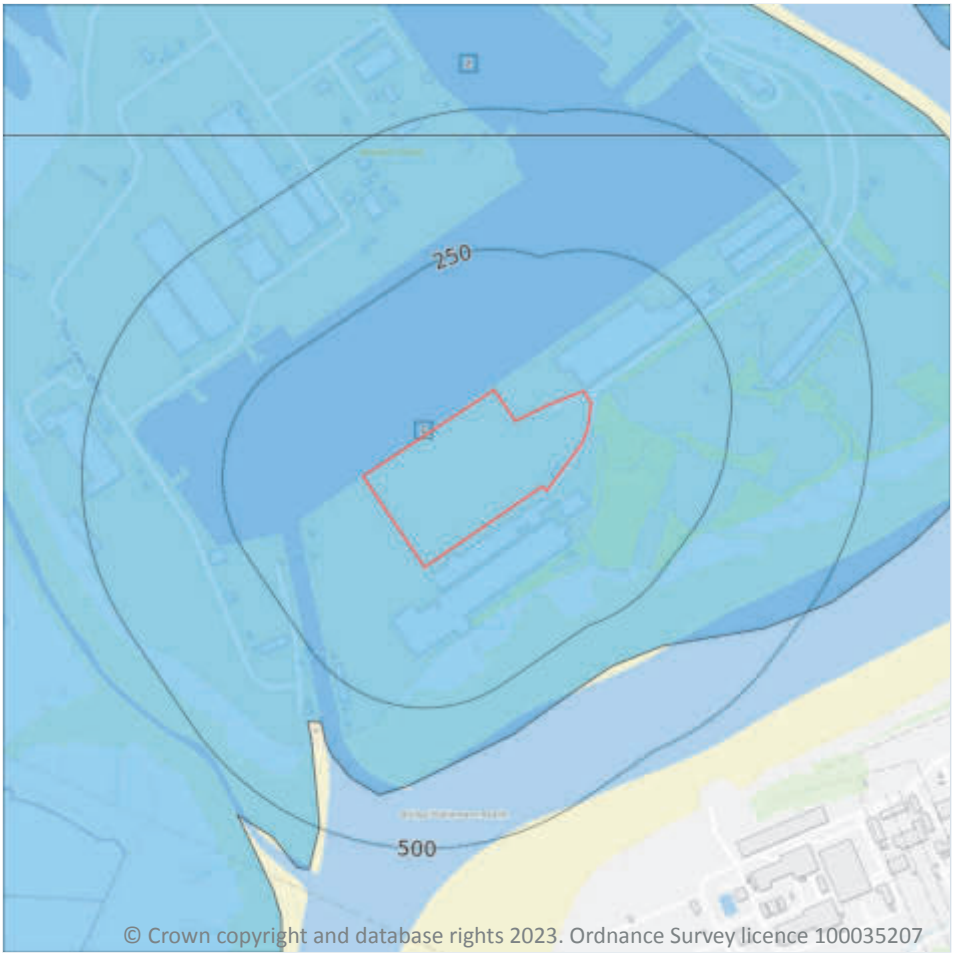
4.21 Pollution inventory radioactive waste

Records within 500m	0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

5 Hydrogeology - Superficial aquifer



Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive
- Unknown

5.1 Superficial aquifer

Records within 500m	2

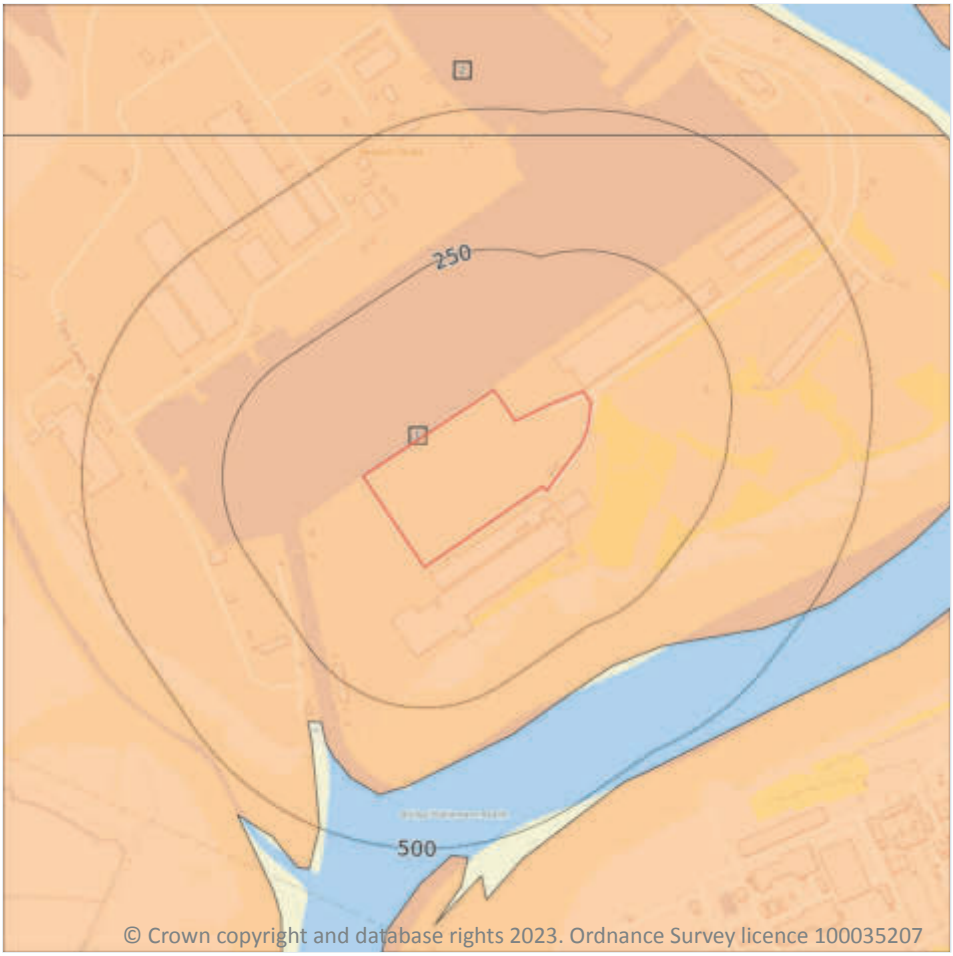
Aquifer status of groundwater held within superficial geology.

Features are displayed on the Hydrogeology map on **page 51 >**

ID	Location	Designation	Description
1	**On site**	**Unproductive**	**These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow**
2	452m N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Bedrock aquifer



Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive

5.2 Bedrock aquifer

Records within 500m	2

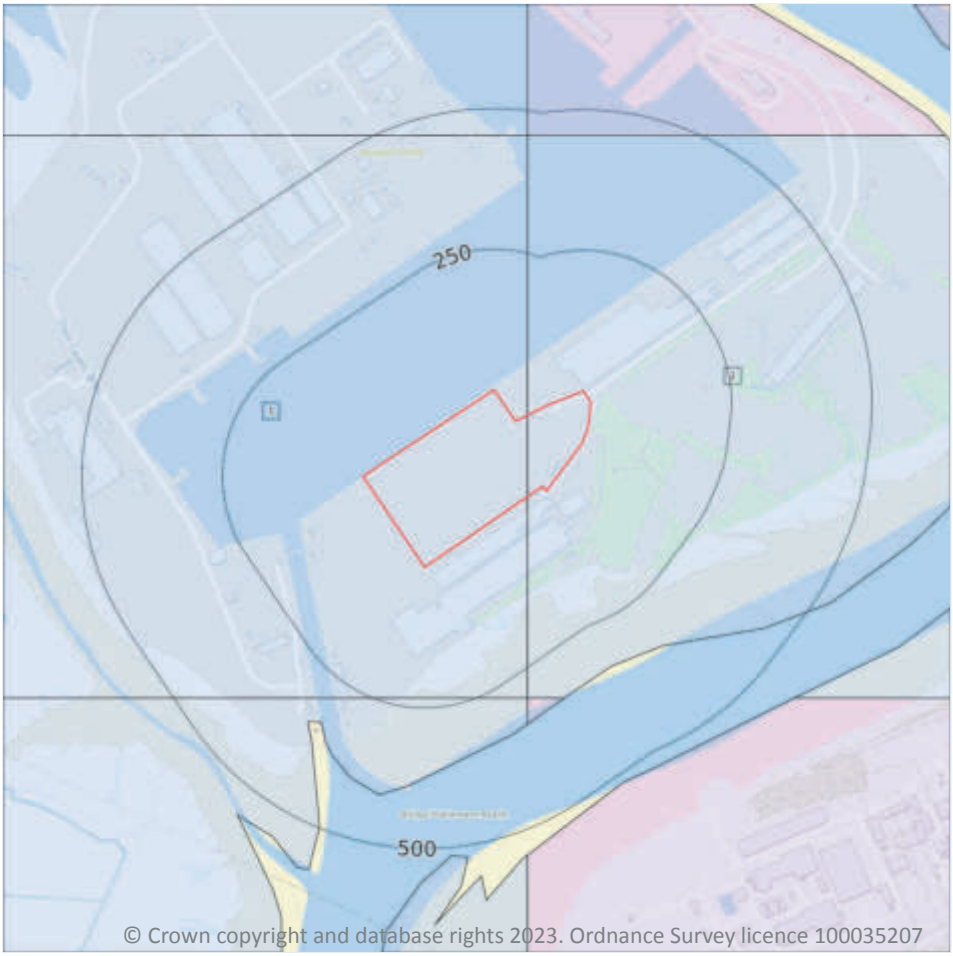
Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 52 >**

ID	Location	Designation	Description
1	**On site**	**Secondary B**	**Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeablehorizons and weathering. These are generally the water-bearing parts of the former non-aquifers**
2	452m N	Secondary B	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeablehorizons and weathering. These are generally the water-bearing parts of the former non-aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Groundwater vulnerability



Site Outline

Search buffers in metres (m)

Superficial vulnerability

- Principal superficial aquifer, high vulnerability
- Secondary superficial aquifer, high vulnerability
- Principal superficial aquifer, medium vulnerability
- Secondary superficial aquifer, medium vulnerability
- Principal superficial aquifer, low vulnerability
- Secondary superficial aquifer, low vulnerability

Bedrock vulnerability

- Principal bedrock aquifer, high vulnerability
- Secondary bedrock aquifer, high vulnerability
- Principal bedrock aquifer, medium vulnerability
- Secondary bedrock aquifer, medium vulnerability
- Principal bedrock aquifer, low vulnerability
- Secondary bedrock aquifer, low vulnerability

Other information

- Unproductive aquifer
- Soluble rock risk
- Local information

5.3 Groundwater vulnerability

Records within 50m	2

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 54 >**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary bedrock aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, Unproductive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: >550mm/year	Vulnerability: Unproductive Aquifer type: Unproductive Thickness: >10m Patchiness value: >90% Recharge potential: Low	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures
2	On site	Summary Classification: Secondary bedrock aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, Unproductive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: 300-550mm/year	Vulnerability: Unproductive Aquifer type: Unproductive Thickness: >10m Patchiness value: >90% Recharge potential: Low	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

5.4 Groundwater vulnerability- soluble rock risk

Records on site	0

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

This data is sourced from the British Geological Survey and the Environment Agency.

5.5 Groundwater vulnerability- local information

Records on site	0

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk ↗.

This data is sourced from the British Geological Survey and the Environment Agency.

Abstractions and Source Protection Zones



Site Outline

Search buffers in metres (m)

- Source Protection Zone 1 — Inner catchment
- Source Protection Zone 2 — Outer catchment
- Source Protection Zone 3 — Total catchment
- Source Protection Zone 4 — Zone of Special Interest
- Source Protection Zone 1c — Inner catchment - confined aquifer
- Source Protection Zone 2c — Outer catchment - confined aquifer
- Source Protection Zone 3c — Total catchment - confined aquifer
- Drinking water abstraction licences
- Drinking water abstraction licences — Polygon features
- Drinking water abstraction licences — Linear features
- Groundwater abstraction licence (point)
- Groundwater abstraction licence (area)
- Groundwater abstraction licence (linear)
- Surface Water Abstractions (point)
- Surface Water Abstractions (area)
- Surface Water Abstractions (linear)

5.6 Groundwater abstractions

Records within 2000m	0

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.7 Surface water abstractions

Records within 2000m	2

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 56 >**

ID	Location	Details	
-	1553m E	Status: Historical Licence No: 20/56/72/0040 Details: Evaporative Cooling Direct Source: EAW Surface Water Point: LAGOON AT ALPHASTEEL Data Type: Point Name: Alphasteel Limited Easting: 333650 Northing: 184750	Annual Volume (m^3): 20000 Max Daily Volume (m^3): 320 Original Application No: - Original Start Date: 26/04/1995 Expiry Date: - Issue No: 100 Version Start Date: 25/11/1999 Version End Date: -
-	1923m NW	Status: Historical Licence No: 20/56/11/0013 Details: General use relating to Secondary Category (Medium Loss) Direct Source: EAW Surface Water Point: DOCK FEEDER AT PILLGWENLLY TO WHITEHEAD Data Type: Point Name: Corus UK Ltd Easting: 330800 Northing: 186100	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 22/10/1973 Expiry Date: - Issue No: 102 Version Start Date: 17/04/2000 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.8 Potable abstractions

Records within 2000m	0

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.9 Source Protection Zones

Records within 500m	0

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.10 Source Protection Zones (confined aquifer)

Records within 500m	0

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

This data is sourced from the Environment Agency and Natural Resources Wales.

6 Hydrology



Site Outline

Search buffers in metres (m)

Water Network (OS MasterMap)

Surface water features (wider than 5m)

Surface water features (narrower than 5m)

WFD River, canal and surface water transfer water bodies

WFD Lake water bodies

WFD Transitional and coastal water bodies

WFD Surface water body catchments boundaries

WFD Groundwater body boundaries

6.1 Water Network (OS MasterMap)

Records within 250m	20

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

Features are displayed on the Hydrology map on **page 59 >**

ID	Location	Type of water feature	Ground level	Permanence	Name
A	73m E	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
A	106m E	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	107m E	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	140m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	143m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	143m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
10	148m W	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	148m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	150m SE	Tidal river or stream.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	153m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	167m S	Tidal river or stream.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	172m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
11	174m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	175m S	Tidal river or stream.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
12	176m SW	Lock or flight of locks. An enclosure in a canal or navigable river with gates and sluices at either end.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
13	181m SE	Tidal river or stream.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	183m SE	Tidal river or stream.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	188m S	Tidal river or stream.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
14	220m S	Tidal river or stream.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	228m S	Tidal river or stream.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m	12

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

Features are displayed on the Hydrology map on **page 59 >**

This data is sourced from the Ordnance Survey.

6.3 WFD Surface water body catchments

Records on site	1

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 59 >**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
2	**On site**	**Coastal catchment**	**Not part of a river WB catchment**	**156**	**Usk below Abergavenny**	**Usk**

This data is sourced from the Environment Agency and Natural Resources Wales.

6.4 WFD Surface water bodies

Records identified	**1**

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site.

Features are displayed on the Hydrology map on **page 59 >**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
C	166m S	Transitional	USK	GB530905415404	Moderate	Good	Moderate	2019

This data is sourced from the Environment Agency and Natural Resources Wales.

6.5 WFD Groundwater bodies

Records on site	**1**

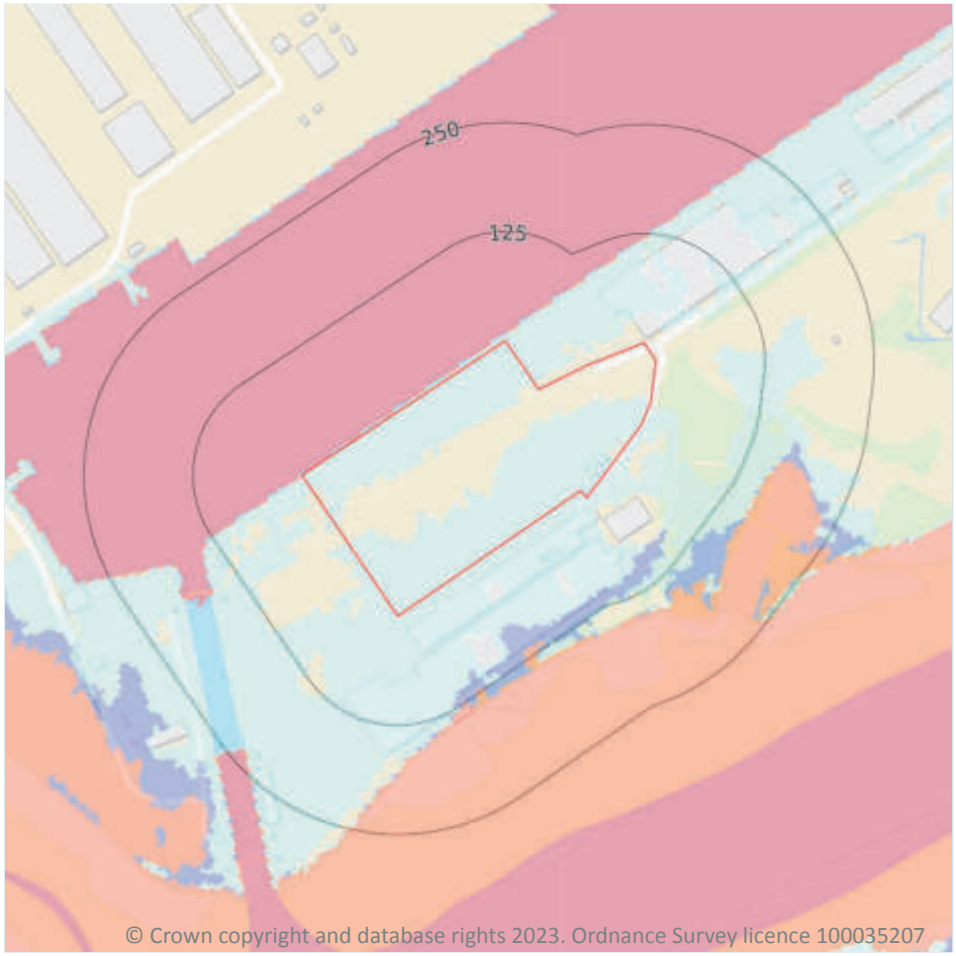
Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place.

Features are displayed on the Hydrology map on **page 59 >**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
3	**On site**	**SE Valleys Eastern Devonian Old Red Sandstone**	**GB40902G204700**	**Good**	**Good**	**Good**	**2017**

This data is sourced from the Environment Agency and Natural Resources Wales.

7 River and coastal flooding



Site Outline

Search buffers in metres (m)

River and coastal flooding:

- High
- Medium
- Low
- Very Low
- Historical Flood Events
- Areas Used for Flood Storage
- Areas Benefiting from Flood Defences
- Flood Defences

7.1 Risk of flooding from rivers and the sea

Records within 50m	4

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

Features are displayed on the River and coastal flooding map on **page 63 >**

Distance	Flood risk category
On site	**High**
0 - 50m	High

This data is sourced from the Environment Agency and Natural Resources Wales.

7.2 Historical Flood Events

Records within 250m	**0**

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.3 Flood Defences

Records within 250m	**0**

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.4 Areas Benefiting from Flood Defences

Records within 250m	**0**

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

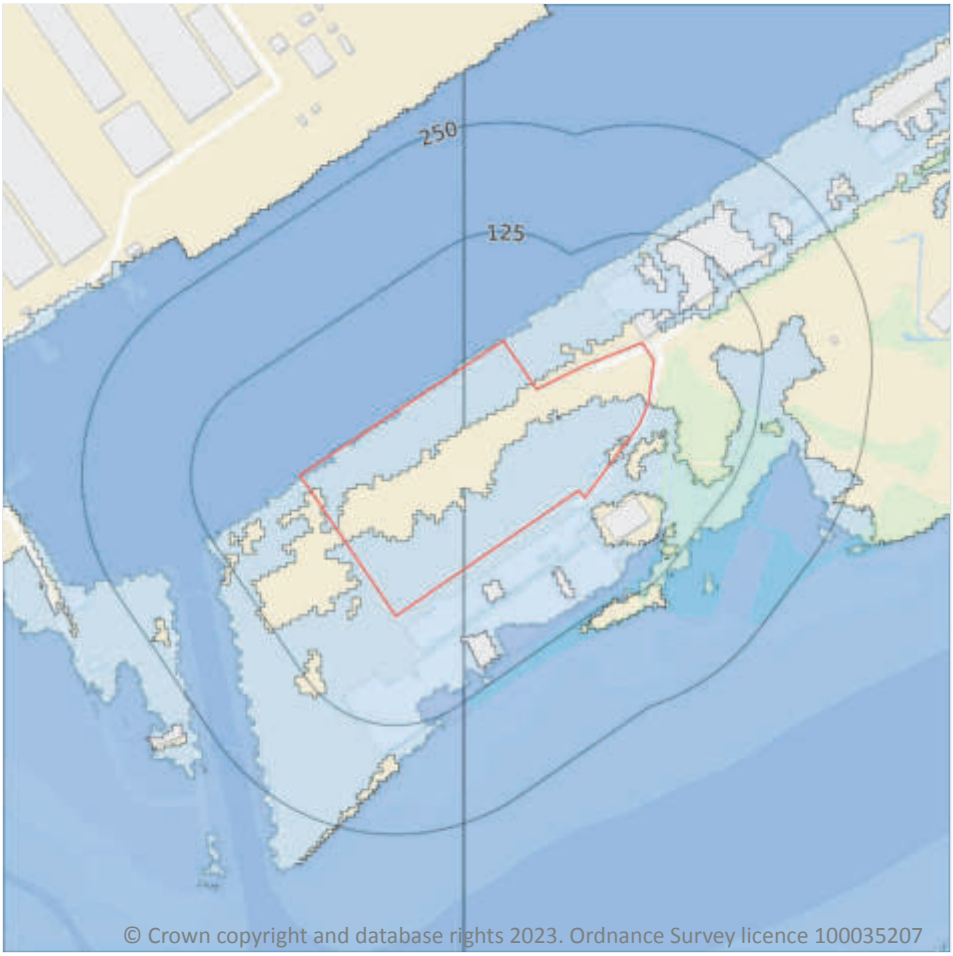
7.5 Flood Storage Areas

Records within 250m	**0**

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.

River and coastal flooding - Flood Zones



Site Outline

Search buffers in metres (m)

Flood zone 2

Flood zone 3

7.6 Flood Zone 2

Records within 50m	1

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

Features are displayed on the River and coastal flooding map on **page 63 >**

Location	Type
On site	**Zone 2 - (Fluvial /Tidal Models)**

This data is sourced from the Environment Agency and Natural Resources Wales.

7.7 Flood Zone 3

Records within 50m	1

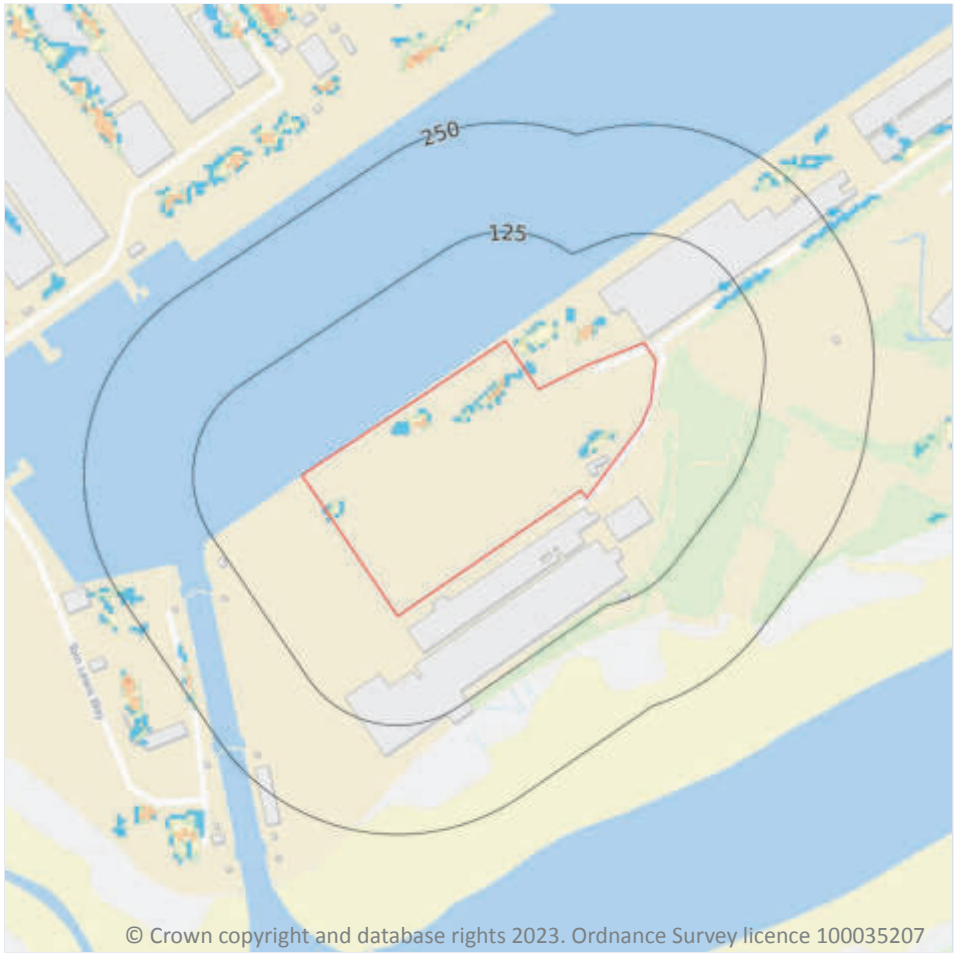
Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

Features are displayed on the River and coastal flooding map on **page 63 >**

Location	Type
On site	**Zone 3 - (Fluvial /Tidal Models)**

This data is sourced from the Environment Agency and Natural Resources Wales.

8 Surface water flooding



Site Outline

Search buffers in metres (m)

1 in 1000 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

8.1 Surface water flooding

Highest risk on site	**1 in 30 year, 0.1m - 0.3m**
Highest risk within 50m	**1 in 30 year, 0.1m - 0.3m**

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 67 >**

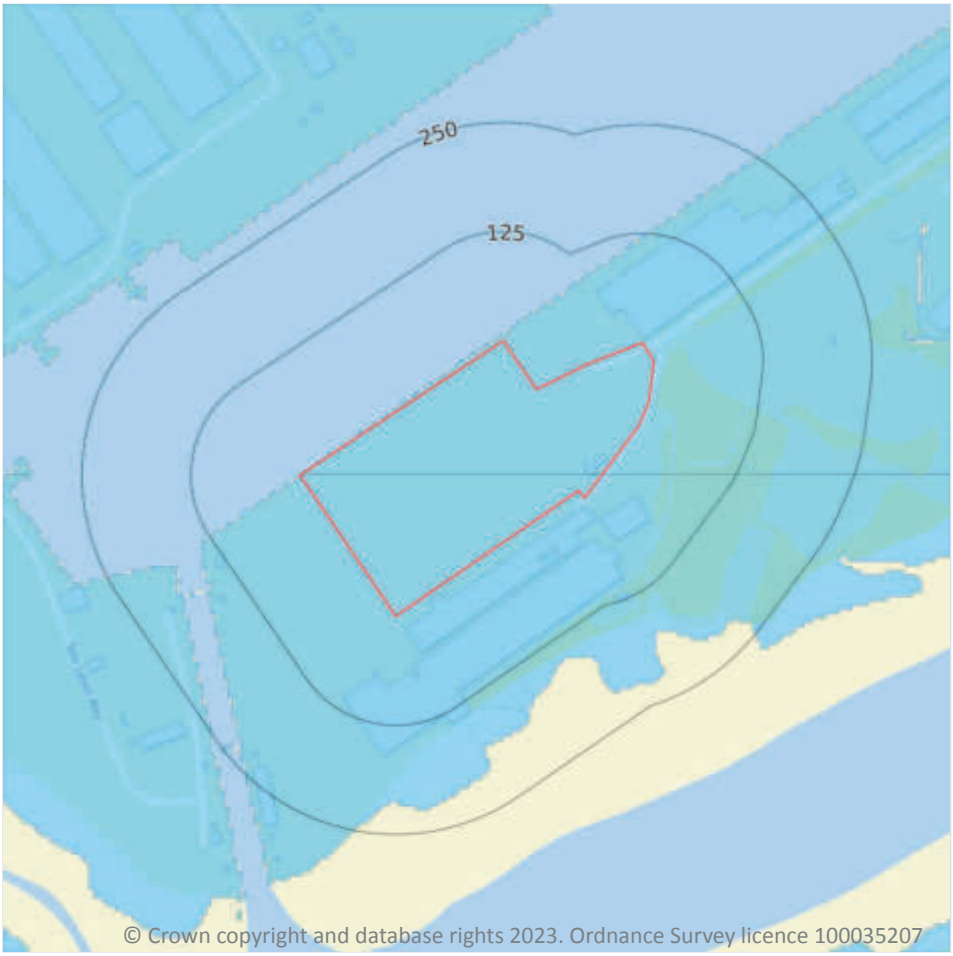
The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

The table below shows the maximum flood depths for a range of return periods for the site.

Return period	Maximum modelled depth
1 in 1000 year	Between 0.3m and 1.0m
1 in 250 year	Between 0.1m and 0.3m
1 in 100 year	Between 0.1m and 0.3m
1 in 30 year	Between 0.1m and 0.3m

This data is sourced from Ambiental Risk Analytics.

9 Groundwater flooding



Site Outline

Search buffers in metres (m)

High

Moderate - High

Moderate

Low

Negligible

9.1 Groundwater flooding

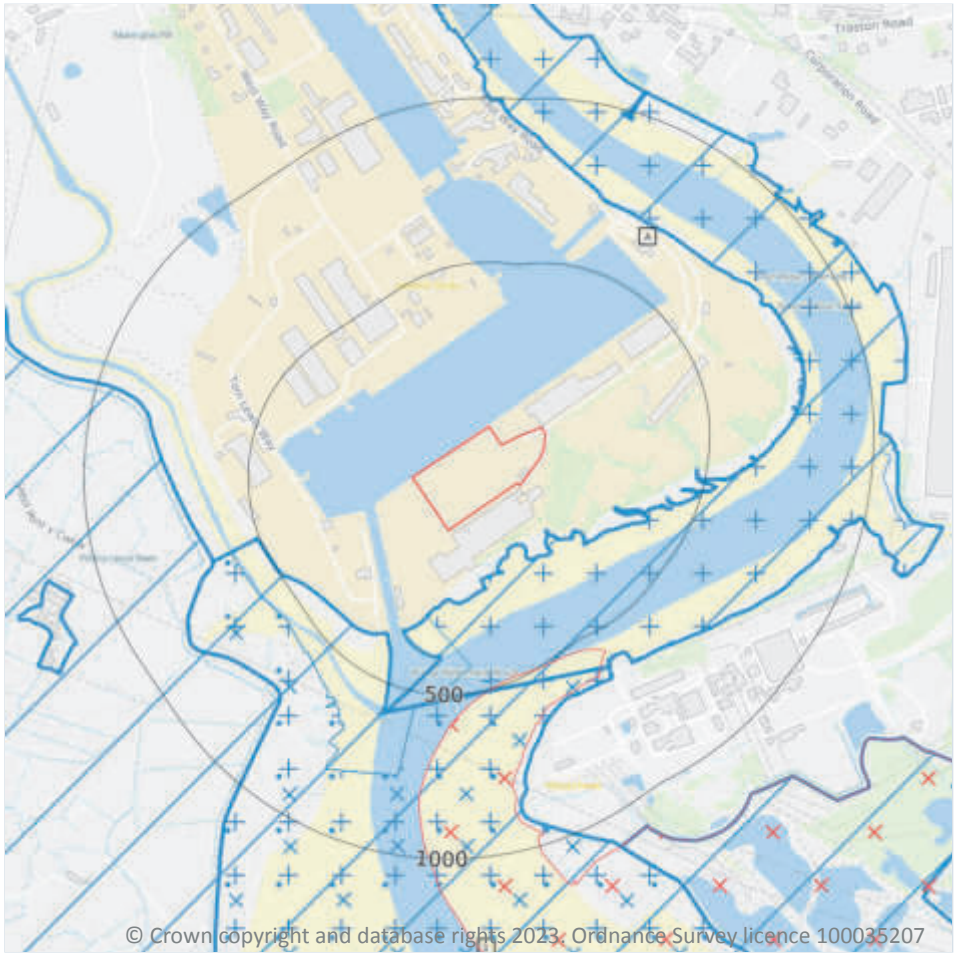
Highest risk on site	**Negligible**
Highest risk within 50m	**Negligible**

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 69 >**

This data is sourced from Ambiental Risk Analytics.

10 Environmental designations



Site Outline

Search buffers in metres (m)

- Sites of Special Scientific Interest (SSSI)
- Conserved wetland sites (Ramsar sites)
- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- National Nature Reserves (NNR)
- Designated Ancient Woodland

10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m	6

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

Features are displayed on the Environmental designations map on **page 70 >**

ID	Location	Name	Data source
A	150m SE	River Usk (Lower Usk) / Afon Wysg (Wysg Isaf)	Natural Resources Wales

ID	Location	Name	Data source
1	365m SW	Severn Estuary	Natural Resources Wales
3	658m W	Gwent Levels - St. Brides	Natural Resources Wales
4	1084m SE	Gwlyptiroedd Casnewydd / Newport Wetlands	Natural Resources Wales
-	1847m E	Gwent Levels - Nash and Goldcliff	Natural Resources Wales
-	1881m S	Severn Estuary	Natural Resources Wales

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m	**1**

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

Features are displayed on the Environmental designations map on **page 70 >**

ID	Location	Site	Details
B	504m S	Name: Severn Estuary (Wales) Site status: - Data source: Natural Resources Wales	Overview: The estuary's classic funnel shape, unique in Britain, is a factor causing the Severn to have the second-largest tidal range in the world (after the Bay of Fundy, Canada). This tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide swept sand and rock. The species-poor invertebrate community includes high densities of ragworms, lugworms and other invertebrates forming an important food source for passage and wintering waders. A further consequence of the large tidal range is the extensive intertidal zone, one of the largest in the UK, comprising mudflats, sand banks, shingle, and rocky platforms. Glassworts and annual sea-blite colonise the open mud, with beds of all three species of eelgrass Zostera occurring on more sheltered mud and sandbanks. Large expanses of common cord-grass also occur on the outer marshes. Heavily grazed saltmarsh fringes the estuary with a range of saltmarsh types present. The middle marsh sward is dominated by common saltmarsh-grass with typical associated species. In the upper marsh, red fescue and saltmarsh rush become more prominent. Ramsar criteria: Ramsar criterion 1 Due to immense tidal range (second-largest in world), this affects both the physical environment and biological communities. Habitats Directive Annex I features present on the pSAC include: H1110 Sandbanks which are slightly covered by sea water all the time H1130 Estuaries H1140 Mudflats and sandflats not covered by seawater at low tide H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Ramsar criterion 3 Due to unusual estuarine communities, reduced diversity and high productivity. Ramsar criterion 4 This site is important for the run of migratory fish between sea and river via estuary. Species include Salmon Salmo salar, sea trout S. trutta, sea lamprey Petromyzon marinus, river lamprey Lampetra fluviatilis, allis shad Alosa alosa, twaite shad A. fallax, and eel Anguilla anguilla. It is also of particular importance for migratory birds during spring and autumn. Ramsar criterion 8 The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Salmon Salmo salar, sea trout S. trutta, sea lamprey Petromyzon marinus, river lamprey Lampetra fluviatilis, allis shad Alosa alosa, twaite shad A. fallax, and eel Anguilla anguilla use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species particularly allis shad Alosa alosa and twaite shad A. fallax which feed on mysid shrimps in the salt wedge.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.3 Special Areas of Conservation (SAC)

Records within 2000m	2

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

Features are displayed on the Environmental designations map on **page 70 >**

ID	Location	Name	Features of interest	Habitat description	Data source
A	150m SE	River Usk / Afon Wysg	Estuaries; Intertidal mudflats and sandflats; Atlantic salt meadows; Rivers with floating vegetation often dominated by water-crowfoot; Beech forests on neutral to rich soils; Mixed woodland on base-rich soils associated with rocky slopes; Western acidic oak woodland; Bog woodland; Alder woodland on floodplains; Sea lamprey; Brook lamprey; River lamprey; Allis shad; Twaite shad; Atlantic salmon; Bullhead; Freshwater pearl mussel; White-clawed (or Atlantic stream) crayfish; Lesser horseshoe bat; Otter.	Improved grassland; Dry grassland, Steppes; Inland water bodies (Standing water, Running water); Broad-leaved deciduous woodland; Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins); Salt marshes, Salt pastures, Salt steppes; Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites); Bogs, Marshes, Water fringed vegetation, Fens; Heath, Scrub, Maquis and Garrigue, Phygrana; Humid grassland, Mesophile grassland	Natural Resources Wales
B	504m S	Severn Estuary (Wales)	Subtidal sandbanks; Estuaries; Intertidal mudflats and sandflats; Reefs; Glasswort and other annuals colonising mud and sand; Cord-grass swards; Atlantic salt meadows; Shifting dunes; Sea lamprey; River lamprey; Allis shad; Twaite shad.	Salt marshes, Salt pastures, Salt steppes; Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	Natural Resources Wales

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.4 Special Protection Areas (SPA)

Records within 2000m	1

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

Features are displayed on the Environmental designations map on **page 70 >**

ID	Location	Name	Species of interest	Habitat description	Data source
B	504m S	Severn Estuary (Wales)	Tundra swan; Common shelduck; Gadwall; Common redshank; Greater white-fronted goose; Dunlin	Coastal sand dunes, Sand beaches, Machair; Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins); Improved grassland; Salt marshes, Salt pastures, Salt steppes	Natural Resources Wales

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.5 National Nature Reserves (NNR)

Records within 2000m	**1**

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

Features are displayed on the Environmental designations map on **page 70 >**

ID	Location	Name	Data source
2	488m S	Newport Wetlands	Natural Rescources Wales

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.6 Local Nature Reserves (LNR)

Records within 2000m	**0**

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.7 Designated Ancient Woodland

Records within 2000m	**3**

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

Features are displayed on the Environmental designations map on **page 70 >**

ID	Location	Name	Woodland Type
-	1649m W	Unknown	Restored Ancient Woodland Site
-	1671m W	Unknown	Ancient Woodland Site of Unknown Category
-	1687m W	Unknown	Restored Ancient Woodland Site

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.8 Biosphere Reserves

Records within 2000m	0

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.9 Forest Parks

Records within 2000m	0

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

This data is sourced from the Forestry Commission.

10.10 Marine Conservation Zones

Records within 2000m	0

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.11 Green Belt

Records within 2000m	0

Areas designated to prevent urban sprawl by keeping land permanently open.

This data is sourced from the Ministry of Housing, Communities and Local Government.

10.12 Proposed Ramsar sites

Records within 2000m	0

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m	0

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m	0

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.15 Nitrate Sensitive Areas

Records within 2000m	0

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

This data is sourced from Natural England.

10.16 Nitrate Vulnerable Zones

Records within 2000m	0

Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

This data is sourced from Natural England and Natural Resources Wales.

SSSI Impact Zones and Units



Site Outline

Search buffers in metres (m)

SSSI Impact Risk Zones

SSSI Units

Not recorded

Favourable

Unfavourable - Recovering

Unfavourable - No change

Unfavourable - Declining

Partially destroyed

Destroyed

10.17 SSSI Impact Risk Zones

Records on site	1

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

Features are displayed on the SSSI Impact Zones and Units map on **page 78 >**

ID	Location	Type of developments requiring consultation
1	On site	**All applications - All planning applications (except householder) outside or extending outside existing settlements/urban areas affecting greenspace, farmland, semi natural habitats or landscape features such as trees, hedges, streams, rural buildings/structures** **Infrastructure - Pipelines and underground cables, pylons and overhead cables. Any transport proposal including road, rail and by water (excluding routine maintenance). Airports, helipads and other aviation proposals.** **Wind and Solar - Solar schemes with footprint > 0.5ha, all wind turbines** **Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction.** **Rural non-residential - Large non residential developments outside existing settlements/urban areas where net additional gross internal floorspace is > 1,000m² or footprint exceeds 0.2ha** **Residential - Residential development of 10 units or more.** **Rural residential - Any residential developments outside of existing settlements/urban areas with a total net gain in residential units** **Waste - Landfill. Incl: inert landfill, non-hazardous landfill, hazardous landfill.**

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	**0**

Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

This data is sourced from Natural England and Natural Resources Wales.

11 Visual and cultural designations

11.1 World Heritage Sites

Records within 250m	0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.2 Area of Outstanding Natural Beauty

Records within 250m	0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.3 National Parks

Records within 250m	0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.

11.4 Listed Buildings

Records within 250m	0

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.5 Conservation Areas

Records within 250m	0

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.6 Scheduled Ancient Monuments

Records within 250m	0

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

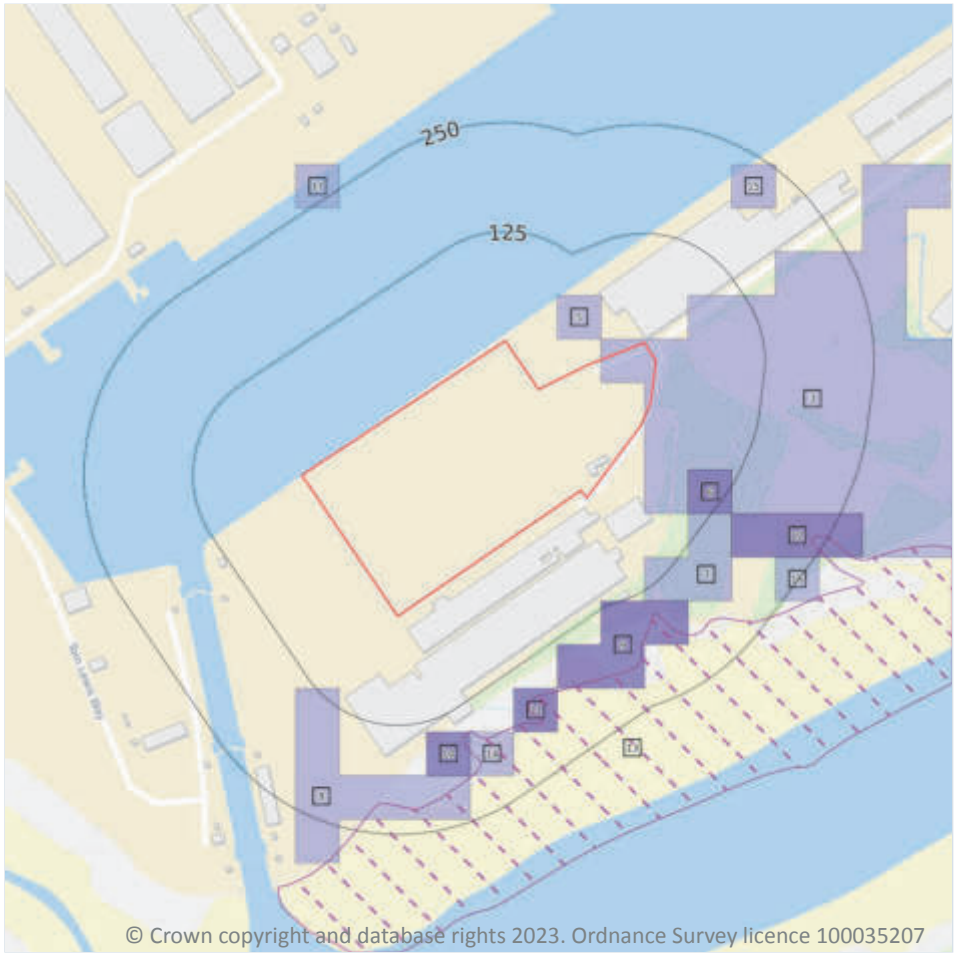
11.7 Registered Parks and Gardens

Records within 250m	0

Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

12 Agricultural designations



Site Outline

Search buffers in metres (m)

- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Timber felling licences
- Open Access land

12.1 Agricultural Land Classification

Records within 250m	13

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on **page 82 >**

ID	Location	Classification	Description
3	**On site**	**Grade 4**	**Poor quality agricultural land**
5	22m NE	Grade 4	Poor quality agricultural land
6	74m E	Grade 5	Very poor quality agricultural land

ID	Location	Classification	Description
7	95m SE	Grade 4	Poor quality agricultural land
8	106m SW	Grade 4	Poor quality agricultural land
9	117m SE	Grade 5	Very poor quality agricultural land
10	137m S	Grade 5	Very poor quality agricultural land
11	143m S	Grade 5	Very poor quality agricultural land
12	144m E	Grade 5	Very poor quality agricultural land
14	156m S	Grade 4	Poor quality agricultural land
15	184m NE	Grade 4	Poor quality agricultural land
16	214m E	Grade 4	Poor quality agricultural land
17	232m NW	Grade 4	Poor quality agricultural land

This data is sourced from Natural Resources Wales.

12.2 Open Access Land

Records within 250m	**1**

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

Features are displayed on the Agricultural designations map on **page 82 >**

ID	Location	Name	Classification	Other relevant legislation
13	154m SE	-	Open Access Other Statutory Access Land	-

This data is sourced from Natural England and Natural Resources Wales.

12.3 Tree Felling Licences

Records within 250m	**0**

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m	0

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. The schemes identified may be historical schemes that have now expired, or may still be active.

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

Records within 250m	0

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

This data is sourced from Natural England.

13 Habitat designations

13.1 Priority Habitat Inventory

Records within 250m	0

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m	0

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m	0

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

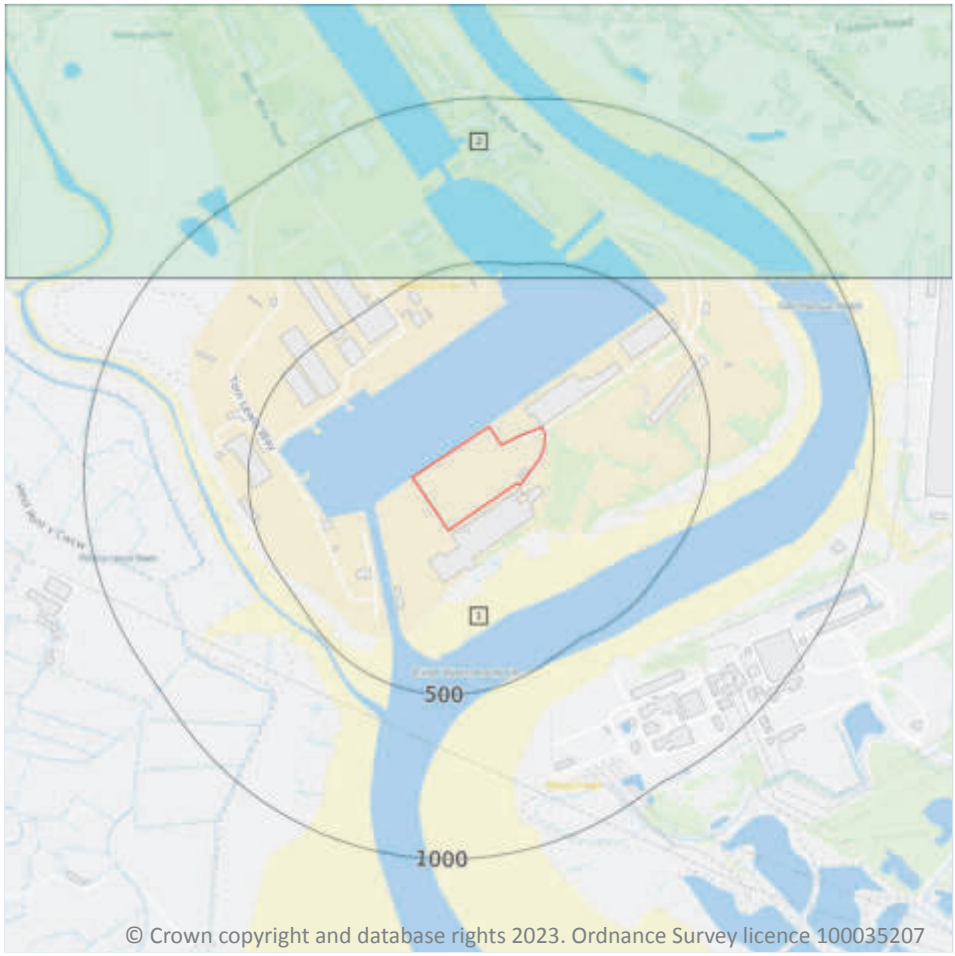
13.4 Limestone Pavement Orders

Records within 250m	0

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.

14 Geology 1:10,000 scale - Availability



Site Outline

Search buffers in metres (m)

Full coverage

Partial coverage

No coverage

14.1 10k Availability

Records within 500m	2

An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:10,000 scale - Availability map on **page 86 >**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**No coverage**	**No coverage**	**No coverage**	**No coverage**	**NoCov**
2	452m N	No coverage	Full	Full	No coverage	ST38NW

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Artificial and made ground

14.2 Artificial and made ground (10k)

Records within 500m	0

Details of made, worked, infilled, disturbed and landscaped ground at 1:10,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Superficial



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Site Outline

Search buffers in metres (m)

Landslip (10k)

Superficial geology (10k)
Please see table for more details.

14.3 Superficial geology (10k)

Records within 500m	1

Superficial geological deposits at 1:10,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:10,000 scale - Superficial map on **page 88 >**

ID	Location	LEX Code	Description	Rock description
1	452m N	TFD-CZ	Tidal Flat Deposits - Clay, Silty (unlithified Deposits Coding Scheme)	Clay, Silty

This data is sourced from the British Geological Survey.

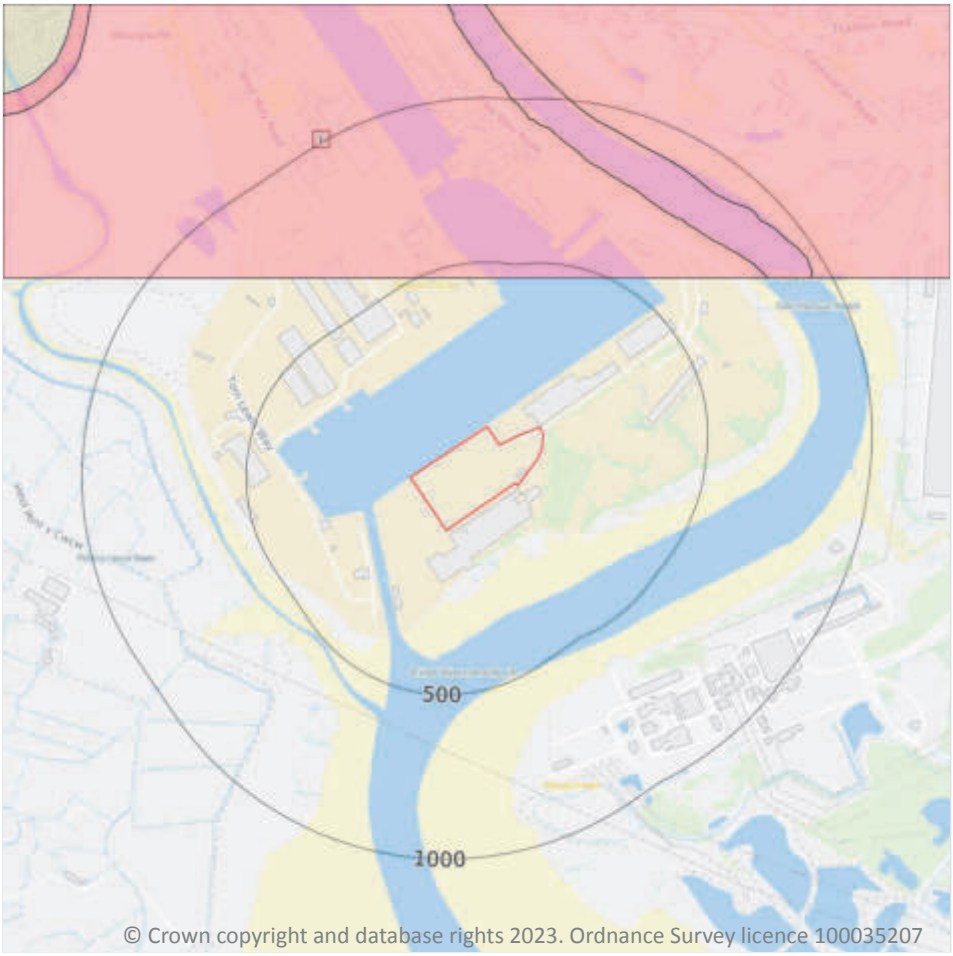
14.4 Landslip (10k)

Records within 500m	0

Mass movement deposits on BGS geological maps at 1:10,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Bedrock



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Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (10k)

Bedrock geology (10k)
Please see table for more details.

14.5 Bedrock geology (10k)

Records within 500m	1

Bedrock geology at 1:10,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 90 >**

ID	Location	LEX Code	Description	Rock age
1	452m N	MMG-MDST	Mercia Mudstone Group - Mudstone	Rhaetian Age - Early Triassic Epoch

This data is sourced from the British Geological Survey.

14.6 Bedrock faults and other linear features (10k)

Records within 500m	0

Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

This data is sourced from the British Geological Survey.

15 Geology 1:50,000 scale - Availability



Site Outline

Search buffers in metres (m)

Geological map tile

15.1 50k Availability

Records within 500m	1

An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme. Where 50k data is not available, this area has been filled in with 625k scale data.

Features are displayed on the Geology 1:50,000 scale - Availability map on **page 92 >**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**Full**	**Full**	**Full**	**Full**	**EW249_newport_v4**

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Artificial and made ground

15.2 Artificial and made ground (50k)

Records within 500m	0

Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

This data is sourced from the British Geological Survey.

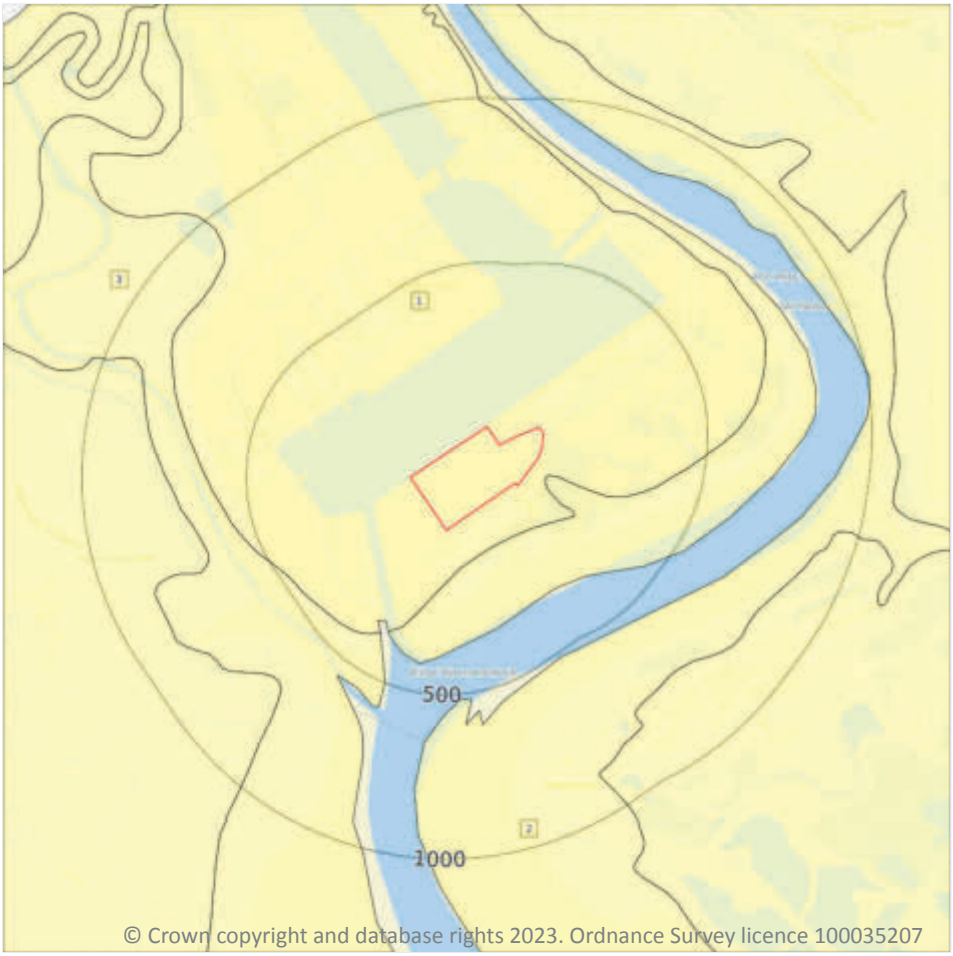
15.3 Artificial ground permeability (50k)

Records within 50m	0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (50k)

Superficial geology (50k)
Please see table for more details.

15.4 Superficial geology (50k)

Records within 500m **3**

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:50,000 scale - Superficial map on **page 94 >**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**TFD-XCZ**	**TIDAL FLAT DEPOSITS**	**CLAY AND SILT**
2	54m E	TFD-XCZ	TIDAL FLAT DEPOSITS	CLAY AND SILT
3	370m SW	TFD-XCZ	TIDAL FLAT DEPOSITS	CLAY AND SILT

This data is sourced from the British Geological Survey.

15.5 Superficial permeability (50k)

Records within 50m	1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Intergranular**	**Low**	**Very Low**

This data is sourced from the British Geological Survey.

15.6 Landslip (50k)

Records within 500m	0

Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

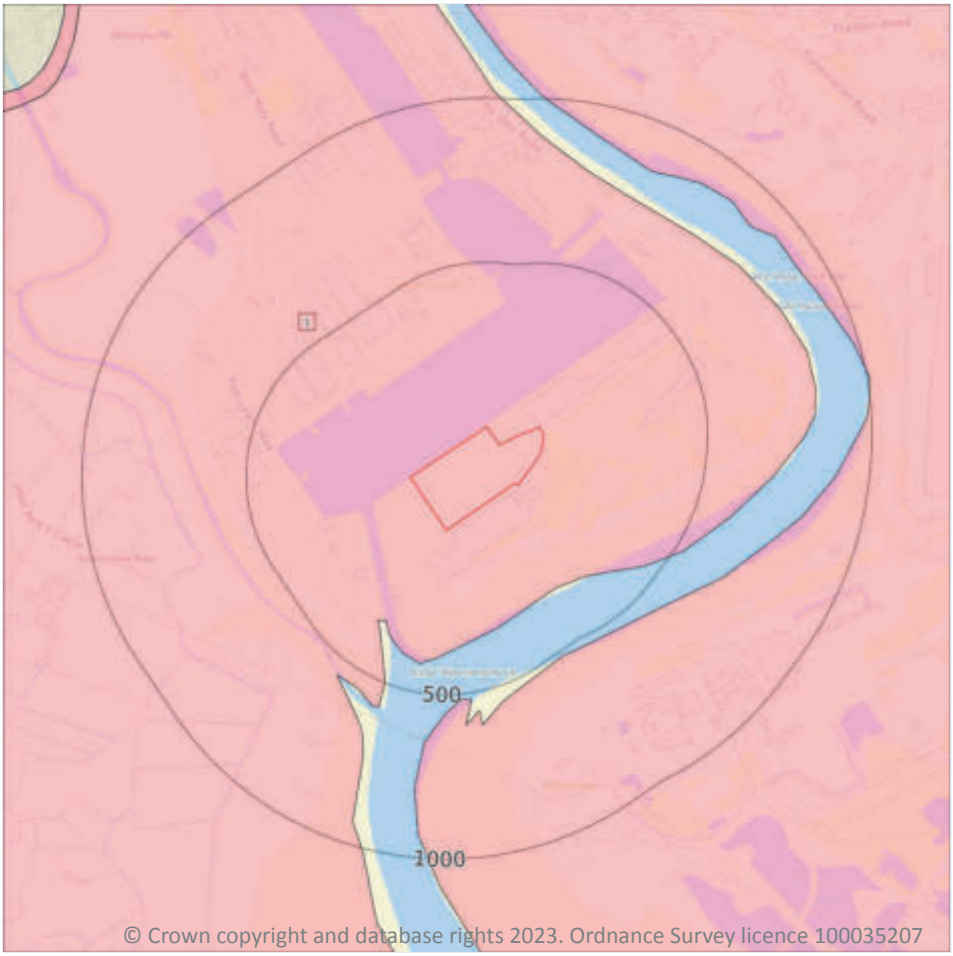
15.7 Landslip permeability (50k)

Records within 50m	0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Bedrock



Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (50k)

Bedrock geology (50k)
Please see table for more details.

15.8 Bedrock geology (50k)

Records within 500m	1

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 96 >**

ID	Location	LEX Code	Description	Rock age
1	**On site**	**MMG-MDST**	**MERCIA MUDSTONE GROUP - MUDSTONE**	**-**

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m	1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Fracture**	**Low**	**Low**

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m	0

Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

This data is sourced from the British Geological Survey.

16 Boreholes

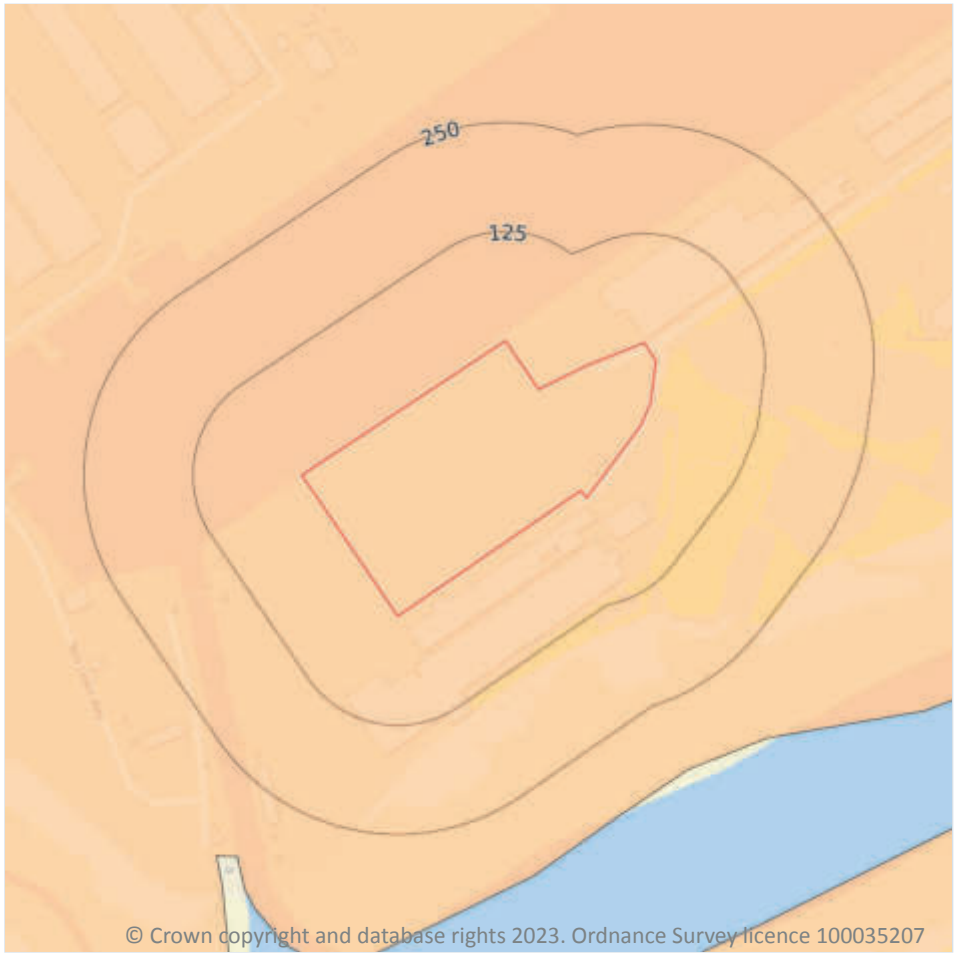
16.1 BGS Boreholes

Records within 250m	**0**

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

This data is sourced from the British Geological Survey.

17 Natural ground subsidence - Shrink swell clays



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.1 Shrink swell clays

Records within 50m	1

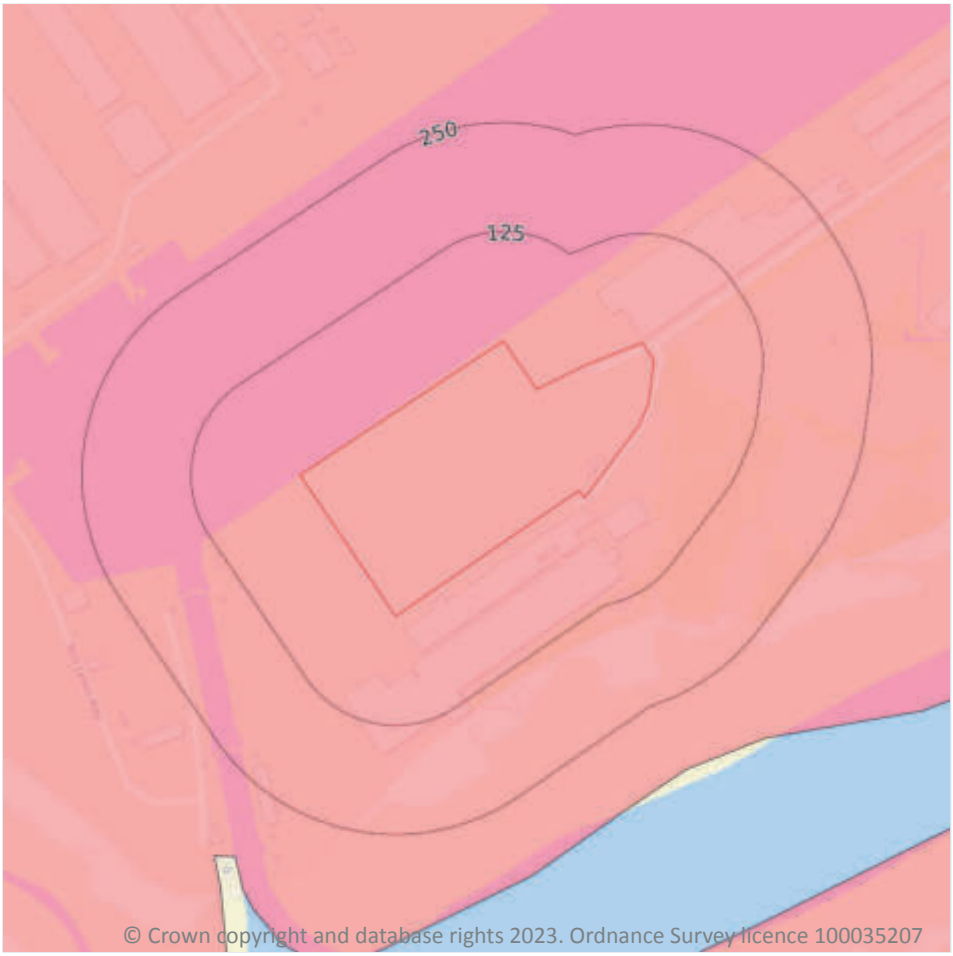
The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 99 >**

Location	Hazard rating	Details
On site	**Low**	**Ground conditions predominantly medium plasticity.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Running sands



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.2 Running sands

Records within 50m	1

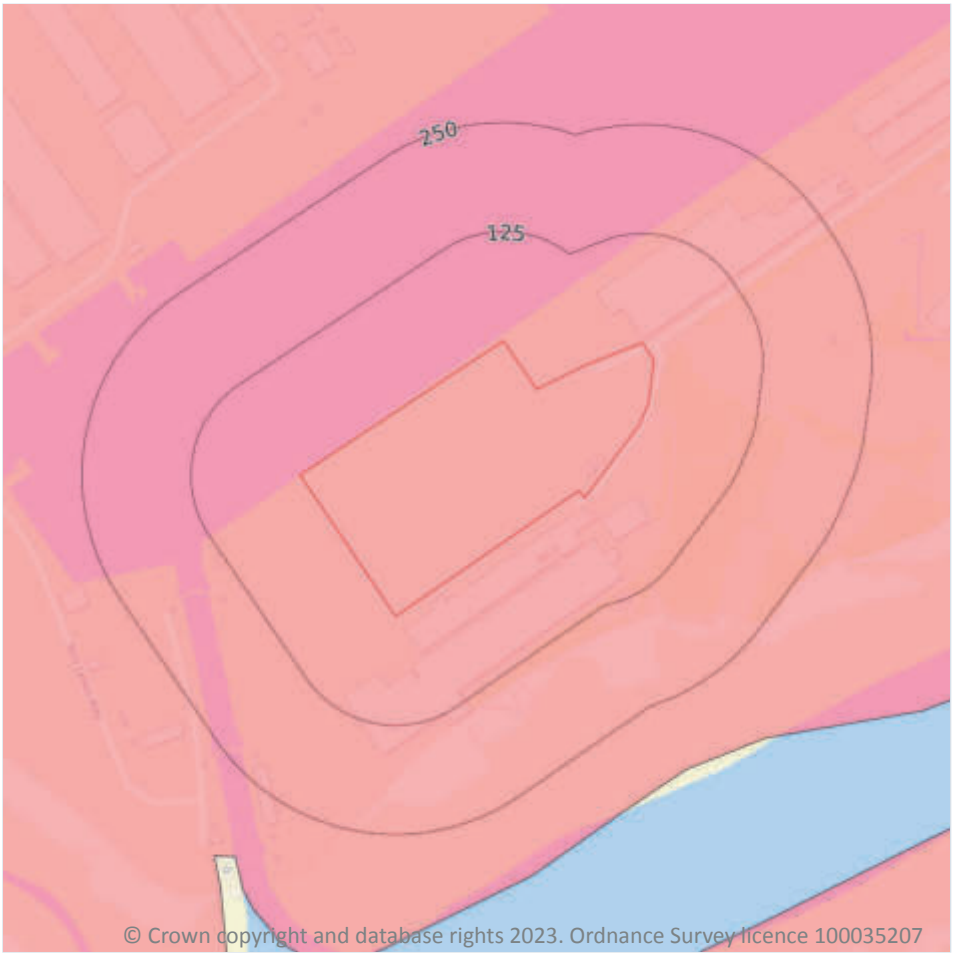
The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

Features are displayed on the Natural ground subsidence - Running sands map on **page 100 >**

Location	Hazard rating	Details
On site	**Moderate**	**Running sand conditions are probably present. Constraints may apply to land uses involving excavation or the addition or removal of water.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Compressible deposits



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.3 Compressible deposits

Records within 50m	1

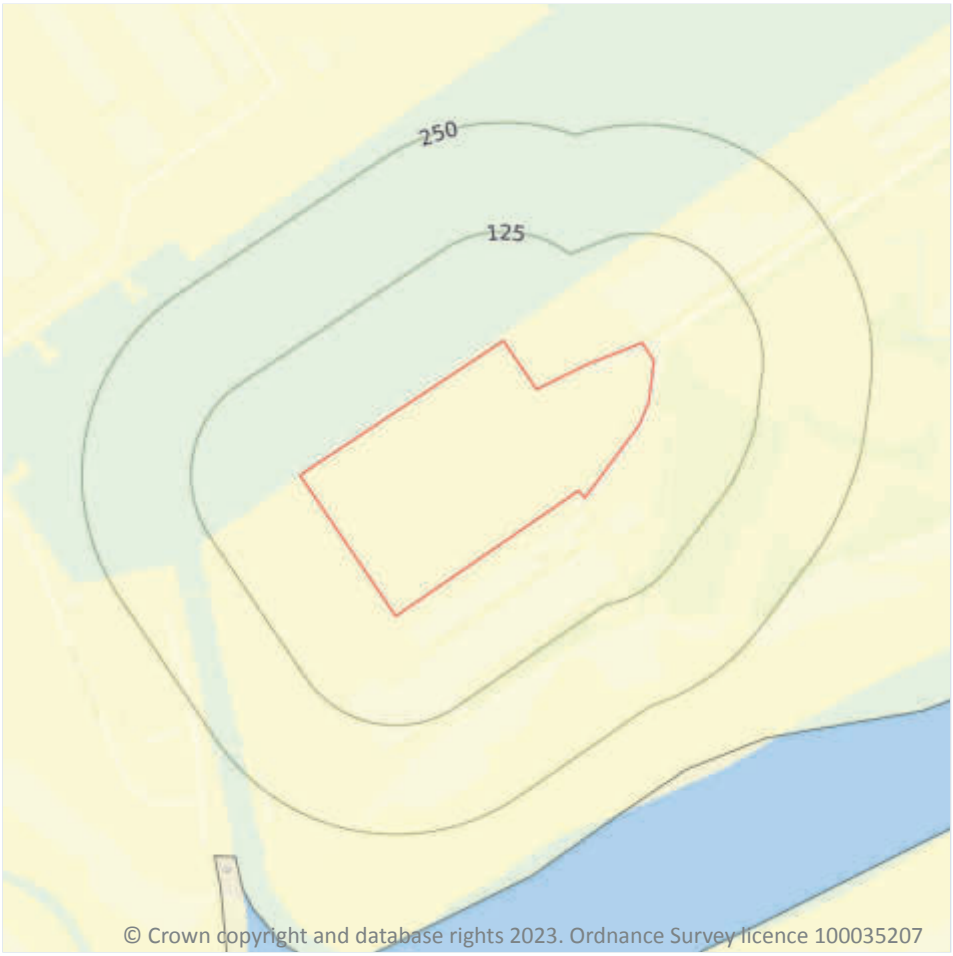
The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 101 >**

Location	Hazard rating	Details
On site	**Moderate**	**Compressibility and uneven settlement hazards are probably present. Land use should consider specifically the compressibility and variability of the site.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Collapsible deposits



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.4 Collapsible deposits

Records within 50m	1

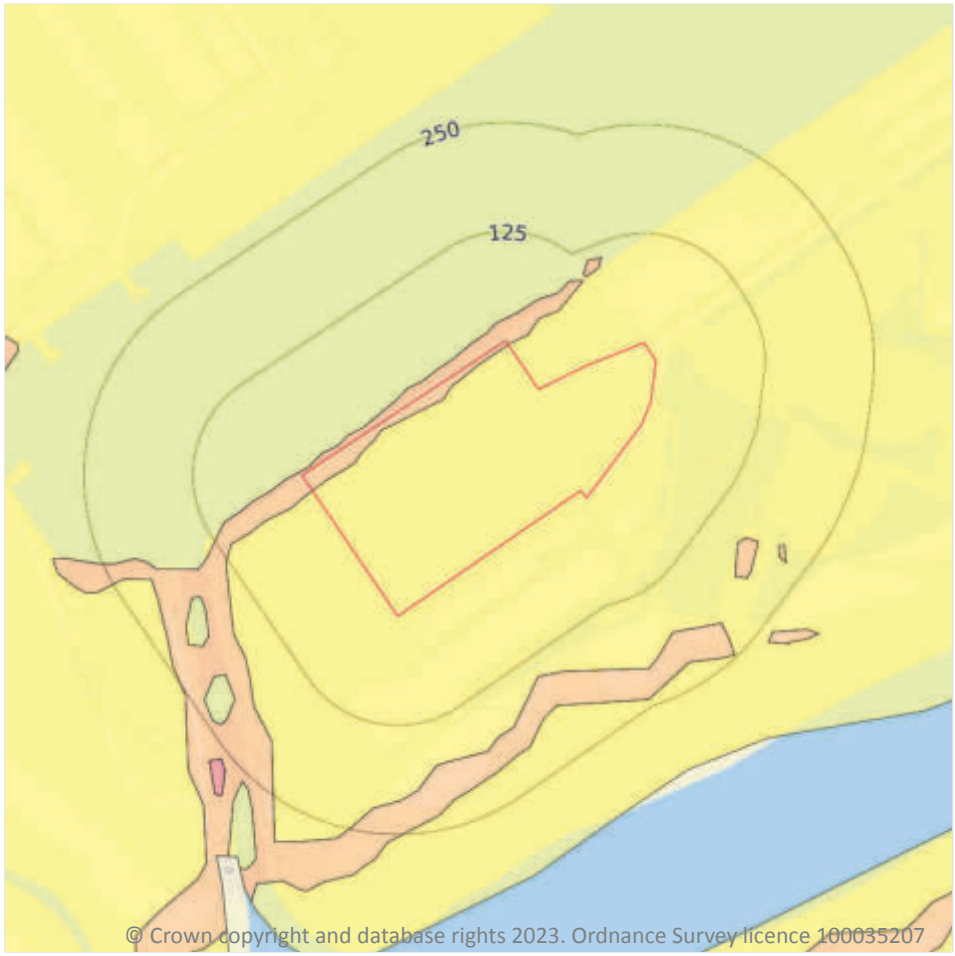
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 102 >**

Location	Hazard rating	Details
On site	**Negligible**	**Deposits with potential to collapse when loaded and saturated are believed not to be present.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Landslides



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.5 Landslides

Records within 50m	2

The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

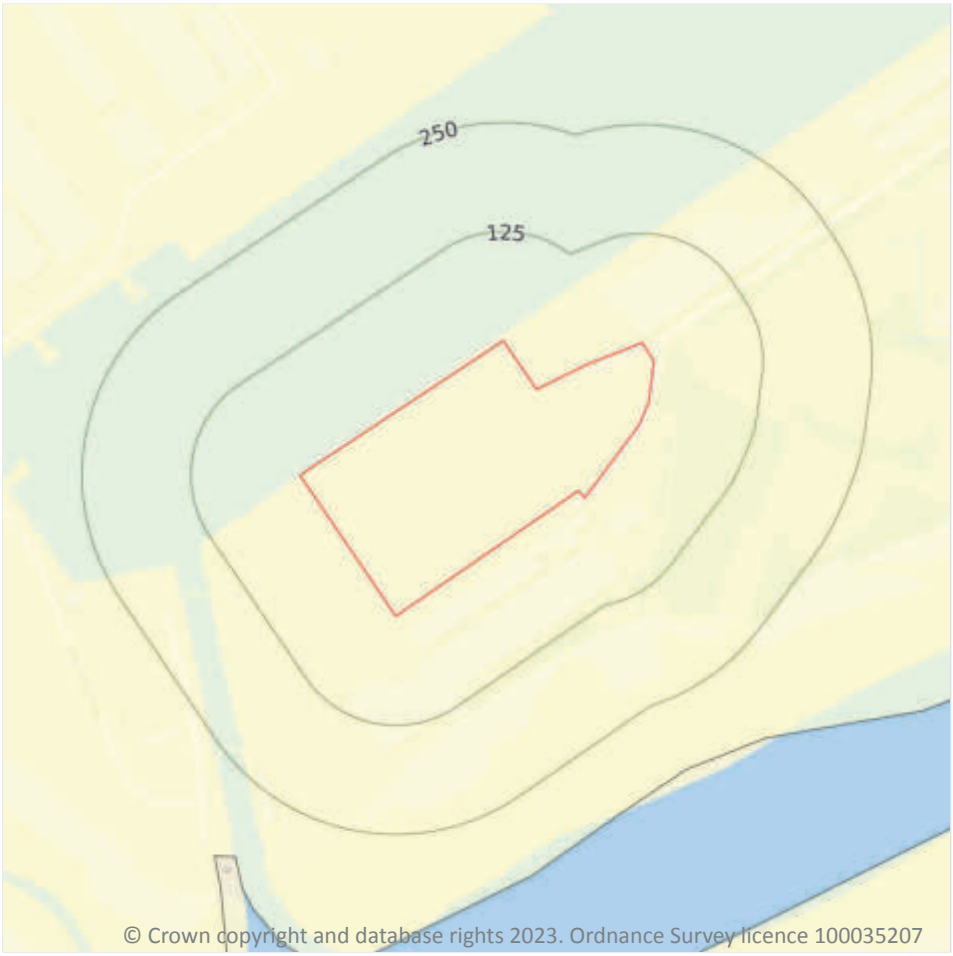
Features are displayed on the Natural ground subsidence - Landslides map on **page 103 >**

Location	Hazard rating	Details
On site	**Very low**	**Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.**

Location	Hazard rating	Details
On site	**Low**	**Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Ground dissolution of soluble rocks



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.6 Ground dissolution of soluble rocks

Records within 50m	1

The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 105 >**

Location	Hazard rating	Details
On site	**Negligible**	**Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.**

This data is sourced from the British Geological Survey.

18 Mining and ground workings



Site Outline

Search buffers in metres (m)

BritPits

Surface ground workings

Underground workings

Underground mining extents

Historical mineral planning areas

TCA non-coal mining

Non Coal Mining

Sporadic underground mining of restricted extent possible

Localised small scale underground mining possible

Small scale mining possible

Underground mining known or likely within or in close proximity

Underground mining known within or in very close proximity

18.1 BritPits

Records within 500m	2

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

Features are displayed on the Mining and ground workings map on **page 107 >**

ID	Location	Details	Description
4	113m NE	Name: Newport Depot Address: NEWPORT, Gwent Commodity: Marine Sand & Gravel Status: Ceased	Type: Sea, river or canal wharf where mineral commodities are unloaded and stored Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
H	289m SW	Name: North Dock Address: NEWPORT, Gwent Commodity: Marine Sand & Gravel Status: Active	Type: Sea, river or canal wharf where mineral commodities are unloaded and stored Status description: Site which is actively extracting mineral products, or in the case of wharfs and rail depots, is actively handing minerals

This data is sourced from the British Geological Survey.

18.2 Surface ground workings

Records within 250m **23**

Historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

Features are displayed on the Mining and ground workings map on **page 107 >**

ID	Location	Land Use	Year of mapping	Mapping scale
A	**On site**	**Docks**	**1922**	**1:10560**
A	**On site**	**Docks**	**1922**	**1:10560**
B	**On site**	**Pond**	**1900**	**1:10560**
B	**On site**	**Pond**	**1882**	**1:10560**
C	**On site**	**Unspecified Level**	**1949**	**1:10560**
C	**On site**	**Unspecified Level**	**1885**	**1:10560**
C	**On site**	**Unspecified Level**	**1900**	**1:10560**
C	**On site**	**Unspecified Heap**	**1900**	**1:10560**
C	**On site**	**Quay**	**1956**	**1:10560**
D	**On site**	**Dock**	**1922**	**1:10560**
1	0m W	Docks	1922	1:10560
E	60m NE	Dock	1949	1:10560
E	60m NE	Dock	1920	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
2	63m NE	Unspecified Heap	1900	1:10560
3	87m NE	Unspecified Ground Workings	1900	1:10560
5	185m N	Ponds	1900	1:10560
F	188m E	Unspecified Ground Workings	1956	1:10560
6	198m N	Unspecified Heap	1900	1:10560
7	212m SW	Dock	1956	1:10560
D	215m NE	Pond	1900	1:10560
G	238m SW	Unspecified Pit	1922	1:10560
G	238m SW	Unspecified Pit	1922	1:10560
H	243m SW	Unspecified Pit	1922	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.3 Underground workings

Records within 1000m	0

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground mining extents

Records within 500m	0

This data identifies underground mine workings that could present a potential risk, including adits and seam workings. These features have been identified from BGS Geological mapping and mine plans sourced from the BGS and various collections and sources.

This data is sourced from Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m	0

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m	0

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

This data is sourced from the British Geological Survey.

18.7 JPB mining areas

Records on site	0

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

This data is sourced from Johnson Poole and Bloomer.

18.8 The Coal Authority non-coal mining

Records within 500m	0

This data provides an indication of the potential zone of influence of recorded underground non-coal mining workings. Any and all analysis and interpretation of Coal Authority Data in this report is made by Groundsure, and is in no way supported, endorsed or authorised by the Coal Authority. The use of the data is restricted to the terms and provisions contained in this report. Data reproduced in this report may be the copyright of the Coal Authority and permission should be sought from Groundsure prior to any re-use.

This data is sourced from The Coal Authority.

18.9 Researched mining

Records within 500m	0

This data indicates areas of potential mining identified from alternative or archival sources, including; BGS Geological paper maps, Lidar data, aerial photographs (from World War II onwards), archaeological data services, websites, Tithe maps, and various text/plans from collected books and reports. Some of this data is approximate and Groundsure have interpreted the resultant risk area and, where possible, specific areas of risk have been captured.

This data is sourced from Groundsure.

18.10 Mining record office plans

Records within 500m	0

This dataset is representative of Mining Record Office and/or plan extents held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

This data is sourced from Groundsure.

18.11 BGS mine plans

Records within 500m	0

This dataset is representative of BGS mine plans held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

This data is sourced from Groundsure.

18.12 Coal mining

Records on site	0

Areas which could be affected by past, current or future coal mining.

This data is sourced from the Coal Authority.

18.13 Brine areas

Records on site	0

The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.

This data is sourced from the Cheshire Brine Subsidence Compensation Board.

18.14 Gypsum areas

Records on site	0

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.15 Tin mining

Records on site	0

Generalised areas that may be affected by historical tin mining.

This data is sourced from Groundsure.

18.16 Clay mining

Records on site	0

Generalised areas that may be affected by kaolin and ball clay extraction.

This data is sourced from the Kaolin and Ball Clay Association (UK).

19 Ground cavities and sinkholes

19.1 Natural cavities

Records within 500m	0

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

This data is sourced from Stantec UK Ltd.

19.2 Mining cavities

Records within 1000m	0

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

This data is sourced from Stantec UK Ltd.

19.3 Reported recent incidents

Records within 500m	0

This data identifies sinkhole information gathered from media reports and Groundsure's own records. This data goes back to 2014 and includes relative accuracy ratings for each event and links to the original data sources. The data is updated on a regular basis and should not be considered a comprehensive catalogue of all sinkhole events. The absence of data in this database does not mean a sinkhole definitely has not occurred during this time.

This data is sourced from Groundsure.

19.4 Historical incidents

Records within 500m	0

This dataset comprises an extract of 1:10,560, 1:10,000, 1:2,500 and 1:1,250 scale historical Ordnance Survey maps held by Groundsure, dating back to the 1840s. It shows shakeholes, deneholes and other 'holes' as noted on these maps. Dene holes are medieval chalk extraction pits, usually comprising a narrow shaft with a number of chambers at the base of the shaft. Shakeholes are an alternative name for suffusion sinkholes, most commonly found in the limestone landscapes of North Yorkshire but also extensively noted around the Brecon Beacons National Park.

Not all 'holes' noted on Ordnance Survey mapping will necessarily be present within this dataset.

This data is sourced from Groundsure.

19.5 National karst database

Records within 500m	0

This is a comprehensive database of national karst information gathered from a wide range of sources. BGS have collected data on five main types of karst feature: Sinkholes, stream links, caves, springs, and incidences of associated damage to buildings, roads, bridges and other engineered works.

Since the database was set up in 2002 data covering most of the evaporite karst areas of the UK have now been added, along with data covering about 60% of the Chalk, and 35% of the Carboniferous Limestone outcrops. Many of the classic upland karst areas have yet to be included. Recorded so far are: Over 800 caves, 1300 stream sinks, 5600 springs, 10,000 sinkholes.

The database is not yet complete, and not all records have been verified. The absence of data does not mean that karst features are not present at a site. A reliability rating is included with each record.

This data is sourced from the British Geological Survey.

20 Radon



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Site Outline

Search buffers in metres (m)

- Greater than 30%
- Between 10% and 30%
- Between 5% and 10%
- Between 3% and 5%
- Between 1% and 3%
- Less than 1%

20.1 Radon

Records on site	1

The Radon Potential data classifies areas based on their likelihood of a property having a radon level at or above the Action Level in Great Britain. The dataset is intended for use at 1:50,000 scale and was derived from both geological assessments and indoor radon measurements (more than 560,000 records). A minimum 50m buffer should be considered when searching the maps, as the smallest detectable feature at this scale is 50m. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain (1:100,000 scale).

Features are displayed on the Radon map on **page 115 >**

Location	Estimated properties affected	Radon Protection Measures required
On site	**Less than 1%**	**None**

This data is sourced from the British Geological Survey and UK Health Security Agency.

21 Soil chemistry

21.1 BGS Estimated Background Soil Chemistry

Records within 50m	6

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km^2. In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km^2; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**

This data is sourced from the British Geological Survey.

21.2 BGS Estimated Urban Soil Chemistry

Records within 50m	0

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km^2).

This data is sourced from the British Geological Survey.

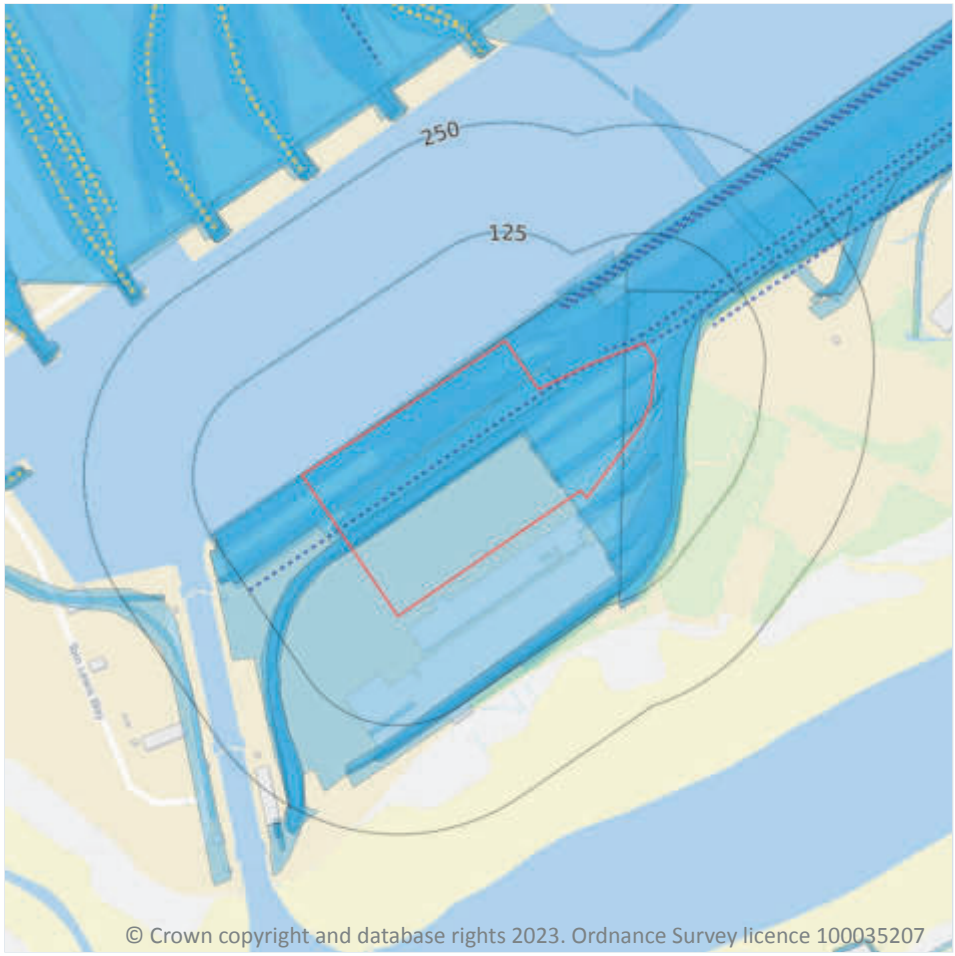
21.3 BGS Measured Urban Soil Chemistry

Records within 50m	0

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km^2.

This data is sourced from the British Geological Survey.

22 Railway infrastructure and projects



Site Outline

Search buffers in metres (m)

- Crossrail 1 Stations
- Crossrail 1 Route
- Crossrail 2 Stations
- Crossrail 2 Route
- Crossrail 2 Worksites
- Crossrail 2 Safeguarding
- Crossrail 2 Headhouses
- Railway stations
- Active railways
- Active tunnels
- Abandoned railways
- Historic railways
- Historic tunnels
- Underground stations
- Underground Lines
- Royal Mail tunnels
- HS2 optimised route
- HS2 Stations
- HS2 Depots
- HS2 Surface Safeguarding
- HS2 Subsurface Safeguarding

22.1 Underground railways (London)

Records within 250m	0

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

This data is sourced from publicly available information by Groundsure.

22.2 Underground railways (Non-London)

Records within 250m	0

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.

This data is sourced from publicly available information by Groundsure.

22.3 Railway tunnels

Records within 250m	0

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

22.4 Historical railway and tunnel features

Records within 250m	41

Railways and tunnels digitised from historical Ordnance Survey mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

Features are displayed on the Railway infrastructure and projects map on **page 119 >**

Location	Land Use	Year of mapping	Mapping scale
On site	**Railway Sidings**	**1968**	**1250**
On site	**Railway Sidings**	**1955**	**1250**
On site	**Railway Sidings**	**1971**	**1250**
On site	**Railway Sidings**	**1956**	**1250**
On site	**Railway Sidings**	**1955**	**2500**
On site	**Railway Sidings**	**1968**	**2500**
On site	**Railway Sidings**	**1956**	**2500**
On site	**Railway Sidings**	**1989**	**1250**
On site	**Railway Sidings**	**1992**	**1250**
On site	**Railway Sidings**	**1920**	**2500**
On site	**Railway Sidings**	**1921**	**2500**
On site	**Railway Sidings**	**1922**	**10560**
On site	**Railway Sidings**	**1950**	**10560**
On site	**Railway Sidings**	**1949**	**10560**
On site	**Railway Sidings**	**1885**	**10560**
On site	**Railway Sidings**	**1916**	**10560**
On site	**Railway Sidings**	**1956**	**10560**

Location	Land Use	Year of mapping	Mapping scale
8m E	Railway Sidings	1920	2500
13m E	Railway Sidings	1956	1250
37m NE	Railway Sidings	1992	1250
58m NE	Railway Sidings	1921	2500
60m NE	Railway Sidings	1920	10560
60m NE	Railway Sidings	1949	10560
65m SE	Railway Sidings	1920	2500
72m NE	Railway Sidings	1920	10560
78m NE	Railway Sidings	1949	10560
100m S	Railway Sidings	1920	2500
100m SE	Railway Sidings	1922	10560
103m SE	Railway Sidings	1920	2500
115m SE	Railway Sidings	1955	2500
115m SE	Railway Sidings	1968	2500
115m SE	Railway Sidings	1968	1250
115m SE	Railway Sidings	1955	1250
163m NE	Railway Sidings	1994	1250
171m NE	Railway Sidings	1900	10560
190m NE	Railway Sidings	1921	2500
207m NE	Railway Sidings	1900	2500
209m W	Railway Sidings	1955	2500
209m W	Railway Sidings	1955	1250
212m SW	Railway Sidings	1956	10560
223m NE	Railway Sidings	1994	1250

This data is sourced from Ordnance Survey/Groundsure.

22.5 Royal Mail tunnels

Records within 250m	0

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.

This data is sourced from Groundsure/the Postal Museum.

22.6 Historical railways

Records within 250m	0

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

This data is sourced from OpenStreetMap.

22.7 Railways

Records within 250m	7

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

Features are displayed on the Railway infrastructure and projects map on **page 119 >**

Location	Name	Type
On site		**rail**
7m NE		rail
10m NE		rail
69m NE		rail
73m NE		rail
74m NE		rail
77m NE		rail

This data is sourced from Ordnance Survey and OpenStreetMap.

22.8 Crossrail 1

Records within 500m	0

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

This data is sourced from publicly available information by Groundsure.

22.9 Crossrail 2

Records within 500m	0

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

This data is sourced from publicly available information by Groundsure.

22.10 HS2

Records within 500m	0

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

This data is sourced from HS2 ltd.

Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see https://www.groundsure.com/sources-reference ↗.

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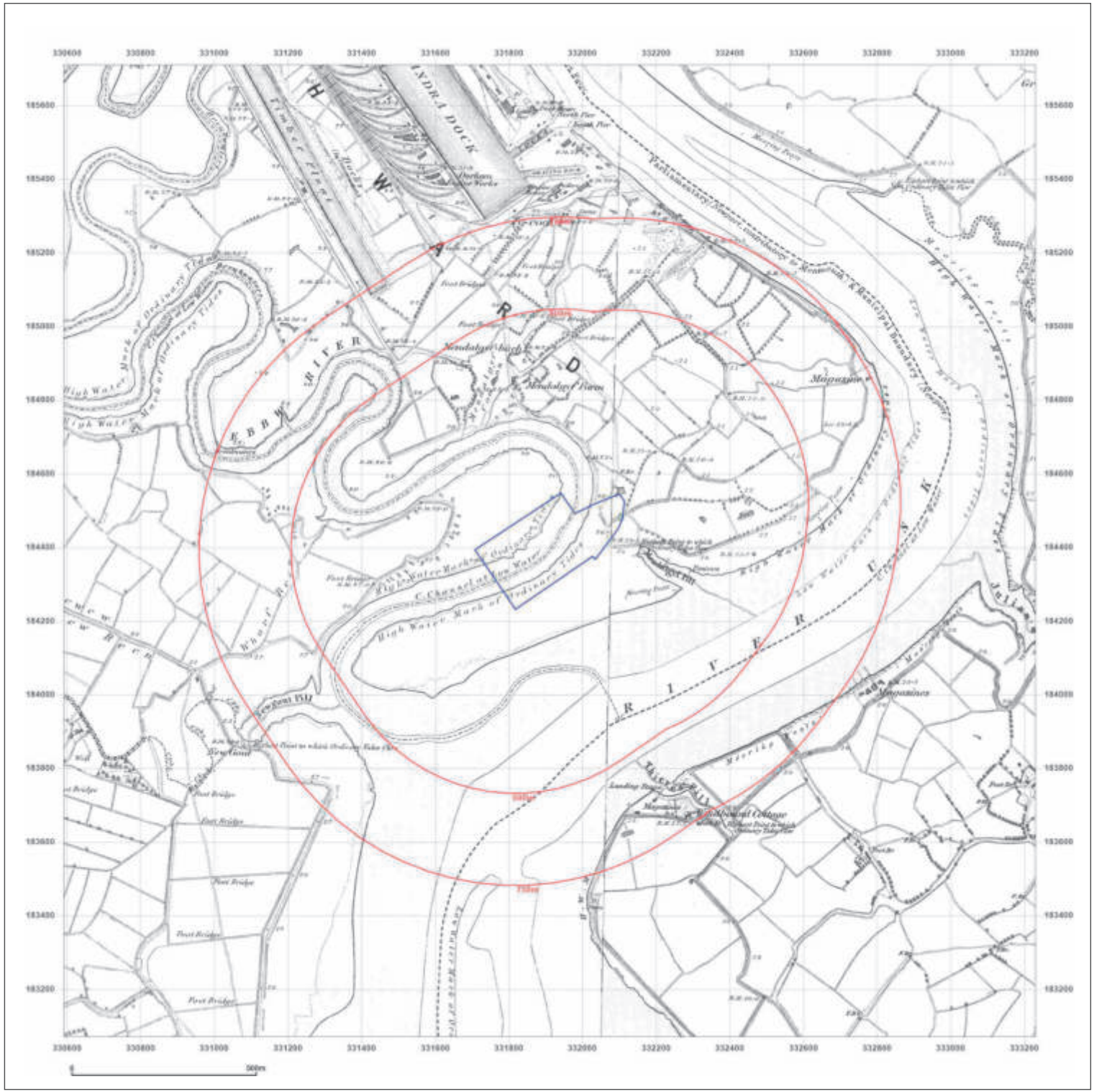

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: County Series
Map date: **1882**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
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Surveyed 1882
Revised 1882
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1882
Revised 1882
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 29 September 2023

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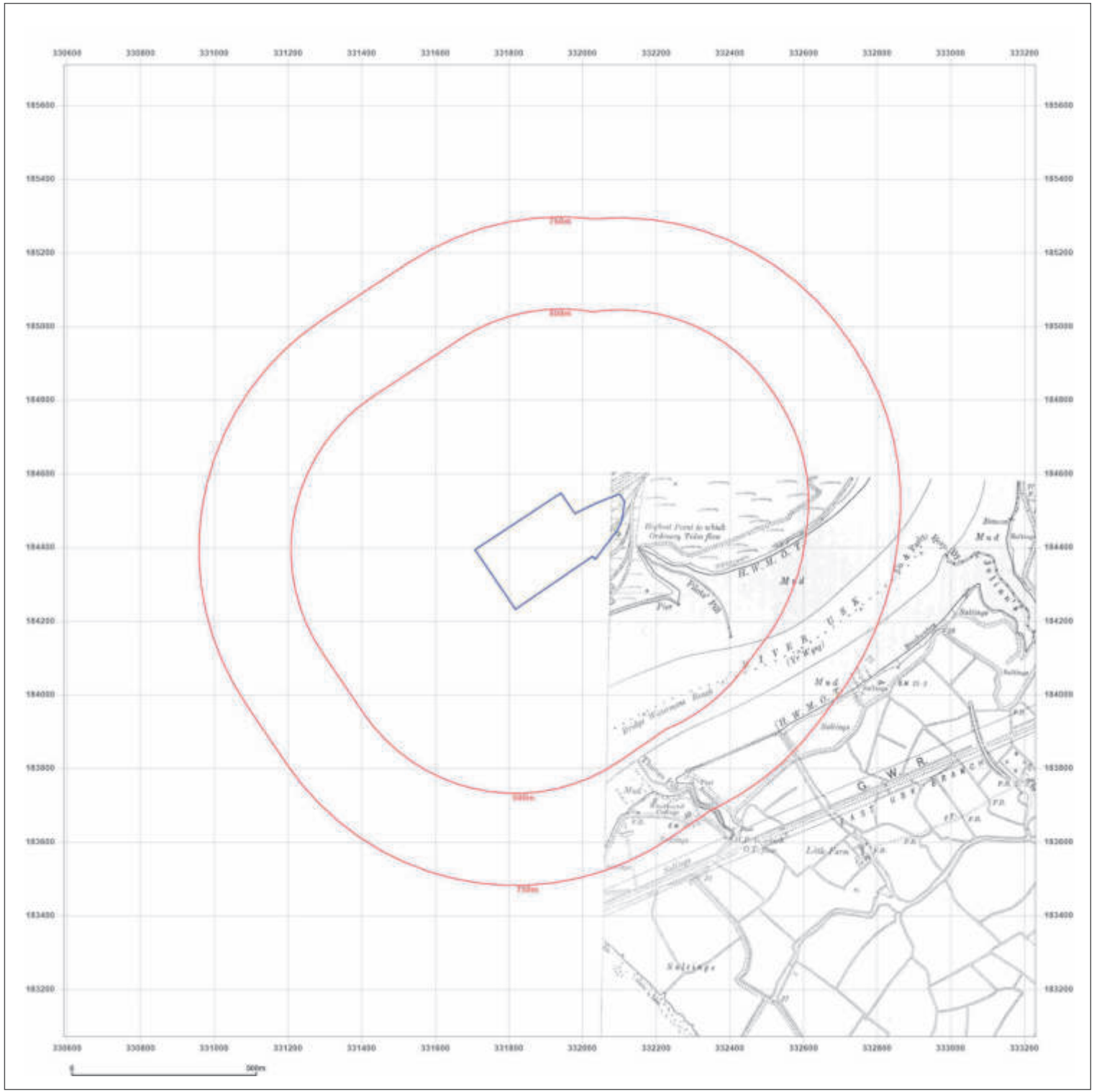

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: County Series
Map date: **1885**
Scale: 1:10,560
Printed at: 1:10,560

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W E
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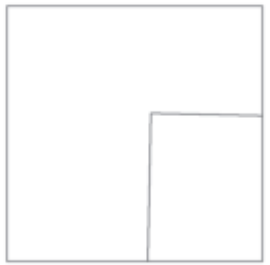

Surveyed 1885
Revised 1885
Edition N/A
Copyright N/A
Levelled N/A

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330600
330800
331000
331200
331400
331600
331800
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332200
332400
332600
332800
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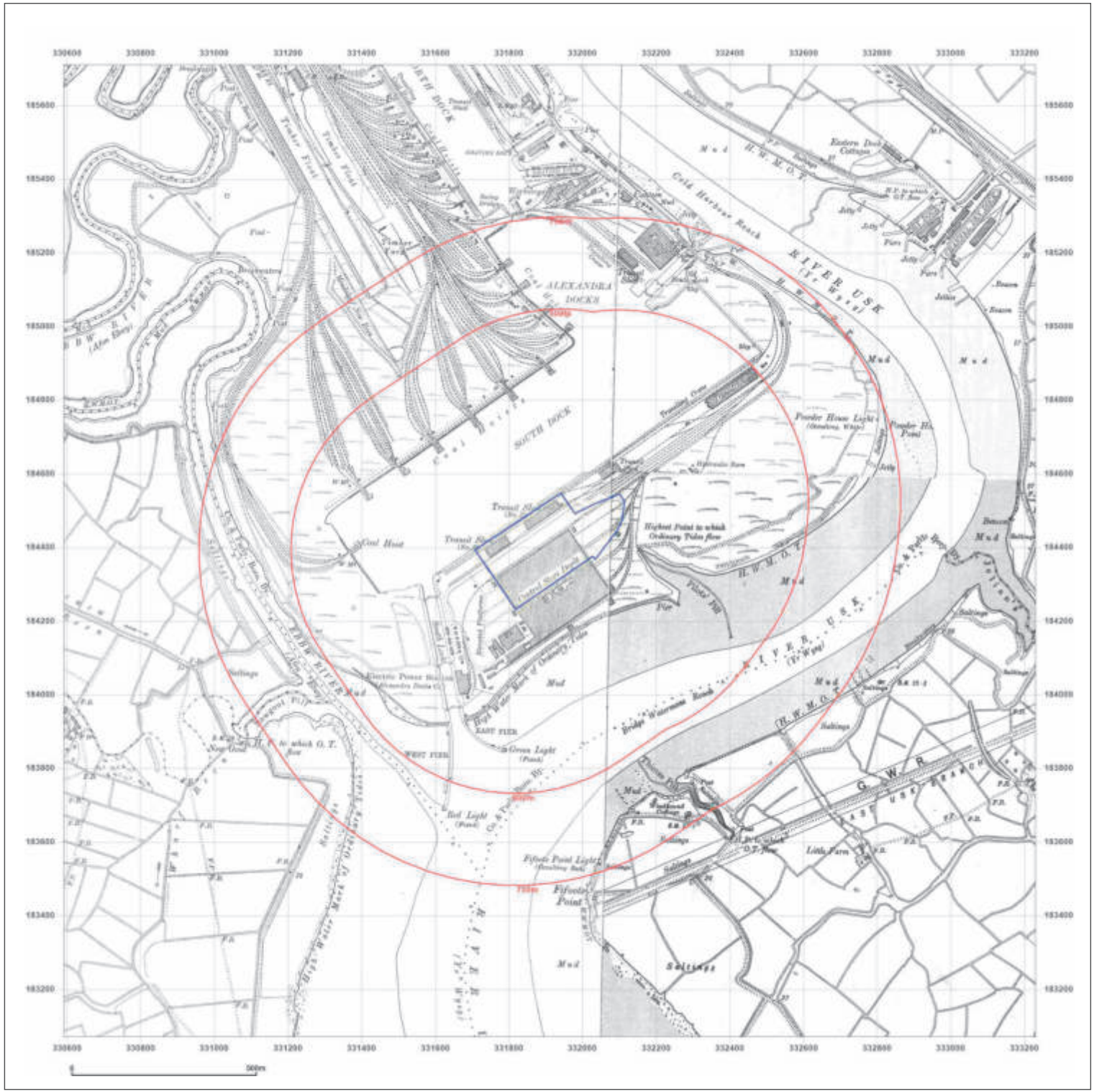
333200
185600
185400
185200
185000
184800
184600
184400
184200
184000
183800
183600
183400
183200
SOUTH DOCK
Pond
Mud
Fifoots Point
Fifoots Point Light
Cold Harbour Reach
Bridge Waterman Beach
Tidal Basin
Tidal Dock
Union Dry Docks
UNION DRY DOCKS
Pumping House &
Electric Light Sta.
Monmouthpt Port's Sanitary Hospital
Powder House Light
Powder House Pond
South Pumping Station
Little Farm
Windham Cottages
Union Dry Docks Cottages
Landing Slip
North Pier
North Lock
Dock House
Lighthouse
Passing Station
Tank
Pier
Jetties Pier
Jetties Pond
Tidal Basin
Timber Pond
Brookstone
Mon & Brec Canal
Pontypool & Caerleon Navigation
Pontypool & Caerleon Navig. Pier
Pontypool & Caerleon Navig. Basin
Pontypool & Caerleon Navig. Pier & Basin
Pontypool & Caerleon Navig. Basin & Pier



Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: County Series
Map date: **1920-1922**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
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Surveyed 1881
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1881
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1885
Revised 1922
Edition 1922
Copyright N/A
Levelled N/A

Surveyed 1885
Revised 1920
Edition 1922
Copyright N/A
Levelled 1900

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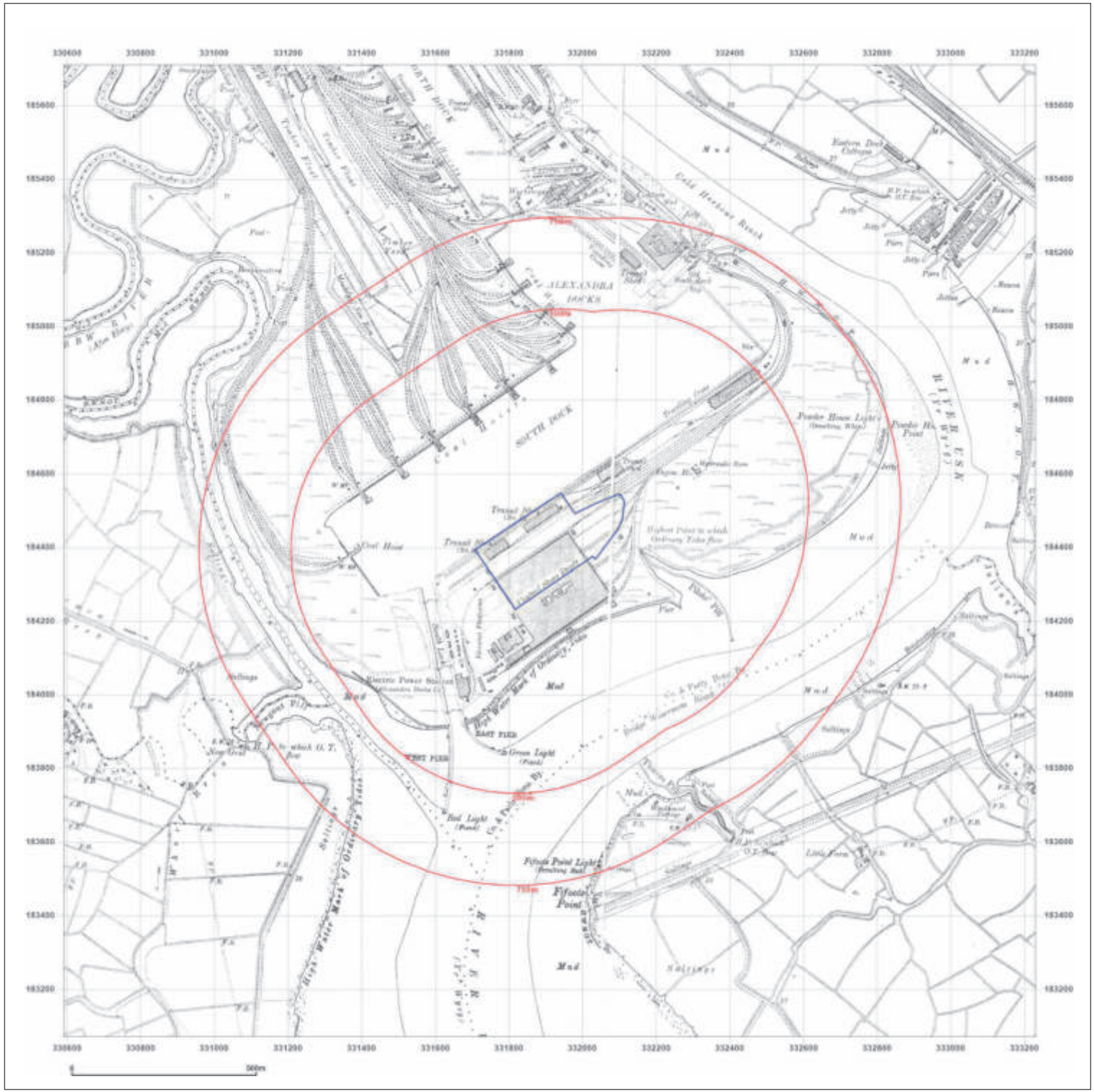

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: County Series
Map date: **1922**
Scale: 1:10,560
Printed at: 1:10,560

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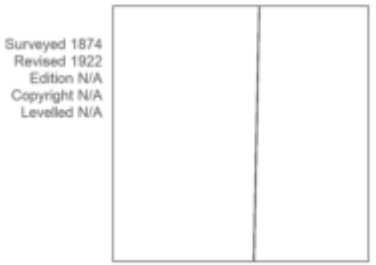

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Production date: 29 September 2023

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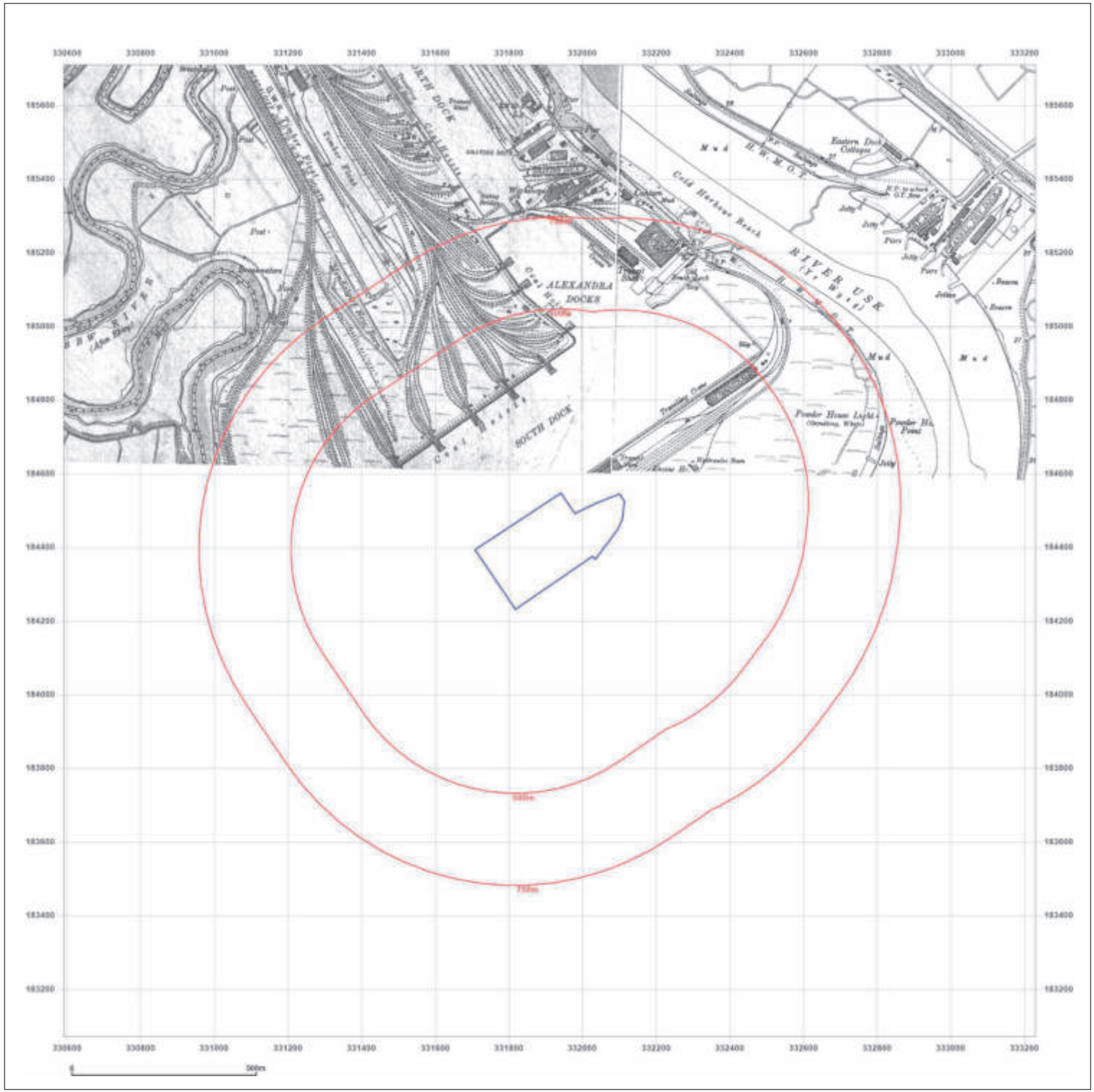

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: County Series
Map date: **1938**
Scale: 1:10,560
Printed at: 1:10,560

N
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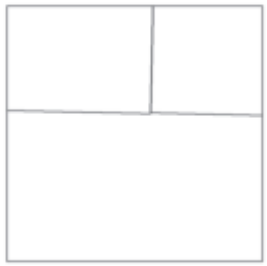
Surveyed 1881
Revised 1938
Edition N/A
Copyright N/A
Levelled 1900



Surveyed 1881
Revised 1938
Edition N/A
Copyright N/A
Levelled 1900

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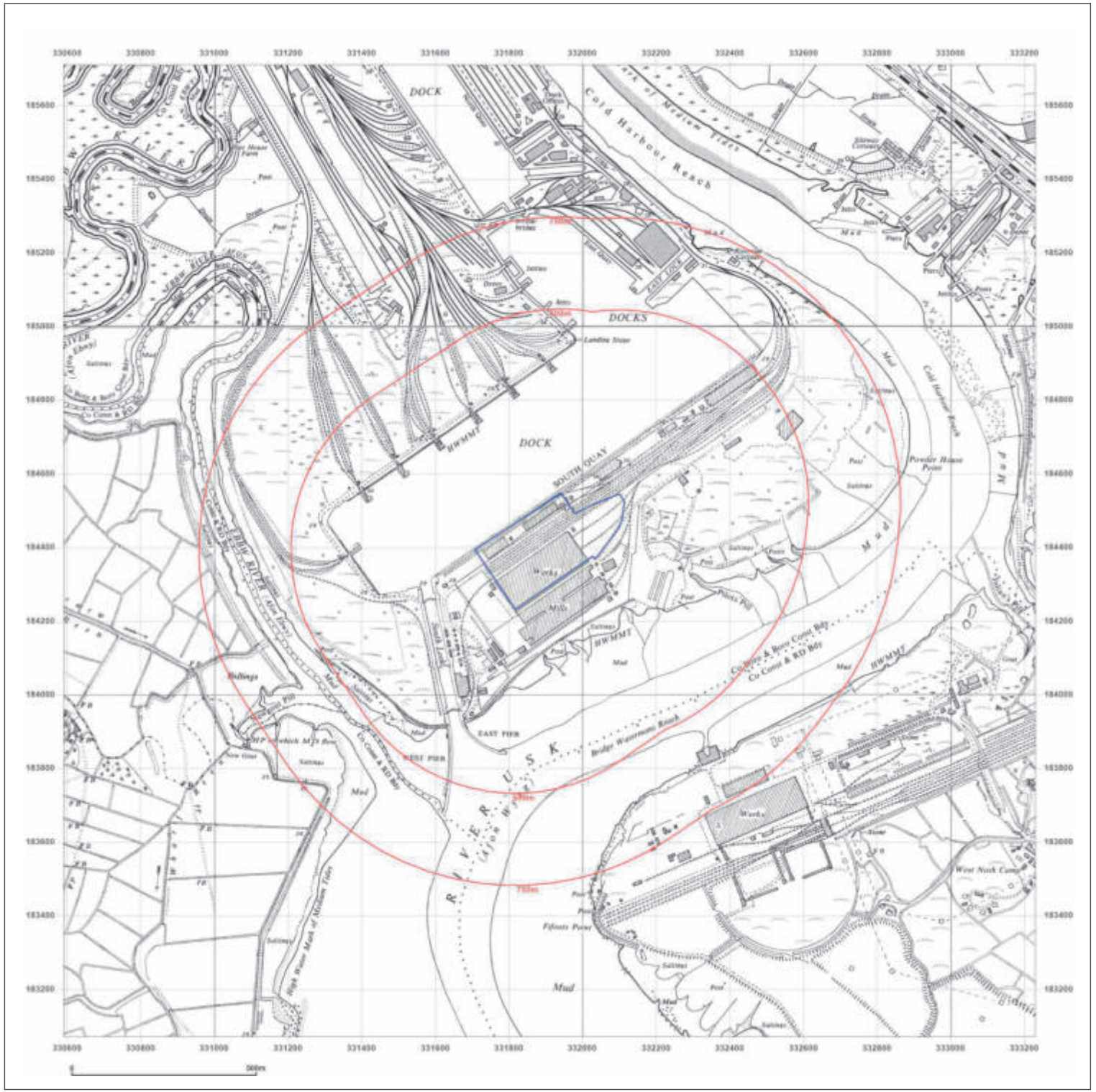
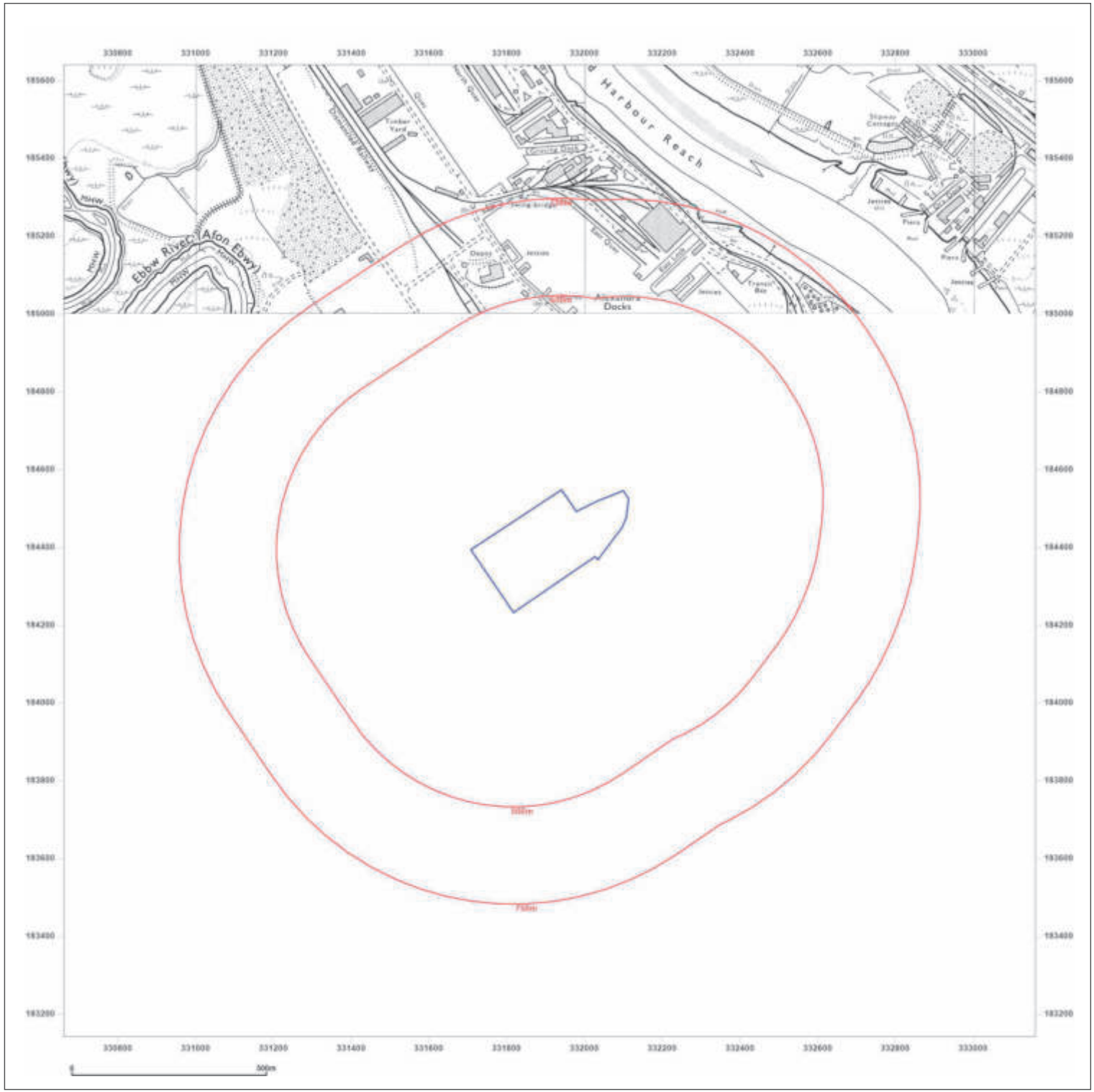
ALEXANDRA DOCKS
SOUTH DOCK
RIVER USK
Mud
Saltings
Pifcoke Point
Pifcoke Point Light
Powder House Light
EBBW RIVER
Coal Hard
Coal Hards
Highest Point to which Ordinary Tides flow
Trestle Road
Timber Wharf
Cold Harbour Reach
Eastern Dock Cottages
Little Farm
Red Light
Green Light
EAST PIER
WEST PIER
Hydraulic Ram
Powder Ho Point
Fifoots Point
Fifoots Point Light
Saltings
Mud
RIVER
RIVER USK
Coal Hards
Coal Hard


DOCK
DOCKS
DOCK
SOUTH QUAY
Cold Harbour Reach
Mud
Mud
Mud



Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: National Grid
Map date: **1973**
Scale: 1:10,000
Printed at: 1:10,000

N
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Surveyed 1973
Revised 1973
Edition N/A
Copyright N/A
Levelled N/A



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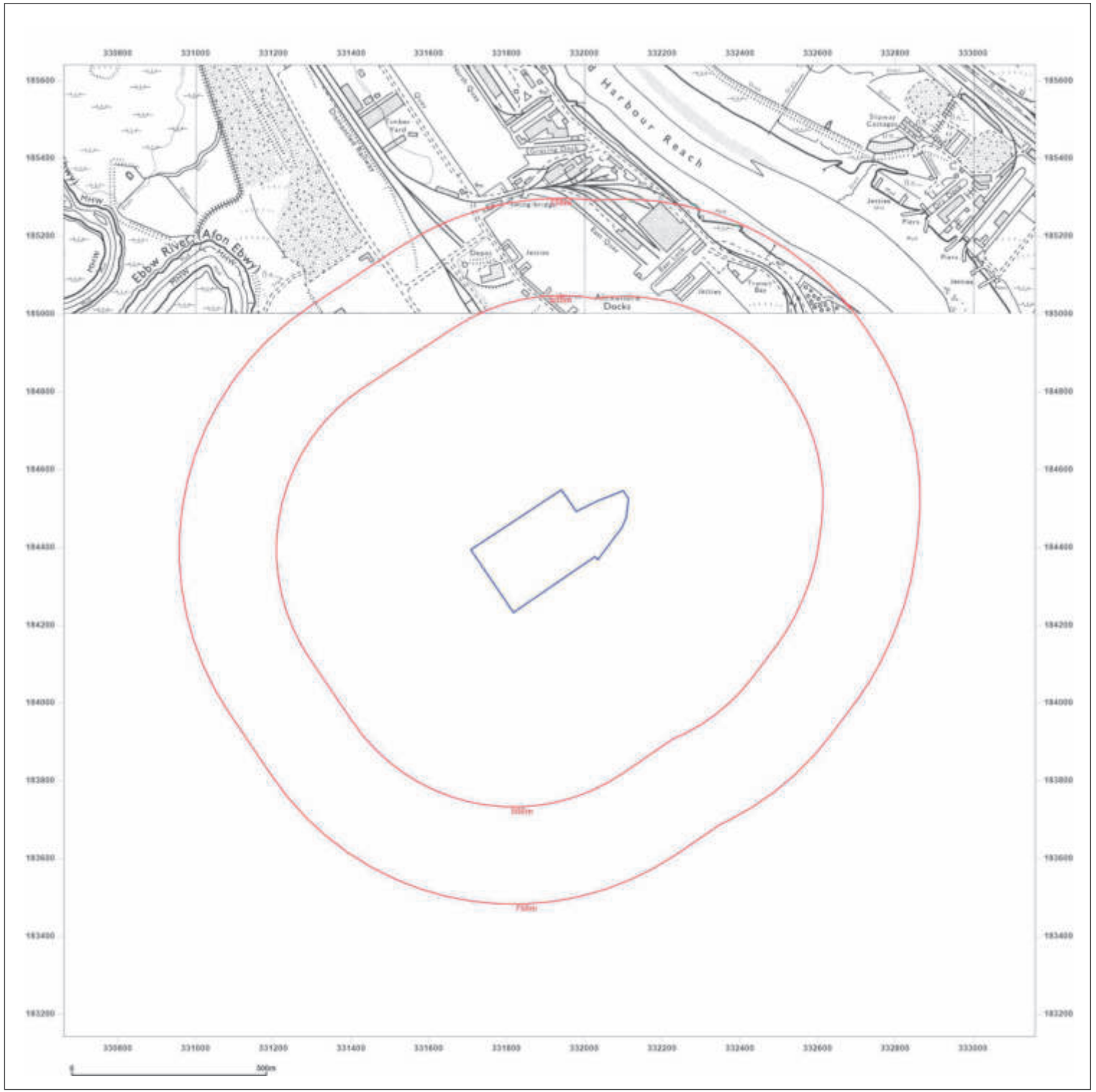

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: National Grid
Map date: 1981
Scale: 1:10,000
Printed at: 1:10,000

N
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Surveyed 1981
Revised 1981
Edition N/A
Copyright N/A
Levelled N/A



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NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: National Grid
Map date: **1985**
Scale: 1:10,000
Printed at: 1:10,000

N
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Surveyed 1984
Revised 1985
Edition N/A
Copyright N/A
Levelled N/A



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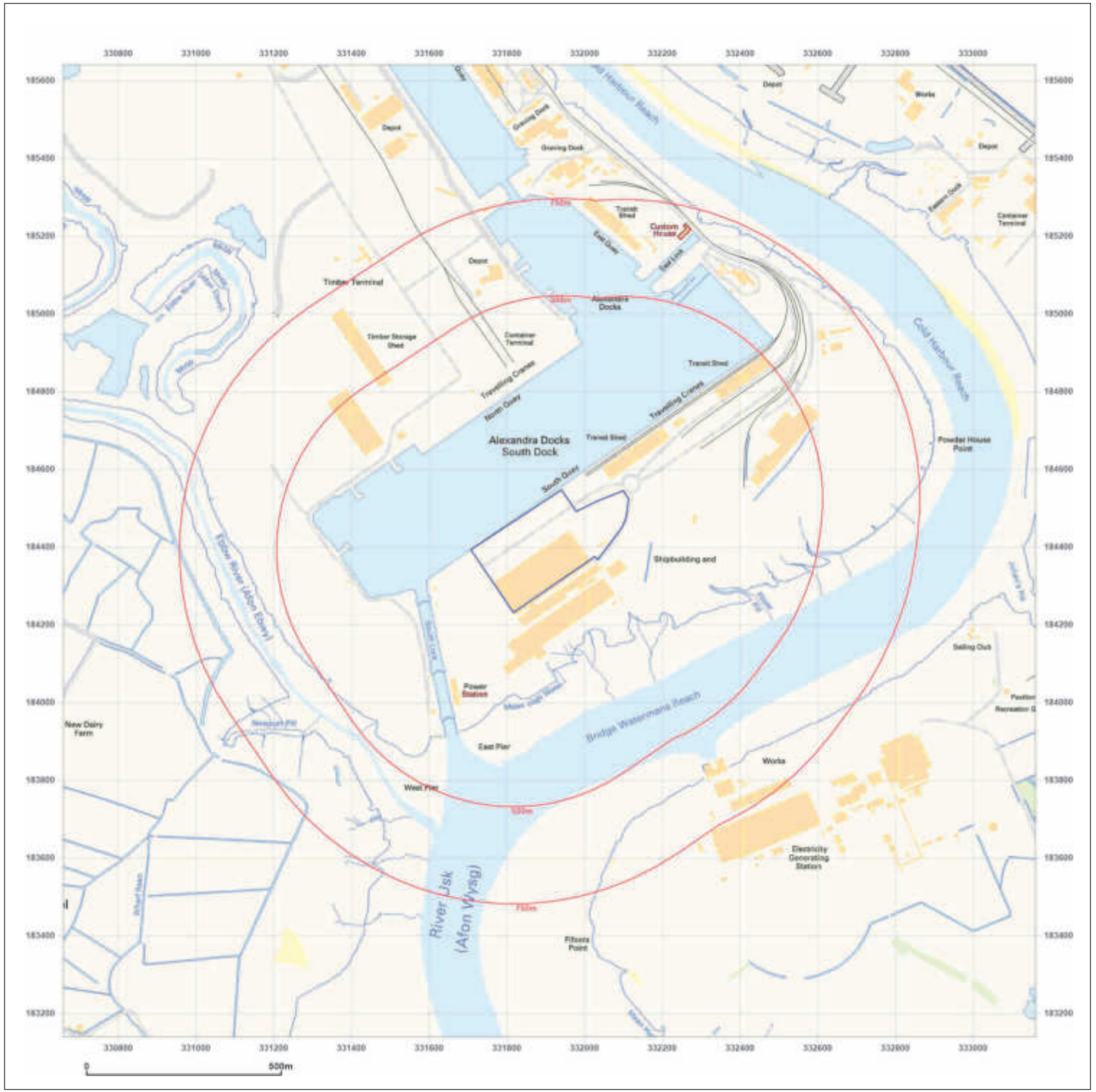

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: National Grid
Map date: 2001
Scale: 1:10,000
Printed at: 1:10,000

N
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2001

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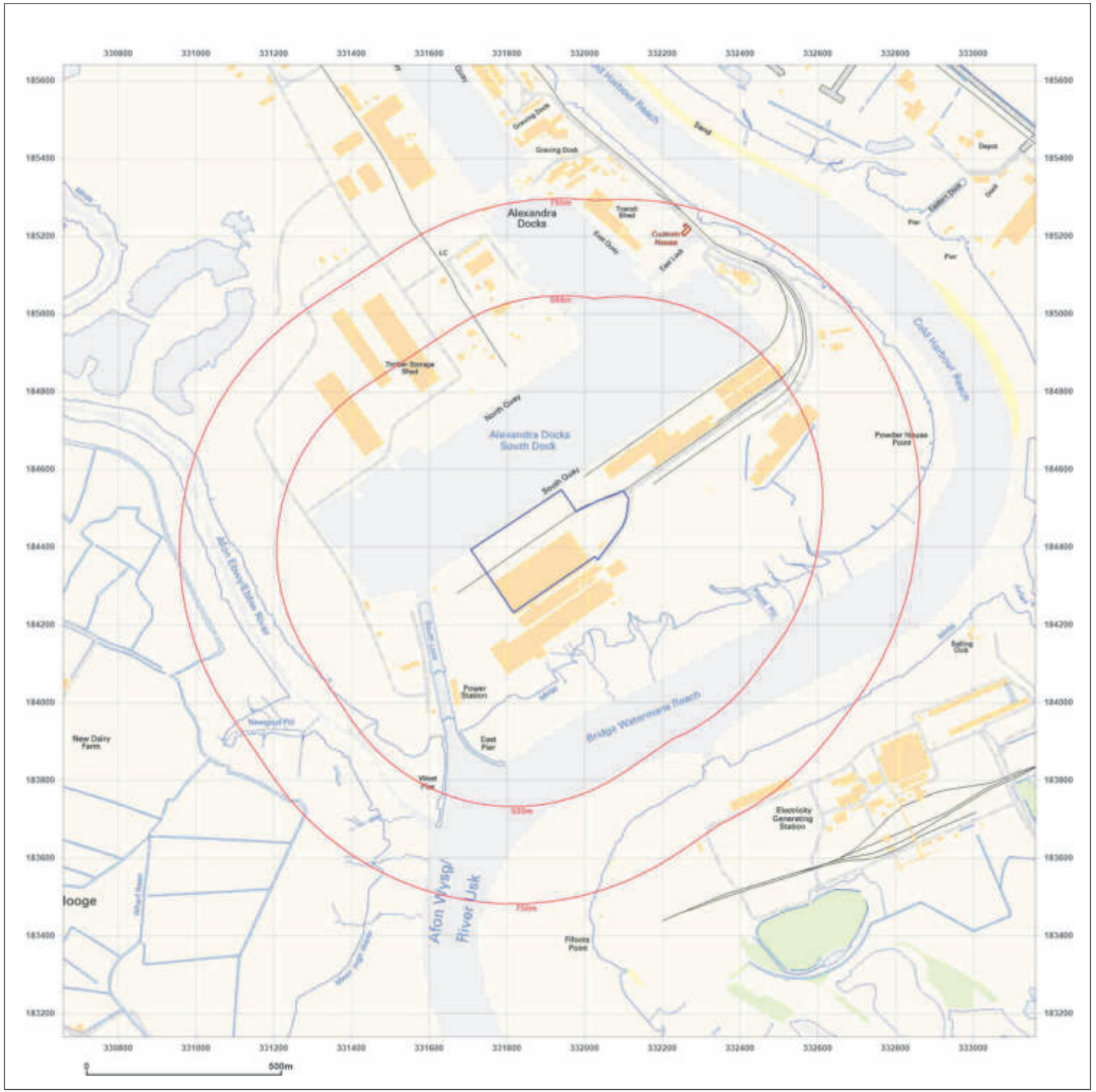

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: National Grid
Map date: 2010
Scale: 1:10,000
Printed at: 1:10,000

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Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E
Grid Ref: 331910, 184390

Map Name: National Grid
Map date: 2023
Scale: 1:10,000
Printed at: 1:10,000

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2023

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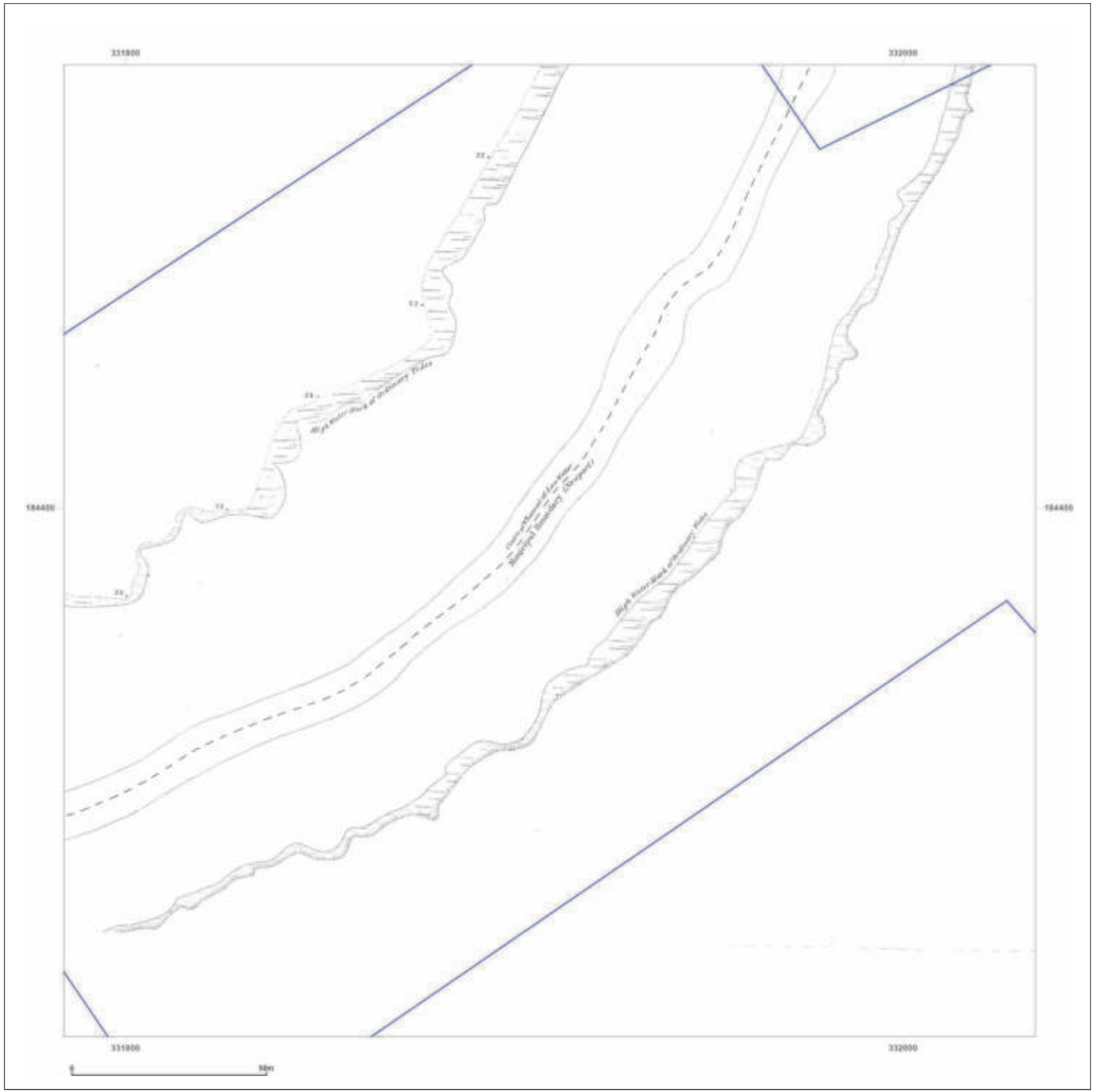

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_2500
Grid Ref: 331909, 184389

Map Name: County Series Town Plan
Map date: **1883**
Scale: 1:500
Printed at: 1:1,000

N
W E
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Surveyed 1883
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_2500
Grid Ref: 331909, 184389

Map Name: County Series Town Plan
Map date: **1883**
Scale: 1:500
Printed at: 1:1,000

N
W E
S

Surveyed 1883
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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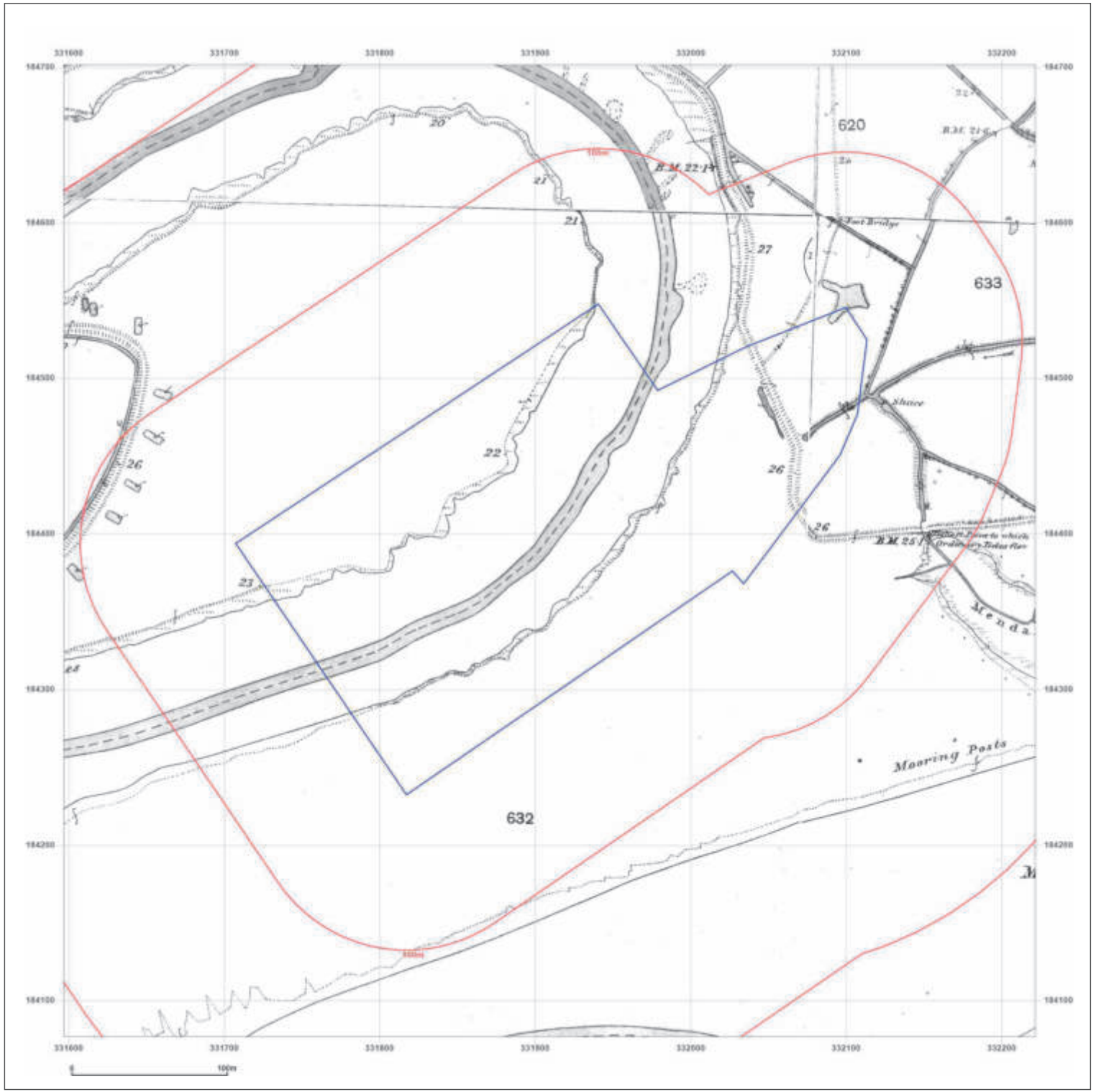

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_2500
Grid Ref: 331909, 184389

Map Name: County Series
Map date: 1884
Scale: 1:2,500
Printed at: 1:2,500

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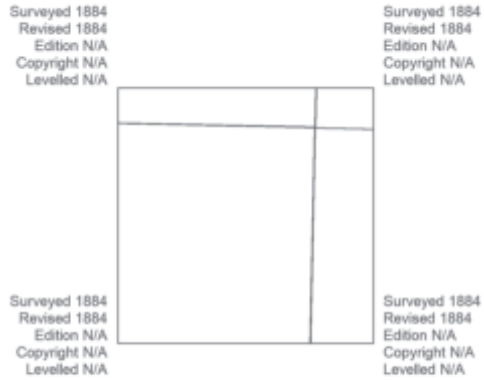

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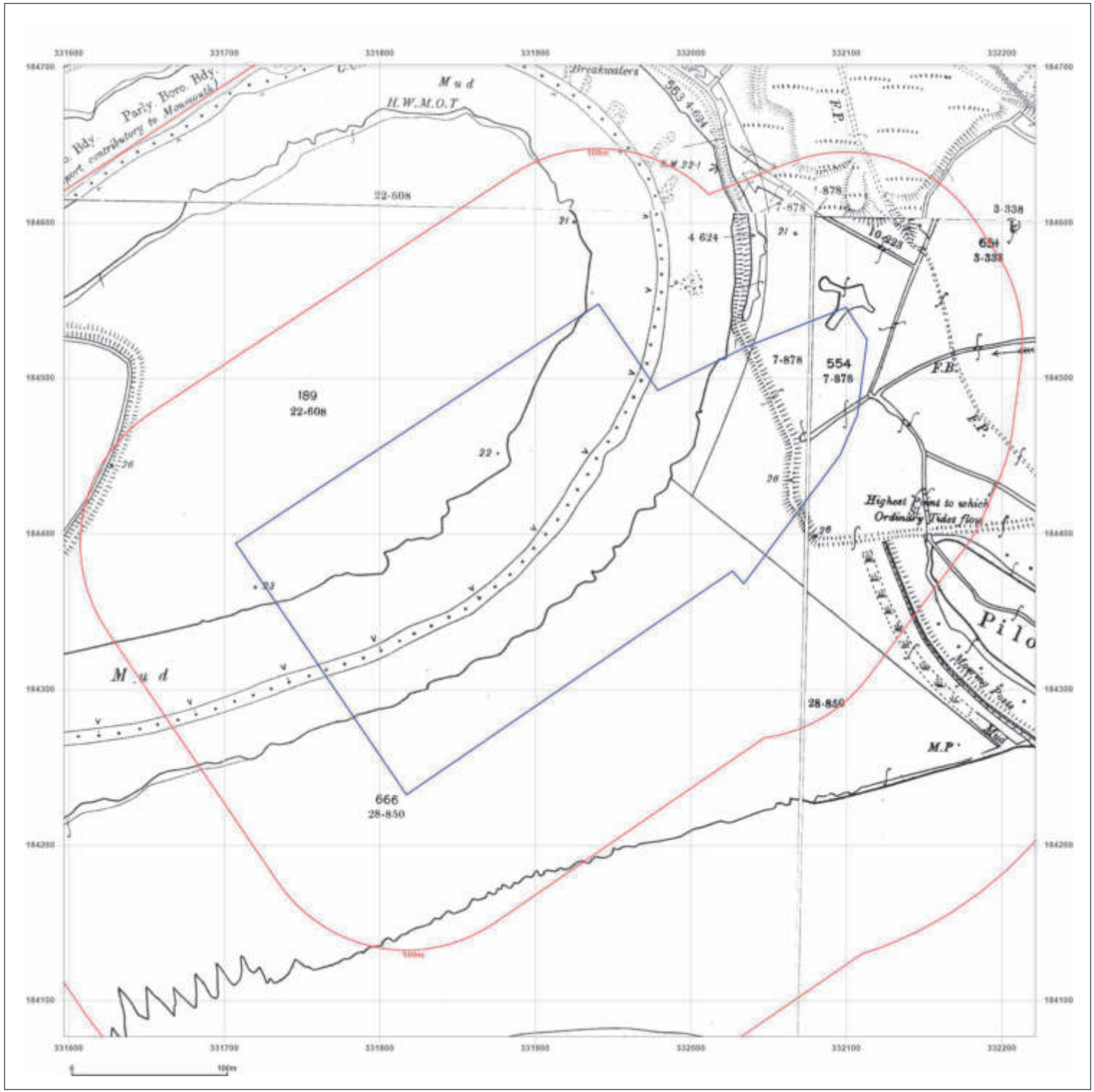

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_2500
Grid Ref: 331909, 184389

Map Name: County Series
Map date: 1900-1901
Scale: 1:2,500
Printed at: 1:2,500

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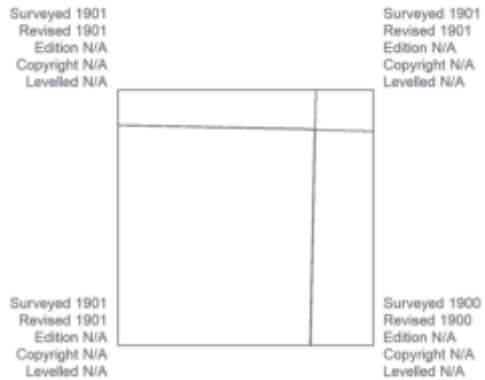

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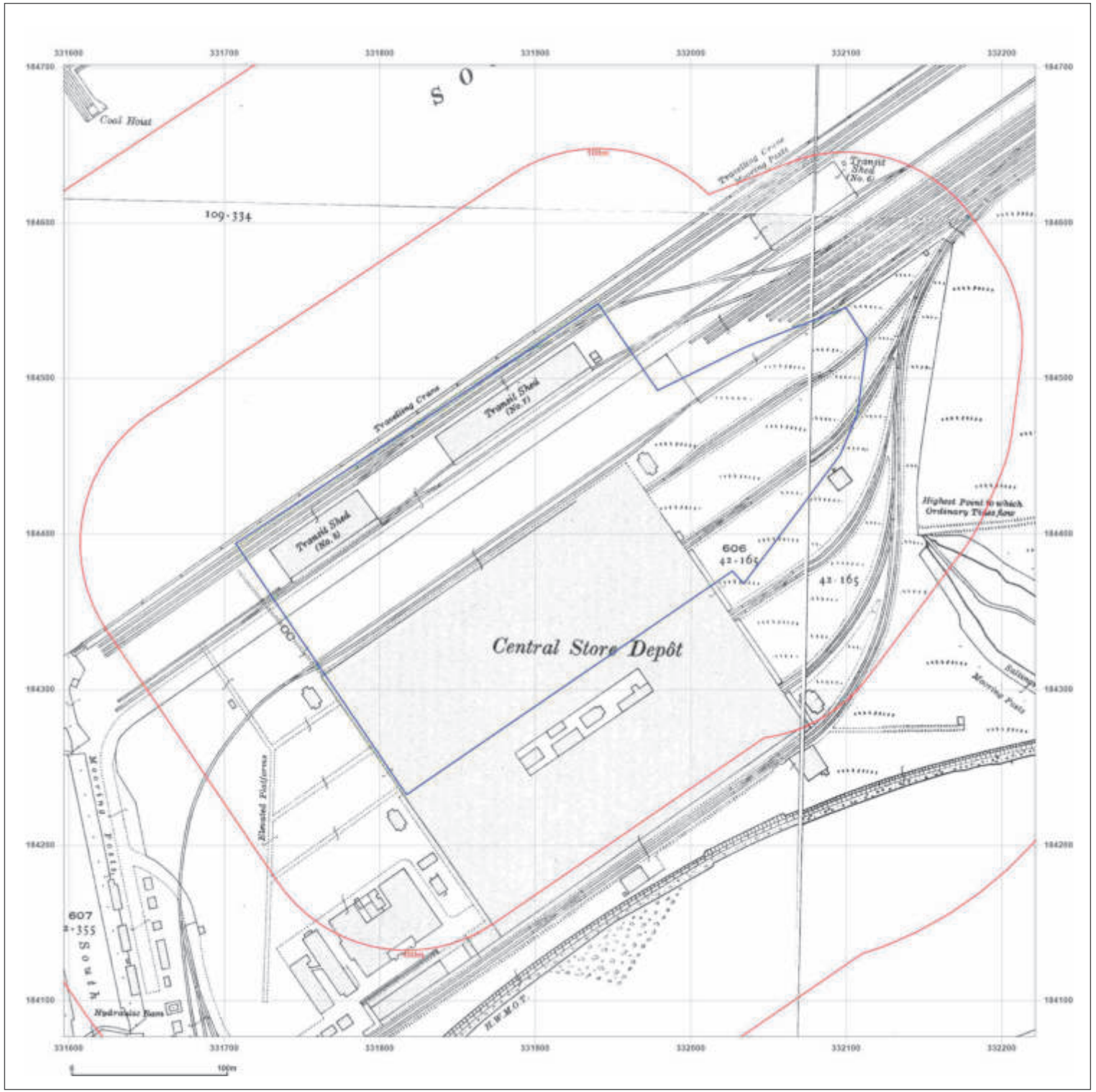

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_2500
Grid Ref: 331909, 184389

Map Name: County Series
Map date: 1920-1921
Scale: 1:2,500
Printed at: 1:2,500

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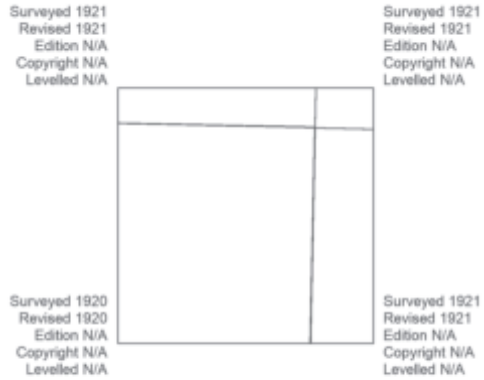

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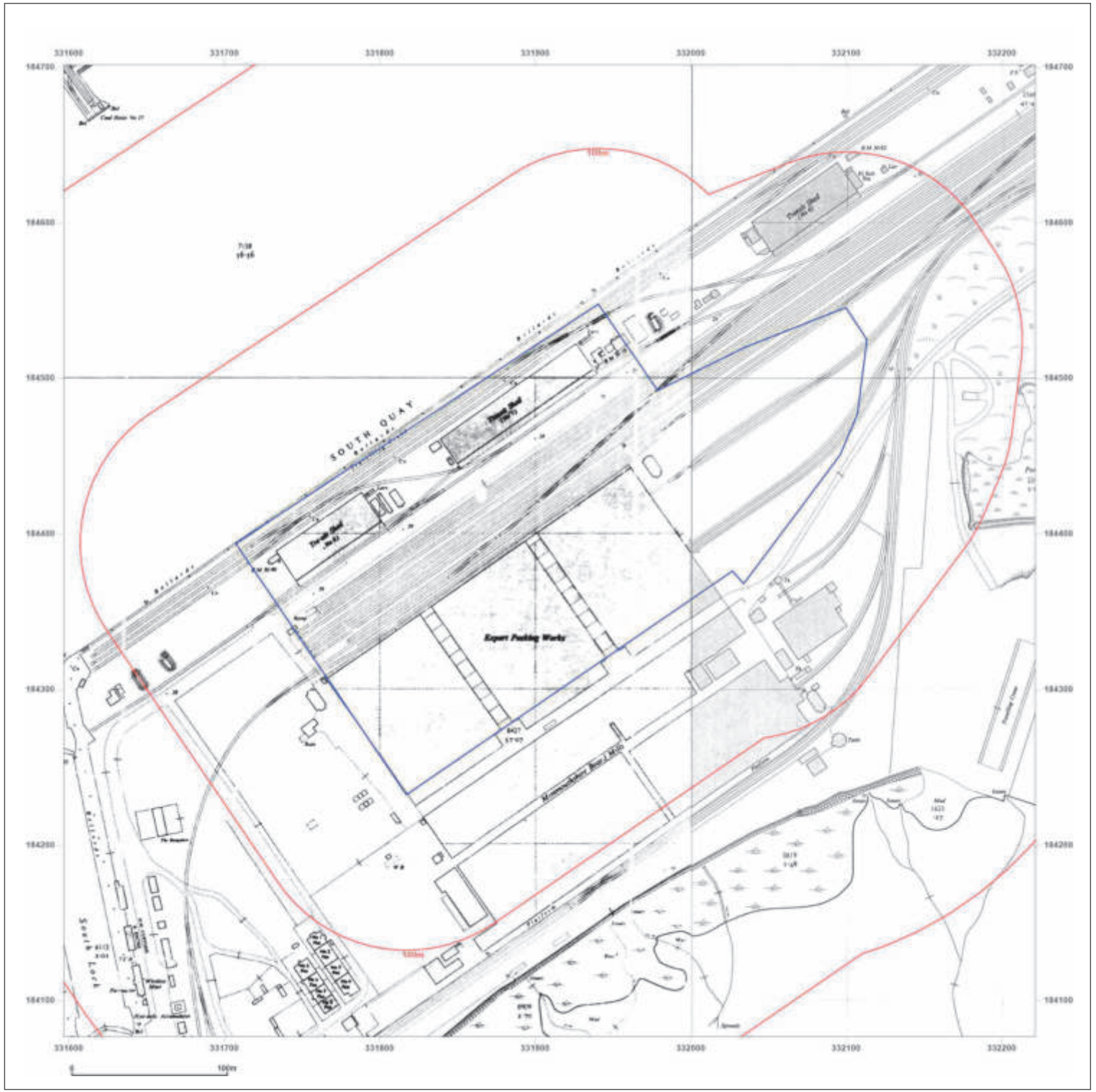

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_2500
Grid Ref: 331909, 184389

Map Name: National Grid
Map date: **1956**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1955
Revised N/A
Edition 1956
Copyright N/A
Levelled 1952

Surveyed 1956
Revised 1956
Edition 1956
Copyright N/A
Levelled 1952

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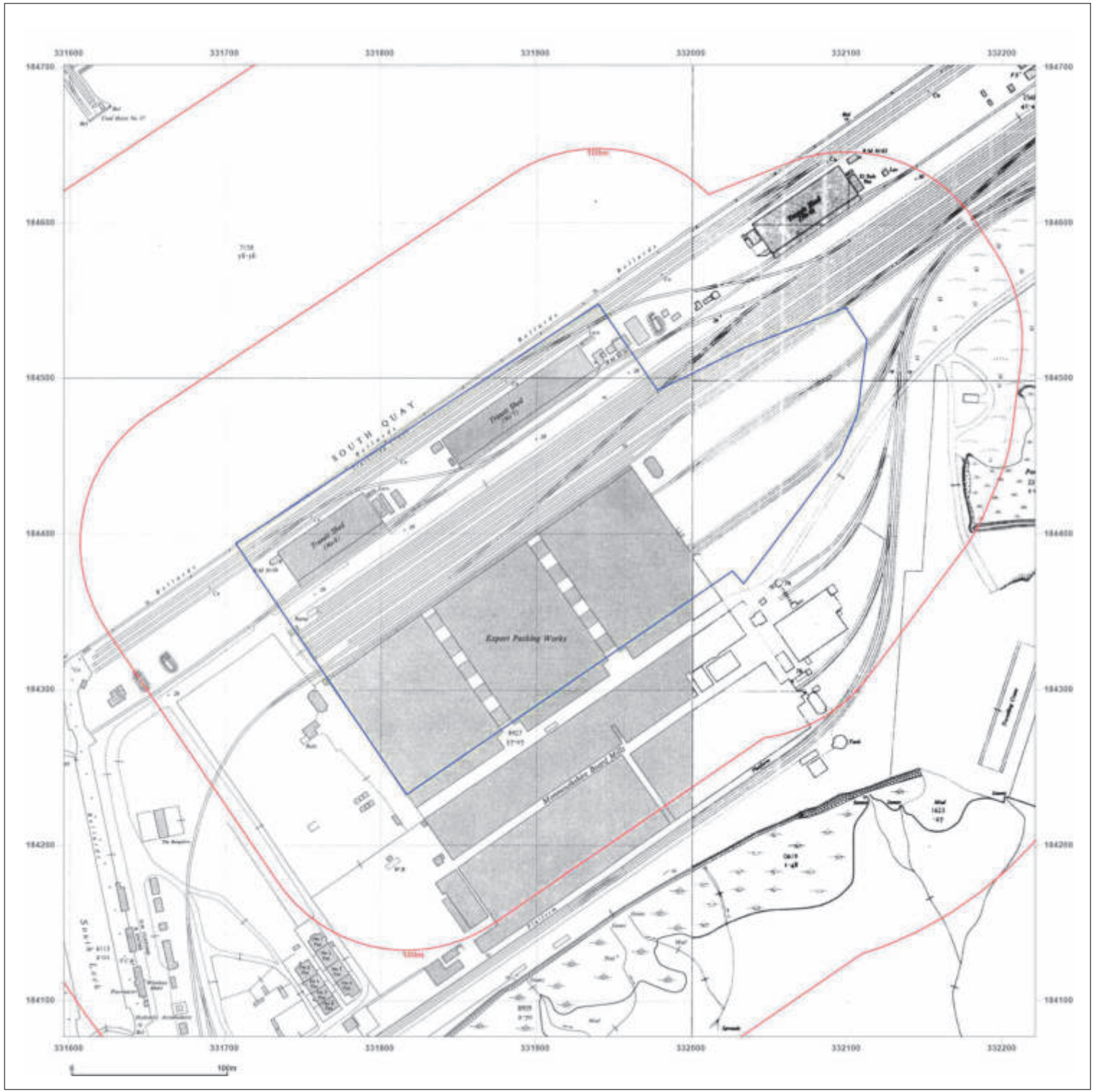

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_2500
Grid Ref: 331909, 184389

Map Name: National Grid
Map date: 1956-1957
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1955
Revised 1955
Edition 1956
Copyright N/A
Levelled 1952

Surveyed 1956
Revised N/A
Edition 1956
Copyright N/A
Levelled 1952

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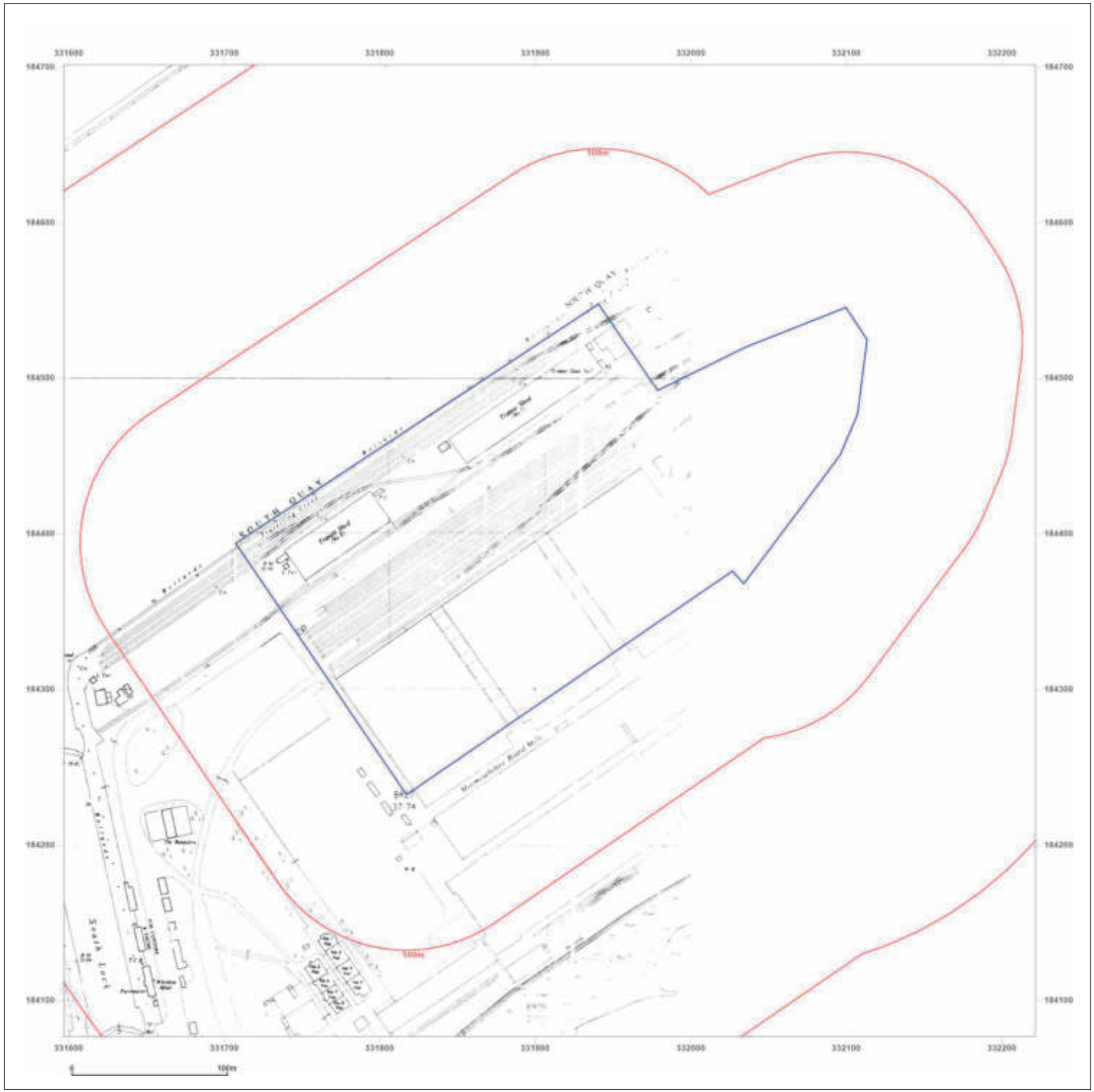
www.groundsure.com/sites/default/files/groundsure_legend.pdf



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Site Details:

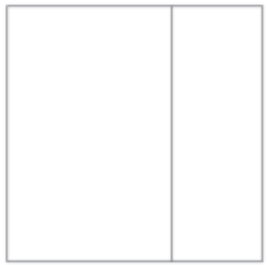
ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_2500
Grid Ref: 331909, 184389

Map Name: National Grid
Map date: **1969**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



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Production date: 29 September 2023

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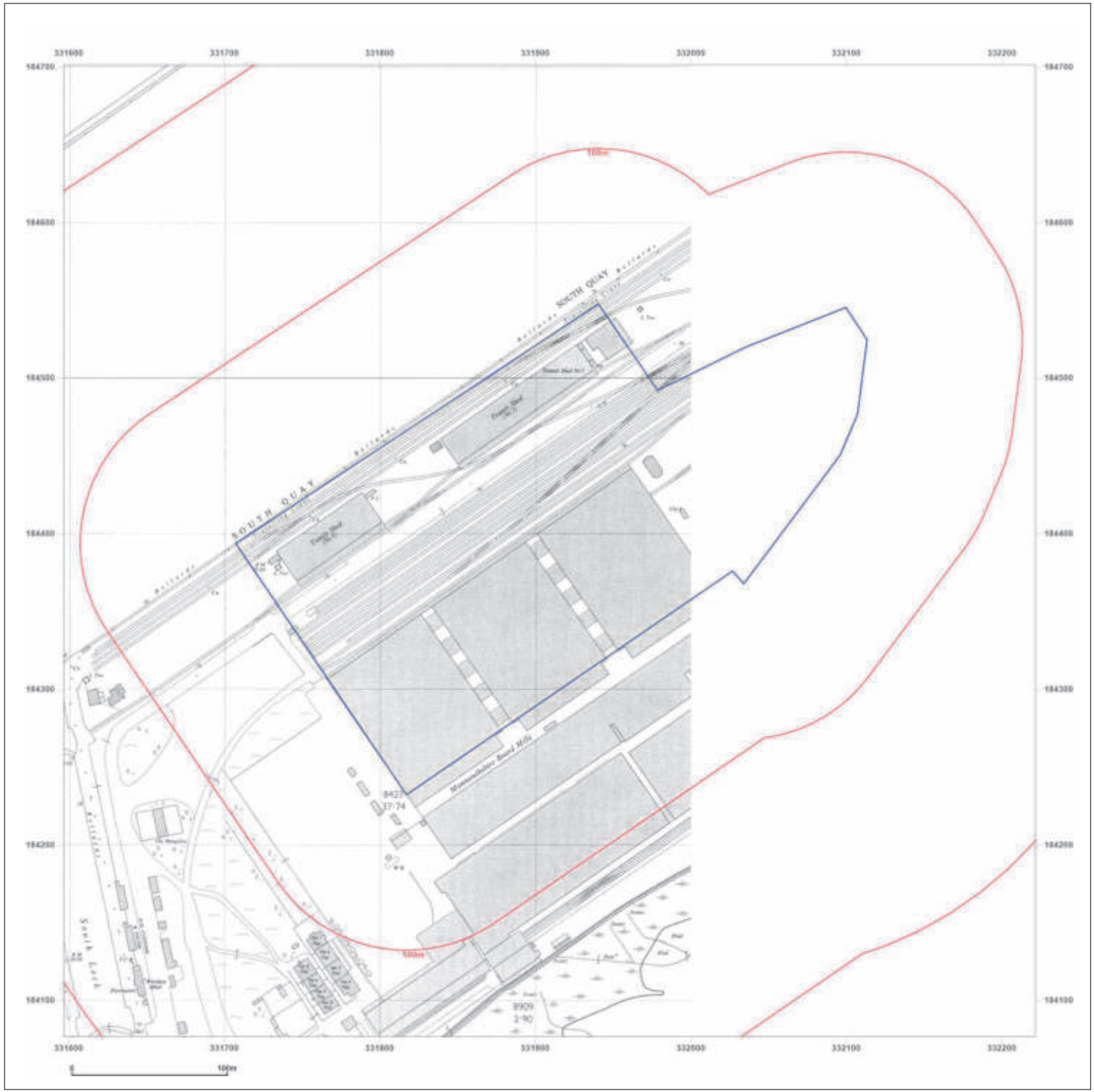

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_2500
Grid Ref: 331909, 184389

Map Name: National Grid
Map date: **1969**
Scale: 1:2,500
Printed at: 1:2,500

N
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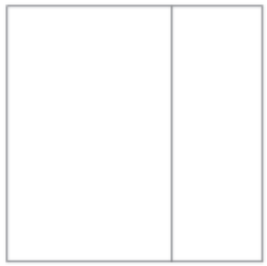
Surveyed 1968
Revised 1968
Edition N/A
Copyright 1969
Levelled 1961



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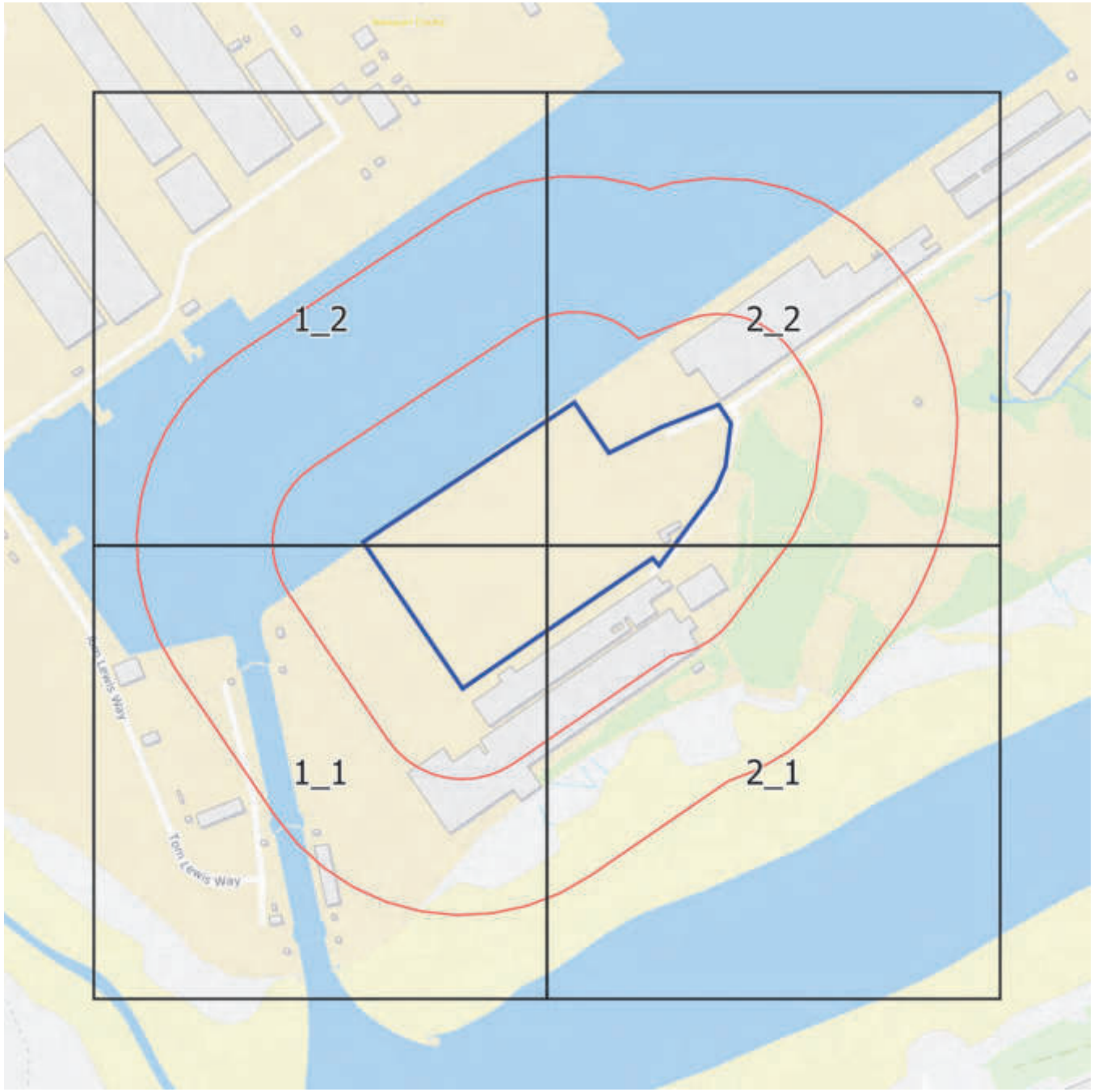

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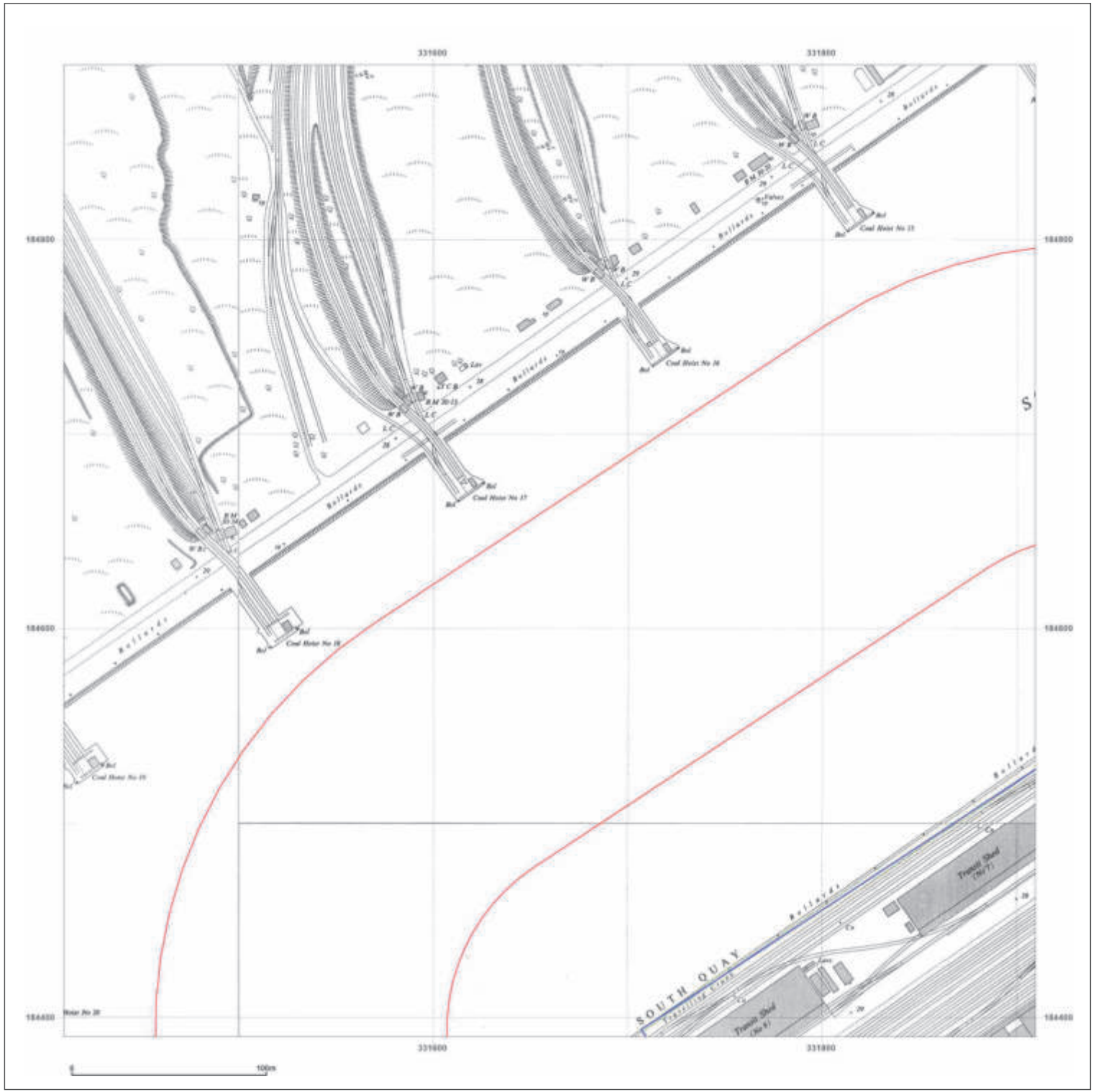
1:1,250 Scale Grid Index





Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_1_2
Grid Ref: 331660, 184640

Map Name: National Grid
Map date: **1955**
Scale: 1:1,250
Printed at: 1:2,000

N
W E
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Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1952	Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1952
Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1952	Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1952

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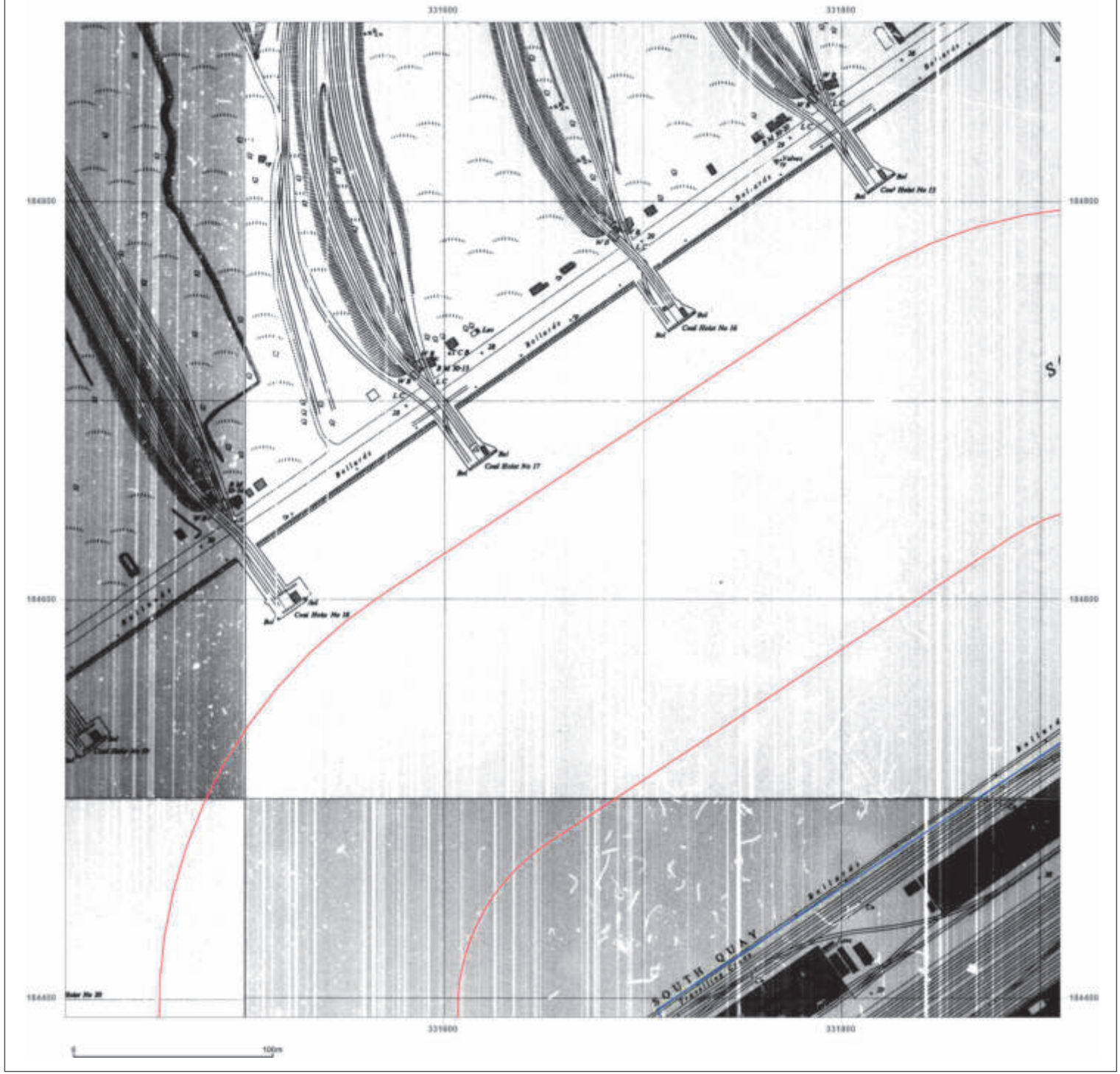

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Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_1_2
Grid Ref: 331660, 184640

Map Name: National Grid
Map date: **1956**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed 1955 Revised N/A Edition 1956 Copyright N/A Levelled N/A		Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A
Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A		Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A

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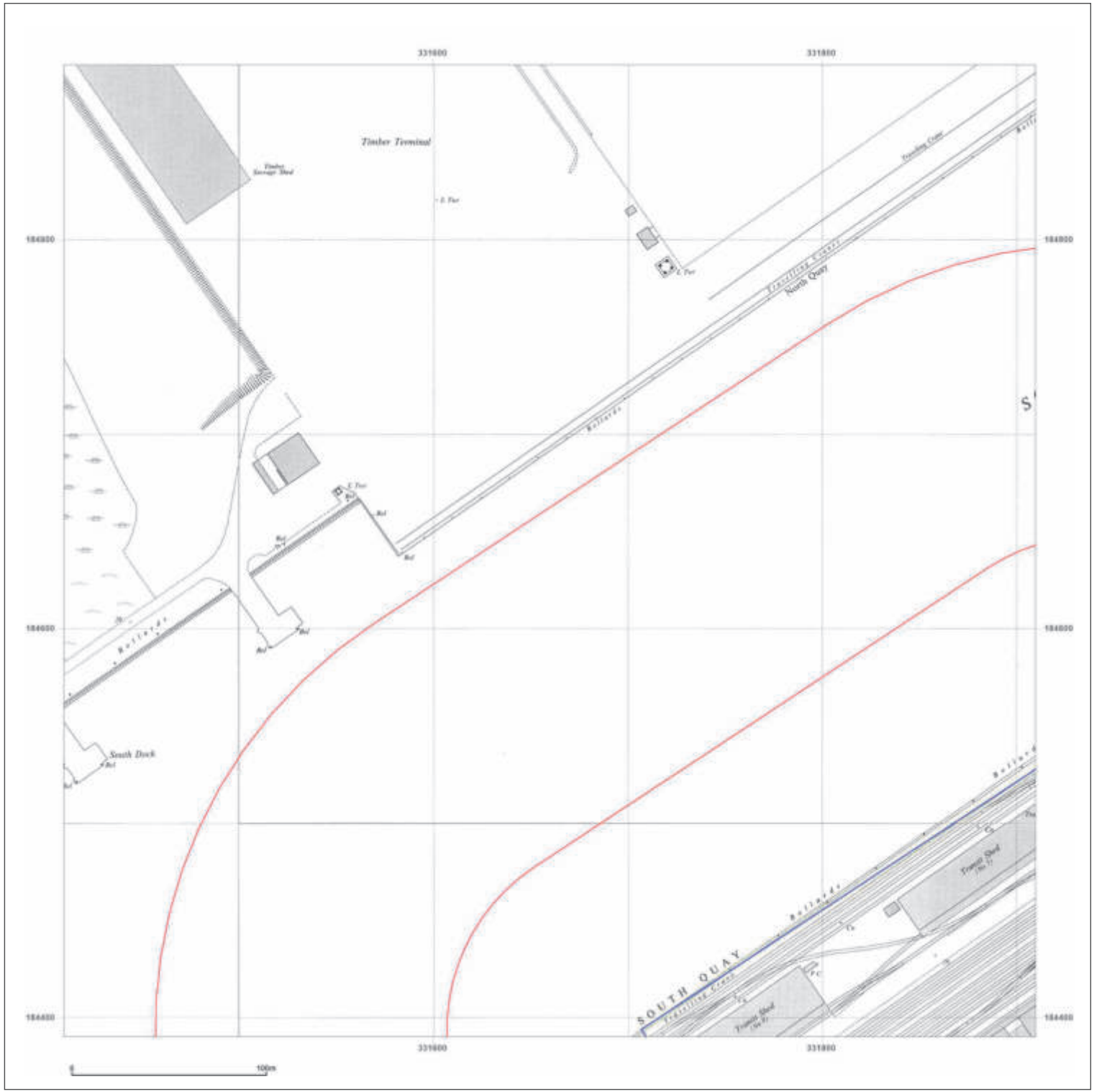

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_1_2
Grid Ref: 331660, 184640

Map Name: National Grid
Map date: **1968**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed 1955 Revised 1968 Edition N/A Copyright 1968 Levelled 1961	Surveyed 1955 Revised 1968 Edition N/A Copyright 1968 Levelled 1961
Surveyed 1955 Revised 1968 Edition N/A Copyright 1968 Levelled 1961	Surveyed 1955 Revised 1968 Edition N/A Copyright 1968 Levelled 1961

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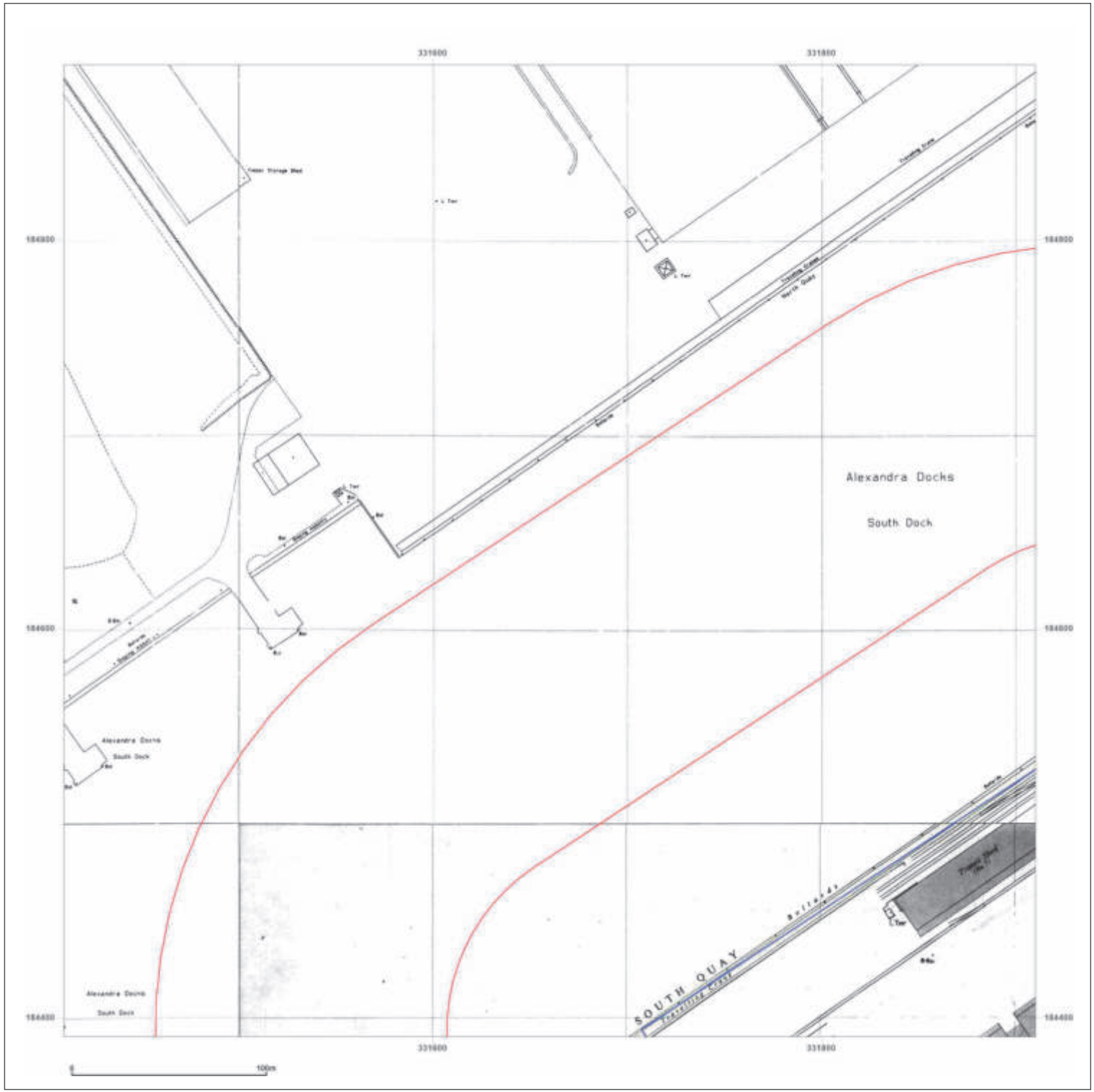

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Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_1_2
Grid Ref: 331660, 184640

Map Name: National Grid
Map date: **1989-1992**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A
Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A	Surveyed 1961 Revised 1989 Edition N/A Copyright 1989 Levelled 1961

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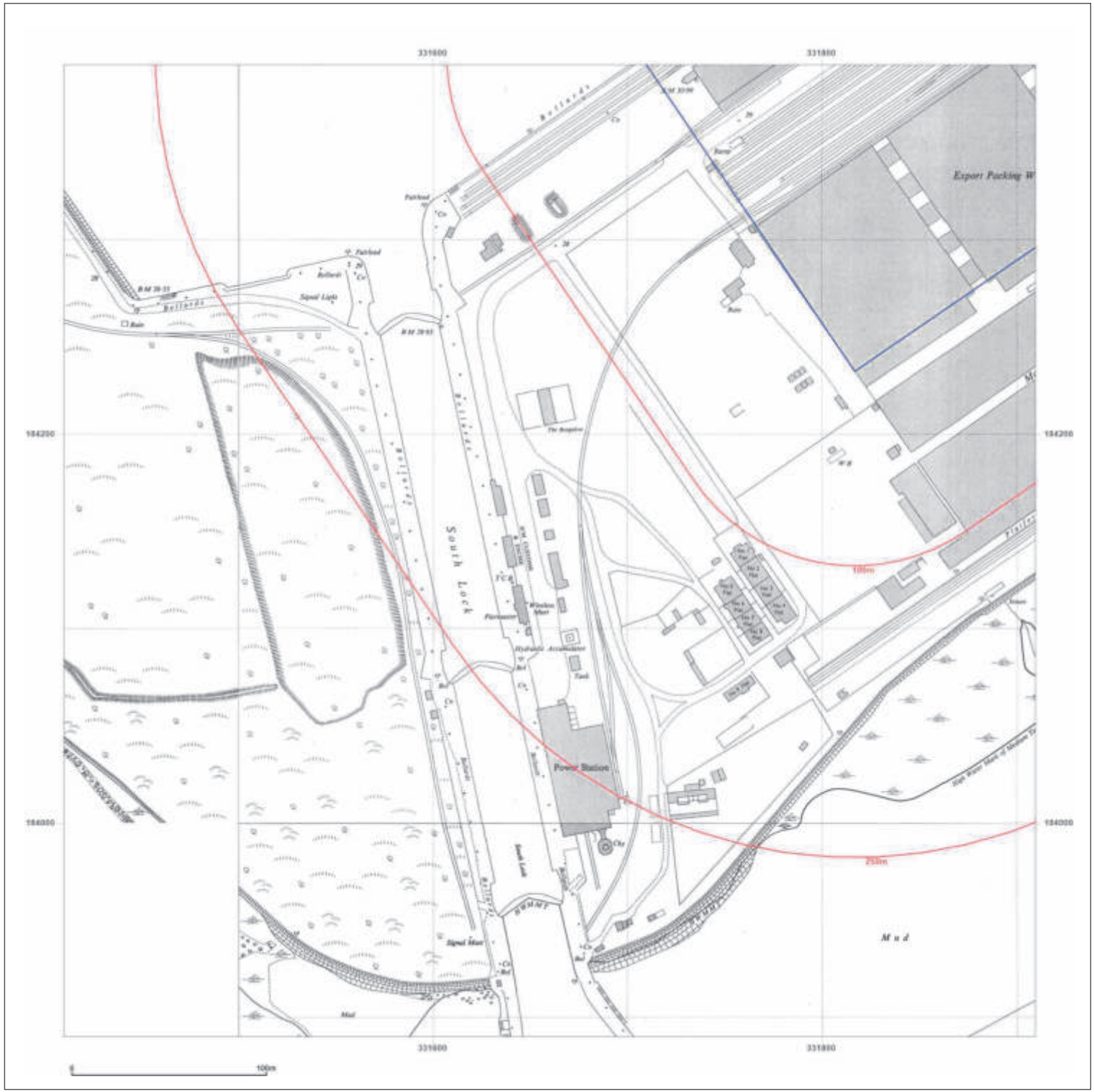

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Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_1_1
Grid Ref: 331660, 184140

Map Name: National Grid
Map date: **1955-1956**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed 1955
Revised 1955
Edition N/A
Copyright N/A
Levelled 1952

Surveyed 1955
Revised 1955
Edition N/A
Copyright N/A
Levelled 1952

Surveyed 1956
Revised 1956
Edition N/A
Copyright N/A
Levelled N/A

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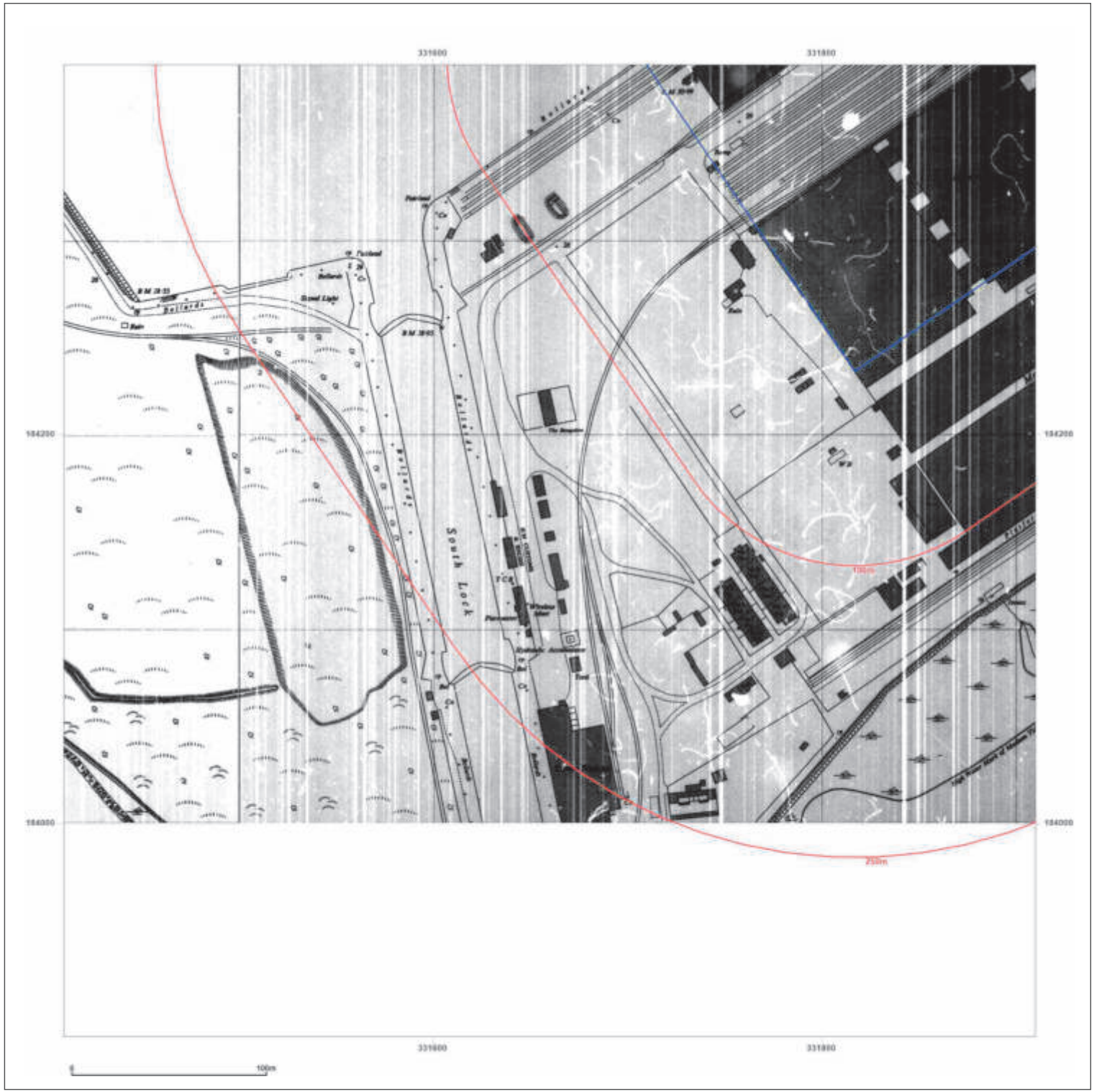

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Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_1_1
Grid Ref: 331660, 184140

Map Name: National Grid
Map date: **1956**
Scale: 1:1,250
Printed at: 1:2,000

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_1_1
Grid Ref: 331660, 184140

Map Name: National Grid
Map date: **1966-1968**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed 1955
Revised 1968
Edition N/A
Copyright 1968
Levelled 1961

Surveyed 1955
Revised 1968
Edition N/A
Copyright 1968
Levelled 1961

Surveyed 1956
Revised 1965
Edition N/A
Copyright 1966
Levelled 1961

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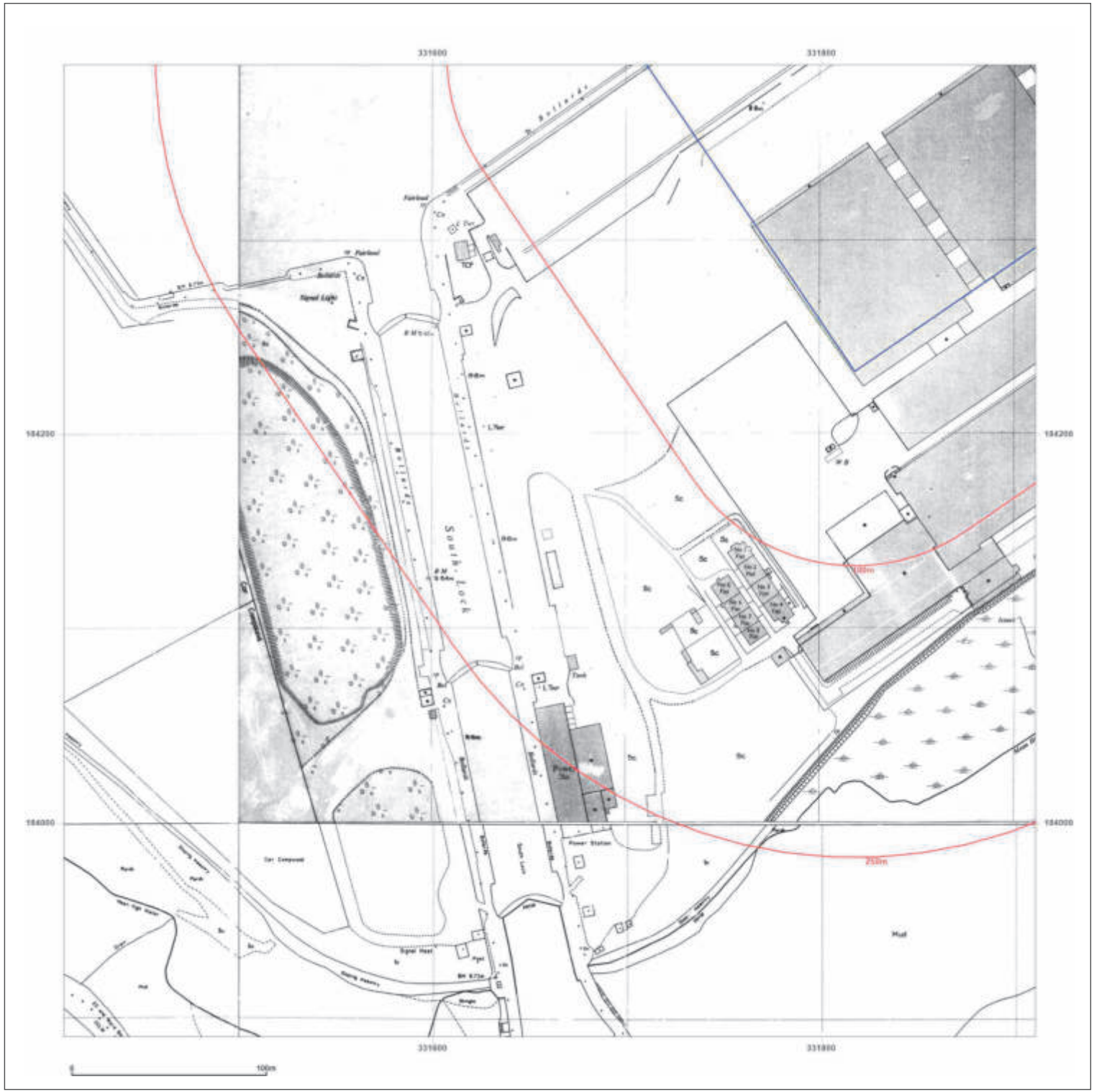

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Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_1_1
Grid Ref: 331660, 184140

Map Name: National Grid
Map date: 1989-1992
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A	Surveyed 1961 Revised 1989 Edition N/A Copyright 1989 Levelled 1961
Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A

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NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_1_1
Grid Ref: 331660, 184140

Map Name: National Grid
Map date: **1992-1995**
Scale: 1:1,250
Printed at: 1:2,000

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1992
Levelled N/A

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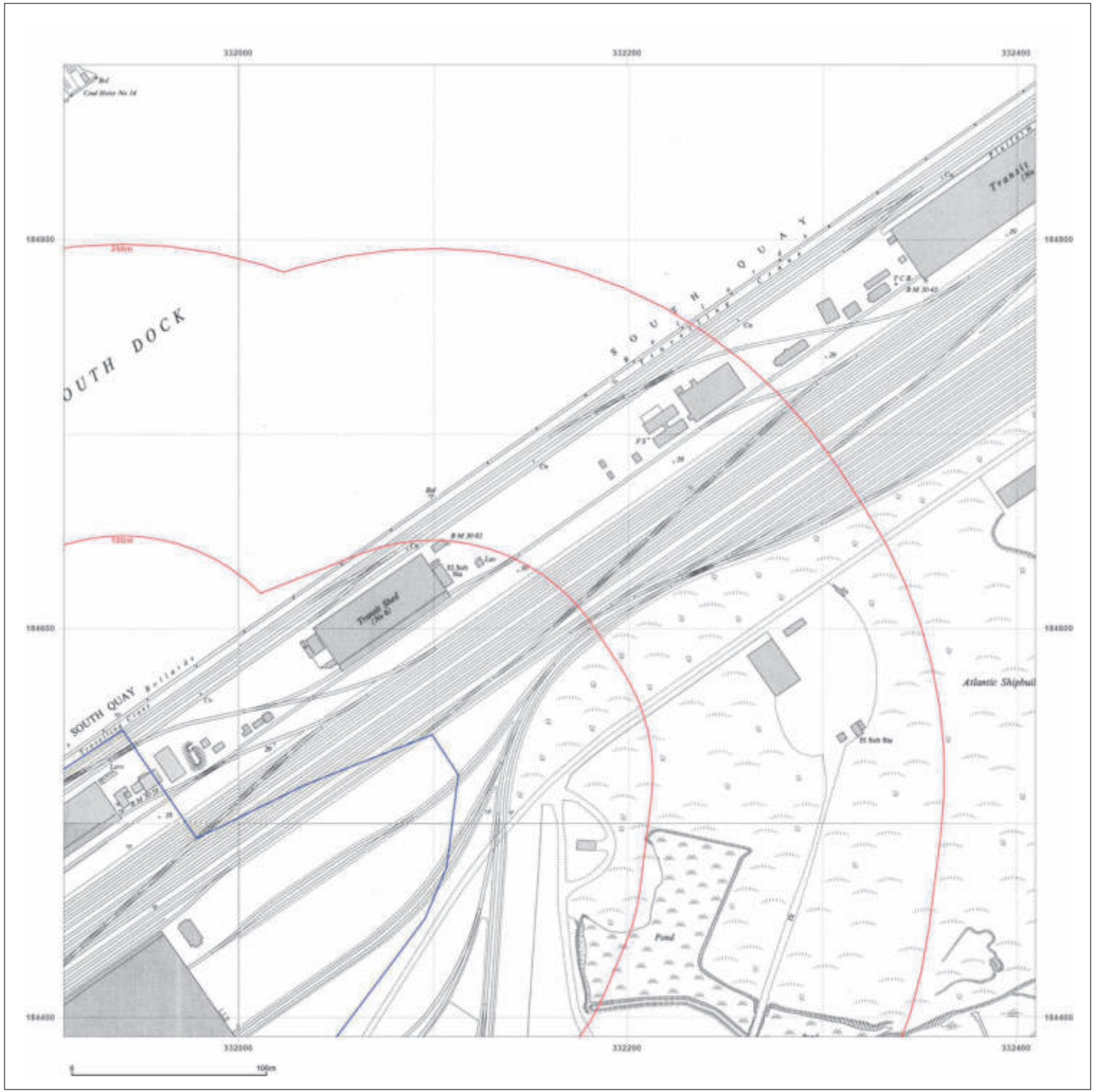

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Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_2_2
Grid Ref: 332160, 184640

Map Name: National Grid
Map date: **1955-1956**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1952	Surveyed 1956 Revised 1956 Edition N/A Copyright N/A Levelled 1952
Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1952	Surveyed 1956 Revised 1956 Edition N/A Copyright N/A Levelled 1952

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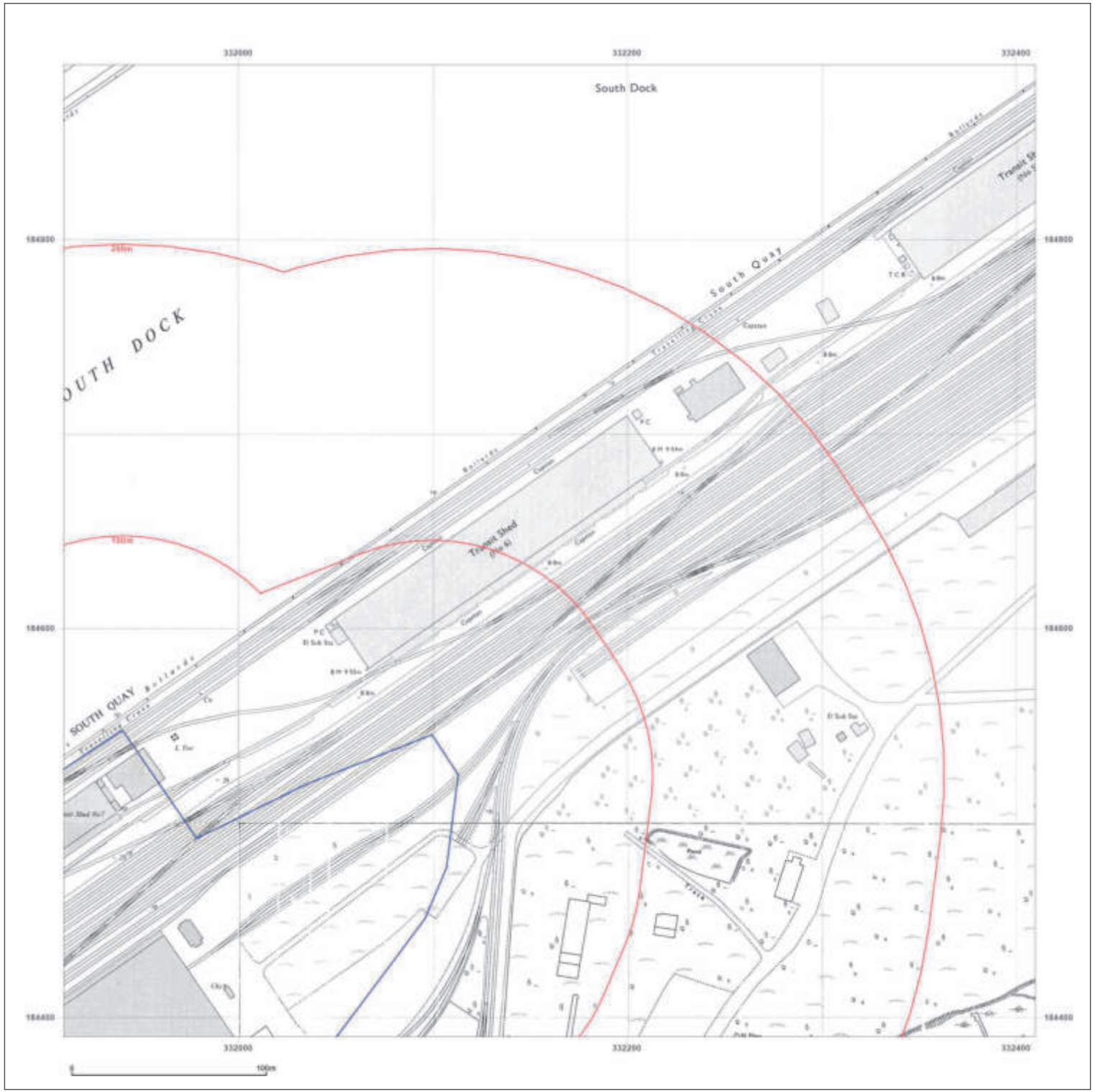

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_2_2
Grid Ref: 332160, 184640

Map Name: National Grid
Map date: 1968-1971
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed 1955 Revised 1968 Edition N/A Copyright 1968 Levelled 1961	Surveyed 1956 Revised 1970 Edition N/A Copyright 1971 Levelled 1961
Surveyed 1955 Revised 1968 Edition N/A Copyright 1968 Levelled 1961	Surveyed 1956 Revised 1971 Edition N/A Copyright 1971 Levelled 1961

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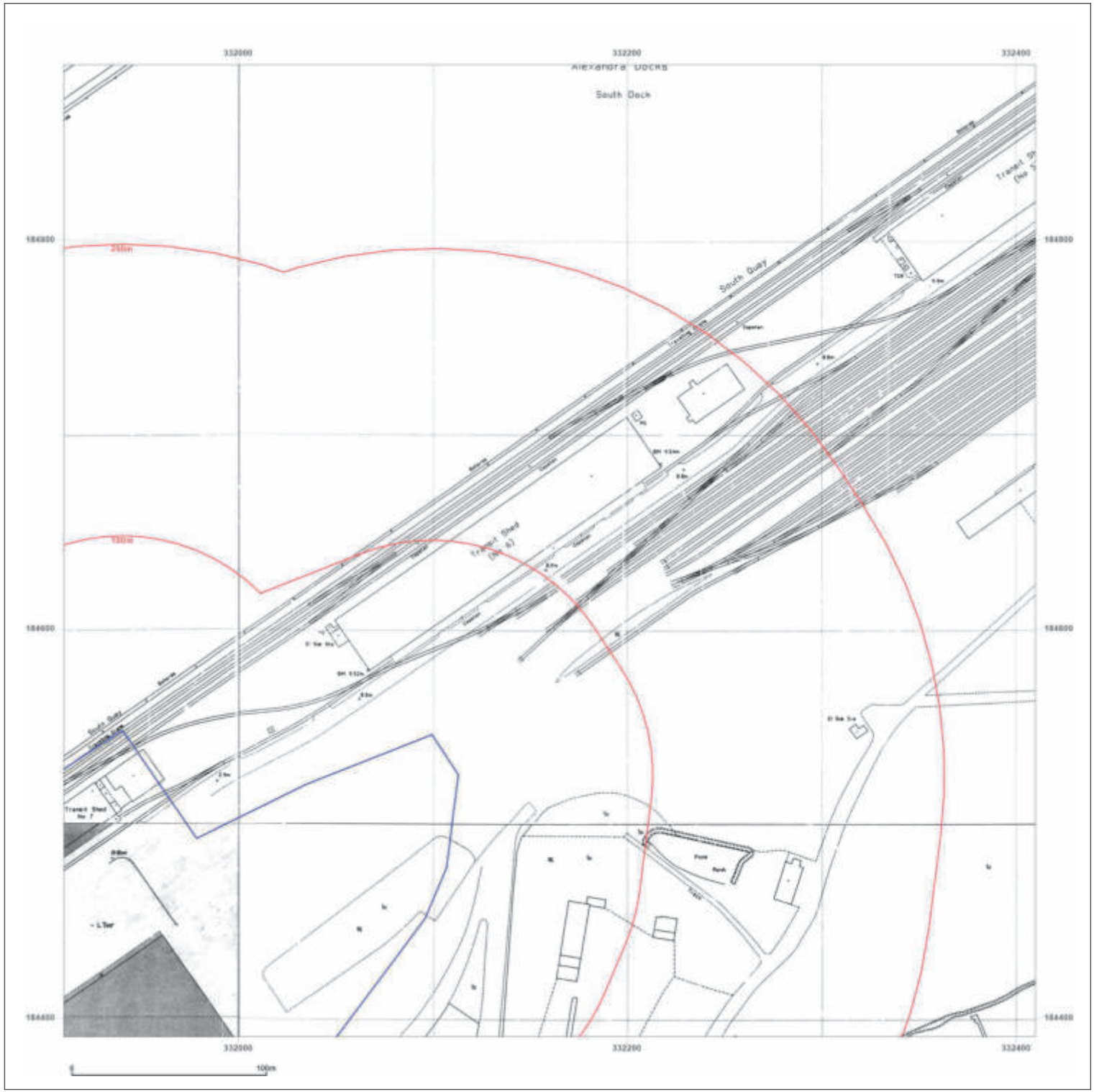

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_2_2
Grid Ref: 332160, 184640

Map Name: National Grid
Map date: **1989-1992**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A
Surveyed 1961 Revised 1989 Edition N/A Copyright 1989 Levelled 1961	Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A

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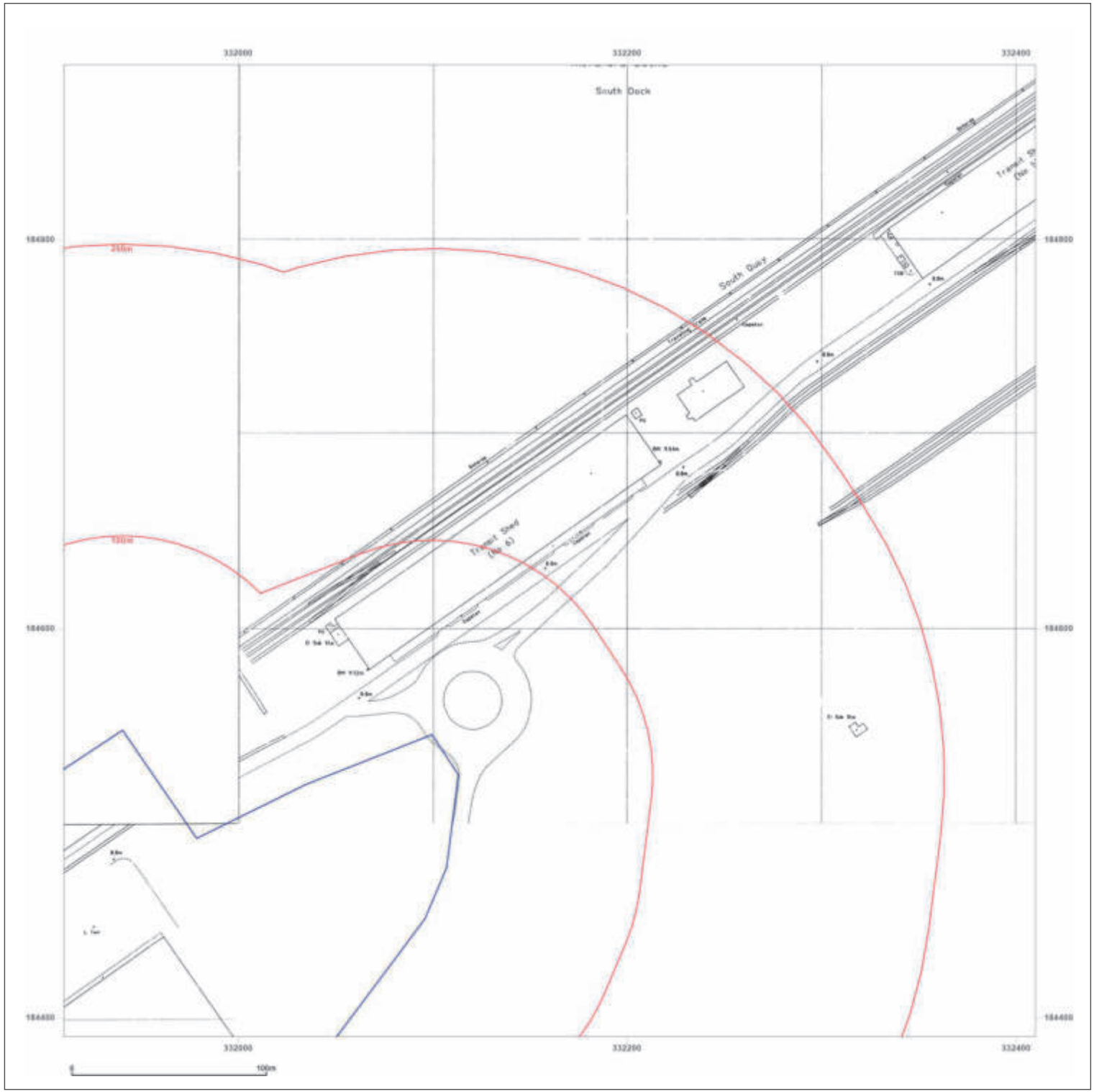

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Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_2_2
Grid Ref: 332160, 184640

Map Name: National Grid
Map date: **1992-1994**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1992
Levelled N/A

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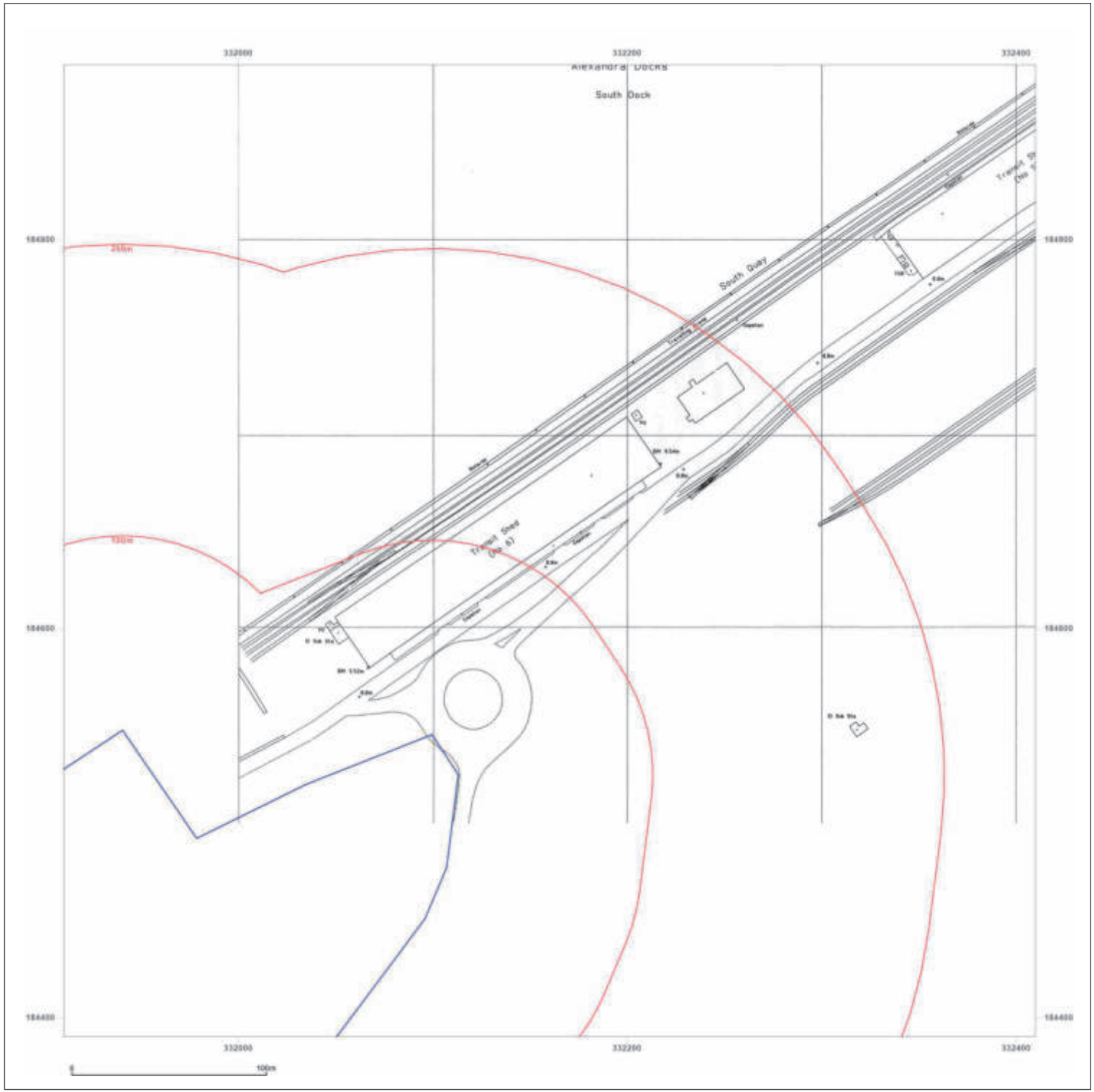

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_2_2
Grid Ref: 332160, 184640

Map Name: National Grid
Map date: **1994**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed 1994
Revised 1994
Edition N/A
Copyright 1994
Levelled N/A

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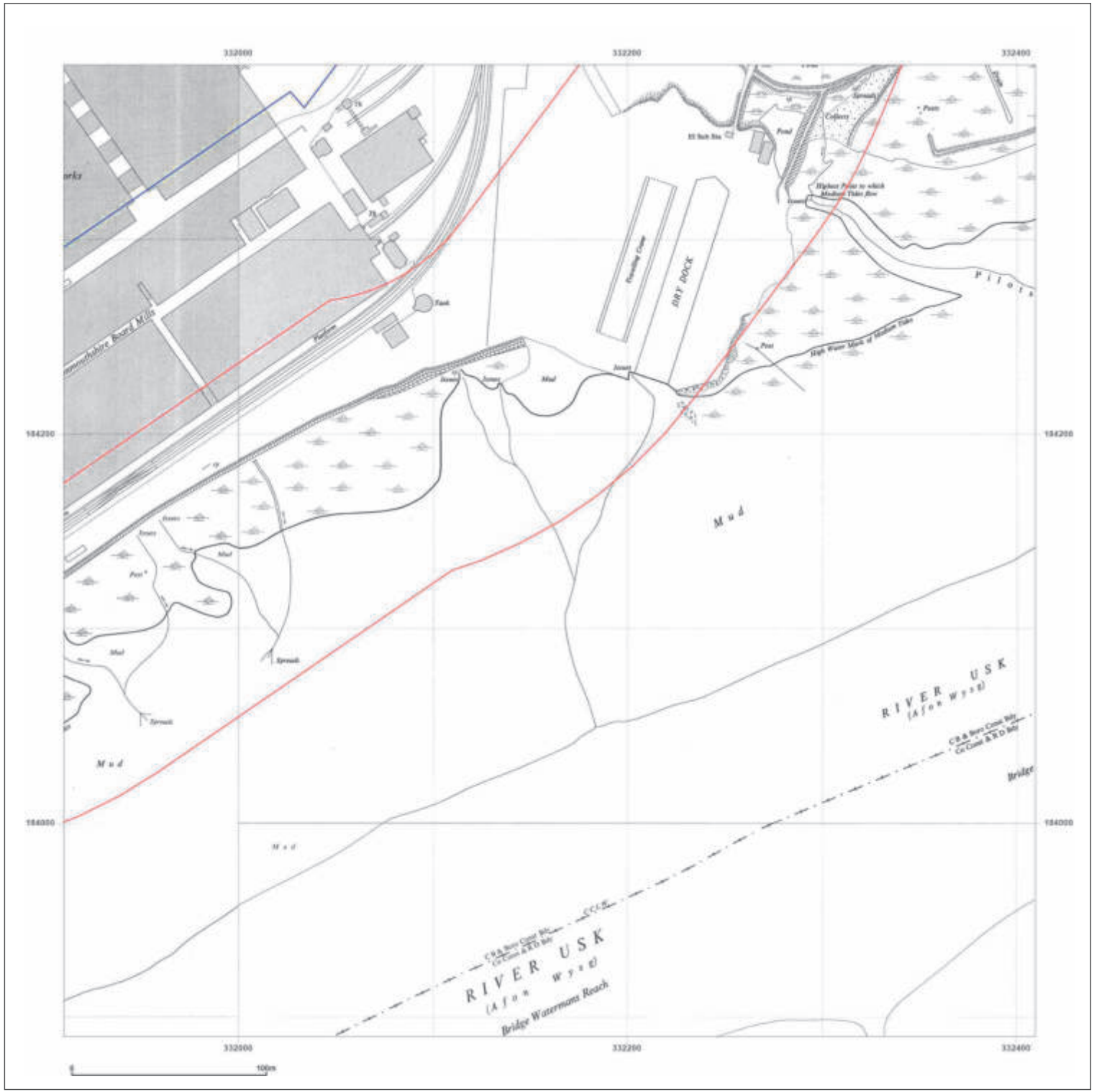

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_2_1
Grid Ref: 332160, 184140

Map Name: National Grid
Map date: **1955-1956**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1952	Surveyed 1956 Revised 1956 Edition N/A Copyright N/A Levelled 1952
Surveyed 1956 Revised 1956 Edition N/A Copyright N/A Levelled N/A	Surveyed 1956 Revised 1956 Edition N/A Copyright N/A Levelled 1953

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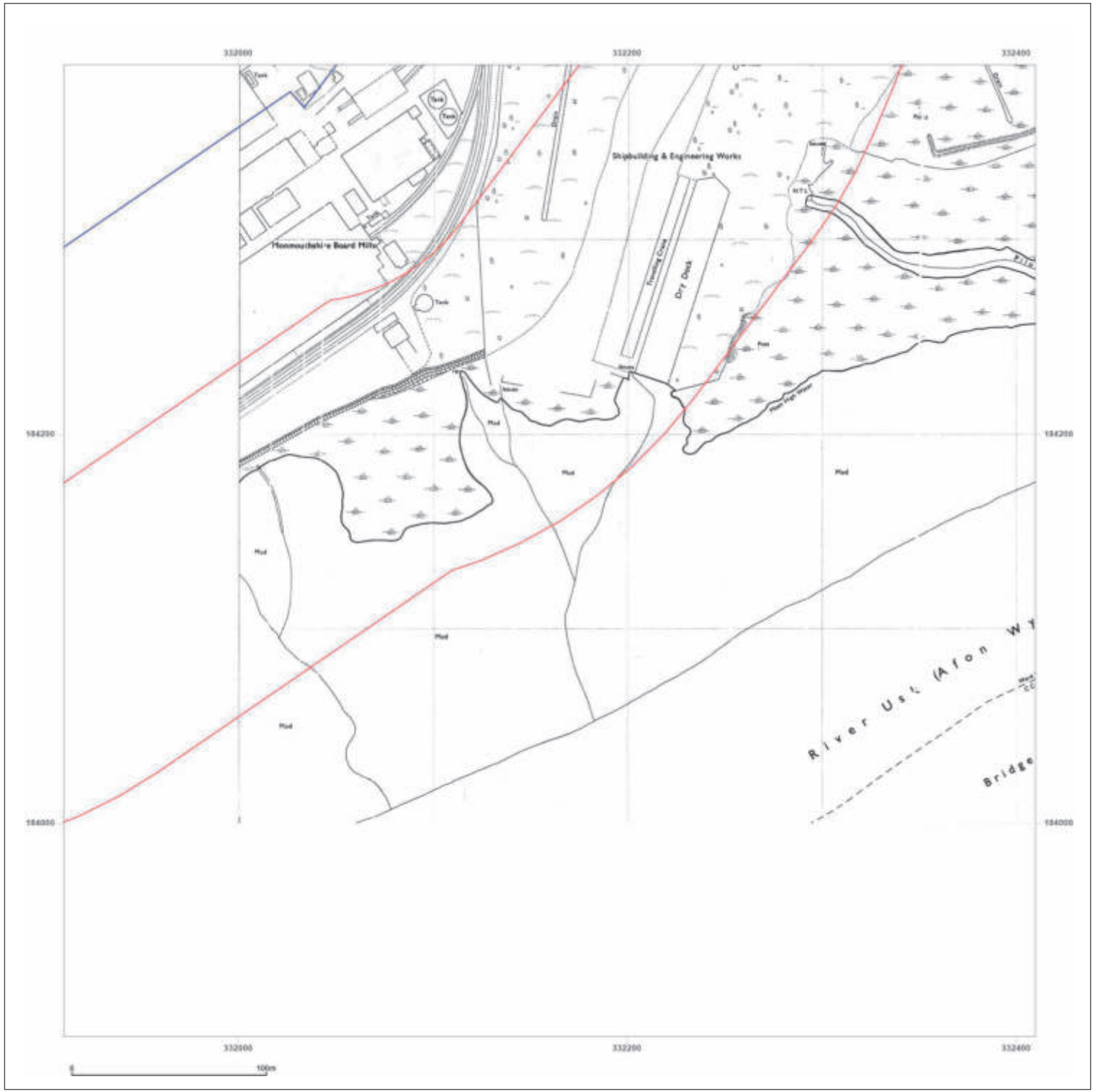

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Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_2_1
Grid Ref: 332160, 184140

Map Name: National Grid
Map date: **1971**
Scale: 1:1,250
Printed at: 1:2,000

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Site Details:

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Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_1250_2_1
Grid Ref: 332160, 184140

Map Name: National Grid
Map date: **1992**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A
Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A

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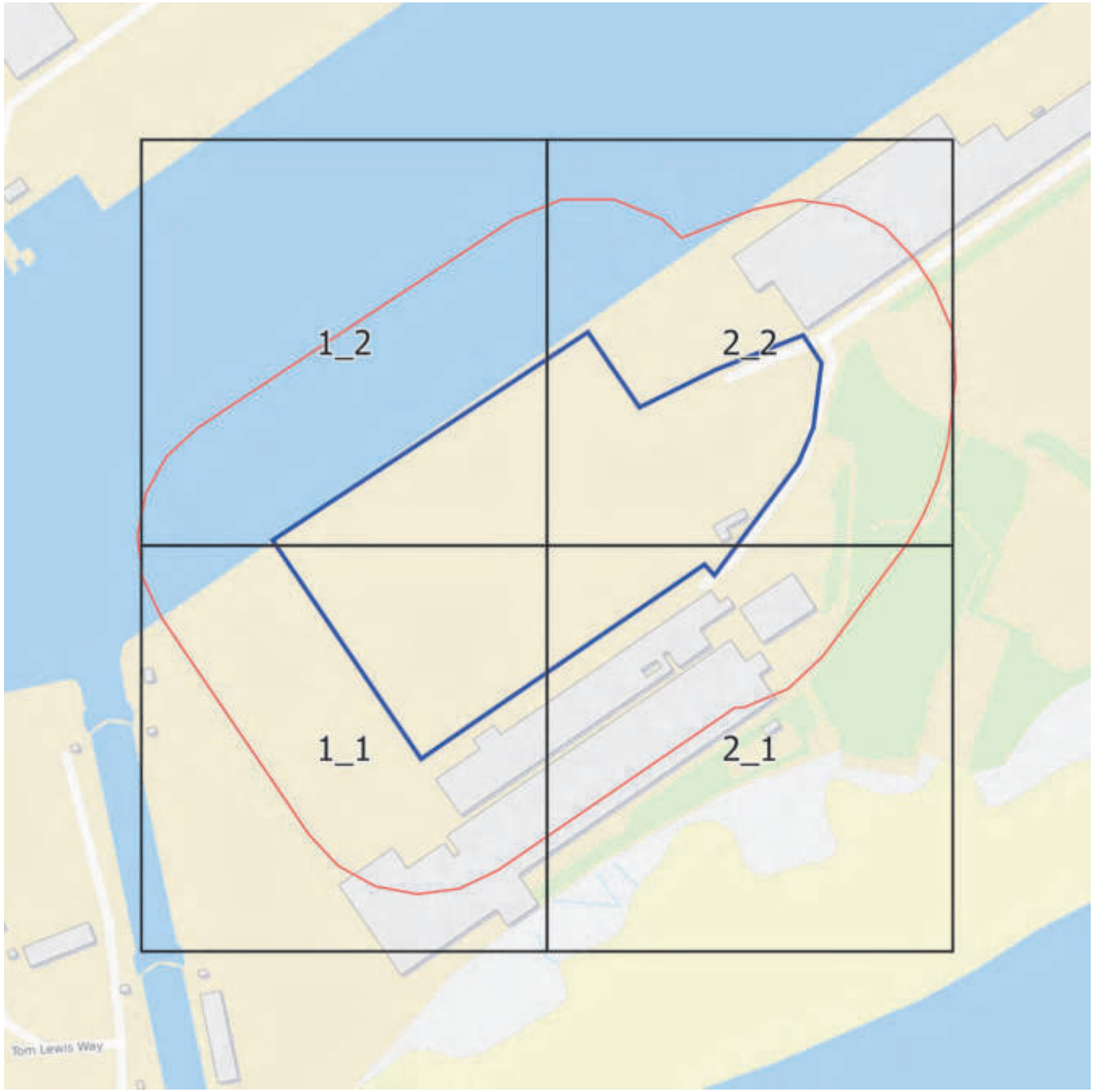

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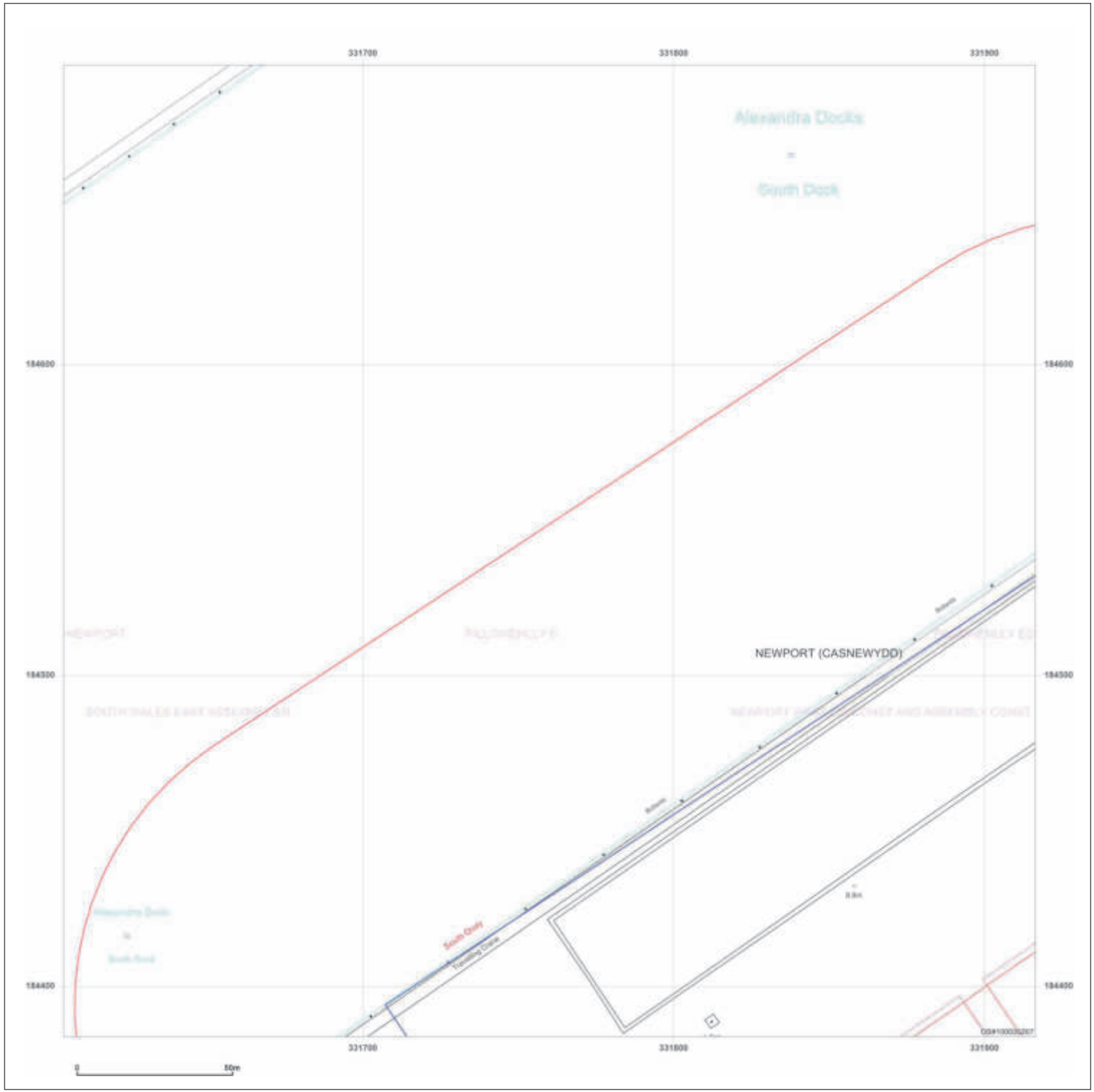
Landline Scale Grid Index





Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_Landline_1_2
Grid Ref: 331760, 184540

Map Name: LandLine
Map date: 2003
Scale: 1:1,250
Printed at: 1:1,250

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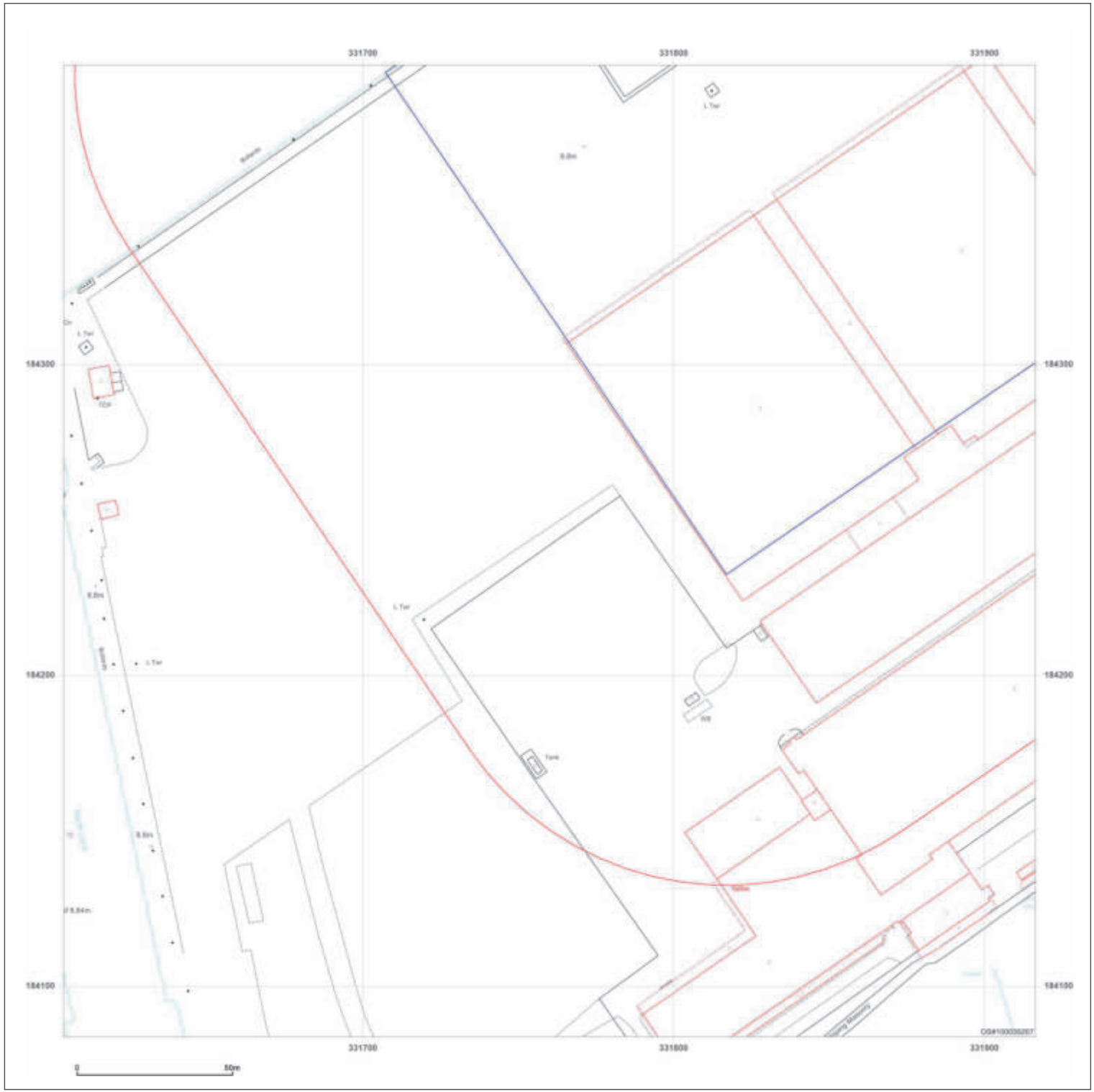

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_Landline_1_1
Grid Ref: 331760, 184240

Map Name: LandLine
Map date: 2003
Scale: 1:1,250
Printed at: 1:1,250

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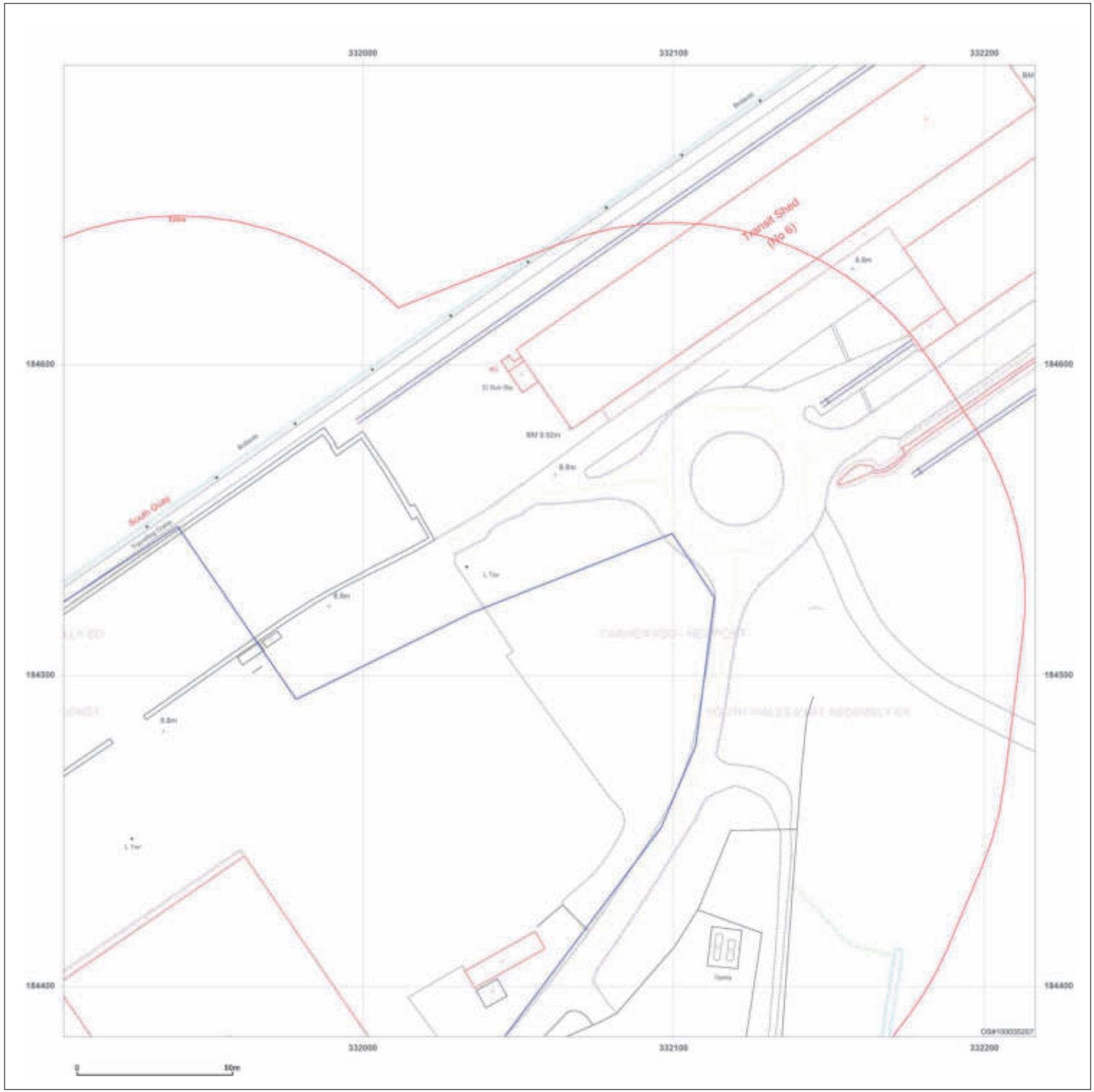

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_Landline_2_2
Grid Ref: 332060, 184540

Map Name: LandLine
Map date: 2003
Scale: 1:1,250
Printed at: 1:1,250

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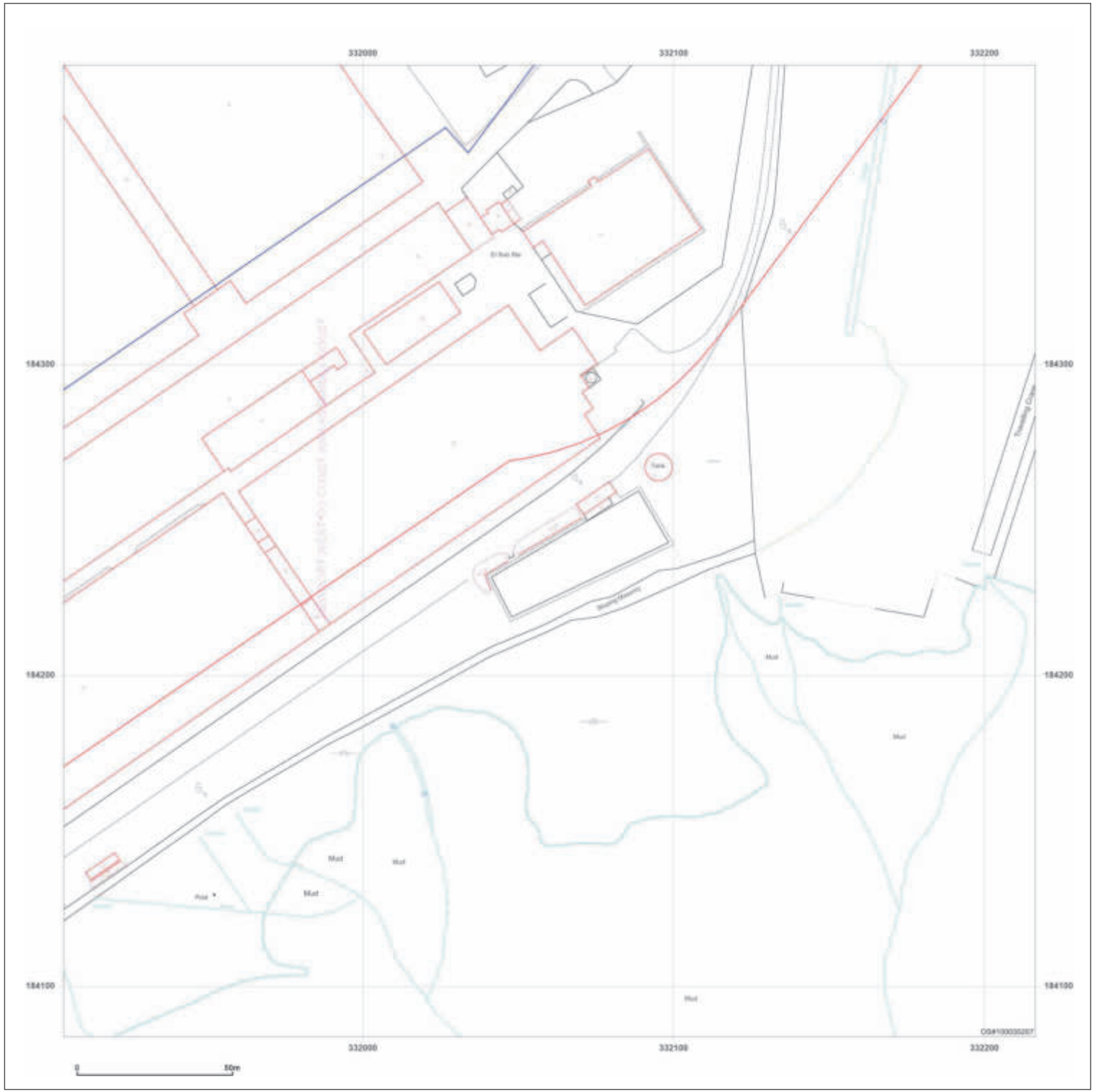

Groundsure INSIGHTS

Site Details:

ALEXANDRA DOCKS,
NEWPORT, NP20 2WF

Client Ref: P02141599
Report Ref: GS-GWL-9WE-BL9-B7E_Landline_2_1
Grid Ref: 332060, 184240

Map Name: LandLine
Map date: 2003
Scale: 1:1,250
Printed at: 1:1,250

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APPENDIX 3 PHOTO REPORT OF SITE VISIT



Eastern section - flooded (2)



Eastern section - flooded (3)



Eastern section - flooded (4)



Eastern section - flooded (5)



Eastern section - flooded



Eastern section - partially flooded



Eastern section



Northern section (2)



Northern section (3)



Northern section



Northern sectoin



Western section - Scrap metal (2)



Western section - Scrap metal (3)



Western section - Scrap metal (4)



Western section - Scrap metal (5)



Western section - Scrap metal (6)



Western section - Scrap metal

APPENDIX 4 BOREHOLE LOGS

Borehole Log

LCP1

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 332047.903 - 184422.976 Level: 7.993

Hole Type: BH Logged By: J De Vos Dates: 23/07/2024 - 7/23/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Light Cable Percussion Rig

Well	Water	Samples Depth (m)	Samples Type	Result	Depth	Legend	Stratum Description	Depth m
					0.15		TARMAC hardstanding	
							MADE GROUND - crushed tarmac, gravel, brick	0.5
					0.75		soft silty CLAY	
				1,0/0,1,1,0 N=2				1.0
								1.5
				1,1/1,0,1,1 N=3				2.0
								2.5
					2.80		stiff silty CLAY	
				1,1/2,2,2,2 N=8				3.0
								3.5
					3.70		soft silty CLAY	
				1,1/1,1,1,1 N=4				4.0
								4.5
				1,0/0,1,0,1 N=2				

Borehole Log

LCP1

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 332047.903 - 184422.976 Level: 7.993

Hole Type: BH Logged By: J De Vos Dates: 23/07/2024 - 7/23/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Light Cable Percussion Rig

Well	Water	Samples Depth (m)	Samples Type	Result	Depth	Legend	Stratum Description	Depth m
				1,0/0,1,0,1 N=2			soft silty CLAY	
				1,1/0,1,1,1 N=3				6.5
				1,1/0,1,1,1 N=3				8.0
				1,1/1,1,1,2 N=5				9.5

5.5
6.0
7.0
7.5
8.5
9.0

Borehole Log

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 332047.903 - 184422.976 Level: 7.993

Hole Type: BH Logged By: J De Vos Dates: 23/07/2024 - 7/23/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Light Cable Percussion Rig

Well	Water	Samples Depth (m)	Samples Type	Result	Depth	Legend	Stratum Description	Depth m
							soft silty CLAY	10.5
				1,1/2,2,1,3 N=8				11.0
								11.5
								12.0
				1,1/1,1,1,2 N=5				12.5
					12.80		soft silty peaty CLAY with peat fragments	13.0
								13.5
				2,2/2,2,3,3 N=10				14.0
								14.5

Borehole Log

LCP1

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 332047.903 - 184422.976 Level: 7.993

Hole Type: BH Logged By: J De Vos Dates: 23/07/2024 - 7/23/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Light Cable Percussion Rig

Well	Water	Samples Depth (m)	Samples Type	Result	Depth	Legend	Stratum Description	Depth m
							soft silty peaty CLAY with peat fragments	
				1,2/2,3,7,8 N=20	15.30		Sandy cobbly GRAVEL	15.5
					15.80		SANDSTONE	
				25,50/R,,, N=R	16.00			16.0
								16.5
								17.0
								17.5
								18.0
								18.5
								19.0
								19.5

Borehole Log

LCP2

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331849.612 - 184399.357 Level: 8.956

Hole Type: BH Logged By: J De Vos Dates: 24/07/2024 - 7/24/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Light Cable Percussion Rig

Well	Water	Samples Depth (m)	Samples Type	Result	Depth	Legend	Stratum Description	Depth m
					0.10		TARMAC hardstanding	
							MADE GROUND - compacted gravel	0.5
					0.60		MADE GROUND - gravel, coal gravel, tarmca, fragments of brick	
				3,3/3,1,0,1 N=5				1.0
					1.40		soft silty CLAY	1.5
				1,0/0,1,1,1 N=3				2.0
								2.5
				1,1/1,1,1,1 N=4				3.0
								3.5
				1,0/1,1,0,1 N=3				4.0
								4.5
				1,0/1,2,2,1 N=6				

Borehole Log

LCP2

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331849.612 - 184399.357 Level: 8.956

Hole Type: BH Logged By: J De Vos Dates: 24/07/2024 - 7/24/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Light Cable Percussion Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
				1,0/1,2,2,1 N=6			soft silty CLAY	
				1,1/1,2,1,1 N=5				5.5
				1,0/0,1,1,0 N=2				6.0
				1,2/1,2,1,1 N=5				6.5
								7.0
								7.5
								8.0
								8.5
								9.0
								9.5

Borehole Log

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331849.612 - 184399.357 Level: 8.956

Hole Type: BH Logged By: J De Vos Dates: 24/07/2024 - 7/24/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Light Cable Percussion Rig

Well	Water	Samples Depth (m)	Samples Type	Result	Depth	Legend	Stratum Description	Depth m
							soft silty CLAY	
				1,2/3,3,3,3 N=12				10.5
								11.0
								11.5
				1,2/3,3,4,3 N=13				12.0
								12.5
								13.0
				2,2/2,3,3,3 N=11				13.5
								14.0
								14.5

Borehole Log

LCP2

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331849.612 - 184399.357 Level: 8.956

Hole Type: BH Logged By: J De Vos Dates: 24/07/2024 - 7/24/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Light Cable Percussion Rig

Well	Water	Samples Depth (m)	Samples Type	Result	Depth	Legend	Stratum Description	Depth m
				1,2/2,1,0,2 N=5			soft silty CLAY	15.5
								16.0
								16.5
					16.90			
				4,5/6,19,23,8 N=R			Sandy cobbly GRAVEL	17.0
					17.20			
					17.30		SANDSTONE	
								17.5
								18.0
								18.5
								19.0
								19.5

Borehole Log

WS1

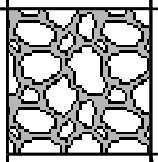
Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331790.559 - 184437.721 Level: 8.755

Hole Type: BH Logged By: J De Vos Dates: 23/07/2024 - 7/23/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
					0.45		TARMAC hardstanding refusal on burried obstruction	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Borehole Log

WS2

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331855.115 - 184477.654 Level: 8.766

Hole Type: BH Logged By: J De Vos Dates: 23/07/2024 - 7/23/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
		0.5 - 0.75	J		0.50		TARMAC and CONCRETE hardstanding	0.5
							MADE GROUND - GRAVEL; loose quartzite	1.0
								1.5
								2.0
								2.5
		2.6 - 3.0	J		3.00			3.0
							Soft dark grey silty SAND	
		3.3 - 3.5	J					3.5
					4.00		No recovery - suspected SAND	4.0
								4.5
					5.00			

Borehole Log

WS3

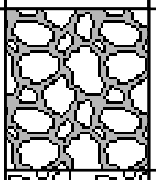
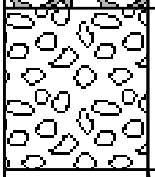
Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331948.842 - 184544.795 Level: 8.791

Hole Type: BH Logged By: J De Vos Dates: 23/07/2024 - 7/23/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
							CONCRETE hardstanding	
					0.50			0.5
		0.7 - 1.0	J				MADE GROUND - GRAVEL; loose quartzite	
					1.00		refusal on burried obstruction	1.0
								1.5
								2.0
								2.5
								3.0
								3.5
								4.0
								4.5

Borehole Log

WS4

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331829.441 - 184424.824 Level: 8.751

Hole Type: BH Logged By: J De Vos Dates: 23/07/2024 - 7/23/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
					0.50		CONCRETE hardstanding	0.5
		0.6 - 0.8	J		0.80		MADE GROUND - black sandy GRAVEL (crushed tarmac?)	
		0.9 - 1.2	J				Soft grey sandy SILT	1.0
					2.00		No recovery - suspected sandy SILT	2.0
					4.00		SILT	4.0
					5.00			4.5

Borehole Log

WS5

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331887.53 - 184420.325 Level: 9.015

Hole Type: BH Logged By: J De Vos Dates: 25/07/2024 - 7/25/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
					0.30		TARMAC hardstanding	
		0.5 - 0.7	J				MADE GROUND - GRAVEL; compacted quartzite	0.5
					0.70		MADE GROUND - black sandy GRAVEL (crushed tarmac?)	1.0
		1.2 - 1.5	J					1.5
								2.0
								2.5
					2.90		Silty CLAY	3.0
								3.5
		3.6 - 4.0	J					4.0
								4.5
					5.00			

Borehole Log

WS6

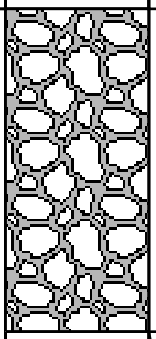
Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331925.025 - 184484.221 Level: 8.687

Hole Type: BH Logged By: J De Vos Dates: 23/07/2024 - 7/23/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
							CONCRETE hardstanding	
					1.00		refusal on burried obstruction	

0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5

Borehole Log

WS7

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331965.557 - 184473.61 Level: 8.975

Hole Type: BH Logged By: J De Vos Dates: 23/07/2024 - 7/23/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
		0.3 - 0.5	J		0.10		TARMAC hardstanding	
							MADE GROUND - GRAVEL; loose quartzite	
					0.50		MADE GROUND - black sandy GRAVEL (crushed tarmac?)	0.5
					1.00		refusal on burried obstruction	1.0
								1.5
								2.0
								2.5
								3.0
								3.5
								4.0
								4.5

Borehole Log

WS8

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331899.311 - 184295.432 Level: 8.527

Hole Type: BH Logged By: J De Vos Dates: n/a - n/a

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth
		Depth (m)	Type					m
					0.00		Not accessible - scrap yard	

0.5

1.0

1.5

2.0

2.5

3.0

3.5

4.0

4.5

Borehole Log

WS9

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331897.833 - 184337.183 Level: 7.913

Hole Type: BH Logged By: J De Vos Dates: 25/07/2024 - 7/25/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
		0.1 - 0.35	J				MADE GROUND - rubble, concrete, tarmac	
					0.35			
							MADE GROUND - CONCRETE	
					0.70			
		0.9 - 1.2	J				MADE GROUND - very sandy CLAY - occasioinaly coal gravel?	
					1.50			
		1.7 - 2.0	J				blue green stif CLAY	
					5.00			

Borehole Log

WS10

Page 1 of 1

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331915.029 - 184399.768 Level: 8.273

Hole Type: BH Logged By: J De Vos Dates: 25/07/2024 - 7/25/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples Depth (m)	Samples Type	Result	Depth	Legend	Stratum Description	Depth m
					0.35		TARMAC hardstanding	
		0.45 - 0.65	J		0.65		MADE GROUND - sandy, clayey coal gravel	0.5
		0.9 - 1.2	J				silty CLAY, occasionally stif, occasionally soft	1.0
								1.5
								2.0
		2.5 - 2.8	J					2.5
								3.0
								3.5
								4.0
								4.5
					5.00			

Borehole Log

WS11

Page 1 of 1

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331941.936 - 184331.909 Level: 8.019

Hole Type: BH Logged By: J De Vos Dates: 25/07/2024 - 7/25/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples Depth (m)	Samples Type	Result	Depth	Legend	Stratum Description	Depth m
					0.40		CONCRETE hardstanding	
		0.6 - 0.9	J				MADE GROUND - sandy, clayey coal gravel	0.5
					1.00		Poor recovery - suspected sandy, gravelly clay	1.0
		1.5 - 1.8	J					1.5
					2.00		silty CLAY, occasionally stif, occasionally soft	2.0
		3.0 - 3.3	J					2.5
								3.0
								3.5
								4.0
								4.5
					5.00			

Borehole Log

WS12

Page 1 of 1

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 331984.803 - 184419.866 Level: 7.87

Hole Type: BH Logged By: J De Vos Dates: 24/07/2024 - 7/24/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
					0.20		MADE GROUND - old coal	
		0.6 - 1.0	J				MADE GROUND - coal gravel	0.5
					1.25			1.0
		1.4 - 1.65	J				MADE GROUND - sandy, clayey coal gravel, brick	1.5
					1.65		MADE GROUND - very sandy, gravelly soft CALY	
					1.90			
					2.00		MADE GROUND - soft CLAY with organic detritus	2.0
							MADE GROUND - coal gravel	2.5
					3.00		MADE GROUND - coal gravel, slightly getting clayey	3.0
								3.5
					3.70		soft silty CLAY	
		3.8 - 4.0	J					4.0
								4.5
					5.00			

Borehole Log

WS13

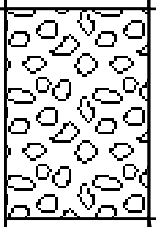
Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 332088.926 - 184505.934 Level: 8.294

Hole Type: BH Logged By: J De Vos Dates: 25/07/2024 - 7/25/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
					0.65		MADE GROUND - GRAVEL; compacted quartzite refusal	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Borehole Log

WS14

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 332013.117 - 184468.464 Level: 8.106

Hole Type: BH Logged By: J De Vos Dates: 24/07/2024 - 7/24/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples Depth (m)	Samples Type	Result	Depth	Legend	Stratum Description	Depth m
					0.15		TARMAC hardstanding	
		0.25 - 0.5	J		0.25		MADE GROUND - crushed tarmac, gravel, brick	
							MADE GROUND - gravelly CLAY, occasional brick and sand	0.5
								1.0
								1.5
		1.6 - 1.8	J		1.60			
					1.80		MADE GROUND - CLAY with lots of crushed tarmac	
							Soft silty CLAY	2.0
								2.5
					2.60		Gravelly CLAY	
					3.00		silty CLAY, getting stiffer	3.0
		3.5 - 3.8	J					3.5
					4.00		stiff silty CLAY	4.0
								4.5
					5.00			

Borehole Log

WS15

Project Name: Cemminerals - Newport Project No: 38917

Location: Alexandra Docks, Newport Co-ords: 332051.267 - 184404.897 Level: 8.662

Hole Type: BH Logged By: J De Vos Dates: 24/07/2024 - 7/24/24

Client: Cemminerals Consultant: ABO nv

Plant Used: Tracked Windowless Rig

Well	Water	Samples		Result	Depth	Legend	Stratum Description	Depth m
		Depth (m)	Type					
					0.07		TARMAC hardstanding	
		0.3 - 0.6	J				MADE GROUND - gravelly CLAY, occasional brick and sand	
					0.60			0.5
		0.7 - 0.9	J				MADE GROUND - crushed tarmac, gravel, brick	
					0.90			
					1.00		Sandy CLAY	1.0
							poor recovery - suspected sandy, silty CLAY	
		1.5 - 1.8	J					1.5
					2.00			2.0
							silty CLAY, occasionally stif, occasionally soft	
								2.5
								3.0
								3.5
								4.0
								4.5
					5.00			

APPENDIX 5 CERTIFICATES OF ANALYSES

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Analytical Report Number : 24-033335

Project / Site name:	Newport - Cemminerals	**Samples received on:**	29/07/2024
Your job number:		**Samples instructed on/ Analysis started on:**	29/07/2024
Your order number:		**Analysis completed by:**	07/08/2024
Report Issue Number:	1	**Report issued on:**	07/08/2024
Samples Analysed:	4 10:1 WAC samples		

Signed:

Joanna Wawrzeczko
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

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

Analytical Report Number: 24-033335
Project / Site name: Newport - Cemminerals

Lab Sample Number				271520	271521	271522	271523
Sample Reference				WS12.S1	WS9.S3	WS15.S1	WS5.S2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	1.70	0.30	1.20
Date Sampled				24/07/2024	25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	27.4
Moisture Content	%	0.01	NONE	11	28	15	18
Total mass of sample received	kg	0.1	NONE	1	1.1	0.5	1.1
General Inorganics							
pH (L005B)	pH Units	N/A	MCERTS	7.8	8.6	8	7.8
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-	1.3	1.8	3
Total Organic Carbon (TOC) – Manual	%	0.1	MCERTS	7.1	-	-	-
Loss on Ignition @ 450°C	%	0.2	MCERTS	58	3.4	6	11
Acid Neutralisation Capacity	+/- mmol/kg	-9999	NONE	0.86	21	7.6	5.1
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	1.3	< 0.05	0.11	0.35
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.15	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.49	< 0.05	0.24	0.05
Phenanthrene	mg/kg	0.05	MCERTS	2.2	< 0.05	3.6	0.56
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.78	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.28	< 0.05	5.1	0.23
Pyrene	mg/kg	0.05	MCERTS	0.34	< 0.05	4.1	0.21
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.12	< 0.05	2.3	0.15
Chrysene	mg/kg	0.05	MCERTS	0.54	< 0.05	2.4	0.28
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.27	< 0.05	2.7	0.15
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	0.95	0.08
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.1	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1	0.06
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.32	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.95	0.09
Coronene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	5.5	< 0.80	-	-
Total WAC-17 PAHs	mg/kg	0.85	NONE	5.5	< 0.85	26.8	2.21
Petroleum Hydrocarbons							
Mineral Oil (EC10 - EC40) EH_CU_1D_AL	mg/kg	10	NONE	77	16	31	150
VOCs							
Benzene	µg/kg	5	MCERTS	< 5.0 ~	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0 ~	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0 ~	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0 ~	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0 ~	< 5.0	< 5.0	< 5.0
Total BTEX	µg/kg	5	MCERTS	< 5.0 ~	< 5.0	< 5.0	< 5.0

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-033335
Project / Site name: Newport - Cemminerals

Lab Sample Number				271520	271521	271522	271523
Sample Reference				WS12.S1	WS9.S3	WS15.S1	WS5.S2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	1.70	0.30	1.20
Date Sampled				24/07/2024	25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**				
PCBs by GC-MS							
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	0.001	< 0.001	< 0.001	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	0.001	< 0.001	< 0.001	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	0.001	< 0.001	< 0.001	0.004
PCB Congener 153	mg/kg	0.001	MCERTS	0.001	< 0.001	< 0.001	0.003
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007	< 0.007	< 0.007

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Waste Acceptance Criteria Analytical Results

Report No:	**24-033335**						
					Client: LENCOIS		
Location	**Newport - Cemminerals**						
Lab Reference (Sample Number)	271520				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	24/07/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS12.S1						
Depth (m)	0.60						
Solid Waste Analysis							
TOC (%)	7.1				3%	5%	6%
Loss on Ignition (%)	58				--	--	10%
BTEX (µg/kg)	< 5.0 ~				6000	--	--
Sum of PCBs (mg/kg)	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	77				500	--	--
Total PAH (WAC-17) (mg/kg)	5.50				100	--	--
pH (units)	7.8				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	0.86				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.0571			0.571	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.010			0.10	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00171			0.0171	0.5	10	30
Nickel *	0.0030			0.030	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.020			0.20	4	50	200
Chloride *	< 0.15			< 1.5	800	15000	25000
Fluoride*	0.12			1.2	10	150	500
Sulphate *	100			1000	1000	20000	50000
TDS*	160			1600	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	2.96			29.5	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.0						
Dry Matter (%)	89						
Moisture (%)	11						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-033335**						
					Client: LENCOIS		
Location	**Newport - Cemminerals**						
Lab Reference (Sample Number)	271521				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	25/07/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS9.S3						
Depth (m)	1.70						
Solid Waste Analysis							
TOC (%)**	1.3				3%	5%	6%
Loss on Ignition (%) **	3.4				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	16				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	8.6				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	21				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.0161			0.161	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.018			0.18	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00636			0.0636	0.5	10	30
Nickel *	0.0033			0.033	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.010			0.10	4	50	200
Chloride *	33			330	800	15000	25000
Fluoride*	0.43			4.3	10	150	500
Sulphate *	89			890	1000	20000	50000
TDS*	250			2500	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	16.2			162	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	72						
Moisture (%)	28						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

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Waste Acceptance Criteria Analytical Results

Report No:	**24-033335**						
					Client: LENCOIS		
Location	**Newport - Cemminerals**						
Lab Reference (Sample Number)	271522				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	25/07/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS15.S1						
Depth (m)	0.30						
Solid Waste Analysis							
TOC (%)**	1.8				3%	5%	6%
Loss on Ignition (%) **	6.0				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	31				500	--	--
Total PAH (WAC-17) (mg/kg)	26.8				100	--	--
pH (units)**	8.0				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	7.6				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00253			0.0253	0.5	2	25
Barium *	0.0155			0.155	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00088			0.0088	0.5	10	70
Copper *	0.018			0.18	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00595			0.0595	0.5	10	30
Nickel *	0.0020			0.020	0.4	10	40
Lead *	0.0015			0.015	0.5	10	50
Antimony *	0.0049			0.049	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.014			0.14	4	50	200
Chloride *	1.5			15	800	15000	25000
Fluoride*	0.13			1.3	10	150	500
Sulphate *	4.6			46	1000	20000	50000
TDS*	59			590	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	14.6			146	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.5						
Dry Matter (%)	85						
Moisture (%)	15						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

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Waste Acceptance Criteria Analytical Results

Report No:	**24-033335**						
					Client: LENCOIS		
Location	**Newport - Cemminerals**						
Lab Reference (Sample Number)	271523				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	25/07/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS5.S2						
Depth (m)	1.20						
Solid Waste Analysis							
TOC (%)	3.0				3%	5%	6%
Loss on Ignition (%)	11				--	--	10%
BTEX (µg/kg)	< 5.0				6000	--	--
Sum of PCBs (mg/kg)	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	150				500	--	--
Total PAH (WAC-17) (mg/kg)	2.21				100	--	--
pH (units)	7.8				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	5.1				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00172			0.0172	0.5	2	25
Barium *	0.0586			0.586	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00077			0.0077	0.5	10	70
Copper *	0.0062			0.062	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.0143			0.143	0.5	10	30
Nickel *	0.0036			0.036	0.4	10	40
Lead *	0.0024			0.024	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.013			0.13	4	50	200
Chloride *	9.7			97	800	15000	25000
Fluoride*	0.21			2.1	10	150	500
Sulphate *	58			580	1000	20000	50000
TDS*	130			1300	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	4.63			46.3	500	800	1000
Leach Test Information							
Stone Content (%)	27.4						
Sample Mass (kg)	1.1						
Dry Matter (%)	82						
Moisture (%)	18						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

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Analytical Report Number : 24-033335
Project / Site name: Newport - Cemminerals

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
271520	WS12.S1	None Supplied	0.6	Brown gravelly sand
271521	WS9.S3	None Supplied	1.7	Light grey clay
271522	WS15.S1	None Supplied	0.3	Brown clay and sand with gravel and brick
271523	WS5.S2	None Supplied	1.2	Brown gravelly clay with clinker and stones

Analytical Report Number : 24-033335
Project / Site name: Newport - Cemminerals

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in soil	Determination of pH in soil by addition of water followed by electrometric measurement	In-house method	L005B	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L023B	D	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Sample Preparation		In-house method	L043B	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046B	W	NONE
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025

Analytical Report Number : 24-033335
Project / Site name: Newport - Cemminerals

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

~ - Quality control surrogate recovery outside of limits, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.

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Analytical Report Number : 24-033333

Project / Site name:	Newport - Cemminerals	**Samples received on:**	29/07/2024
Your job number:		**Samples instructed on/ Analysis started on:**	29/07/2024
Your order number:		**Analysis completed by:**	07/08/2024
Report Issue Number:	1	**Report issued on:**	07/08/2024
Samples Analysed:	18 soil samples		

Signed: JSwagrak

Joanna Szwagrzak
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271500	271501	271502	271503	271504
Sample Reference				WS12.S1	WS12.S2	WS12.S3	WS10.S1	WS10.S2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	1.40	3.80	0.45	0.90
Date Sampled				24/07/2024	24/07/2024	24/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	11	17	25	17	21
Total mass of sample received	kg	0.1	NONE	1	1.1	0.6	1.1	1.1
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	EWS	EWS	EWS	EWS	EWS
Actinolite detected	Type	N/A	ISO 17025	-	-	Not-detected	-	-
Amosite detected	Type	N/A	ISO 17025	-	-	Not-detected	-	-
Anthophyllite detected	Type	N/A	ISO 17025	-	-	Not-detected	-	-
Chrysotile detected	Type	N/A	ISO 17025	-	-	Detected	-	-
Crocidolite detected	Type	N/A	ISO 17025	-	-	Not-detected	-	-
Tremolite detected	Type	N/A	ISO 17025	-	-	Not-detected	-	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	-	< 0.001	-	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	-	Loose Fibres	-	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	8	10.7	8.2	7.9	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO_4	mg/kg	50	MCERTS	2600	9300	2000	2800	3500
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	3100	2100	1200	2300	3600
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.57	1.04	0.596	1.17	1.8
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	1570	1040	596	1170	1800
Sulphide	mg/kg	1	MCERTS	2.9	55	25	26	5900 [&+]
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-	3.2	1.9	2.8	1.7
Total Organic Carbon (TOC) – Manual	%	0.1	MCERTS	7.1	-	-	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271500	271501	271502	271503	271504
Sample Reference				WS12.S1	WS12.S2	WS12.S3	WS10.S1	WS10.S2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	1.40	3.80	0.45	0.90
Date Sampled				24/07/2024	24/07/2024	24/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	1.1	0.57	0.2	0.97	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.37	0.31	0.08	0.1	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	2	1.7	0.41	0.82	0.09
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.17	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.25	2.2	0.24	0.09	0.05
Pyrene	mg/kg	0.05	MCERTS	0.32	1.7	0.24	0.14	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	1.4	< 0.05	0.07	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	1.7	< 0.05	0.24	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	2	0.15	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.82	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.3	< 0.05	0.06	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.78	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.29	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.81	0.07	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	4.01	15.6	1.39	2.49	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	3.3	11	13	13	21
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	2	2.2	1.9	3.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	3.7	13	27	23	31
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	20	15	19	11
Lead (aqua regia extractable)	mg/kg	1	MCERTS	14	36	31	28	22
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	4.4	9.4	24	26	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.2	< 1.0	3.2	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	59	110	110	84	93
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010 ~	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010 ~	0.028	< 0.010	< 0.010
TPHCWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	1	0.084 ~	1.5	< 0.010	< 0.010
TPHCWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	1	MCERTS	4	12	13	< 1.0	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	2	MCERTS	< 2.0	3.2	< 2.0	2.2	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	< 8.0	26	15	< 8.0	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	55	250	130	10	< 8.0
TPHCWG - Aliphatic >EC5 - EC35 $_{EH_CU+HS_1D_AL}$	mg/kg	10	NONE	60	290	160	12	< 10
TPHCWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010 ~	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010 ~	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	0.02	MCERTS	< 0.020	< 0.020 ~	< 0.020	< 0.020	< 0.020
TPHCWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	2	MCERTS	5.1	< 2.0	< 2.0	3	< 2.0
TPHCWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	11	< 10	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	19	28	< 10	< 10
TPHCWG - Aromatic >EC5 - EC35 $_{EH_CU+HS_1D_AR}$	mg/kg	10	NONE	< 10	30	28	< 10	< 10

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271500	271501	271502	271503	271504
Sample Reference				WS12.S1	WS12.S2	WS12.S3	WS10.S1	WS10.S2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	1.40	3.80	0.45	0.90
Date Sampled				24/07/2024	24/07/2024	24/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	81	350	200	29	< 10
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271505	271506	271507	271508	271509
Sample Reference				WS10.S3	WS9.S1	WS9.S2	WS9.S3	WS11.S1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.50	0.10	0.90	1.70	0.60
Date Sampled				25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	25	5.7	11	28	9.1
Total mass of sample received	kg	0.1	NONE	1.1	1.1	1	1.1	1.1
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	EWS	EWS	EWS	EWS	EWS
Actinolite detected	Type	N/A	ISO 17025	-	-	-	-	-
Amosite detected	Type	N/A	ISO 17025	-	-	-	-	-
Anthophyllite detected	Type	N/A	ISO 17025	-	-	-	-	-
Chrysotile detected	Type	N/A	ISO 17025	-	-	-	-	-
Crocidolite detected	Type	N/A	ISO 17025	-	-	-	-	-
Tremolite detected	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	-	-	-	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	8.1	10.6	9.8	8.4	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO_4	mg/kg	50	MCERTS	2000	230000	33000	1700	3900
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	2400	3800	3700	1000	3800
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.21	1.88	1.87	0.52	1.88
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	1210	1880	1870	520	1880
Sulphide	mg/kg	1	MCERTS	15	33	32	35	6.1
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.3	5.4	6.2	1.3	4.4
Total Organic Carbon (TOC) – Manual	%	0.1	MCERTS	-	-	-	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271505	271506	271507	271508	271509
Sample Reference				WS10.S3	WS9.S1	WS9.S2	WS9.S3	WS11.S1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.50	0.10	0.90	1.70	0.60
Date Sampled				25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.72	0.76	< 0.05	0.76
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.21	0.34	< 0.05	0.26
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	1.3	1.8	< 0.05	1.1
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.16	1.9	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.95	0.24	< 0.05	0.32
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.72	0.31	< 0.05	0.29
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.33	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.58	0.56	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.44	< 0.05	< 0.05	0.27
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.14	< 0.05	< 0.05	0.1
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.17	< 0.05	< 0.05	0.13
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.16	0.08	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.28	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	6.2	5.93	< 0.80	3.25
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	5.3	41	11	16
Boron (water soluble)	mg/kg	0.2	MCERTS	5.8	1	1	3.7	1.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	36	62	47	33	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	50	53	8.9	65
Lead (aqua regia extractable)	mg/kg	1	MCERTS	22	33	64	17	52
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	31	14	16	28	29
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	2.9	1.4	1.4
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	95	360	150	95	510
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPHCWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPHCWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	0.041	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPHCWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	1	MCERTS	< 1.0	2.5	2.4	< 1.0	2.8
TPHCWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	3
TPHCWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	< 8.0	19	17	< 8.0	20
TPHCWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	< 8.0	440	230	< 8.0	240
TPHCWG - Aliphatic >EC5 - EC35 $_{EH_CU+HS_1D_AL}$	mg/kg	10	NONE	< 10	460	250	< 10	270
TPHCWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	0.02	MCERTS	< 0.020	< 0.020 ~	< 0.020 ~	< 0.020	< 0.020
TPHCWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1	MCERTS	< 1.0	2.4	1.4	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	2	MCERTS	< 2.0	6.7	4.2	< 2.0	4.7
TPHCWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	20	< 10	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	350	110	< 10	52
TPHCWG - Aromatic >EC5 - EC35 $_{EH_CU+HS_1D_AR}$	mg/kg	10	NONE	< 10	380	110	< 10	57

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271505	271506	271507	271508	271509
Sample Reference				WS10.S3	WS9.S1	WS9.S2	WS9.S3	WS11.S1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.50	0.10	0.90	1.70	0.60
Date Sampled				25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	1300	570	< 10	410
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271510	271511	271512	271513	271514
Sample Reference				WS11.S2	WS11.S3	WS15.S1	WS15.S2	WS15.S3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	3.00	0.30	0.70	1.50
Date Sampled				25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	32.9	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	24	15	15	21
Total mass of sample received	kg	0.1	NONE	0.6	1.1	0.6	1.1	1.1
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	MBI	MBI	MBI	MBI	MBI
Actinolite detected	Type	N/A	ISO 17025	-	-	-	Not-detected	-
Amosite detected	Type	N/A	ISO 17025	-	-	-	Detected	-
Anthophyllite detected	Type	N/A	ISO 17025	-	-	-	Not-detected	-
Chrysotile detected	Type	N/A	ISO 17025	-	-	-	Not-detected	-
Crocidolite detected	Type	N/A	ISO 17025	-	-	-	Not-detected	-
Tremolite detected	Type	N/A	ISO 17025	-	-	-	Not-detected	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	-	-	< 0.001	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	-	-	Loose Fibrous Debris	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	9.1	8.4	7.9	7.8	9.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO_4	mg/kg	50	MCERTS	3200	770	780	1300	1500
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	3600	410	160	310	490
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.81	0.207	0.0789	0.155	0.243
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	1810	207	78.9	155	243
Sulphide	mg/kg	1	MCERTS	100	44	19	61	31
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	3.1	0.9	1.8	3.1	1.5
Total Organic Carbon (TOC) – Manual	%	0.1	MCERTS	-	-	-	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271510	271511	271512	271513	271514
Sample Reference				WS11.S2	WS11.S3	WS15.S1	WS15.S2	WS15.S3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	3.00	0.30	0.70	1.50
Date Sampled				25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.58	< 0.05	0.13	0.16	0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.14	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.13	0.07	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.24	< 0.05	0.24	0.09	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.8	< 0.05	3.6	0.88	0.17
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.72	0.11	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.15	< 0.05	4.9	4.1	0.3
Pyrene	mg/kg	0.05	MCERTS	0.18	< 0.05	4.1	3.2	0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.2	2.3	0.18
Chrysene	mg/kg	0.05	MCERTS	0.28	< 0.05	2.5	3.7	0.23
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	2.6	5.9	0.32
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	0.96	1.9	0.11
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.07	< 0.05	2.1	3.3	0.23
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.98	2.4	0.15
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.34	0.85	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.08	< 0.05	1	2.2	0.19
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	2.38	< 0.80	26.5	31.1	2.22
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	56	17	15	18	15
Boron (water soluble)	mg/kg	0.2	MCERTS	1.5	5.1	0.8	0.3	1.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.6	0.7	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	41	47	25	25	28
Copper (aqua regia extractable)	mg/kg	1	MCERTS	140	17	68	130	45
Lead (aqua regia extractable)	mg/kg	1	MCERTS	30	26	75	210	60
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	49	40	32	36	28
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	3	< 1.0	1.7	1.5	1.4
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	320	110	280	290	150
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	0.98	< 0.010	< 0.010	0.054	< 0.010
TPHCWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	1	MCERTS	29	< 1.0	< 1.0	3.5	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	2	MCERTS	4.3	< 2.0	< 2.0	5	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	8.1	< 8.0	< 8.0	17	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	130	< 8.0	20	100	39
TPHCWG - Aliphatic >EC5 - EC35 $_{EH_CU+HS_1D_AL}$	mg/kg	10	NONE	170	< 10	20	130	39
TPHCWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	0.02	MCERTS	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1	MCERTS	1.8	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	2	MCERTS	5.5	< 2.0	< 2.0	< 2.0	< 2.0
TPHCWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	< 10	< 10	16	< 10
TPHCWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	19	< 10	< 10	82	21
TPHCWG - Aromatic >EC5 - EC35 $_{EH_CU+HS_1D_AR}$	mg/kg	10	NONE	26	< 10	< 10	98	21

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271510	271511	271512	271513	271514
Sample Reference				WS11.S2	WS11.S3	WS15.S1	WS15.S2	WS15.S3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	3.00	0.30	0.70	1.50
Date Sampled				25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	230	< 10	39	280	110
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271515	271516	271517
Sample Reference				WS5.S1	WS5.S2	WS5.S3
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.20	3.60
Date Sampled				25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
Stone Content	%	0.1	NONE	33.6	27.4	< 0.1
Moisture Content	%	0.01	NONE	7.6	18	29
Total mass of sample received	kg	0.1	NONE	1.1	1.1	1.1

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	MBI	MBI	MBI
Actinolite detected	Type	N/A	ISO 17025	-	-	-
Amosite detected	Type	N/A	ISO 17025	-	-	-
Anthophyllite detected	Type	N/A	ISO 17025	-	-	-
Chrysotile detected	Type	N/A	ISO 17025	-	-	-
Crocidolite detected	Type	N/A	ISO 17025	-	-	-
Tremolite detected	Type	N/A	ISO 17025	-	-	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	-	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	-	-

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	8.7	7.7	8.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO_4	mg/kg	50	MCERTS	3000	1400	1100
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	300	690	650
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.149	0.346	0.327
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	149	346	327
Sulphide	mg/kg	1	MCERTS	11	28	97
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.5	3	1.3
Total Organic Carbon (TOC) – Manual	%	0.1	MCERTS	-	-	-

Total Phenols

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

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271515	271516	271517
Sample Reference				WS5.S1	WS5.S2	WS5.S3
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.20	3.60
Date Sampled				25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.35	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.07	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.08	0.59	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.23	0.07
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.23	0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.13	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.29	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.18	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.1	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.09	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	2.25	< 0.80
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	35	30	22
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	1.2	5.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	21	36
Copper (aqua regia extractable)	mg/kg	1	MCERTS	35	69	14
Lead (aqua regia extractable)	mg/kg	1	MCERTS	74	130	24
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	51	30
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.2	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	210	84	100
Petroleum Hydrocarbons						
TPHCWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	1	MCERTS	< 1.0	2.9	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	< 8.0	16	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	< 8.0	120	< 8.0
TPHCWG - Aliphatic >EC5 - EC35 $_{EH_CU+HS_1D_AL}$	mg/kg	10	NONE	< 10	130	< 10
TPHCWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	0.02	MCERTS	< 0.020	< 0.020	< 0.020
TPHCWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPHCWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	39	< 10
TPHCWG - Aromatic >EC5 - EC35 $_{EH_CU+HS_1D_AR}$	mg/kg	10	NONE	< 10	39	< 10

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals

Lab Sample Number				271515	271516	271517
Sample Reference				WS5.S1	WS5.S2	WS5.S3
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.20	3.60
Date Sampled				25/07/2024	25/07/2024	25/07/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	210	< 10
VOCs						
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 24-033333
Project / Site name: Newport - Cemminerals
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
271502	WS12.S3	3.80	109	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**
271513	WS15.S2	0.70	144	Loose Fibrous Debris	**Amosite**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

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

Analytical Report Number : 24-033333
Project / Site name: Newport - Cemminerals

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
271500	WS12.S1	None Supplied	0.6	Brown gravelly sand
271501	WS12.S2	None Supplied	1.4	Grey sand with clinker and gravel
271502	WS12.S3	None Supplied	3.8	Light grey clay with gravel
271503	WS10.S1	None Supplied	0.45	Brown clay with gravel
271504	WS10.S2	None Supplied	0.9	Light grey clay
271505	WS10.S3	None Supplied	2.5	Brown clay
271506	WS9.S1	None Supplied	0.1	Brown loam and sand with gravel
271507	WS9.S2	None Supplied	0.9	Light grey clay and sand with gravel and coal
271508	WS9.S3	None Supplied	1.7	Light grey clay
271509	WS11.S1	None Supplied	0.6	Grey clay and sand with coal
271510	WS11.S2	None Supplied	1.5	Grey gravelly clay with stones
271511	WS11.S3	None Supplied	3	Brown clay
271512	WS15.S1	None Supplied	0.3	Brown clay and sand with gravel and brick
271513	WS15.S2	None Supplied	0.7	Brown loam and clay with gravel
271514	WS15.S3	None Supplied	1.5	Brown clay with gravel and vegetation
271515	WS5.S1	None Supplied	0.5	Brown gravelly clay with stones
271516	WS5.S2	None Supplied	1.2	Brown gravelly clay with clinker and stones
271517	WS5.S3	None Supplied	3.6	Light grey clay

Analytical Report Number : 24-033333
Project / Site name: Newport - Cemminerals

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references	HSE Report No: 83/1996, HSG 248 (2021), HSG 264 (2012) & SCA Blue Book (draft)	A006B	D	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode	In-house method	L010	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L023B	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	MCERTS

Analytical Report Number : 24-033333
Project / Site name: Newport - Cemminerals

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

&+ - Result is above calibration range after the maximum dilution has been applied. The result should be considered the minimum value. The actual result could be significantly higher. This result is not accredited.

~ - Quality control surrogate recovery outside of limits, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.

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Analytical Report Number : 24-032434

Project / Site name:	Newport-Cemminerals	**Samples received on:**	25/07/2024
Your job number:		**Samples instructed on/ Analysis started on:**	25/07/2024
Your order number:		**Analysis completed by:**	01/08/2024
Report Issue Number:	1	**Report issued on:**	01/08/2024
Samples Analysed:	8 soil samples		

Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 24-032434
Project / Site name: Newport-Cemminerals

Lab Sample Number				266765	266766	266767	266768	266769
Sample Reference				WS2	WS2	WS2	WS3	WS4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	2.60	3.30	0.70	0.60
Date Sampled				23/07/2024	23/07/2024	23/07/2024	23/07/2024	23/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	11.4	13.8	< 0.1	9.5	< 0.1
Moisture Content	%	0.01	NONE	1.2	3.5	21	10	18
Total mass of sample received	kg	0.1	NONE	1.4	1.4	1.4	1.4	1.4
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	WEM	WEM	WEM	WEM	WEM
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	10.2	10	8.7	9.3	9.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO_4	mg/kg	50	MCERTS	470	950	1000	890	2200
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	110	150	370	200	300
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0551	0.0729	0.185	0.102	0.148
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	55.1	72.9	185	102	148
Sulphide	mg/kg	1	MCERTS	13	520	45	13	36
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.2	0.3	1.1	3.9	3.1
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.14	0.22	0.08	1.5	0.17
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.06	0.24	0.14	0.08	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.33	0.18	0.17	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.2	3	1.2	1	1.2
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.82	0.44	< 0.05	0.22
Fluoranthene	mg/kg	0.05	MCERTS	0.52	6.5	2.7	< 0.05	1.7
Pyrene	mg/kg	0.05	MCERTS	0.43	5	2.1	< 0.05	1.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.32	2.7	1.4	0.21	1
Chrysene	mg/kg	0.05	MCERTS	0.3	2.8	1.2	0.34	1.3
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.38	3.2	1.3	< 0.05	1.2
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.15	1.4	0.5	< 0.05	0.67
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.31	2.4	1.2	0.14	0.78
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.17	1.3	0.61	< 0.05	0.52
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.42	0.2	< 0.05	0.21
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.16	1.4	0.57	< 0.05	0.61
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	3.16	31.8	13.7	3.47	11

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Analytical Report Number: 24-032434
Project / Site name: Newport-Cemminerals

Lab Sample Number				266765	266766	266767	266768	266769
Sample Reference				WS2	WS2	WS2	WS3	WS4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	2.60	3.30	0.70	0.60
Date Sampled				23/07/2024	23/07/2024	23/07/2024	23/07/2024	23/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	14	14	11	18
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.4	2	0.5	0.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	12
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	12	13	28	7.9	31
Copper (aqua regia extractable)	mg/kg	1	MCERTS	11	25	16	12	140
Lead (aqua regia extractable)	mg/kg	1	MCERTS	18	21	37	14	260
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	14	23	12	51
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	2.5	< 1.0	2.1	3
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	50	61	89	41	550
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	0.039
TPHCWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	0.071	0.12
TPHCWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	0.047	< 0.010	0.19	0.29
TPHCWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	3.6	8.3
TPHCWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	2	MCERTS	2.2	6.4	4.8	6.2	12
TPHCWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	< 8.0	12	< 8.0	12	20
TPHCWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	72	41	25	51	69
TPHCWG - Aliphatic >EC5 - EC35 $_{EH_CU+HS_1D_AL}$	mg/kg	10	NONE	75	59	30	74	110
TPHCWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	0.02	MCERTS	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1	MCERTS	< 1.0	1.3	< 1.0	2	1.1
TPHCWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	2	MCERTS	< 2.0	7.4	4.2	7	6.8
TPHCWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	46	19	< 10	20
TPHCWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	15	79	31	< 10	43
TPHCWG - Aromatic >EC5 - EC35 $_{EH_CU+HS_1D_AR}$	mg/kg	10	NONE	15	130	54	< 10	71
TPH (EC10 - EC40) $_{EH_CU_1D_TOTAL}$	mg/kg	10	MCERTS	100	210	97	100	210
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0 ~	< 5.0 ~
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0 ~	< 5.0 ~
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0 ~	< 5.0 ~
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0 ~	< 5.0 ~
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0 ~	< 5.0 ~
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0 ~	< 5.0 ~

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 24-032434
Project / Site name: Newport-Cemminerals

Lab Sample Number				266770	266771	266772
Sample Reference				WS4	WS7	WS14
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.90	0.30	1.60
Date Sampled				23/07/2024	23/07/2024	24/07/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	11.1
Moisture Content	%	0.01	NONE	27	11	5.9
Total mass of sample received	kg	0.1	NONE	1.4	2	2
Asbestos						
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	WEM	WEM	WEM
General Inorganics						
pH (L099)	pH Units	N/A	MCERTS	8.5	8.1	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO_4	mg/kg	50	MCERTS	1000	180	120
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	300	19	24
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.149	0.00957	0.0118
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	149	9.57	11.8
Sulphide	mg/kg	1	MCERTS	26	< 1.0	< 1.0
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.2	0.4	0.6
Total Phenols						
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	< 0.80

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Analytical Report Number: 24-032434
Project / Site name: Newport-Cemminerals

Lab Sample Number				266770	266771	266772
Sample Reference				WS4	WS7	WS14
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.90	0.30	1.60
Date Sampled				23/07/2024	23/07/2024	24/07/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	9.7	12
Boron (water soluble)	mg/kg	0.2	MCERTS	4.3	< 0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	2.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	43	23	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	15	15
Lead (aqua regia extractable)	mg/kg	1	MCERTS	58	18	25
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	35	28	32
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	190	74	99
Petroleum Hydrocarbons						
TPHCWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.01	MCERTS	0.054	< 0.010	< 0.010
TPHCWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.01	MCERTS	0.09	< 0.010	0.73
TPHCWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	1	< 1.0	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	8.7	< 2.0	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	27	< 8.0	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	47	< 8.0	< 8.0
TPHCWG - Aliphatic >EC5 - EC35 EH_CU+HS_1D_AL	mg/kg	10	NONE	84	< 10	< 10
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.02	MCERTS	< 0.020	< 0.020	< 0.020
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	1.6	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	4.8	< 2.0	< 2.0
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	12	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10	< 10
TPHCWG - Aromatic >EC5 - EC35 EH_CU+HS_1D_AR	mg/kg	10	NONE	19	< 10	< 10
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	120	< 10	< 10
VOCs						
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-032434
Project / Site name: Newport-Cemminerals

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
266765	WS2	None Supplied	0.5	Non Soil. *b
266766	WS2	None Supplied	2.6	Non Soil. *b
266767	WS2	None Supplied	3.3	Brown clay and loam with gravel
266768	WS3	None Supplied	0.7	Non Soil. *b
266769	WS4	None Supplied	0.6	Black clay and sand with gravel and stones
266770	WS4	None Supplied	0.9	Brown clay and loam
266771	WS7	None Supplied	0.3	Brown loam with gravel
266772	WS14	None Supplied	1.6	Brown loam with gravel and stones

Analytical Report Number : 24-032434
Project / Site name: Newport-Cemminerals

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode	In-house method	L010	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS

Analytical Report Number : 24-032434
Project / Site name: Newport-Cemminerals

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

~ - Quality control surrogate recovery outside of limits, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.

*b - Unaccredited sample matrix.

UKAS TESTING
4041

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Analytical Report Number : 24-044693

Project / Site name:	Newport	**Samples received on:**	23/09/2024
Your job number:		**Samples instructed on/ Analysis started on:**	30/09/2024
Your order number:		**Analysis completed by:**	09/10/2024
Report Issue Number:	1	**Report issued on:**	09/10/2024
Samples Analysed:	6 water samples		

Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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Analytical Report Number: 24-044693
Project / Site name: Newport

Lab Sample Number				331323	331324	331325	331326	331327
Sample Reference				WS4	WS11	WS15	CP1	CP2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				11/09/2024	11/09/2024	11/09/2024	11/09/2024	11/09/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
General Inorganics								
pH (L099)	pH Units	N/A	ISO 17025	7.4	7.4	7.3	7.8	7.6
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO_4	µg/l	45	ISO 17025	21900	282000	116000	141000	189000
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	-	-	-	-	-
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	13	4.9	5.88	9.94	8.45
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	6.02	1.2	3.96	35.6	27.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.04	0.02	0.08	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.4	0.3	0.3	0.6	0.5
Copper (dissolved)	µg/l	0.5	ISO 17025	2.5	13	8.4	1.3	3
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	0.3	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	6	2	6.1	3	2.6
Selenium (dissolved)	µg/l	0.6	ISO 17025	12	< 0.6	2.1	-	9
Zinc (dissolved)	µg/l	0.5	ISO 17025	3.5	25	24	2.9	6.3
Boron (dissolved)	µg/l	10	ISO 17025	1000	110	300	2200	1300
Calcium (dissolved)	mg/l	0.012	ISO 17025	-	-	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-	< 4.0	-

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Analytical Report Number: 24-044693
Project / Site name: Newport

Lab Sample Number				331323	331324	331325	331326	331327
Sample Reference				WS4	WS11	WS15	CP1	CP2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				11/09/2024	11/09/2024	11/09/2024	11/09/2024	11/09/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Petroleum Hydrocarbons								
TPH - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC10 - EC12 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC12 - EC16 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC16 - EC21 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC21 - EC35 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC5 - EC35 $_{HS+EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC12 - EC16 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC16 - EC21 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC21 - EC35 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC35 $_{HS+EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH (EC10 - EC40) $_{EH_1D_TOTAL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-044693
Project / Site name: Newport

Lab Sample Number				331328
Sample Reference				DOCK
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				11/09/2024
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**	
General Inorganics				
pH (L099)	pH Units	N/A	ISO 17025	7.3
Total Cyanide	µg/l	10	ISO 17025	-
Sulphate as SO_4	µg/l	45	ISO 17025	-
Sulphide	µg/l	5	NONE	-
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	4.92
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	-
Total Phenols				
Total Phenols (monohydric)	µg/l	10	ISO 17025	-
Speciated PAHs				
Naphthalene	µg/l	0.01	ISO 17025	-
Acenaphthylene	µg/l	0.01	ISO 17025	-
Acenaphthene	µg/l	0.01	ISO 17025	-
Fluorene	µg/l	0.01	ISO 17025	-
Phenanthrene	µg/l	0.01	ISO 17025	-
Anthracene	µg/l	0.01	ISO 17025	-
Fluoranthene	µg/l	0.01	ISO 17025	-
Pyrene	µg/l	0.01	ISO 17025	-
Benzo(a)anthracene	µg/l	0.01	ISO 17025	-
Chrysene	µg/l	0.01	ISO 17025	-
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	-
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	-
Benzo(a)pyrene	µg/l	0.01	ISO 17025	-
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	-
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	-
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	-
Total PAH				
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	-
Heavy Metals / Metalloids				
Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.21
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.4
Copper (dissolved)	µg/l	0.5	ISO 17025	5.4
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	2
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	24
Boron (dissolved)	µg/l	10	ISO 17025	120
Calcium (dissolved)	mg/l	0.012	ISO 17025	130
Selenium (dissolved)	µg/l	4	ISO 17025	-

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Analytical Report Number: 24-044693
Project / Site name: Newport

Lab Sample Number				331328
Sample Reference				DOCK
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				11/09/2024
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**	
Petroleum Hydrocarbons				
TPH - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	µg/l	1	ISO 17025	-
TPH - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	µg/l	1	ISO 17025	-
TPH - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	µg/l	1	ISO 17025	-
TPH - Aliphatic >EC10 - EC12 $_{EH_1D_AL_MS}$	µg/l	10	NONE	-
TPH - Aliphatic >EC12 - EC16 $_{EH_1D_AL_MS}$	µg/l	10	NONE	-
TPH - Aliphatic >EC16 - EC21 $_{EH_1D_AL_MS}$	µg/l	10	NONE	-
TPH - Aliphatic >EC21 - EC35 $_{EH_1D_AL_MS}$	µg/l	10	NONE	-
TPH - Aliphatic >EC5 - EC35 $_{HS+EH_1D_AL_MS}$	µg/l	10	NONE	-
TPH - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	µg/l	1	ISO 17025	-
TPH - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	µg/l	1	ISO 17025	-
TPH - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	µg/l	1	ISO 17025	-
TPH - Aromatic >EC10 - EC12 $_{EH_1D_AR_MS}$	µg/l	10	NONE	-
TPH - Aromatic >EC12 - EC16 $_{EH_1D_AR_MS}$	µg/l	10	NONE	-
TPH - Aromatic >EC16 - EC21 $_{EH_1D_AR_MS}$	µg/l	10	NONE	-
TPH - Aromatic >EC21 - EC35 $_{EH_1D_AR_MS}$	µg/l	10	NONE	-
TPH - Aromatic >EC5 - EC35 $_{HS+EH_1D_AR_MS}$	µg/l	10	NONE	-
TPH (EC10 - EC40) $_{EH_1D_TOTAL_MS}$	µg/l	10	NONE	-
VOCs				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	-
Benzene	µg/l	3	ISO 17025	-
Toluene	µg/l	3	ISO 17025	-
Ethylbenzene	µg/l	3	ISO 17025	-
p & m-xylene	µg/l	3	ISO 17025	-
o-xylene	µg/l	3	ISO 17025	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-044693
Project / Site name: Newport

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited matrices: SW, PW, GW, except B - SW,GW, Hg - SW,PW, Al - SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode	In-house method	L029-PL	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR Analyser. Accredited matrices: SW, PW, GW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	ISO 17025
Total Organic Carbon in water	Determination of total organic carbon in water by TOC/DOC NDIR Analyser. Accredited matrices: SW, PW, GW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited matrices: SW, PW, GW, FSE, LL; PrW, DI PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited matrices: SW, PW, GW, PrW, DI PrW, FSE, LL	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Total Petroleum Hydrocarbons with carbon banding in water by GC-MS	Determination of total petroleum hydrocarbons in water by GC-MS with carbon banding aliphatic and aromatic	In-house method	L070B	W	NONE
Total Petroleum Hydrocarbons in water by GC-MS	Determination of total petroleum hydrocarbons in water by GC-MS. Accredited matrices (TPH C12 - C35): SW, PW, GW	In-house method	L070B	W	NONE
BTEX and/or Volatile Organic Compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW, PW, GW	In-house method based on USEPA 8260	L073B	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW, PW, GW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide in water by distillation followed by colorimetry. Accredited matrices: SW, PW, GW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Total Petroleum Hydrocarbons in water by HS-GC-MS	Determination of total petroleum hydrocarbons in water by headspace GC-MS. Accredited matrices: SW, PW, GW	In-house method	L088-PL	W	ISO 17025
pH of water at 20°C (automated)	Determination of pH of water by electrochemical measurement. Accredited matrices: SW, PW, GW, FSE, LL	In-house method	L099-PL	W	ISO 17025

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Analytical Report Number : 24-044693
Project / Site name: Newport

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Speciated PAHs and/or Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds (including PAHs) in water by extraction in dichloromethane followed by GC-MS. Accredited matrices (PAHs): SW, PW, GW	In-house method based on USEPA 8270	L102B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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Analytical Report Number : 24-044693

Project / Site name: Newport

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
CP1	N/A	W	331326	c	BTEX and/or Volatile Organic Compounds in water	L073B	c
CP1	N/A	W	331326	c	Metals in water by ICP-MS (dissolved)	L012B	c
CP1	N/A	W	331326	c	Metals in water by ICP-OES (dissolved)	L039B	c
CP1	N/A	W	331326	c	Speciated PAHs and/or Semi-volatile organic compounds in water	L102B	c
CP1	N/A	W	331326	c	Sulphate in water	L039B	c
CP1	N/A	W	331326	c	Sulphide in water	L029-PL	c
CP1	N/A	W	331326	c	Total Organic Carbon in water	L037B	c
CP1	N/A	W	331326	c	Total Petroleum Hydrocarbons in water by GC-MS	L070B	c
CP1	N/A	W	331326	c	Total Petroleum Hydrocarbons in water by HS-GC-MS	L088-PL	c
CP1	N/A	W	331326	c	Total Petroleum Hydrocarbons with carbon banding in water by GC-MS	L070B	c
CP1	N/A	W	331326	c	Total cyanide in water	L080-PL	c
CP1	N/A	W	331326	c	pH of water at 20°C (automated)	L099-PL	c
CP2	N/A	W	331327	c	BTEX and/or Volatile Organic Compounds in water	L073B	c
CP2	N/A	W	331327	c	Metals in water by ICP-MS (dissolved)	L012B	c
CP2	N/A	W	331327	c	Metals in water by ICP-OES (dissolved)	L039B	c
CP2	N/A	W	331327	c	Speciated PAHs and/or Semi-volatile organic compounds in water	L102B	c
CP2	N/A	W	331327	c	Sulphate in water	L039B	c
CP2	N/A	W	331327	c	Sulphide in water	L029-PL	c
CP2	N/A	W	331327	c	Total Organic Carbon in water	L037B	c
CP2	N/A	W	331327	c	Total Petroleum Hydrocarbons in water by GC-MS	L070B	c
CP2	N/A	W	331327	c	Total Petroleum Hydrocarbons in water by HS-GC-MS	L088-PL	c
CP2	N/A	W	331327	c	Total Petroleum Hydrocarbons with carbon banding in water by GC-MS	L070B	c
CP2	N/A	W	331327	c	Total cyanide in water	L080-PL	c
CP2	N/A	W	331327	c	pH of water at 20°C (automated)	L099-PL	c
DOCK	N/A	W	331328	c	Dissolved Organic Carbon in water	L037B	c
DOCK	N/A	W	331328	c	Metals in water by ICP-MS (dissolved)	L012B	c
DOCK	N/A	W	331328	c	Metals in water by ICP-OES (dissolved)	L039B	c
DOCK	N/A	W	331328	c	pH of water at 20°C (automated)	L099-PL	c
WS11	N/A	W	331324	c	BTEX and/or Volatile Organic Compounds in water	L073B	c
WS11	N/A	W	331324	c	Metals in water by ICP-MS (dissolved)	L012B	c
WS11	N/A	W	331324	c	Metals in water by ICP-OES (dissolved)	L039B	c
WS11	N/A	W	331324	c	Speciated PAHs and/or Semi-volatile organic compounds in water	L102B	c
WS11	N/A	W	331324	c	Sulphate in water	L039B	c
WS11	N/A	W	331324	c	Sulphide in water	L029-PL	c
WS11	N/A	W	331324	c	Total Organic Carbon in water	L037B	c
WS11	N/A	W	331324	c	Total Petroleum Hydrocarbons in water by GC-MS	L070B	c
WS11	N/A	W	331324	c	Total Petroleum Hydrocarbons in water by HS-GC-MS	L088-PL	c
WS11	N/A	W	331324	c	Total Petroleum Hydrocarbons with carbon banding in water by GC-MS	L070B	c
WS11	N/A	W	331324	c	Total cyanide in water	L080-PL	c
WS11	N/A	W	331324	c	pH of water at 20°C (automated)	L099-PL	c
WS15	N/A	W	331325	c	BTEX and/or Volatile Organic Compounds in water	L073B	c
WS15	N/A	W	331325	c	Metals in water by ICP-MS (dissolved)	L012B	c
WS15	N/A	W	331325	c	Metals in water by ICP-OES (dissolved)	L039B	c
WS15	N/A	W	331325	c	Speciated PAHs and/or Semi-volatile organic compounds in water	L102B	c
WS15	N/A	W	331325	c	Sulphate in water	L039B	c
WS15	N/A	W	331325	c	Sulphide in water	L029-PL	c
WS15	N/A	W	331325	c	Total Organic Carbon in water	L037B	c
WS15	N/A	W	331325	c	Total Petroleum Hydrocarbons in water by GC-MS	L070B	c
WS15	N/A	W	331325	c	Total Petroleum Hydrocarbons in water by HS-GC-MS	L088-PL	c
WS15	N/A	W	331325	c	Total Petroleum Hydrocarbons with carbon banding in water by GC-MS	L070B	c
WS15	N/A	W	331325	c	Total cyanide in water	L080-PL	c
WS15	N/A	W	331325	c	pH of water at 20°C (automated)	L099-PL	c
WS4	N/A	W	331323	c	BTEX and/or Volatile Organic Compounds in water	L073B	c
WS4	N/A	W	331323	c	Metals in water by ICP-MS (dissolved)	L012B	c
WS4	N/A	W	331323	c	Metals in water by ICP-OES (dissolved)	L039B	c
WS4	N/A	W	331323	c	Speciated PAHs and/or Semi-volatile organic compounds in water	L102B	c
WS4	N/A	W	331323	c	Sulphate in water	L039B	c
WS4	N/A	W	331323	c	Sulphide in water	L029-PL	c

Sample Deviation Report

Analytical Report Number : 24-044693

Project / Site name: Newport

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS4	N/A	W	331323	c	Total Organic Carbon in water	L037B	c
WS4	N/A	W	331323	c	Total Petroleum Hydrocarbons in water by GC-MS	L070B	c
WS4	N/A	W	331323	c	Total Petroleum Hydrocarbons in water by HS-GC-MS	L088-PL	c
WS4	N/A	W	331323	c	Total Petroleum Hydrocarbons with carbon banding in water by GC-MS	L070B	c
WS4	N/A	W	331323	c	Total cyanide in water	L080-PL	c
WS4	N/A	W	331323	c	pH of water at 20°C (automated)	L099-PL	c

APPENDIX 6 GENERIC ASSESSMENT CRITERIA

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newport, Wales

Lab Sample Number		271500	271501	271502	271503	271504
Sample Reference		WS12.S1	WS12.S2	WS12.S3	WS10.S1	WS10.S2
Depth (m)		0.60	1.40	3.80	0.45	0.90
Date Sampled		24/07/2024	24/07/2024	24/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Stone Content	%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	11	17	25	17	21
Total mass of sample received	kg	1	1.1	0.6	1.1	1.1
Asbestos in Soil Screen	D/ND	Not-detected	Not-detected	Detected	Not-detected	Not-detected
Asbestos Quantification Total	%	-	-	< 0.001	-	-
Asbestos in Soil Screen / Identification Name	Type	-	-	Loose Fibres	-	-
General Inorganics						
Total Cyanide	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols						
Total Phenols (monohydric)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	1.1	0.57	0.2	0.97	< 0.05
Acenaphthylene	mg/kg	< 0.05	0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.37	0.31	0.08	0.1	< 0.05
Phenanthrene	mg/kg	2	1.7	0.41	0.82	0.09
Anthracene	mg/kg	< 0.05	0.17	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.25	2.2	0.24	0.09	0.05
Pyrene	mg/kg	0.32	1.7	0.24	0.14	< 0.05
Benzo(a)anthracene	mg/kg	< 0.05	1.4	< 0.05	0.07	< 0.05
Chrysene	mg/kg	< 0.05	1.7	< 0.05	0.24	< 0.05
Benzo(b)fluoranthene	mg/kg	< 0.05	2	0.15	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	< 0.05	0.82	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	< 0.05	1.3	< 0.05	0.06	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05	0.78	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	< 0.05	0.29	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	< 0.05	0.81	0.07	< 0.05	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	4.01	15.6	1.39	2.49	< 0.80
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	3.3	11	13	13	21
Cadmium (aqua regia extractable)	mg/kg	0.3	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	3.7	13	27	23	31
Copper (aqua regia extractable)	mg/kg	16	20	15	19	11
Lead (aqua regia extractable)	mg/kg	14	36	31	28	22
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	4.4	9.4	24	26	27
Selenium (aqua regia extractable)	mg/kg	< 1.0	1.2	< 1.0	3.2	< 1.0
Zinc (aqua regia extractable)	mg/kg	59	110	110	84	93
VOCs						
MTBE (Methyl Tertiary Butyl Ether)		< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
Benzene	mg/kg	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
Toluene	mg/kg	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
Ethylbenzene	mg/kg	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
p & m-Xylene	mg/kg	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newport, Wales

Lab Sample Number		271500	271501	271502	271503	271504
Sample Reference		WS12.S1	WS12.S2	WS12.S3	WS10.S1	WS10.S2
Depth (m)		0.60	1.40	3.80	0.45	0.90
Date Sampled		24/07/2024	24/07/2024	24/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Petroleum Hydrocarbons						
TPH C10 - C40 $_{EH_CU_1D_TOTAL}$	mg/kg	81	350	200	29	< 10
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010 ~	< 0.010	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010 ~	0.028	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	1	0.084 ~	1.5	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	4	12	13	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	< 2.0	3.2	< 2.0	2.2	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	< 8.0	26	15	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	55	250	130	10	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	60	290	160	12	< 10
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010 ~	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010 ~	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	< 0.020	< 0.020 ~	< 0.020	< 0.020	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	5.1	< 2.0	< 2.0	3	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	< 10	11	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	< 10	19	28	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	< 10	30	28	< 10	< 10

LEGEND
Not suitable for Commercial - 1%SOM
Not suitable for Commercial - 2.5 %SOM
Not suitable for Commercial - 6 %SOM

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271505	271506	271507	271508	271509
Sample Reference		WS10.S3	WS9.S1	WS9.S2	WS9.S3	WS11.S1
Depth (m)		2.50	0.10	0.90	1.70	0.60
Date Sampled		25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Stone Content	%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	25	5.7	11	28	9.1
Total mass of sample received	kg	1.1	1.1	1	1.1	1.1
Asbestos in Soil Screen	D/ND	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification Total	%	-	-	-	-	-
Asbestos in Soil Screen / Identification Name	Type	-	-	-	-	-
General Inorganics						
Total Cyanide	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols						
Total Phenols (monohydric)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	< 0.05	0.72	0.76	< 0.05	0.76
Acenaphthylene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	< 0.05	0.21	0.34	< 0.05	0.26
Phenanthrene	mg/kg	< 0.05	1.3	1.8	< 0.05	1.1
Anthracene	mg/kg	< 0.05	0.16	1.9	< 0.05	< 0.05
Fluoranthene	mg/kg	< 0.05	0.95	0.24	< 0.05	0.32
Pyrene	mg/kg	< 0.05	0.72	0.31	< 0.05	0.29
Benzo(a)anthracene	mg/kg	< 0.05	0.33	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	< 0.05	0.58	0.56	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	< 0.05	0.44	< 0.05	< 0.05	0.27
Benzo(k)fluoranthene	mg/kg	< 0.05	0.14	< 0.05	< 0.05	0.1
Benzo(a)pyrene	mg/kg	< 0.05	0.17	< 0.05	< 0.05	0.13
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05	0.16	0.08	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	< 0.05	0.28	< 0.05	< 0.05	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	< 0.80	6.2	5.93	< 0.80	3.25
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	14	5.3	41	11	16
Cadmium (aqua regia extractable)	mg/kg	< 0.2	0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	36	62	47	33	10
Copper (aqua regia extractable)	mg/kg	12	50	53	8.9	65
Lead (aqua regia extractable)	mg/kg	22	33	64	17	52
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	31	14	16	28	29
Selenium (aqua regia extractable)	mg/kg	< 1.0	< 1.0	2.9	1.4	1.4
Zinc (aqua regia extractable)	mg/kg	95	360	150	95	510
VOCs						
MTBE (Methyl Tertiary Butyl Ether)		< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Benzene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Toluene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Ethylbenzene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
p & m-Xylene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
o-Xylene	µg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271505	271506	271507	271508	271509
Sample Reference		WS10.S3	WS9.S1	WS9.S2	WS9.S3	WS11.S1
Depth (m)		2.50	0.10	0.90	1.70	0.60
Date Sampled		25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Petroleum Hydrocarbons						
TPH C10 - C40 $_{EH_CU_1D_TOTAL}$	mg/kg	< 10	1300	570	< 10	410
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.041	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	< 1.0	2.5	2.4	< 1.0	2.8
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	< 2.0	< 2.0	< 2.0	< 2.0	3
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	< 8.0	19	17	< 8.0	20
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	< 8.0	440	230	< 8.0	240
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	< 10	460	250	< 10	270
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	< 0.020	< 0.020 ~	< 0.020 ~	< 0.020	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	< 1.0	2.4	1.4	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	< 2.0	6.7	4.2	< 2.0	4.7
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	< 10	20	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	< 10	350	110	< 10	52
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	< 10	380	110	< 10	57

LEGEND
Not suitable for Commercial - 1%SOM
Not suitable for Commercial - 2.5 %SOM
Not suitable for Commercial - 6 %SOM

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271510	271511	271512	271513	271514
Sample Reference		WS11.S2	WS11.S3	WS15.S1	WS15.S2	WS15.S3
Depth (m)		1.50	3.00	0.30	0.70	1.50
Date Sampled		25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Stone Content	%	32.9	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	15	24	15	15	21
Total mass of sample received	kg	0.6	1.1	0.6	1.1	1.1
Asbestos in Soil Screen	D/ND	Not-detected	Not-detected	Not-detected	Detected	Not-detected
Asbestos Quantification Total	%	-	-	-	< 0.001	-
Asbestos in Soil Screen / Identification Name	Type	-	-	-	Loose Fibrous Debri	-
General Inorganics						
Total Cyanide	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols						
Total Phenols (monohydric)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	0.58	< 0.05	0.13	0.16	0.05
Acenaphthylene	mg/kg	< 0.05	< 0.05	< 0.05	0.14	< 0.05
Acenaphthene	mg/kg	< 0.05	< 0.05	0.13	0.07	< 0.05
Fluorene	mg/kg	0.24	< 0.05	0.24	0.09	< 0.05
Phenanthrene	mg/kg	0.8	< 0.05	3.6	0.88	0.17
Anthracene	mg/kg	< 0.05	< 0.05	0.72	0.11	< 0.05
Fluoranthene	mg/kg	0.15	< 0.05	4.9	4.1	0.3
Pyrene	mg/kg	0.18	< 0.05	4.1	3.2	0.3
Benzo(a)anthracene	mg/kg	< 0.05	< 0.05	2.2	2.3	0.18
Chrysene	mg/kg	0.28	< 0.05	2.5	3.7	0.23
Benzo(b)fluoranthene	mg/kg	< 0.05	< 0.05	2.6	5.9	0.32
Benzo(k)fluoranthene	mg/kg	< 0.05	< 0.05	0.96	1.9	0.11
Benzo(a)pyrene	mg/kg	0.07	< 0.05	2.1	3.3	0.23
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05	< 0.05	0.98	2.4	0.15
Dibenz(a,h)anthracene	mg/kg	< 0.05	< 0.05	0.34	0.85	< 0.05
Benzo(ghi)perylene	mg/kg	0.08	< 0.05	1	2.2	0.19
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	2.38	< 0.80	26.5	31.1	2.22
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	56	17	15	18	15
Cadmium (aqua regia extractable)	mg/kg	< 0.2	< 0.2	0.6	0.7	< 0.2
Chromium (aqua regia extractable)	mg/kg	41	47	25	25	28
Copper (aqua regia extractable)	mg/kg	140	17	68	130	45
Lead (aqua regia extractable)	mg/kg	30	26	75	210	60
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	49	40	32	36	28
Selenium (aqua regia extractable)	mg/kg	3	< 1.0	1.7	1.5	1.4
Zinc (aqua regia extractable)	mg/kg	320	110	280	290	150
VOCs						
MTBE (Methyl Tertiary Butyl Ether)		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271510	271511	271512	271513	271514
Sample Reference		WS11.S2	WS11.S3	WS15.S1	WS15.S2	WS15.S3
Depth (m)		1.50	3.00	0.30	0.70	1.50
Date Sampled		25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Petroleum Hydrocarbons						
TPH C10 - C40 $_{EH_CU_1D_TOTAL}$	mg/kg	230	< 10	39	280	110
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.98	< 0.010	< 0.010	0.054	< 0.010
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	29	< 1.0	< 1.0	3.5	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	4.3	< 2.0	< 2.0	5	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8.1	< 8.0	< 8.0	17	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	130	< 8.0	20	100	39
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	170	< 10	20	130	39
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1.8	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	5.5	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	< 10	< 10	< 10	16	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	19	< 10	< 10	82	21
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	26	< 10	< 10	98	21

LEGEND
Not suitable for Commercial - 1%SOM
Not suitable for Commercial - 2.5 %SOM
Not suitable for Commercial - 6 %SOM

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271515	271516	271517	266765	266766
Sample Reference		WS5.S1	WS5.S2	WS5.S3	WS2	WS2
Depth (m)		0.50	1.20	3.60	0.50	2.60
Date Sampled		25/07/2024	25/07/2024	25/07/2024	23/07/2024	23/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Stone Content	%	33.6	27.4	< 0.1	11.4	13.8
Moisture Content	%	7.6	18	29	1.2	3.5
Total mass of sample received	kg	1.1	1.1	1.1	1.4	1.4
Asbestos in Soil Screen	D/ND	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification Total	%	-	-	-		
Asbestos in Soil Screen / Identification Name	Type	-	-	-		
General Inorganics						
Total Cyanide	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols						
Total Phenols (monohydric)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	< 0.05	0.35	< 0.05	0.14	0.22
Acenaphthylene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	< 0.05	< 0.05	< 0.05	0.06	0.24
Fluorene	mg/kg	< 0.05	0.07	< 0.05	< 0.05	0.33
Phenanthrene	mg/kg	0.08	0.59	< 0.05	0.2	3
Anthracene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	0.82
Fluoranthene	mg/kg	< 0.05	0.23	0.07	0.52	6.5
Pyrene	mg/kg	< 0.05	0.23	0.05	0.43	5
Benzo(a)anthracene	mg/kg	< 0.05	0.13	< 0.05	0.32	2.7
Chrysene	mg/kg	< 0.05	0.29	< 0.05	0.3	2.8
Benzo(b)fluoranthene	mg/kg	< 0.05	0.18	< 0.05	0.38	3.2
Benzo(k)fluoranthene	mg/kg	< 0.05	< 0.05	< 0.05	0.15	1.4
Benzo(a)pyrene	mg/kg	< 0.05	0.1	< 0.05	0.31	2.4
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05	< 0.05	< 0.05	0.17	1.3
Dibenz(a,h)anthracene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	0.42
Benzo(ghi)perylene	mg/kg	< 0.05	0.09	< 0.05	0.16	1.4
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	< 0.80	2.25	< 0.80	3.16	31.8
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	35	30	22	15	14
Cadmium (aqua regia extractable)	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	13	21	36	12	13
Copper (aqua regia extractable)	mg/kg	35	69	14	11	25
Lead (aqua regia extractable)	mg/kg	74	130	24	18	21
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	15	51	30	13	14
Selenium (aqua regia extractable)	mg/kg	1.2	< 1.0	< 1.0	< 1.0	2.5
Zinc (aqua regia extractable)	mg/kg	210	84	100	50	61
VOCs						
MTBE (Methyl Tertiary Butyl Ether)		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271515	271516	271517	266765	266766
Sample Reference		WS5.S1	WS5.S2	WS5.S3	WS2	WS2
Depth (m)		0.50	1.20	3.60	0.50	2.60
Date Sampled		25/07/2024	25/07/2024	25/07/2024	23/07/2024	23/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Petroleum Hydrocarbons						
TPH C10 - C40 $_{EH_CU_1D_TOTAL}$	mg/kg	< 10	210	< 10	100	210
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	0.047
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	< 1.0	2.9	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	< 2.0	< 2.0	< 2.0	2.2	6.4
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	< 8.0	16	< 8.0	< 8.0	12
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	< 8.0	120	< 8.0	72	41
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	< 10	130	< 10	75	59
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	1.3
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	< 2.0	< 2.0	< 2.0	< 2.0	7.4
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	< 10	< 10	< 10	< 10	46
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	< 10	39	< 10	15	79
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	< 10	39	< 10	15	130

LEGEND
Not suitable for Commercial - 1%SOM
Not suitable for Commercial - 2.5 %SOM
Not suitable for Commercial - 6 %SOM

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		266767	266768	266769	266770	266771
Sample Reference		WS2	WS3	WS4	WS4	WS7
Depth (m)		3.30	0.70	0.60	0.90	0.30
Date Sampled		23/07/2024	23/07/2024	23/07/2024	23/07/2024	23/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Stone Content	%	< 0.1	9.5	< 0.1	< 0.1	< 0.1
Moisture Content	%	21	10	18	27	11
Total mass of sample received	kg	1.4	1.4	1.4	1.4	2
Asbestos in Soil Screen	D/ND	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification Total	%					
Asbestos in Soil Screen / Identification Name	Type					
General Inorganics						
Total Cyanide	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols						
Total Phenols (monohydric)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	0.08	1.5	0.17	< 0.05	< 0.05
Acenaphthylene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.14	0.08	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.18	0.17	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	1.2	1	1.2	< 0.05	< 0.05
Anthracene	mg/kg	0.44	< 0.05	0.22	< 0.05	< 0.05
Fluoranthene	mg/kg	2.7	< 0.05	1.7	< 0.05	< 0.05
Pyrene	mg/kg	2.1	< 0.05	1.4	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	1.4	0.21	1	< 0.05	< 0.05
Chrysene	mg/kg	1.2	0.34	1.3	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	1.3	< 0.05	1.2	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.5	< 0.05	0.67	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	1.2	0.14	0.78	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.61	< 0.05	0.52	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.2	< 0.05	0.21	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.57	< 0.05	0.61	< 0.05	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	13.7	3.47	11	< 0.80	< 0.80
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	14	11	18	15	9.7
Cadmium (aqua regia extractable)	mg/kg	< 0.2	< 0.2	12	2.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	28	7.9	31	43	23
Copper (aqua regia extractable)	mg/kg	16	12	140	29	15
Lead (aqua regia extractable)	mg/kg	37	14	260	58	18
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	23	12	51	35	28
Selenium (aqua regia extractable)	mg/kg	< 1.0	2.1	3	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	89	41	550	190	74
VOCs						
MTBE (Methyl Tertiary Butyl Ether)		< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Benzene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Toluene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Ethylbenzene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
p & m-Xylene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
o-Xylene	µg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		266767	266768	266769	266770	266771
Sample Reference		WS2	WS3	WS4	WS4	WS7
Depth (m)		3.30	0.70	0.60	0.90	0.30
Date Sampled		23/07/2024	23/07/2024	23/07/2024	23/07/2024	23/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Petroleum Hydrocarbons						
TPH C10 - C40 $_{EH_CU_1D_TOTAL}$	mg/kg	97	100	210	120	< 10
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010	0.039	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	< 0.010	0.071	0.12	0.054	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	< 0.010	0.19	0.29	0.09	< 0.010
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	< 1.0	3.6	8.3	1	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	4.8	6.2	12	8.7	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	< 8.0	12	20	27	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	25	51	69	47	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	30	74	110	84	< 10
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	< 1.0	2	1.1	1.6	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	4.2	7	6.8	4.8	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	19	< 10	20	12	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	31	< 10	43	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	54	< 10	71	19	< 10

LEGEND
Not suitable for Commercial - 1%SOM
Not suitable for Commercial - 2.5 %SOM
Not suitable for Commercial - 6 %SOM

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		266772
Sample Reference		WS14
Depth (m)		1.60
Date Sampled		24/07/2024
Analytical Parameter (Soil Analysis)	**Units**	
Stone Content	%	11.1
Moisture Content	%	5.9
Total mass of sample received	kg	2
Asbestos in Soil Screen	D/ND	Not-detected
Asbestos Quantification Total	%	
Asbestos in Soil Screen / Identification Name	Type	
General Inorganics		
Total Cyanide	mg/kg	< 1.0
Total Phenols		
Total Phenols (monohydric)	mg/kg	< 1.0
Speciated PAHs		
Naphthalene	mg/kg	< 0.05
Acenaphthylene	mg/kg	< 0.05
Acenaphthene	mg/kg	< 0.05
Fluorene	mg/kg	< 0.05
Phenanthrene	mg/kg	< 0.05
Anthracene	mg/kg	< 0.05
Fluoranthene	mg/kg	< 0.05
Pyrene	mg/kg	< 0.05
Benzo(a)anthracene	mg/kg	< 0.05
Chrysene	mg/kg	< 0.05
Benzo(b)fluoranthene	mg/kg	< 0.05
Benzo(k)fluoranthene	mg/kg	< 0.05
Benzo(a)pyrene	mg/kg	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05
Dibenz(a,h)anthracene	mg/kg	< 0.05
Benzo(ghi)perylene	mg/kg	< 0.05
Total PAH		
Speciated Total EPA-16 PAHs	mg/kg	< 0.80
Heavy Metals / Metalloids		
Arsenic (aqua regia extractable)	mg/kg	12
Cadmium (aqua regia extractable)	mg/kg	< 0.2
Chromium (aqua regia extractable)	mg/kg	18
Copper (aqua regia extractable)	mg/kg	15
Lead (aqua regia extractable)	mg/kg	25
Mercury (aqua regia extractable)	mg/kg	< 0.3
Nickel (aqua regia extractable)	mg/kg	32
Selenium (aqua regia extractable)	mg/kg	< 1.0
Zinc (aqua regia extractable)	mg/kg	99
VOCs		
MTBE (Methyl Tertiary Butyl Ether)		< 5.0
Benzene	mg/kg	< 5.0
Toluene	mg/kg	< 5.0
Ethylbenzene	mg/kg	< 5.0
p & m-Xylene	mg/kg	< 5.0
o-Xylene	µg/kg	< 5.0

LIMITING VALUES ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		266772
Sample Reference		WS14
Depth (m)		1.60
Date Sampled		24/07/2024
Analytical Parameter (Soil Analysis)	**Units**	
Petroleum Hydrocarbons		
TPH C10 - C40 EH_CU_1D_TOTAL	mg/kg	< 10
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.73
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	< 10
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	< 10

LEGEND
Not suitable for Commercial - 1%SOM
Not suitable for Commercial - 2.5 %SOM
Not suitable for Commercial - 6 %SOM

GENERIC ASSESSMENT CIRTERIA SCREENING

Groundwater

Project / Site name: Cemminerals, South Docks, Newport

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Lab Sample Number				331323	331324	331325	331326	331327
Sample Reference				WS4	WS11	WS15	CP1	CP2
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				11/09/2024	11/09/2024	11/09/2024	11/09/2024	11/09/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
General Inorganics								
pH (L099)	pH Units	N/A	ISO 17025	7.4	7.4	7.3	7.8	7.6
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO_4	µg/l	45	ISO 17025	21900	282000	116000	141000	189000
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	-	-	-	-	-
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	13	4.9	5.88	9.94	8.45
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	6.02	1.2	3.96	35.6	27.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.04	0.02	0.08	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.4	0.3	0.3	0.6	0.5
Copper (dissolved)	µg/l	0.5	ISO 17025	**2.5**	**13**	**8.4**	**1.3**	**3**
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	0.3	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	6	2	6.1	3	2.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	3.5	**25**	**24**	2.9	6.3
Boron (dissolved)	µg/l	10	ISO 17025	1000	110	300	2200	1300
Calcium (dissolved)	mg/l	0.012	ISO 17025	-	-	-	-	-
Selenium (dissolved)	µg/l	4	ISO 17025	-	-	-	< 4.0	-
Petroleum Hydrocarbons								
TPH - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC10 - EC12 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC12 - EC16 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC16 - EC21 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC21 - EC35 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC5 - EC35 $_{HS+EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC12 - EC16 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC16 - EC21 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC21 - EC35 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC35 $_{HS+EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH (EC10 - EC40) $_{EH_1D_TOTAL_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0

Value > GAC EQS (bioavailibility correction possible)

Value > GAC EQS

SOIL ASSESSMENT CRITERIA FOR HUMAN HEALTH RISK ASSESSMENT

Parameter	Residential		Commercial	Allotment	Public Open Space near Residential land (POSresi)	Public Park Land (POSpark)	Source	Model
	With Home Grown Produce	Without Home Grown Produce						
	1-6% SOM (mg kg^{-1})	1-6% SOM (mg kg^{-1})	1-6% SOM (mg kg^{-1})	1-6% SOM (mg kg^{-1})	1-6% SOM (mg kg^{-1})	1-6% SOM (mg kg^{-1})		
Metals/Metalloids (a)								
Antimony	Not Derived	550	7,500	Not Derived	-	-	CL:AIRE	CLEA v1.06
Arsenic (inorganic)	37	40	640	43	79	170	LQM/CIEH S4ULs	CLEA v1.071
Barium	Not Derived	1,300	22,000	Not Derived	-	-	CL:AIRE	CLEA v1.06
Beryllium	1.7	1.7	12	35	2.2	63	LQM/CIEH S4ULs	CLEA v1.071
Boron	290	11,000	240,000	45	21,000	46,000	LQM/CIEH S4ULs	CLEA v1.071
Cadmium (d)	11	85	190	1.9	120	560	LQM/CIEH S4ULs	CLEA v1.071
Chromium (III)	910	910	8,600	18,000	1,500	33,000	LQM/CIEH S4ULs	CLEA v1.071
Chromium (VI) (e)	6	6	33	1.8	7.7	220	LQM/CIEH S4ULs	CLEA v1.071
Copper	2,400	7,100	68,000	520	12,000	44,000	LQM/CIEH S4ULs	CLEA v1.071
Lead (f)	200	310	2,330	80	630	1,300	DEFRA C4SL	CLEA
Mercury (Methyl)	11	15	320	6	40	68	LQM/CIEH S4ULs	CLEA v1.071
Molybdenum	Not Derived	670	17,000	Not Derived	-	-	CL:AIRE	CLEA v1.06
Nickel	130	180	980	53	230	800	LQM/CIEH S4ULs	CLEA v1.071
Selenium	250	430	12,000	88	1,100	1,800	LQM/CIEH S4ULs	CLEA v1.071
Vanadium	410	1,200	9,000	91	2,000	5,000	LQM/CIEH S4ULs	CLEA v1.071
Zinc	3,700	40,000	730,000	620	81,000	170,000	LQM/CIEH S4ULs	CLEA v1.071
Other Inorganics								
Asbestos	Non Detection	Non Detection	Non Detection	Non Detection	Non Detection	Non Detection		
Free Cyanide	34	34	34	34	34	34	ATKINS ATRISK SSV	CLEA v1.04

Parameter	Residential						Commercial (mg kg^{-1})			Allotment (mg kg^{-1})			Public Open Space near Residential land (POSresi) (mg kg^{-1})			Public Park Land (POSpark) (mg kg^{-1})			Source	Model
	With Home Grown Produce (mg kg^{-1})			Without Home Grown Produce (mg kg^{-1})																
	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM		
Organics																				
Biphenyl	66	160	360	220	500	980	18,000	33,000	48,000	14	35	83	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Organometals																				
Tributyl tin oxide	0.25	0.59	1.3	1.4	3.1	5.7	130	180	200	0.042	0.1	0.24	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
PAHs																				
Acenaphthene	210	510	1,100	3,000	4,700	6,000	84,000	97,000	100,000	34	85	200	15,000	15,000	15,000	29,000	30,000	30,000	LQM/CIEH S4ULs	CLEA v1.071
Acenaphthylene	170	420	920	2,900	4,600	6,000	83,000	97,000	100,000	28	69	160	15,000	15,000	15,000	29,000	30,000	30,000	LQM/CIEH S4ULs	CLEA v1.071
Anthracene	2,400	5,400	11,000	31,000	35,000	37,000	520,000	540,000	540,000	380	950	2,200	74,000	74,000	74,000	150,000	150,000	150,000	LQM/CIEH S4ULs	CLEA v1.071
Benzo(a)anthracene	7.2	11	13	11	14	15	170	170	180	2.9	6.5	13	29	29	29	49	56	62	LQM/CIEH S4ULs	CLEA v1.071
Benzo(a)pyrene	2.2	2.7	3.0	3.2	3.2	3.2	35	35	36	0.97	2	3.5	5.7	5.7	5.7	11	12	13	LQM/CIEH S4ULs	CLEA v1.071
Benzo(b)fluoranthene	2.6	3.3	3.7	3.9	4.0	4.0	44	44	45	0.99	2.1	3.9	7.1	7.2	7.2	13	15	16	LQM/CIEH S4ULs	CLEA v1.071
Benzo(g,h,i)perylene	320	340	350	360	360	360	3,900	4,000	4,000	290	470	640	640	640	640	1,400	1,500	1,600	LQM/CIEH S4ULs	CLEA v1.071
Benzo(k)fluoranthene	77	93	100	110	110	110	1,200	1,200	1,200	37	75	130	190	190	190	370	410	440	LQM/CIEH S4ULs	CLEA v1.071
Chrysene	15	22	27	30	31	32	350	350	350	4.1	9.4	19	57	57	57	93	110	120	LQM/CIEH S4ULs	CLEA v1.071
Dibenz(a,h)anthracene	0.24	0.28	0.30	0.31	0.32	0.32	3.5	3.6	3.6	0.14	0.27	0.43	0.57	0.57	0.58	1.1	1.3	1.4	LQM/CIEH S4ULs	CLEA v1.071
Fluoranthene	280	560	890	1,500	1,600	1,600	23,000	23,000	23,000	52	130	290	3,100	3,100	3,100	6,300	6,300	6,400	LQM/CIEH S4ULs	CLEA v1.071
Fluorene	170	400	860	2,800	3,800	4,500	63,000	68,000	71,000	27	67	160	9,900	9,900	9,900	20,000	20,000	20,000	LQM/CIEH S4ULs	CLEA v1.071
Indeno(1,2,3-cd)pyrene	27	36	41	45	46	46	500	510	510	9.5	21	39	82	82	82	150	170	180	LQM/CIEH S4ULs	CLEA v1.071
Naphthalene	2.3	5.6	13	2.3	5.6	13	190	460	1,100	4.1	10	24	4,900	4,900	4,900	1,200	1,900	3,000	LQM/CIEH S4ULs	CLEA v1.071
Phenanthrene	95	220	440	1,300	1,500	1,500	22,000	22,000	23,000	15	38	90	3,100	3,100	3,100	6,200	6,200	6,300	LQM/CIEH S4ULs	CLEA v1.071
Pyrene	620	1,200	2,000	3,700	3,800	3,800	54,000	54,000	54,000	110	270	620	7,400	7,400	7,400	15,000	15,000	15,000	LQM/CIEH S4ULs	CLEA v1.071
Coal Tar (Bap as surrogate marker)	0.79	0.98	1.1	1.2	1.2	1.2	15	15	15	0.32	0.67	1.2	2.2	2.2	2.2	4.4	4.7	4.8	LQM/CIEH S4ULs	CLEA v1.071
TPHs																				
Aliphatic EC 5-6	42	78	160	42	78	160	3,200	5,900	12,000	730	1,700	3,900	570,000	590,000	600,000	95,000	130,000	180,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >6-8	100	230	530	100	230	530	7,800	17,000	40,000	2,300	5,600	13,000	600,000	610,000	620,000	150,000	220,000	320,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >8-10	27	65	150	27	65	150	2,000	4,800	11,000	320	770	1,700	13,000	13,000	13,000	14,000	18,000	21,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >10-12	130	330	760	130	330	770	9,700	23,000	47,000	2,200	4,400	7,300	13,000	13,000	13,000	21,000	23,000	24,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >12-16	1100	2,400	4,300	1100	2,400	4,400	59,000	82,000	90,000	11,000	13,000	13,000	13,000	13,000	13,000	25,000	25,000	26,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >16-35	65,000	92,000	110,000	65,000	92,000	110,000	1,600,000	1,700,000	1,800,000	260,000	270,000	270,000	250,000	250,000	250,000	450,000	480,000	490,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >35-44	65,000	92,000	110,000	65,000	92,000	110,000	1,600,000	1,700,000	1,800,000	260,000	270,000	270,000	250,000	250,000	250,000	450,000	480,000	490,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >5-7 (benzene)	70	140	300	370	690	1400	26,000	46,000	86,000	13	27	57	56,000	56,000	56,000	76,000	84,000	92,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >7-8 (toluene)	130	290	660	860	1800	3,900	56,000	110,000	180,000	22	51	120	56,000	56,000	56,000	87,000	95,000	100,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >8-10	34	83	190	47	110	270	3,500	8,100	17,000	8.6	21	51	5,000	5,000	5,000	7,200	8,500	9,300	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >10-12	74	180	380	250	590	1200	16,000	28,000	34,000	13	31	74	5,000	5,000	5,000	9,200	9,700	10,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >12-16	140	330	660	1,800	2,300	2,500	36,000	37,000	38,000	23	57	130	5,100	5,100	5,000	10,000	10,000	10,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >16-21	260	540	930	1,900	1,900	1,900	28,000	28,000	28,000	46	110	260	3,800	3,800	3,800	7,600	7,700	7,800	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >21-35	1,100	1,500	1,700	1,900	1,900	1,900	28,000	28,000	28,000	370	820	1,600	3,800	3,800	3,800	7,800	7,800	7,900	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >35-44	1,100	1,500	1,700	1,900	1,900	1,900	28,000	28,000	28,000	370	820	1,600	3,800	3,800	3,800	7,800	7,800	7,900	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic + Aromatic EC >44-70	1,600	1,800	1,900	1,900	1,900	1,900	28,000	28,000	28,000	1,200	2,100	3,000	3,800	3,800	3,800	7,800	7,800	7,900	LQM/CIEH S4ULs	CLEA v1.071
BTEX																				
Benzene	0.087	0.17	0.37	0.38	0.7	1.4	27	47	90	0.017	0.034	0.075	72	72	73	90	100	110	LQM/CIEH S4ULs	CLEA v1.071
Toluene	130	290	660	880	1,900	3,900	56,000	110,000	180,000	22	51	120	56,000	56,000	56,000	87,000	95,000	100,000	LQM/CIEH S4ULs	CLEA v1.071
Ethylbenzene	47	110	260	83	190	440	5,700	13,000	27,000	16	39	91	24,000	24,000	25,000	17,000	22,000	27,000	LQM/CIEH S4ULs	CLEA v1.071
o-xylene	60	140	330	88	210	480	6,600	15,000	33,000	28	67	160	41,000	42,000	43,000	17,000	24,000	33,000	LQM/CIEH S4ULs	CLEA v1.071
m-xylene	59	140	320	82	190	450	6,200	14,000	31,000	31	74	170	41,000	42,000	43,000	17,000	24,000	32,000	LQM/CIEH S4ULs	CLEA v1.071
p-xylene	56	130	310	79	180	430	5,900	14,000	30,000	29	69	160	41,000	42,000	43,000	17,000	23,000	31,000	LQM/CIEH S4ULs	CLEA v1.071
Chloroalkanes & Alkenes																				
1,1-Dichloroethane	2.4	3.9	7.4	2.5	4.1	7.7	280	450	850	9.2	17	35	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
1,2 Dichloroethane	0.0071	0.011	0.019	0.0092	0.013	0.023	0.67	0.97	1.7	0.0046	0.0083	0.016	29	29	29	21	24	28	LQM/CIEH S4ULs	CLEA v1.071
1,1-Dichloroethene	0.23	0.4	0.82	0.23	0.41	0.82	26	46	92	2.8	5.6	12	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
1,1,1 Trichloroethane	8.8	18	39	9	18	40	660	1,300	3,000	48	110	240	140,000	140,000	140,000	57,000	76,000	100,000	LQM/CIEH S4ULs	CLEA v1.071
1,1,2 Trichloroethane	0.6	1.2	2.7	0.88	1.8	3.9	94	190	400	0.28	0.61	1.4	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
1,1,2,2 Tetrachloroethane	1.6	3.4	7.5	3.9	8	17	270	550	1,100	0.41	0.89	2	1,400	1,400	1,400	1,800	2,100	2,300	LQM/CIEH S4ULs	CLEA v1.071
1,1,1,2 Tetrachloroethane	1.2	2.8	6.4	1.5	3.5	8.2	110	250	560	0.79	1.9	4.4	1,400	1,400	1,400	1,500	1,800	2,100	LQM/CIEH S4ULs	CLEA v1.071
Tetrachloroethene	0.18	0.39	0.9	0.18	0.4	0.92	19	42	95	0.65	1.5	3.6	1,400	1,400	1,400	810	1,100	1,500	LQM/CIEH S4ULs	CLEA v1.071
Tetrachloromethane (Carbon tetrachloride)	0.026	0.056	0.13	0.026	0.056	0.13	2.9	6.3	14.0	0.45	1	2.4	890	920	950	190	270	400	LQM/CIEH S4ULs	CLEA v1.071
Trichloroethene	0.016	0.034	0.075	0.017	0.036	0.08	1.2	2.6	5.7	0.041	0.091	0.21	120	120	120	70	91	120	LQM/CIEH S4ULs	CLEA v1.071
Trichloromethane (chloroform)	0.91	1.7	3.4	1.2	2.1	4.2	99	170	350	0.42	0.83	1.7	2,500	2,500	2,500	2,600	2,800	3,100	LQM/CIEH S4ULs	CLEA v1.071
Chloroethane (vinyl chloride)	0.00064	0.00087	0.0014	0.00077	0.0010	0.0015	0.059	0.077	0.12	0.00055	0.0010	0.0018	3.5	3.5	3.5	4.8	5	5.4	LQM/CIEH S4ULs	CLEA v1.071
Explosives																				
2,4,6 Trinitrotoluene (TNT)	1.6	3.7	8.1	65	66	66	1,000	1,000	1,000	0.24	0.58	1.4	130	130	130	260	270	270	LQM/CIEH S4ULs	CLEA v1.071
RDX	120	250	540	13,000	13,000	13,000	210,000	210,000	210,000	17	38	85	26,000	26,000	27,000	49,000	51,000	53,000	LQM/CIEH S4ULs	CLEA v1.071
HMX	5.7	13	26	6,700	6,700	6,700	110,000	110,000	110,000	0.86	1.90	3.90	13,000	13,000	13,000	23,000	23,000	24,000	LQM/CIEH S4ULs	CLEA v1.071
Pesticides																				
Aldrin	5.7	6.6	7.1	7.3	7.4	7.5	170	170	170	3.2	6.1	9.6	18	18	18	30	31	31	LQM/CIEH S4ULs	CLEA v1.071
Dieldrin	0.97	2	3.5	7	7.3	7.4	170	170	170	0.17	0.41	0.96	18	18	18	30	30	31	LQM/CIEH S4ULs	CLEA v1.071
Atrazine	3.3	7.6	17.4	610	620	620	9,300	9,400	9,400	0.5	1.2	2.7	1,200	1,200	1,200	2,300	2,400	2,400	LQM/CIEH S4ULs	CLEA v1.071
Dichlorvos	0.032	0.066	0.14	6.4	6.5	6.6	140	140	140	0.0049	0.01	0.022	16	16	16	26	26	27	LQM/CIEH S4ULs	CLEA v1.071
Alpha-Endosulfan	7.4	18	41	160	280	410	5,600	7,400	8,400	1.2	2.9	6.8	1,200	1,200	1,200	2,400	2,400	2,500	LQM/CIEH S4ULs	CLEA v1.071
Beta-Endosulfan	7	17	39	190	320	440	6,300	7,800	8,700	1.1	2.7	6.4	1,200	1,200	1,200	2,400	2,400	2,500	LQM/CIEH S4ULs	CLEA v1.071
Alpha-Hexachlorocyclohexane	0.23	0.55	1.2	6.9	9.2	11	170	180	180	0.035	0.087	0.21	24	24	24	47	48	48	LQM/CIEH S4ULs	CLEA v1.071
Beta-Hexachlorocyclohexane	0.085	0.2	0.46	3.7	3.8	3.8	65	65	65	0.013	0.032	0.077	8.1	8.1	8.1	15	15	16	LQM/CIEH S4ULs	CLEA v1.071
Gamma-Hexachlorocyclohexane	0.06	0.14	0.33	2.9	3.3	3.5	67	69	70	0.0092	0.023	0.054	8.2	8.2	8.2	14	15	15	LQM/CIEH S4ULs	CLEA v1.071
Chlorobenzenes																				
Chlorobenzene	0.46	1	2.4	0.46	1	2.4	56	130	290	5.9	14	32	11,000	13,000	14,000	1,300	2,000	2,900	LQM/CIEH S4ULs	CLEA v1.071
1,2 Dichlorobenzene	23	55	130	24	57	130	2,000	4,800	11,000	94	230	540	90,000	95,000	98,000	24,000	36,000	51,000	LQM/CIEH S4ULs	CLEA v1.071
1,3 Dichlorobenzene	0.4	1	2.3	0.44	1.1	2.5	30	73	170	0.25	0.6	1.5	300	300	300	390	440	470	LQM/CIEH S4ULs	CLEA v1.071
1,4 Dichlorobenzene	61	150	350	61	150	350	4,400	10,000	25,000	15	37	88	17,000	17,000	17,000	36,000	36,000	36,000	LQM/CIEH S4ULs	CLEA v1.071
1,2,3 Trichlorobenzene	1.5	3.6	8.6	1.5	3.7	8.8	102	250	590	4.7	12	28	1,800	1,800	1,800	770	1,100	1,600	LQM/CIEH S4ULs	CLEA v1.071
1,2,4 Trichlorobenzene	2.6	6.4	15	2.6	6.4	15	220	530	1,300	55	140	320	15,000	17,000	19,000	1,700	2,600	4,000	LQM/CIEH S4ULs	CLEA v1.071
1,3,5 Trichlorobenzene	0.33	0.81	1.9	0.33	0.81	1.9	23	55	130	4.7	12	28	1,700	1,700	1,800	380	580	860	LQM/CIEH S4ULs	CLEA v1.071
1,2,3,4 Tetrachlorobenzene	15	36	78	24	56	120	1,700	3,080	4,400	4.4	11	26	830	830	830	1,500	1,600	1,600	LQM/CIEH S4ULs	CLEA v1.071
1,2,3,5 Tetrachlorobenzene	0.66	1.6	3.7	0.75	1.9	4.3	49	120	240	0.38	0.9	2.2	78	79	79	110	120	130	LQM/CIEH S4ULs	CLEA v1.071
1,2,4,5 Tetrachlorobenzene	0.33	0.77	1.6	0.73	1.7	3.5	42	72	96	0.06	0.16	0.37	13	13	13	25	26	26	LQM/CIEH S4ULs	CLEA v1.071
Pentachlorobenzene	5.8	12	22	19	30	38	640	770	830	1.2	3.1	7	100	100	100	190	190	190	LQM/CIEH S4ULs	CLEA v1.071
Hexachlorobenzene	1.8	3.3	4.9	4.1	5.7	6.7	110	120	120	0.47	1.1	2.5	16	16	16	30	30	30	LQM/CIEH S4ULs	CLEA v1.071
Phenols																				
Phenol	120	200	380	440	690	1,200	440	690	1,300	23	42	83	440	690	1,300	440	690	1,300	LQM/CIEH S4ULs	CLEA v1.071
Chlorophenol (4 congeners)	0.87	2	4.5	94	150	210	3,500	4,000	4,300	0.13	0.3	0.7	620	620	620	1,100	1,100	1,100	LQM/CIEH S4ULs	CLEA v1.071
Pentachlorophenol	0.22	0.52	1.2	27	29	31	400	400	400	0.03	0.08	0.19	60	60	60	110	120	120	LQM/CIEH S4ULs	CLEA v1.071
Other (Unchlorinated)																				
Methyl tert-butyl ether (MTBE)	49	84	160	73	120	220	7,900	13,000	24,000	23	44	90	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Carbon disulphide	0.14	0.29	0.62	0.14	0.29	0.62	11	22	47	4.8	10	23	11,000	11,000	12,000	1,300	1,900	2,700	LQM/CIEH S4ULs	CLEA v1.071
Hexachlorobutadiene	0.29	0.7	1.6	0.32	0.78	1.8	31	66	120	0.25	0.61	1.4	25	25	25	48	50	51	LQM/CIEH S4ULs	CLEA v1.071
Styrene	8.1	19	43	35	78	170	3,300	6,500	11,000	12	3.7	8.7	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Dioxins, Furans and Dioxin-like PCBs																				
PCDDs, PCDFs and dioxin-like PCB's (Sum)	0.008	0.008	0.008	0.008	0.008	0.008	0.24	0.24	0.24	0.008	0.008	0.008	-	-	-	-	-	-	EA SGV	CLEA v1.05
VOC																				
1,2-Dichloropropane	0.024	0.042	0.084	0.024	0.042	0.085	3	6	12	0.62	1.2	2.6	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Bromoform	2.8	5.9	13	5.2	11	23	760	1,500	3,100	0.95	2.1	4.6	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
1,2,4-Trimethylbenzene	0.35	0.85	2	0.41	0.99	2.3	42	99	220	0.38	0.93	2.2	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Chloromethane	0.0083	0.0098	0.013	0.0085	0.0099	0.013	1	1	2	0.066	0.13	0.23	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Dichloromethane	0.58	0.98	1.7	2.1	2.8	4.5	270	360	560	0.1	0.19	0.34	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Bromodichloromethane	0.016	0.03	0.061	0.019	0.034	0.07	2	4	8	0.016	0.032	0.068	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Trans 1,2 Dichloroethene	0.19	0.34	0.7	0.19	0.35	0.71	22	40	81	0.93	1.9	4	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Cis 1,2 Dichloroethene	0.11	0.19	0.37	0.12	0.2	0.39	14	24	47	0.26	0.5	1	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Isopropylbenzene	11	27	64	12	28	67	1,400	3,300	7,700	32	79	190	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
SVOCs																				
2,4-Dimethylphenol	19	43	97	210	410	730	16,000	24,000	30,000	3.1	7.2	17	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
2,4-Dinitrotoluene	1.5	3.2	7.2	170	170	170	3,700	3,700	3,800	0.22	0.49	1.1	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
2,6-Dinitrotoluene	0.78	1.7	3.9	78	84	87	1,900	1,900	1,900	0.12	0.27	0.61	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
2-Chloronaphthalene	3.7	9.2	22	3.8	9.3	22	390	960	2,200	40	98	230	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Diethyl Phthalate	120	260	570	1800	3500	6300	150,000	220,000	290,000	19	41	94	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Bis (2-ethylhexyl) phthalate	280	610	1100	2700	2800	2800	85,000	86,000	86,000	47	120	280	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Propylbenzene	34	82	190	40	97	230	4,100	9,700	21,000	34	83	200	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Bromobenzene	0.87	2	4.7	0.91	2.1	4.9	97	220	520	3.2	7.6	18	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Hexachloroethane	0.2	0.48	1.1	0.22	0.54	1.3	22	53	120	0.27	0.67	1.6	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Total Cresols (2-, 3- and 4-methylphenol)	80	180	400	3700	5400	6900	160,000	180,000	180,000	12	27	63	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Butyl benzyl phthalate	1400	3300	7200	42000	44000	44000	940,000	940,000	950,000	220	550	1300	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Di-n-butyl phthalate	13	31	67	450	450	450	15,000	15,000	15,000	2	5	12	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Di-n-octyl phthalate	2300	2800	3100	3400	3400	3400	89,000	89,000	89,000	940	2100	3900	-	-	-	-	-	-	CL:AIRE	CLEA v1.06

CONTROLLED WATERS GAC VALUES (FOR FRESH WATER)

Parameter	Generic Assessment Criterion (µg/l unless otherwise stated)	
	Environmental quality standard [a]	Drinking water standard [b]
Metals and metalloids		
Arsenic	50	10
Boron	2,000	1,000
Cadmium	5	5
Chromium+	5-250	50
Copper+	1-28	2,000
Lead+	4-250	25
Mercury	1	1
Nickel+	50-200	20
Selenium	10	10
Zinc+	8-500	5,000
Other inorganics		
Sulphate	400 mg/l	250 mg/l
Ammonia (NH_3 as N)	15	---
Ammonium (as NH_4^+)	---	500
Organics		
TPH (sum)	Not specified [c] [d]	Not specified [d]
Naphthalene	10	---
Benzo(a)pyrene	---	0.01
Benzo(b)fluoranthene*	---	0.1
Benzo(k)fluoranthene*	---	0.1
Benzo(ghi)perylene*	---	0.1
Indeno(1,2,3-cd)pyrene*	---	0.1
Sum PAH-4*	---	0.1
Benzene	30	1
Toluene	50	700 [f]
Ethylbenzene	20 [e]	300 [f]
Xylenes (sum)	30	500 [f]
MTBE	2,600 [g]	200 [h]
Tetrachloroethene (PCE)	10	10 (sum PCE + TCE)
Trichloroethene (TCE)	10	
Phenol	30	0.5
Others		
Electrical Conductivity	---	2,500 µS/cm @ 20ºC
pH	6-9 pH units [i]	6.5-9.5 pH units

(a) Except where explicitly stated, these are fresh water Environmental Quality Standards taken from: Environment Agency (2002) Technical Advice to Third Parties on Pollution of Controlled Waters for Part IIA of the EPA 1990.

(b) Except where explicitly stated, taken from: The Water Supply (Water Quality) (Amendment) Regulations 2000, 2001 and 2007.

(c) No specific concentration criteria specified for TPH. TPH must not: form a visible film on the surface of the water or form coatings on the beds of watercourses and lakes; impart a detectable 'hydrocarbon' taste to fish; or, produce harmful effects in fish.

(d) Subject to justification on a case-by-case basis, it may be appropriate to apply 200µg/l TPH as a GAC on the basis that this is the DW2 class threshold value specified in the Surface Water (Abstraction for Drinking Water) (Classification) Regulations (1996). DW2 waters are generally suitable for abstraction as drinking water supplies, subject to standard filtration and chemical treatment.

(e) SEPA (2004) Environmental Quality Standards, Issue No 1, October 2004

(f) World Health Organisation (WHO) Guidelines for Drinking Water Quality, 1984. Health value.

(g) EU Risk Assessment Report (2002) MTBE, 3rd Priority List, Volume 19. PNEC value for fresh and sea water life.

(h) Based on a 5-fold dilution of the USEPA (1997) Drinking Water Advisory on MTBE value for taint, EPA-822-F-97-009..

(i) The Surface Waters (Fishlife) (Classification) Regulations 1997.

\+ To be adjusted for hardness of the receiving water and the type of fish (salmonid or cyprinid) to be protected in a surface water receptor. The lowest values are to be applied in the absence of site-specific information to inform an adjustment.

* The sum of all 4 individual PAHs marked with an asterisk (*).

APPENDIX 7 BIOTIC LIGAND MODEL

BIO-MET

INPUT (MONITORING) DATA								Required	Required	Required
ID	Sample Name	Sample Number	Date	Measured Copper Conc (dissolved) [µg/L]	Measured Nickel Conc (dissolved) [µg/L]	Measured Zinc Conc (dissolved) [µg/L]	Measured Lead Conc (dissolved) [µg/L]	pH	DOC [mg/L]	Ca [mg/L]
1	WS4	WS4	11/09/2024	2.5	6	3.5	0.2	7.3	4.92	130
2	WS11	WS11	11/09/2024	13	2	25	0.2	7.3	4.92	130
3	WS15	WS15	11/09/2024	8.4	6.1	24	0.2	7.3	4.92	130
4	CP1	CP1	11/09/2024	1.3	3	2.9	0.3	7.3	4.92	130
5	CP2	CP2	11/09/2024	3	2.6	6.3	0.2	7.3	4.92	130

BIO-MET

		RESULTS (Copper) with EQSbioav = 1 µg/L					RESULTS (Nickel) with EQSbioav = 4 µg/L						
ID	Sample Name	Local HC5 (dissolved) [µg/L]	BioF	Bioavailable Copper Conc [µg/L]	RCR	Notes	Local HC5 (dissolved) [µg/L]	BioF	Bioavailable Nickel Conc (µg/L)	RCR	Notes	flag pH	flag Ca
1	WS4	23.87	0.04	0.10	0.10	! Local HC5 has been calculated	15.26	0.26	1.57	0.39	! Local HC		Ca is abov
2	WS11	23.87	0.04	0.54	0.54	! Local HC5 has been calculated	15.26	0.26	0.52	0.13	! Local HC		Ca is abov
3	WS15	23.87	0.04	0.35	0.35	! Local HC5 has been calculated	15.26	0.26	1.60	0.40	! Local HC		Ca is abov
4	CP1	23.87	0.04	0.05	0.05	! Local HC5 has been calculated	15.26	0.26	0.79	0.20	! Local HC		Ca is abov
5	CP2	23.87	0.04	0.13	0.13	! Local HC5 has been calculated	15.26	0.26	0.68	0.17	! Local HC		Ca is abov

BIO-MET

		RESULTS (Zinc) with EQSbioav = 10.9 µg/L					RESULTS (Lead) with EQSbioav = 1.2 µg/L				
ID	Sample Name	Local HC5 (dissolved) [µg/L]	BioF	Bioavailable Zinc Conc (µg/L)	RCR	Notes	Local HC5 (dissolved) [µg/L]	BioF	Bioavailable Lead Conc (µg/L)	RCR	Notes
1	WS4	32.76	0.33	1.16	0.11		9.27	0.13	0.03	0.02	
2	WS11	32.76	0.33	8.32	0.76		9.27	0.13	0.03	0.02	
3	WS15	32.76	0.33	7.99	0.73		9.27	0.13	0.03	0.02	
4	CP1	32.76	0.33	0.96	0.09		9.27	0.13	0.04	0.03	
5	CP2	32.76	0.33	2.10	0.19		9.27	0.13	0.03	0.02	

APPENDIX 8 WASTE ASSESSMENT

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newport, Wales

Lab Sample Number		271500	271501	271502	271503	271504
Sample Reference		WS12.S1	WS12.S2	WS12.S3	WS10.S1	WS10.S2
Depth (m)		0.60	1.40	3.80	0.45	0.90
Date Sampled		24/07/2024	24/07/2024	24/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Stone Content	%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	11	17	25	17	21
Total mass of sample received	kg	1	1.1	0.6	1.1	1.1
Asbestos in Soil Screen	D/ND	Not-detected	Not-detected	Detected	Not-detected	Not-detected
Asbestos Quantification Total	%	-	-	< 0.001	-	-
Asbestos in Soil Screen / Identification Name	Type	-	-	Loose Fibres	-	-
General Inorganics						
Total Cyanide	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols						
Total Phenols (monohydric)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	1.1	0.57	0.2	0.97	< 0.05
Acenaphthylene	mg/kg	< 0.05	0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.37	0.31	0.08	0.1	< 0.05
Phenanthrene	mg/kg	2	1.7	0.41	0.82	0.09
Anthracene	mg/kg	< 0.05	0.17	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.25	2.2	0.24	0.09	0.05
Pyrene	mg/kg	0.32	1.7	0.24	0.14	< 0.05
Benzo(a)anthracene	mg/kg	< 0.05	1.4	< 0.05	0.07	< 0.05
Chrysene	mg/kg	< 0.05	1.7	< 0.05	0.24	< 0.05
Benzo(b)fluoranthene	mg/kg	< 0.05	2	0.15	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	< 0.05	0.82	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	< 0.05	1.3	< 0.05	0.06	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05	0.78	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	< 0.05	0.29	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	< 0.05	0.81	0.07	< 0.05	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	4.01	15.6	1.39	2.49	< 0.80
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	3.3	11	13	13	21
Cadmium (aqua regia extractable)	mg/kg	0.3	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	3.7	13	27	23	31
Copper (aqua regia extractable)	mg/kg	16	20	15	19	11
Lead (aqua regia extractable)	mg/kg	14	36	31	28	22
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	4.4	9.4	24	26	27
Selenium (aqua regia extractable)	mg/kg	< 1.0	1.2	< 1.0	3.2	< 1.0
Zinc (aqua regia extractable)	mg/kg	59	110	110	84	93
VOCs						
MTBE (Methyl Tertiary Butyl Ether)		< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
Benzene	mg/kg	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
Toluene	mg/kg	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
Ethylbenzene	mg/kg	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
p & m-Xylene	mg/kg	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	< 5.0	< 5.0 ~	< 5.0	< 5.0	< 5.0

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newport, Wales

Lab Sample Number		271500	271501	271502	271503	271504
Sample Reference		WS12.S1	WS12.S2	WS12.S3	WS10.S1	WS10.S2
Depth (m)		0.60	1.40	3.80	0.45	0.90
Date Sampled		24/07/2024	24/07/2024	24/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Petroleum Hydrocarbons						
TPH C10 - C40 $_{EH_CU_1D_TOTAL}$	mg/kg	81	350	200	29	< 10
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010 ~	< 0.010	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010 ~	0.028	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	1	0.084 ~	1.5	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	4	12	13	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	< 2.0	3.2	< 2.0	2.2	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	< 8.0	26	15	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	55	250	130	10	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	60	290	160	12	< 10
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010 ~	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010 ~	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	< 0.020	< 0.020 ~	< 0.020	< 0.020	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	5.1	< 2.0	< 2.0	3	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	< 10	11	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	< 10	19	28	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	< 10	30	28	< 10	< 10
Hazardous Waste		No	No	No	No	No
Hazardous properties		n/a	n/a	n/a	n/a	n/a

LEGEND
Non Hazardous Waste
Hazardous Waste

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271505	271506	271507	271508	271509
Sample Reference		WS10.S3	WS9.S1	WS9.S2	WS9.S3	WS11.S1
Depth (m)		2.50	0.10	0.90	1.70	0.60
Date Sampled		25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Stone Content	%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	25	5.7	11	28	9.1
Total mass of sample received	kg	1.1	1.1	1	1.1	1.1
Asbestos in Soil Screen	D/ND	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification Total	%	-	-	-	-	-
Asbestos in Soil Screen / Identification Name	Type	-	-	-	-	-
General Inorganics						
Total Cyanide	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols						
Total Phenols (monohydric)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	< 0.05	0.72	0.76	< 0.05	0.76
Acenaphthylene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	< 0.05	0.21	0.34	< 0.05	0.26
Phenanthrene	mg/kg	< 0.05	1.3	1.8	< 0.05	1.1
Anthracene	mg/kg	< 0.05	0.16	1.9	< 0.05	< 0.05
Fluoranthene	mg/kg	< 0.05	0.95	0.24	< 0.05	0.32
Pyrene	mg/kg	< 0.05	0.72	0.31	< 0.05	0.29
Benzo(a)anthracene	mg/kg	< 0.05	0.33	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	< 0.05	0.58	0.56	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	< 0.05	0.44	< 0.05	< 0.05	0.27
Benzo(k)fluoranthene	mg/kg	< 0.05	0.14	< 0.05	< 0.05	0.1
Benzo(a)pyrene	mg/kg	< 0.05	0.17	< 0.05	< 0.05	0.13
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05	0.16	0.08	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	< 0.05	0.28	< 0.05	< 0.05	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	< 0.80	6.2	5.93	< 0.80	3.25
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	14	5.3	41	11	16
Cadmium (aqua regia extractable)	mg/kg	< 0.2	0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	36	62	47	33	10
Copper (aqua regia extractable)	mg/kg	12	50	53	8.9	65
Lead (aqua regia extractable)	mg/kg	22	33	64	17	52
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	31	14	16	28	29
Selenium (aqua regia extractable)	mg/kg	< 1.0	< 1.0	2.9	1.4	1.4
Zinc (aqua regia extractable)	mg/kg	95	360	150	95	510
VOCs						
MTBE (Methyl Tertiary Butyl Ether)		< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Benzene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Toluene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Ethylbenzene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
p & m-Xylene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
o-Xylene	µg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271505	271506	271507	271508	271509
Sample Reference		WS10.S3	WS9.S1	WS9.S2	WS9.S3	WS11.S1
Depth (m)		2.50	0.10	0.90	1.70	0.60
Date Sampled		25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Petroleum Hydrocarbons						
TPH C10 - C40 $_{EH_CU_1D_TOTAL}$	mg/kg	< 10	1300	570	< 10	410
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.041	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	< 1.0	2.5	2.4	< 1.0	2.8
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	< 2.0	< 2.0	< 2.0	< 2.0	3
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	< 8.0	19	17	< 8.0	20
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	< 8.0	440	230	< 8.0	240
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	< 10	460	250	< 10	270
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010 ~	< 0.010 ~	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	< 0.020	< 0.020 ~	< 0.020 ~	< 0.020	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	< 1.0	2.4	1.4	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	< 2.0	6.7	4.2	< 2.0	4.7
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	< 10	20	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	< 10	350	110	< 10	52
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	< 10	380	110	< 10	57
Hazardous Waste		No	Yes	No	No	No
Hazardous properties		n/a	HP11, HP7	n/a	n/a	n/a

LEGEND
Non Hazardous Waste
Hazardous Waste

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271510	271511	271512	271513	271514
Sample Reference		WS11.S2	WS11.S3	WS15.S1	WS15.S2	WS15.S3
Depth (m)		1.50	3.00	0.30	0.70	1.50
Date Sampled		25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Stone Content	%	32.9	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	15	24	15	15	21
Total mass of sample received	kg	0.6	1.1	0.6	1.1	1.1
Asbestos in Soil Screen	D/ND	Not-detected	Not-detected	Not-detected	Detected	Not-detected
Asbestos Quantification Total	%	-	-	-	< 0.001	-
Asbestos in Soil Screen / Identification Name	Type	-	-	-	Loose Fibrous Debri	-
General Inorganics						
Total Cyanide	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols						
Total Phenols (monohydric)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	0.58	< 0.05	0.13	0.16	0.05
Acenaphthylene	mg/kg	< 0.05	< 0.05	< 0.05	0.14	< 0.05
Acenaphthene	mg/kg	< 0.05	< 0.05	0.13	0.07	< 0.05
Fluorene	mg/kg	0.24	< 0.05	0.24	0.09	< 0.05
Phenanthrene	mg/kg	0.8	< 0.05	3.6	0.88	0.17
Anthracene	mg/kg	< 0.05	< 0.05	0.72	0.11	< 0.05
Fluoranthene	mg/kg	0.15	< 0.05	4.9	4.1	0.3
Pyrene	mg/kg	0.18	< 0.05	4.1	3.2	0.3
Benzo(a)anthracene	mg/kg	< 0.05	< 0.05	2.2	2.3	0.18
Chrysene	mg/kg	0.28	< 0.05	2.5	3.7	0.23
Benzo(b)fluoranthene	mg/kg	< 0.05	< 0.05	2.6	5.9	0.32
Benzo(k)fluoranthene	mg/kg	< 0.05	< 0.05	0.96	1.9	0.11
Benzo(a)pyrene	mg/kg	0.07	< 0.05	2.1	3.3	0.23
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05	< 0.05	0.98	2.4	0.15
Dibenz(a,h)anthracene	mg/kg	< 0.05	< 0.05	0.34	0.85	< 0.05
Benzo(ghi)perylene	mg/kg	0.08	< 0.05	1	2.2	0.19
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	2.38	< 0.80	26.5	31.1	2.22
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	56	17	15	18	15
Cadmium (aqua regia extractable)	mg/kg	< 0.2	< 0.2	0.6	0.7	< 0.2
Chromium (aqua regia extractable)	mg/kg	41	47	25	25	28
Copper (aqua regia extractable)	mg/kg	140	17	68	130	45
Lead (aqua regia extractable)	mg/kg	30	26	75	210	60
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	49	40	32	36	28
Selenium (aqua regia extractable)	mg/kg	3	< 1.0	1.7	1.5	1.4
Zinc (aqua regia extractable)	mg/kg	320	110	280	290	150
VOCs						
MTBE (Methyl Tertiary Butyl Ether)		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271510	271511	271512	271513	271514
Sample Reference		WS11.S2	WS11.S3	WS15.S1	WS15.S2	WS15.S3
Depth (m)		1.50	3.00	0.30	0.70	1.50
Date Sampled		25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Petroleum Hydrocarbons						
TPH C10 - C40 $_{EH_CU_1D_TOTAL}$	mg/kg	230	< 10	39	280	110
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.98	< 0.010	< 0.010	0.054	< 0.010
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	29	< 1.0	< 1.0	3.5	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	4.3	< 2.0	< 2.0	5	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8.1	< 8.0	< 8.0	17	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	130	< 8.0	20	100	39
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	170	< 10	20	130	39
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1.8	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	5.5	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	< 10	< 10	< 10	16	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	19	< 10	< 10	82	21
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	26	< 10	< 10	98	21
Hazardous Waste		No	No	No	No	No
Hazardous properties		n/a	n/a	n/a	n/a	n/a

LEGEND
Non Hazardous Waste
Hazardous Waste

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271515	271516	271517	266765	266766
Sample Reference		WS5.S1	WS5.S2	WS5.S3	WS2	WS2
Depth (m)		0.50	1.20	3.60	0.50	2.60
Date Sampled		25/07/2024	25/07/2024	25/07/2024	23/07/2024	23/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Stone Content	%	33.6	27.4	< 0.1	11.4	13.8
Moisture Content	%	7.6	18	29	1.2	3.5
Total mass of sample received	kg	1.1	1.1	1.1	1.4	1.4
Asbestos in Soil Screen	D/ND	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification Total	%	-	-	-		
Asbestos in Soil Screen / Identification Name	Type	-	-	-		
General Inorganics						
Total Cyanide	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols						
Total Phenols (monohydric)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	< 0.05	0.35	< 0.05	0.14	0.22
Acenaphthylene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	< 0.05	< 0.05	< 0.05	0.06	0.24
Fluorene	mg/kg	< 0.05	0.07	< 0.05	< 0.05	0.33
Phenanthrene	mg/kg	0.08	0.59	< 0.05	0.2	3
Anthracene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	0.82
Fluoranthene	mg/kg	< 0.05	0.23	0.07	0.52	6.5
Pyrene	mg/kg	< 0.05	0.23	0.05	0.43	5
Benzo(a)anthracene	mg/kg	< 0.05	0.13	< 0.05	0.32	2.7
Chrysene	mg/kg	< 0.05	0.29	< 0.05	0.3	2.8
Benzo(b)fluoranthene	mg/kg	< 0.05	0.18	< 0.05	0.38	3.2
Benzo(k)fluoranthene	mg/kg	< 0.05	< 0.05	< 0.05	0.15	1.4
Benzo(a)pyrene	mg/kg	< 0.05	0.1	< 0.05	0.31	2.4
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05	< 0.05	< 0.05	0.17	1.3
Dibenz(a,h)anthracene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	0.42
Benzo(ghi)perylene	mg/kg	< 0.05	0.09	< 0.05	0.16	1.4
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	< 0.80	2.25	< 0.80	3.16	31.8
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	35	30	22	15	14
Cadmium (aqua regia extractable)	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	13	21	36	12	13
Copper (aqua regia extractable)	mg/kg	35	69	14	11	25
Lead (aqua regia extractable)	mg/kg	74	130	24	18	21
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	15	51	30	13	14
Selenium (aqua regia extractable)	mg/kg	1.2	< 1.0	< 1.0	< 1.0	2.5
Zinc (aqua regia extractable)	mg/kg	210	84	100	50	61
VOCs						
MTBE (Methyl Tertiary Butyl Ether)		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		271515	271516	271517	266765	266766
Sample Reference		WS5.S1	WS5.S2	WS5.S3	WS2	WS2
Depth (m)		0.50	1.20	3.60	0.50	2.60
Date Sampled		25/07/2024	25/07/2024	25/07/2024	23/07/2024	23/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Petroleum Hydrocarbons						
TPH C10 - C40 EH_CU_1D_TOTAL	mg/kg	< 10	210	< 10	100	210
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	0.047
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	< 1.0	2.9	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	< 2.0	< 2.0	< 2.0	2.2	6.4
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	< 8.0	16	< 8.0	< 8.0	12
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	< 8.0	120	< 8.0	72	41
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	< 10	130	< 10	75	59
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	1.3
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	< 2.0	< 2.0	< 2.0	< 2.0	7.4
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	< 10	< 10	< 10	< 10	46
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	< 10	39	< 10	15	79
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	< 10	39	< 10	15	130
Hazardous Waste		No	No	No	No	No
Hazardous properties		n/a	n/a	n/a	n/a	n/a

LEGEND
Non Hazardous Waste
Hazardous Waste

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		266767	266768	266769	266770	266771
Sample Reference		WS2	WS3	WS4	WS4	WS7
Depth (m)		3.30	0.70	0.60	0.90	0.30
Date Sampled		23/07/2024	23/07/2024	23/07/2024	23/07/2024	23/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Stone Content	%	< 0.1	9.5	< 0.1	< 0.1	< 0.1
Moisture Content	%	21	10	18	27	11
Total mass of sample received	kg	1.4	1.4	1.4	1.4	2
Asbestos in Soil Screen	D/ND	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification Total	%					
Asbestos in Soil Screen / Identification Name	Type					
General Inorganics						
Total Cyanide	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols						
Total Phenols (monohydric)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	0.08	1.5	0.17	< 0.05	< 0.05
Acenaphthylene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.14	0.08	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.18	0.17	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	1.2	1	1.2	< 0.05	< 0.05
Anthracene	mg/kg	0.44	< 0.05	0.22	< 0.05	< 0.05
Fluoranthene	mg/kg	2.7	< 0.05	1.7	< 0.05	< 0.05
Pyrene	mg/kg	2.1	< 0.05	1.4	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	1.4	0.21	1	< 0.05	< 0.05
Chrysene	mg/kg	1.2	0.34	1.3	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	1.3	< 0.05	1.2	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.5	< 0.05	0.67	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	1.2	0.14	0.78	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.61	< 0.05	0.52	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.2	< 0.05	0.21	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.57	< 0.05	0.61	< 0.05	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	13.7	3.47	11	< 0.80	< 0.80
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	14	11	18	15	9.7
Cadmium (aqua regia extractable)	mg/kg	< 0.2	< 0.2	12	2.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	28	7.9	31	43	23
Copper (aqua regia extractable)	mg/kg	16	12	140	29	15
Lead (aqua regia extractable)	mg/kg	37	14	260	58	18
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	23	12	51	35	28
Selenium (aqua regia extractable)	mg/kg	< 1.0	2.1	3	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	89	41	550	190	74
VOCs						
MTBE (Methyl Tertiary Butyl Ether)		< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Benzene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Toluene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
Ethylbenzene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
p & m-Xylene	mg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0
o-Xylene	µg/kg	< 5.0	< 5.0 ~	< 5.0 ~	< 5.0	< 5.0

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		266767	266768	266769	266770	266771
Sample Reference		WS2	WS3	WS4	WS4	WS7
Depth (m)		3.30	0.70	0.60	0.90	0.30
Date Sampled		23/07/2024	23/07/2024	23/07/2024	23/07/2024	23/07/2024
Analytical Parameter (Soil Analysis)	**Units**					
Petroleum Hydrocarbons						
TPH C10 - C40 $_{EH_CU_1D_TOTAL}$	mg/kg	97	100	210	120	< 10
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	< 0.010	< 0.010	0.039	< 0.010	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	< 0.010	0.071	0.12	0.054	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	< 0.010	0.19	0.29	0.09	< 0.010
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	< 1.0	3.6	8.3	1	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	4.8	6.2	12	8.7	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	< 8.0	12	20	27	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	25	51	69	47	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	30	74	110	84	< 10
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	< 1.0	2	1.1	1.6	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	4.2	7	6.8	4.8	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	19	< 10	20	12	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	31	< 10	43	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	54	< 10	71	19	< 10
Hazardous Waste		No	No	No	No	No
Hazardous properties		n/a	n/a	n/a	n/a	n/a

LEGEND
Non Hazardous Waste
Hazardous Waste

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		266772
Sample Reference		WS14
Depth (m)		1.60
Date Sampled		24/07/2024
Analytical Parameter (Soil Analysis)	**Units**	
Stone Content	%	11.1
Moisture Content	%	5.9
Total mass of sample received	kg	2
Asbestos in Soil Screen	D/ND	Not-detected
Asbestos Quantification Total	%	
Asbestos in Soil Screen / Identification Name	Type	
General Inorganics		
Total Cyanide	mg/kg	< 1.0
Total Phenols		
Total Phenols (monohydric)	mg/kg	< 1.0
Speciated PAHs		
Naphthalene	mg/kg	< 0.05
Acenaphthylene	mg/kg	< 0.05
Acenaphthene	mg/kg	< 0.05
Fluorene	mg/kg	< 0.05
Phenanthrene	mg/kg	< 0.05
Anthracene	mg/kg	< 0.05
Fluoranthene	mg/kg	< 0.05
Pyrene	mg/kg	< 0.05
Benzo(a)anthracene	mg/kg	< 0.05
Chrysene	mg/kg	< 0.05
Benzo(b)fluoranthene	mg/kg	< 0.05
Benzo(k)fluoranthene	mg/kg	< 0.05
Benzo(a)pyrene	mg/kg	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05
Dibenz(a,h)anthracene	mg/kg	< 0.05
Benzo(ghi)perylene	mg/kg	< 0.05
Total PAH		
Speciated Total EPA-16 PAHs	mg/kg	< 0.80
Heavy Metals / Metalloids		
Arsenic (aqua regia extractable)	mg/kg	12
Cadmium (aqua regia extractable)	mg/kg	< 0.2
Chromium (aqua regia extractable)	mg/kg	18
Copper (aqua regia extractable)	mg/kg	15
Lead (aqua regia extractable)	mg/kg	25
Mercury (aqua regia extractable)	mg/kg	< 0.3
Nickel (aqua regia extractable)	mg/kg	32
Selenium (aqua regia extractable)	mg/kg	< 1.0
Zinc (aqua regia extractable)	mg/kg	99
VOCs		
MTBE (Methyl Tertiary Butyl Ether)		< 5.0
Benzene	mg/kg	< 5.0
Toluene	mg/kg	< 5.0
Ethylbenzene	mg/kg	< 5.0
p & m-Xylene	mg/kg	< 5.0
o-Xylene	µg/kg	< 5.0

HAZARDOUS WASTE ASSESSMENT

Project / Site name: Cemminerals, Alexandra Docks, Newpo

Lab Sample Number		266772
Sample Reference		WS14
Depth (m)		1.60
Date Sampled		24/07/2024
Analytical Parameter (Soil Analysis)	**Units**	
Petroleum Hydrocarbons		
TPH C10 - C40 EH_CU_1D_TOTAL	mg/kg	< 10
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	< 0.010
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	< 0.010
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.73
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	< 10
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	< 0.020
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	< 10
Hazardous Waste		No
Hazardous properties		n/a

LEGEND
Non Hazardous Waste
Hazardous Waste

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Waste Acceptance Criteria Analytical Results

Report No:	**24-033335**						
					Client: LENCOIS		
Location	**Newport - Cemminerals**						
Lab Reference (Sample Number)	271520				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	24/07/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS12.S1						
Depth (m)	0.60						
Solid Waste Analysis							
TOC (%)	7.1				3%	5%	6%
Loss on Ignition (%)	58				--	--	10%
BTEX (µg/kg)	< 5.0 ~				6000	--	--
Sum of PCBs (mg/kg)	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	77				500	--	--
Total PAH (WAC-17) (mg/kg)	5.50				100	--	--
pH (units)	7.8				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	0.86				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.0571			0.571	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.010			0.10	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00171			0.0171	0.5	10	30
Nickel *	0.0030			0.030	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.020			0.20	4	50	200
Chloride *	< 0.15			< 1.5	800	15000	25000
Fluoride*	0.12			1.2	10	150	500
Sulphate *	100			1000	1000	20000	50000
TDS*	160			1600	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	2.96			29.5	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.0						
Dry Matter (%)	89						
Moisture (%)	11						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-033335**						
					Client: LENCOIS		
Location	**Newport - Cemminerals**						
Lab Reference (Sample Number)	271521				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	25/07/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS9.S3						
Depth (m)	1.70						
Solid Waste Analysis							
TOC (%)**	1.3				3%	5%	6%
Loss on Ignition (%) **	3.4				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	16				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	8.6				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	21				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.0161			0.161	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.018			0.18	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00636			0.0636	0.5	10	30
Nickel *	0.0033			0.033	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.010			0.10	4	50	200
Chloride *	33			330	800	15000	25000
Fluoride*	0.43			4.3	10	150	500
Sulphate *	89			890	1000	20000	50000
TDS*	250			2500	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	16.2			162	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	72						
Moisture (%)	28						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

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Waste Acceptance Criteria Analytical Results

Report No:	**24-033335**						
					Client: LENCOIS		
Location	**Newport - Cemminerals**						
Lab Reference (Sample Number)	271522				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	25/07/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS15.S1						
Depth (m)	0.30						
Solid Waste Analysis							
TOC (%)**	1.8				3%	5%	6%
Loss on Ignition (%) **	6.0				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	31				500	--	--
Total PAH (WAC-17) (mg/kg)	26.8				100	--	--
pH (units)**	8.0				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	7.6				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00253			0.0253	0.5	2	25
Barium *	0.0155			0.155	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00088			0.0088	0.5	10	70
Copper *	0.018			0.18	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00595			0.0595	0.5	10	30
Nickel *	0.0020			0.020	0.4	10	40
Lead *	0.0015			0.015	0.5	10	50
Antimony *	0.0049			0.049	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.014			0.14	4	50	200
Chloride *	1.5			15	800	15000	25000
Fluoride*	0.13			1.3	10	150	500
Sulphate *	4.6			46	1000	20000	50000
TDS*	59			590	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	14.6			146	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.5						
Dry Matter (%)	85						
Moisture (%)	15						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

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Waste Acceptance Criteria Analytical Results

Report No:	**24-033335**						
					Client: LENCOIS		
Location	**Newport - Cemminerals**						
Lab Reference (Sample Number)	271523				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	25/07/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS5.S2						
Depth (m)	1.20						
Solid Waste Analysis							
TOC (%)	3.0				3%	5%	6%
Loss on Ignition (%)	11				--	--	10%
BTEX (µg/kg)	< 5.0				6000	--	--
Sum of PCBs (mg/kg)	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	150				500	--	--
Total PAH (WAC-17) (mg/kg)	2.21				100	--	--
pH (units)	7.8				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	5.1				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00172			0.0172	0.5	2	25
Barium *	0.0586			0.586	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00077			0.0077	0.5	10	70
Copper *	0.0062			0.062	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.0143			0.143	0.5	10	30
Nickel *	0.0036			0.036	0.4	10	40
Lead *	0.0024			0.024	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.013			0.13	4	50	200
Chloride *	9.7			97	800	15000	25000
Fluoride*	0.21			2.1	10	150	500
Sulphate *	58			580	1000	20000	50000
TDS*	130			1300	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	4.63			46.3	500	800	1000
Leach Test Information							
Stone Content (%)	27.4						
Sample Mass (kg)	1.1						
Dry Matter (%)	82						
Moisture (%)	18						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

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Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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APPENDIX 9 DETAILED UXO RISK ASSESSMENT



Detailed Unexploded Ordnance (UXO) Risk Assessment

Project Name	Proposed Cemminerals Facility, South Docks, Newport
Client	ABO nv
Site Address	Proposed Cemminerals Facility, South Docks, Newport, NP20 2WE
Report Reference	DA10337b-00
Date	12/07/2024
Author	AL
Quality Assurance	PB
Final Check	AT

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1ST LINE DEFENCE

Executive Summary

Site Location and Description

The site is located in Newport, Wales.

Recent aerial imagery shows the site to comprise hardstanding land and driveways associated with the South Docks.

It is bound to the north by the waters of Alexandra Docks, to the east by a hardstanding driveway and loading bay, to the south by East Way Road and an additional driveway/loading bay, and to the west by further hardstanding ground associated with the South Docks.

The site is approximately centred on the OS grid reference: **ST 31913 84388.**

Proposed Works

According to communications with ABO nv, the proposed works will include the development of a Cemminerals Facility - although the exact nature and extent of these works were not available at the time of writing.

Geology and Bomb Penetration Depth

The British Geological Survey (BGS) map shows the site underlain by the Mercia Mudstone Group - mudstone of the Triassic period. The superficial deposits are recorded as Tidal Flat Deposits - clay and silt of the Quaternary period.

Site-specific geotechnical information was not available to 1st Line Defence at the time of the production of this report. An assessment of maximum bomb penetration depth can be made once such data becomes available, or by a UXO specialist during on-site support.

It should be noted that the maximum depth that a bomb could reach may vary across a site and will be largely dependent on the specific underlying geological strata and its density.

UXO Risk Assessment

1st Line Defence has assessed that there is an overall **Low Risk** from German and anti-aircraft unexploded ordnance at the site of proposed works. There is an assessed **Low Risk** from Allied unexploded ordnance.

The Risk from German Air-Delivered UXO

- During WWII, the site was situated within the County Borough of Newport. According to official Home Office bombing statistics, this district was subject to an overall low density of bombing, with an average of 12.9 items of ordnance recorded per 1,000 acres. Any incidents were likely due to Adolf Hitler's directive stating that British ports (including the Alexandra Docks) were important targets of bombing (see Annex H for more details).
- During WWII, the site was primarily occupied by part of a large warehouse-like building (the National Cartridge and Box Repair Factory), with rail sidings to the east and north of the building, and smaller warehouses in the north fronting onto Alexandra Dock.
- Available written bomb incident records and Newport Bomb maps recorded multiple bombing incidents within this general part of Newport (see Annexes K, L and M for more details). Most notably, a number of bombing incidents were recorded in proximity to the site's northern and western sections - most notably an HE strike located approximately 190m to the southwest and an incendiary bombing 'shower' near to and around the site boundary (see Annex J for more details). However, nothing could be found to indicate the site itself sustained any bombing or damage.
- No evidence of obvious HE bomb damage was visible in or along the site boundary within WWII-era and post-war aerial photography. Some possible small roof repairs were noted on the main building, sometimes indicative of bomb or incendiary damage on post-war imagery. However, no direct evidence could be found of bombing.
- The nature of the ground cover across the majority of the site should have been relatively conducive to the observation of evidence of UXBs. Any unexploded bombs falling directly on the warehouse structures on site are very likely to have been observed and reported. Similarly, cratering would probably have been noted on the hardstanding ground in the north of the site. It is conceivable that UXB entry holes could have been overlooked in the area of open rail sidings. However, generally, rail infrastructure would have been subject to post-raid checks to ensure it was undamaged. Potential evidence of UXBs such as disturbed ballast, or damaged sleepers/track is more likely to have been noted here than in the surrounding open ground.

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- Considering the use of the site, it would likely have been subject to a frequent and regular level of access at the onset of WWII, further increasing the likelihood that evidence of UXO would have been spotted, reported and dealt with at the time. It is possible that following any bombing/damage in the area, access may have been impeded for a short time until it was deemed safe to return, but research has not identified any positive evidence of this occurring.
- In summary, no positive evidence of HE bombing on site could be found within the available record set. Although there were several incidents recorded within the site's wider area, the general bombing density in Newport was low. Given this and the use/composition of the site during WWII, the risk of German air-delivered UXO contamination on site is not considered to be significant. Overall, the risk of contamination is considered to be **Low**. Because it has not been possible to entirely discount the risk from UXO, it is recommended that UXO Safety and Awareness Briefings are provided to ground personnel, and that a UXO Risk Management Plan is compiled. If any suspect items are encountered during works, 1st Line Defence should be contacted for advice and to reassess the risk as necessary.

The Risk from Allied UXO

- During WWI, the site was part of the National Cartridge and Box Repair Factory, which was established during WWI. Over the next few years, it was primarily used for repairing shell cases and ammunition boxes. Few specific details could be found regarding this factory, and no positive evidence suggesting that items of SAA were handled, stored or produced there could be found. Considering these cases/boxes were regularly transported to the National Shell Filling Factories outside the Glamorgan and Gwent areas, there is believed to have been a minimal risk that items of SAA/LSA were buried or discarded within the site area during this time.
- Furthermore, from 1941 part of the site (highlighted as the No.9 transit shed, see Annex D2) was used as an RAF Maintenance Unit. While few details could be found regarding this unit's specific activities, it was believed to have been used for repair/maintenance purposes. This is largely because it was located near numerous industrial structures such as the Newport Cartridge and Box Repair Factory (see Annex N for more details).
- Therefore, considering the high frequency of access regarding these developments, it is expected that any remaining ordnance (if it had been present) would already have been encountered. As such, it would be unlikely that any shallowly buried ordnance would remain. For these reasons, the overall risk from Allied Ordnance is considered **Low.**
-

Post-WWII Redevelopment

- There appears to have been considerable developments in and around the site since WWII. Most notably, numerous industrial warehouses associated with the 'Central Store Depot' had been removed and replaced by loading bays and smaller industrial structures.
- The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site. For example, the risk from deep buried UXO will only have been mitigated within the volumes of any post-war pile foundations or deep excavations for basement levels. The risk will however remain within virgin geology below and amongst these post-war works, down to the maximum bomb penetration depth.

Recommended Risk Mitigation Measures

The following risk mitigation measures are recommended to support the proposed works at the Proposed Cemminerals Facility, South Docks, Newport site:

Activity	Recommended Risk Mitigation Measure
All Works	• UXO Risk Management Plan • Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

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Glossary

Abbreviation	Definition
AA	Anti-Aircraft
AFS	Auxiliary Fire Service
AP	Anti-Personnel
ARP	Air Raid Precautions
DA	Delay-action
EOC	Explosive Ordnance Clearance
EOD	Explosive Ordnance Disposal
FP	Fire Pot
GM	G Mine (Parachute mine)
HAA	Heavy Anti-Aircraft
HE	High Explosive
IB	Incendiary Bomb
JSEODOC	Joint Services Explosive Ordnance Disposal Operation Centre
LAA	Light Anti-Aircraft
LCC	London County Council
LRRB	Long Range Rocket Bomb (V-2)
LSA	Land Service Ammunition
NFF	National Filling Factory
OB	Oil Bomb
PAC	Pilotless Aircraft (V-1)
PB	Phosphorous Bomb
PM	Parachute Mine
POW	Prisoner Of War
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
RFC	Royal Flying Corps
RNAS	Royal Naval Air Service
ROF	Royal Ordnance Factory
SA	Small Arms
SAA	Small Arms Ammunition
SD2	Anti-personnel "Butterfly Bomb"
SIP	Self-Igniting Phosphorous
U/C	Unclassified bomb
UP	Unrotated Projectile (rocket)
USAAF	United States Army Air Force
UX	Unexploded
UXAA	Unexploded Anti-Aircraft
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V-1	Flying Bomb (Doodlebug)
V-2	Long Range Rocket
WAAF	Women's Auxiliary Air Force
X	Exploded

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Detailed Unexploded Ordnance (UXO) Risk Assessment

Site: Proposed Cemminerals Facility, South Docks, Newport
Client: ABO nv

1. Introduction

1.1. Background

1st Line Defence has been commissioned by ABO nv to conduct a Detailed Unexploded Ordnance (UXO) Risk Assessment for the works proposed at Proposed Cemminerals Facility, South Docks, Newport.

Buried UXO can present a significant risk to construction works and development projects. The discovery of a suspect device during works can cause considerable disruption to operations as well as cause unwanted delays and expense.

UXO in the UK can originate from three principal sources:

1. Munitions resulting from wartime activities including German bombing in WWI and WWII, long range shelling, and defensive activities.
2. Munitions deposited as a result of military training and exercises.
3. Munitions lost, burnt, buried or otherwise discarded either deliberately, accidentally, or ineffectively.

This report will assess the potential factors that may contribute to the risk of UXO contamination. If an elevated risk is identified at the site, this report will recommend appropriate mitigation measures, in order to reduce the risk to as low as is reasonably practicable. Detailed analysis and evidence will be provided to ensure an understanding of the basis for the assessed risk level and any recommendations.

This report complies with the guidelines outlined in CIRIA C681, 'Unexploded Ordnance (UXO) A Guide for the Construction Industry.'

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2. Method Statement

2.1. Report Objectives

The aim of this report is to conduct a comprehensive assessment of the potential risk from UXO at Proposed Cemminerals Facility, South Docks, Newport. The report will also recommend appropriate site and work-specific risk mitigation measures to reduce the risk from explosive ordnance during the envisaged works to a level that is as low as reasonably practicable.

2.2. Risk Assessment Process

1st Line Defence has undertaken a five-step process for assessing the risk of UXO contamination:

1. The likelihood that the site was contaminated with UXO.
2. The likelihood that UXO remains on the site.
3. The likelihood that UXO may be encountered during the proposed works.
4. The likelihood that UXO may be initiated.
5. The consequences of initiating or encountering UXO.

In order to address the above, 1st Line Defence has taken into consideration the following factors:

- Evidence of WWI and WWII German air delivered bombing as well as the legacy of Allied occupation.
- The nature and conditions of the site during WWII.
- The extent of post-war development and UXO clearance operations on site.
- The scope and nature of the proposed works and the maximum assessed bomb penetration depth.
- The nature of ordnance that may have contaminated the proposed site area.

2.3. Sources of Information

Every reasonable effort has been made to ensure that relevant evidence has been consulted and presented in order to produce a thorough and comprehensible report for the client. To achieve this the following, which includes military records and archive material held in the public domain, have been accessed:

- The National Archives and Gwent Archives.
- Historical mapping datasets.
- Historic England National Monuments Record.
- Relevant information supplied by ABO nv.
- Available material from 33 Engineer Regiment (EOD) Archive (part of 29 Explosive Ordnance and Disposal and Search Group).
- 1st Line Defence's extensive historical archives, library and UXO geo-datasets.
- Open sources such as published books and internet resources.

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3. Background to Bombing Records

3.1. General Considerations of Historical Research

This desktop assessment is based largely upon analysis of historical evidence. Every reasonable effort has been made to locate and present significant and pertinent information. 1st Line Defence cannot be held accountable for any changes to the assessed risk level or risk mitigation measures, based on documentation or other data that may come to light at a later date, or which was not available to 1st Line Defence during the production of this report.

It is often problematic and sometimes impossible to verify the completeness and accuracy of WWII-era records. As a consequence, conclusions as to the exact location and nature of a UXO risk can rarely be quantified and are, to a degree, subjective. To counter this, a range of sources have been consulted, presented and analysed. The same methodology is applied to each report during the risk assessment process. 1st Line Defence cannot be held responsible for any inaccuracies or the incompleteness in available historical information.

3.2. German Bombing Records

During WWII, bombing records were generally gathered locally by the police, Air Raid Precaution (ARP) wardens and military personnel. These records typically contained information such as the date, the location, the amount of damage caused and the types of bombs that had fallen during an air raid. This information was made either through direct observation or post-raid surveys. The Ministry of Home Security Bomb Census Organisation would then receive this information, which was plotted onto maps, charts, and tracing sheets by regional technical officers. The collective record set (regional bomb census mapping and locally gathered incidents records) would then be processed and summarised into reports by the Ministry of Home Security Research and Experiments Branch. The latter were tasked with providing the government 'a complete picture of air raid patterns, types of weapons used and damage caused- in particular to strategic services and installations such as railways, shipyards, factories and public utilities.'

The quality, detail and nature of record keeping could vary considerably between provincial towns, boroughs and cities. No two areas identically collated or recorded data. While some local authorities maintained records with a methodical approach, sources in certain areas can be considerably more vague, dispersed, and narrower in scope. In addition, the immediate priority was mostly focused on assisting casualties and minimising damage at the time. As a result, some records can be incomplete and contradictory. Furthermore, many records were even damaged or destroyed in subsequent air raids. Records of raids that took place on sparsely or uninhabited areas were often based upon third party or hearsay information and are therefore not always reliable. Whereas records of attacks on military or strategic targets were often maintained separately and have not always survived.

3.3. Allied Records

During WWII, considerable areas of land were requisitioned by the War Office for the purpose of defence, training, munitions production and the construction of airfields. Records relating to military features vary and some may remain censored. Within urban environments datasets will be consulted detailing the location of munition production as well as wartime air and land defences. In rural locations it may be possible to obtain plans of military establishments, such as airfields, as well as training logs, record books, plans and personal memoirs. As with bombing records, every reasonable effort will be made to access records of, and ascertain any evidence of, military land use. However, there are occasions where such evidence is not available, as records may not be accessible, have been lost/destroyed, or simply were not kept in the first place.

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4. UK Regulatory Environment and Guidelines

4.1. General

There is no formal obligation requiring a UXO risk assessment to be undertaken for construction projects in the UK, nor is there any specific legislation stipulating the management or mitigation of UXO risk. However, it is implicit in the legislation outlined below that those responsible for intrusive works (archaeology, site investigation, drilling, piling, excavation etc.) should undertake a comprehensive and robust assessment of the potential risks to employees and that mitigation measures are implemented to address any identified hazards.

4.2. CDM Regulations 2015

The Construction (Design and Management) Regulations 2015 (CDM 2015) define the responsibilities of parties involved in the construction of temporary or permanent structures.

The CDM 2015 establishes a duty of care extending from clients, principle designers, and contractors to those working on, or affected by, a project. Those responsible for construction projects may therefore be accountable for the personal or proprietary loss of third parties, if correct health and safety procedure has not been applied.

Although the CDM does not specifically reference UXO, the risk presented by such items is both within the scope and purpose of the legislation. It is therefore implied that there is an obligation for parties to:

- Provide an appropriate assessment of potential UXO risks at the site (or ensure such an assessment is completed by others).
- Put in place appropriate risk mitigation measures if necessary.
- Supply all parties with information relevant to the risks presented by the project.
- Ensure the preparation of a suitably robust emergency response plan.

4.3. The 1974 Health and Safety at Work etc. Act

All employers have a responsibility under the Health and Safety at Work etc. Act 1974 and the Management of Health and Safety at Work Regulations 1999, to ensure the health and safety of their employees and third parties, so far as is reasonably practicable and conduct suitable and sufficient risk assessments.

4.4. CIRIA C681

In 2009, the Construction Industry Research and Information Association (CIRIA) produced a guide to the risk posed by UXO to the UK construction industry (CIRIA C681). CIRIA is a neutral, independent and not-for-profit body, linking organisations with common interests and facilitating a range of collaborative activities that help improve the industry.

The publication provides the UK construction industry with a defined process for the management of risks associated with UXO from WWI and WWII air bombardment. It is also broadly applicable to the risks from other forms of UXO that might be encountered. It focuses on construction professionals' needs, particularly if there is a suspected item of UXO on site, and covers issues such as what to expect from a UXO specialist. The guidance also helps clients to fulfil their legal duty under CDM 2015 to provide designers and contractors with project specific health and safety information needed to identify hazards and risks associated with the design and construction work. This report conforms to this CIRIA guidance and to the various recommendations for good practice referenced therein. It is recommended that this document is acquired and studied where possible to allow a better understanding of the background to both the risk assessment process and the UXO issue in the UK in general.

4.5. Additional Legislation

In the event of a casualty resulting from the failure of an employer/client to address the risks relating to UXO, the organisation may be criminally liable under the Corporate Manslaughter and Corporate Homicide Act 2007.

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5. The Role of Commercial UXO Contractors and The Authorities

5.1. Commercial UXO Specialists

The role of a UXO Specialist (often referred to as UXO Consultant or UXO Contractor) such as 1st Line Defence, is defined in CIRIA C681 as the provision of expert knowledge and guidance to the client on the most appropriate and cost-effective approach to UXO risk management at a site.

The principal role of UXO Specialists is to provide the client with an appropriate assessment of the risk posed by UXO for a specific project, and identify and carry out suitable methodology for the mitigation of any identified risks to reduce them to an acceptable level.

The requirement for a UXO Specialist should ideally be identified in the initial stages of a project, and it is recommended that this occur prior to the start of any detailed design. This will enable the client to budget for expenditure that may be required to address the risks from UXO, and may enable the project team to identify appropriate techniques to eliminate or reduce potential risks through considered design, without the need for UXO specific mitigation measures. The UXO Specialist should have suitable qualifications, levels of competency and insurances.

Please note 1st Line Defence has the capability to provide a complete range of required UXO risk mitigation services, in order to reduce a risk to as low as reasonably practicable. This can involve the provision of both ground investigation, and where appropriate, UXO clearance services.

5.2. The Authorities

The police have a responsibility to co-ordinate the emergency services in the event of an ordnance-related incident at a construction site. Upon inspection they may impose a safety cordon, order an evacuation, and call the military authorities Joint Services Explosive Ordnance Disposal Operation Centre (JSEODOC) to arrange for investigation and/or disposal. Within the Metropolitan Police Operational Area, SO15 EOD will be tasked to any discovery of suspected UXO. The request for Explosive Officer (Expo) support is well understood and practiced by all Metropolitan Boroughs. The requirement for any additional assets will then be coordinated by the Expo if required.

In the absence of a UXO specialist, police officers will usually employ such precautionary safety measures, thereby causing works to cease, and possibly requiring the evacuation of neighbouring businesses and properties.

The priority given to the police request will depend on the EOD teams' judgement of the nature of the UXO risk, the location, people and assets at risk, as well as the availability of resources. The speed of response varies; authorities may respond immediately or in some cases it may take several days for the item of ordnance to be dealt with. Depending on the on-site risk assessment the item of ordnance may be removed from the site and/or destroyed by a controlled explosion.

Following the removal of an item of UXO, the military authorities will only undertake further investigations or clearances in high-risk situations. If there are regular UXO finds on a site the JSEODOC may not treat each occurrence as an emergency and will recommend the construction company puts in place alternative procedures, such as the appointment of a commercial contractor to manage the situation.

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6. The Site

6.1. Site Location

The site is located in Newport, Wales. It is bound to the north by the waters of Alexandra Docks, to the east by a hardstanding driveway and loading bay, to the south by East Way Road and an additional driveway/loading bay, and to the west by further hardstanding ground associated with the South Docks.

The site is approximately centred on the OS grid reference: **ST 31913 84388.**

Site location maps are presented in **Annex A**.

6.2. Site Description

Recent aerial imagery shows the site to comprise hardstanding land and driveways associated with the South Docks.

A recent aerial photograph and site plan are presented in **Annex B** and **Annex C** respectively.

7. Scope of the Proposed Works

7.1. General

According to communications with ABO nv, the proposed works will include the development of a Cemminerals Facility - although the exact nature and extent of these works were not available at the time of writing.

8. Ground Conditions

8.1. General Geology

The British Geological Survey (BGS) map shows the site underlain by the Mercia Mudstone Group - mudstone of the Triassic period. The superficial deposits are recorded as Tidal Flat Deposits - clay and silt of the Quaternary period.

8.2. Site-Specific Geology

Site-specific geotechnical data was not provided by the client during the production of this report.

9. Site History

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9.1. Introduction

The purpose of this section is to identify the composition of the site pre and post-WWII. It is important to establish the historical use of the site, as this may indicate the site's relation to potential sources of UXO as well as help with determining factors such as the land use, groundcover, likely frequency of access and signs of bomb damage.

9.2. National Cartridge and Box Repair Factory, Newport

According to anecdotal information, the Newport National Cartridge and Box Repair Factory was located on site.[1]

It was established in 1917 to repair 18lb and 4.5-inch shell cases and ammunition for the war effort. A line of ships was concurrently located within the dockyard to ferry shell cases and boxes from France to Newport - where a line of conveyor belts took the material into the factory. While there, the boxes and cases were repaired before being sent to the National Shell Filling Factories outside Glamorgan and Gwent. It ensured there was no significant wastage of materials in the production of new boxes - and thus streamlined British WWI industrial processes.

By spring 1917, Newport (and its sister site in Dagenham) could repair 650,000 18lbr shell cases, 100,000 4.5-inch shell cases and over 175,000 ammunition boxes per week. See **Annex N** and Section 13.3 for more details.

9.3. Ordnance Survey Historical Maps

Relevant historical maps were obtained for this report and are presented in **Annex D**. See below for a summary of the site history shown on acquired mapping.

Pre-WWII		
Date	Scale	Description
1920-1921	1:2,500	Pre-war OS mapping, dated 1920-1921, shows the site to comprise part of the 'Central Store Depot', hardstanding land, a railway track and two Transit Sheds.

Post-WWII		
Date	Scale	Description
1956-1958	1:2,500	Post-war OS mapping, dated 1956-1958, shows little discernible change on-site since the previous mapping edition. The most notable development was the 'Central Store Depot' becoming the 'Export Packing Works', with the works reduced from one large structure into three separate ones. Additional railway tracks were also constructed within the site's northern/central sections.

10. Introduction to German Air Delivered Ordnance

[1] *Waw005370 Wales (1947). view of Newport Docks.* WAW005370 WALES (1947). View of Newport Docks | Britain From Above. (n.d.). https://www.britainfromabove.org.uk/cy/image/WAW005370

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10.1. General

During WWI and WWII, the UK was subjected to bombing which often resulted in extensive damage to city centres, docks, rail infrastructure and industrial areas. The poor accuracy of WWII targeting technology and the nature of bombing techniques often resulted in neighbouring areas to targets sustaining collateral damage.

In addition to raids which concentrated on specific targets, indiscriminate bombing of large areas also took place. This occurred most prominently in the London 'Blitz', though affected many other towns and cities. As discussed in the following sections, a proportion of the bombs dropped on the UK did not detonate as designed. Although extensive efforts were made to locate and deal with these UXBs at the time, many still remain buried and can present a potential risk to construction projects.

The main focus of research for this section of the report will concern German air delivered ordnance dropped during WWII, although WWI bombing will also be considered.

10.2. Generic Types of WWII German Air Delivered Ordnance

To provide an informed assessment of the hazards posed by any items of unexploded ordnance that may remain in situ on site, the table below provides information on the types of German air delivered ordnance most commonly used by the Luftwaffe during WWII. Images and brief summaries of the characteristics of these items of ordnance are listed in **Appendices i-iii**.

Generic Types of WWII German Air Delivered Ordnance		
Type	**Frequency**	**Likelihood of Detection**
High Explosive (HE) bombs	In terms of weight of ordnance dropped, HE bombs were the most frequently deployed by the Luftwaffe during WWII.	Although efforts were made to identify the presence of unexploded ordnance following an air raid, often the damage and destruction caused by detonated bombs made observation of UXB entry holes impossible. The entry hole of an unexploded bomb can be as little as 20cm in diameter and was easily overlooked in certain ground conditions (see **Annex E**). Furthermore, ARP documents describe the danger of assuming that damage, actually caused by a large UXB, was due to an exploded smaller bomb. UXBs therefore present the greatest risk to present–day intrusive works.
1kg Incendiary bombs (IB)	In terms of the number of weapons dropped, small IBs were the most numerous. Millions of these were dropped throughout WWII.	IBs had very limited penetration capability and in urban areas would often have been located in post-raid surveys. If they failed to initiate and fell in water, on soft vegetated ground, or bombed rubble, they could easily go unnoticed.
Large Incendiary bombs (IB)	These were not as common as the 1kg IBs, although they were more frequently deployed than PMs and AP bomblets.	If large IBs did penetrate the ground, complete combustion did not always occur and in such cases they could remain a risk to intrusive works.
Aerial or Parachute mines (PM)	These were deployed less frequently than HE and IBs due to size, cost and the difficulty of deployment.	If functioning correctly, PMs would generally have had a slow rate of descent and were very unlikely to have penetrated the ground. Where the parachute failed, mines would have simply shattered on impact if the main charge failed to explode. There have been extreme cases when these items have been found unexploded. However, in these scenarios, the ground was either extremely soft or the munition fell into water.
Anti-personnel (AP) bomblets	These were not commonly used and are generally considered to pose a low risk to most works in the UK.	SD2 bomblets were packed into containers holding between 6 and 108 submunitions. They had little ground penetration ability and should have been located by the post-raid survey unless they fell into water, dense vegetation or bomb rubble.

10.3. Failure Rate of German Air Delivered Ordnance

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It has been estimated that 10% of WWII German air delivered HE bombs failed to explode as designed. Reasons for why such weapons might have failed to function as designed include:

- Malfunction of the fuze or gain mechanism (manufacturing fault, sabotage by forced labour or faulty installation).
- Many were fitted with a clockwork mechanism that could become immobilised on impact.
- Failure of the bomber aircraft to arm the bombs due to human error or an equipment defect.
- Jettisoning the bomb before it was armed or from a very low altitude. This most likely occurred if the bomber aircraft was under attack or crashing.

From 1940 to 1945, bomb disposal teams reportedly dealt with a total of 50,000 explosive items of 50kg, over 7,000 anti-aircraft projectiles and 300,000 beach mines. Unexploded ordnance is still regularly encountered across the UK, see press articles in **Annex F**.

10.4. UXB Ground Penetration

An important consideration when assessing the risk from a UXB is the likely maximum depth of burial. There are several factors which determine the depth that an unexploded bomb will penetrate:

- Mass and shape of bomb.
- Height of release.
- Velocity and angle of bomb.
- Nature of the ground cover.
- Underlying geology.

Geology is perhaps the most important variable. If the ground is soft, there is a greater potential of deeper penetration. For example, peat and alluvium are easier to penetrate than gravel and sand, whereas layers of hard strata will significantly retard and may stop the trajectory of a UXB.

10.4.1. The J-Curve Principle

J-curve is the term used to describe the characteristic curve commonly followed by an air delivered bomb dropped from height after it penetrates the ground. Typically, as the bomb is slowed by its passage through underlying soils, its trajectory curves towards the surface. Many UXBs are found with their nose cone pointing upwards as a result of this effect. More importantly, however, is the resulting horizontal offset from the point of entry. This is typically a distance of about one third of the bomb's penetration depth, but can be higher in certain conditions (see **Annex E**).

10.4.2. WWII UXB Ground Penetration Studies

During WWII the Ministry of Home Security undertook a major study on actual bomb penetration depths, carrying out statistical analysis on the measured depths of 1,328 bombs as reported by bomb disposal (BD) teams. Conclusions were drawn predicting the likely average and maximum depths of penetration of different sized bombs in different geological strata.

For example, the largest common German bomb (500kg) had a likely concluded penetration depth of 6m in sand or gravel but 11m in clay. The maximum observed depth for a 500kg bomb was 11.4m and for a 1,000kg bomb 12.8m. Theoretical calculations suggested that significantly greater penetration depths were probable.

10.4.3. Site Specific Bomb Penetration Considerations

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When considering an assessment of the bomb penetration at the site of proposed works the following parameters should be used:

- WWII geology – Mercia Mudstone Group.
- Impact angle and velocity – 10-15° from vertical and 270 metres per second.
- Bomb mass and configuration – The 500kg SC HE bomb, without retarder units or armour piercing nose (this was the largest of the common bombs used against Britain).

It has not been possible to determine maximum bomb penetration capabilities at this stage due to the limitations of site-specific geotechnical information provided for the purpose of this report. An assessment can be made once further information becomes available or by an UXO Specialist on-site.

10.5. V-Weapons

Hitler's 'V-weapon' campaign began from mid-1944. It used newly developed unmanned cruise missiles and rockets. The V-1, known as the flying bomb or pilotless aircraft, and the V-2, a long range rocket, were launched from bases in Germany and occupied Europe. A total of 9,251 V-1s and 1,115 V-2s were recorded in the United Kingdom.

Although these weapons caused considerable damage, their range was limited by their position of deployment across Europe and as a result the vast majority of V-weapon strikes were directed against targets in the south-east of England, predominantly in the London Boroughs and Home Counties. This limitation of capability meant targets in Newport were generally too far to be considered for V-weapon strikes by the Luftwaffe. The risk from V-weapons is therefore considered negligible and will not be further addressed in this report.

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11. The Likelihood of Contamination from German Air Delivered UXBs

11.1. World War I

During WWI Britain was targeted and bombed by Zeppelin Airships as well as Gotha and Giant fixed-wing aircraft. The objective of these raids was to unnerve the British public, to destroy strategic targets and to ultimately attempt to coerce Britain's capitulation from the war. A WWI map of air raids and naval bombardments across the UK was consulted, see **Annex G**. This source shows no discernible evidence of bombing in or around the site boundary.

WWI bombs were generally smaller and dropped from a lower altitude than those used in WWII. This resulted in limited UXB penetration depths. Aerial bombing was often such a novelty at the time that it attracted public interest and even spectators to watch the raids in progress. For these reasons there is a limited risk that UXBs passed undiscovered in the urban environment. When combined with the relative infrequency of attacks and an overall low bombing density, the risk from WWI UXBs is considered low and will not be further addressed in this report.

11.2. World War II Bombing of County Borough of Newport

The Luftwaffe's main objective for the attacks on Britain was to inhibit the country's economic and military capability. To achieve this they targeted airfields, depots, docks, warehouses, wharves, railway lines, factories, and power stations. As the war progressed the Luftwaffe bombing campaign expanded to include the indiscriminate bombing of civilian areas in an attempt to subvert public morale.

During WWII, the site was located within the County Borough of Newport, which sustained an overall Low density of bombing, as represented by bomb density data figures, see Section 11.3. Any bombing was largely due to Adolf Hitler personally issuing a directive stating that ports were important targets, with Newport itself being mentioned. As such, the John Lysaght Ltd Factory and the British Aluminium Company were highlighted in Luftwaffe reconnaissance photography - as were the Alexandra Docks (see **Annex H**). The reason why Newport might only have sustained a low density of bombing could have been due to the Luftwaffe's change in strategy in late 1940. From September of that year, they turned their attention from ports to the indiscriminate bombing of British cities. This was done in an attempt to weaken the country's resolve.

Records of bombing incidents in the civilian areas of the district were typically collected by Air Raid Precautions wardens and collated by Civil Defence personnel. Some other organisations, such as port and railway authorities, maintained separate records. Records would be in the form of typed or hand written incident notes, maps and statistics. Bombing data was carefully analysed, not only due to the requirement to identify those parts of the country most needing assistance, but also in an attempt to find patterns in the Germans' bombing strategy in order to predict where future raids might take place.

Records of bombing incidents are presented in the following sections.

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11.3. WWII Home Office Bombing Statistics

The following table summarises the quantity of German air delivered bombs (excluding 1kg incendiaries and anti-personnel bombs) dropped on the County Borough of Newport between 1940 and 1945.

Record of German Ordnance Dropped on the County Borough of Newport		
Area Acreage		7,383
Weapons	High Explosive bombs (all types)	87
	Parachute mines	8
	Oil bombs	0
	Phosphorus bombs	0
	Fire pots	0
	Pilotless aircraft (V-1)	0
	Long range rocket bombs (V-2)	0
Total		95
Number of Items per 1,000 acres		12.9
Source: Home Office Statistics This table does not include UXO found during or after WWII.		

Detailed records of the quantity and locations of the 1kg incendiary and anti-personnel bombs were not routinely maintained by the authorities as they were frequently too numerous to record. Although the risk relating to IBs is lesser than that relating to larger HE bombs, they were similarly designed to inflict damage and injury. Anti-personnel bombs were used in much smaller quantities and are rarely found today but are potentially more dangerous. Although Home Office statistics did not record these types of ordnance, both should not be overlooked when assessing the general risk to personnel and equipment.

11.4. Newport Region Bomb Census Maps

During WWII, the ARP Department within the Research and Experiments Branch of the Ministry of Home Security produced bomb census maps. These maps collectively show the approximate locations of bombs, mines and rockets dropped in the region. The site area was checked on each available map sheet. Those showing bomb incidents on and in the immediate vicinity of the site are discussed below and are presented in **Annex I**.

Newport Bomb Census Maps – **Annex I**	
Date Range	Comments
1940-1945	There were no bombing incidents recorded in or along the site boundary.

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11.5. Newport Overlay of Bombing Incidents

A local bomb map showing bombing incidents in the borough was compiled from numerous sources and depicted onto an overlay of recent aerial photography. The section showing the site area is described in the table below and presented in **Annex J.**

Newport Overlay of Bombing Incidents	
Date Range	Comments
1940-1945	While no bombing incidents were conclusively recorded on site, there were numerous incidents located within the site's surrounding area. Most notably, 5 HEs were recorded within the water approximately 190m to the southwest (incident number 27), incendiaries within the general site area (incident 43), and five HEs approximately 280m to the northwest (incident 11).

11.6. Monmouthshire Air Raid Message Files

Written records were obtained from Gwent Archives. A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex K**.

Monmouthshire Air Raid Message Files – Annex K			
Date	Size of bomb	Record Transcription	Comments
10th August, 1940	2 x HE	Relevant Transcription: (Date) 10/8/40. (Message) Llanwern reports 2 HE bombs dropped between Llawern and Newport Docks. P31P4. 0778046. Exact position unknown...Inquired of Noah for further information and they supposed HE bombs dropped (?) the aluminium works outside (?) (?).	The site was located within Newport Docks. The mentioned grid reference was located approximately 1.8km to the southeast – too far from the site to be of concern.

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11.7. Monmouthshire ARP Incident Records

Written records were obtained from Gwent Archives. A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex L**.

Monmouthshire Arp Incident Records – **Annex L**				
Date	Exact/Approximate Position	Bomb type/number	Record Transcription	Comments
13th July, 1940	Approximate	5 x HE	13/07/1940 @ 00:15 hrs 5 H.E. Upon grounds at Alexandra Docks.	*The site was located within the Alexandra Docks.*
13th July, 1940	Exact	1 x HE	13/07/1940 @ 00:15 hrs 1 H.E. On Neptune Works of Braithwaites, Alexandra Docks	*The site was located within the Alexandra Docks.* *The Neptune works was located approximately 1.7km northeast of the site.*
14th September, 1940	Exact	5 x HE	14/09/1940 @ 00:23 hrs 5 H.E. All on Alexandra Docks premises near South Lock and R.A.F. Maintenance Unit.	*The site was located within the Alexandra Docks.*
9th October, 1940	Approximate	Unspecified	09/10/1940 @ 20:20 hrs Many unknown number INC Millman Street, Castle Street, Baldwin Street, R.A.F.Maintenance Unit, Alexandra Docks	*Baldwin Street was located approximately 1.7km northwest of the site.* *Castle Street was located approximately 2.2km northeast of the site.* *Millman Street was located approximately 1.9km northwest of the site.* *The site was located within the Alexandra Docks.*

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11.8. Newport WWII Bombing Files

Written records were obtained from *This is Newport.* A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex M**.

Newport WWII Bombing files – **Annex M**		
Date Size of bomb	Record Transcription	Location
June 1940	In June 1940 bombs hit Newport in the St. Julian's and Dewstow areas. The first recorded bomb is just after midnight on 26 June 1940 in the HE Aluminium Works in the grounds of Cleveland Oil Company.	
26th June, 1940	26/06/1940 @ 00:12 hrs 1 H.E. Aluminium Works field to grounds of Cleveland Oil Company.	*This works was located approximately 1km northeast of the site.*
14th August, 1940	14/08/1940 @ 17:38 hrs 7 H.E. All fell in river near Eastern Dry Docks and British Aluminium Company Works.	
13th July, 1940	13/07/1940 @ 00:15 hrs 5 H.E. Upon grounds at Alexandra Docks.	*The site was located within the Alexandra Docks.*
	13/07/1940 @ 00:15 hrs 1 H.E. On Neptune Works of Braithwaites, Alexandra Docks.	*The site was located within the Alexandra Docks.* *The Neptune works was located approximately 1.7km northeast of the site.*
14th September, 1940	14/09/1940 @ 00:23 hrs 5 H.E. All on Alexandra Docks premises near South Lock and R.A.F. Maintenance Unit.	*The site was located within the Alexandra Docks.*
9th October, 1940	09/10/1940 @ 20:20 hrs Many unknown number INC Millman Street, Castle Street, Baldwin Street, R.A.F.Maintenance Unit, Alexandra Docks.	*Baldwin Street was located approximately 1.7km northwest of the site.* *Castle Street was located approximately 2.2km northeast of the site.* *Millman Street was located approximately 1.9km northwest of the site.* *The site was located within the Alexandra Docks.*

11.9. Home Intelligence Summary Files

Written Home Security Intelligence Summaries & Air Raid Files were obtained from the National Archives. The record was compiled by local Air Raid Precaution (ARP) personnel and volunteers during the war, and records the location, date and time of bombing raids, as well as the types of bomb used, and the damage caused.

This record depicted numerous incidents within the confines of the Alexandra Docks. However, while the site was situated within these docks, no positive evidence was provided to suggest they specifically occurred on-site.

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11.10. WWII-Era Aerial Photography

WWII-era aerial photography for the site area was obtained from the National Monuments Record Office (Historic England) / the Aerofilms Collection available from Britain from Above. This photography provides a record of the potential composition of the site during the war, as well as its condition immediately following the war (see **Annex O**).

WWII-Era Aerial Photography	
Date/Title	Description
17th August, 1940	This post-war aerial image, dated 1940, shows no discernible evidence of bomb damage in or around the site boundary. It is shown to be occupied by industrial warehouses, open ground, and various roadways.
13th May, 1946	This post-war aerial image, dated 1946, similarly shows no discernible evidence of bomb damage in or around the site boundary.

11.11. Abandoned Bombs

A post air-raid survey of buildings, facilities, and installations would have included a search for evidence of bomb entry holes. If evidence of an entry hole was encountered, Bomb Disposal Officer Teams would normally have been requested to attempt to locate, render safe, and dispose of the bomb. Occasionally, evidence of UXBs was discovered but due to a relatively benign position, access problems, or a shortage of resources the UXB could not be exposed and rendered safe. Such an incident may have been recorded and noted as an 'abandoned bomb'.

Given the inaccuracy of WWII records, and the fact that these bombs were 'abandoned', their locations cannot be considered definitive or the lists exhaustive. The MoD states that 'action to make the devices safe would be taken only if it was thought they were unstable'. It should be noted that other than the 'officially' abandoned bombs, there will inevitably be UXBs that were never recorded.

1st Line Defence holds no records of officially registered abandoned bombs at or near the site of the proposed works.

11.12. Bomb Disposal Tasks

The information service from the Explosive Ordnance Disposal (EOD) Archive Information Office at 33 Engineer Regiment (now part of 29 EOD & Search Group) no longer processes commercial requests for information. It has therefore not been possible to include any updated official information regarding bomb disposal/clearance tasks with regards to this site. A database of known disposal/clearance tasks has been referred to which does not make reference to such instances occurring within the site of proposed works. If any relevant information is received at a later date, ABO nv will be advised.

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11.13. Evaluation of German Air Delivered UXO Records

German Air Delivered UXO Records Summary	
Factors	**Conclusion**
Density of Bombing *It is important to consider the bombing density when assessing the possibility that UXBs remain in an area. High bombing density could allow for error in record keeping due to extreme damage caused to the area.*	During WWII, the site was situated within the County Borough of Newport. According to official Home Office bombing statistics, this district was subject to an overall low density of bombing, with an average of 12.9 items of ordnance recorded per 1,000 acres. Only a low density of bombing was recorded and believed to have been due to the Luftwaffe's change in strategy from September 1940 onwards. From then on, they turned their attention toward the indiscriminate bombing of British cities. Newport Bomb Census mapping did not record any incidents on-site. However, an overlay of bombing incidents depicted several incidents within the site's surrounding area (see Annex I). These incidents were corroborated and expanded upon by written records, with several bombing incidents recorded around the general site area - but none specifically recorded on site.
Damage *If buildings or structures on a site sustained bomb or fire damage, any resulting rubble and debris could have obscured the entry holes of unexploded bombs dropped during the same or later raids.*	Post-war aerial photography depicted no typical HE damage indicators within this part of the Alexandra docks. Typical indicators included bomb cratering, scattered earth, debris, clearance or indentations to the ground. However, there was some possible roofing repairs noted – sometimes an indicator of incendiary bomb repairs in post-war aerial imagery.
Ground Cover *The nature of the ground cover present during WWII would have a substantial influence on any visual indication that may indicate UXO being present.*	It is considered likely the ground cover present on site would have been relatively conducive toward the detection of UXO, given the site was occupied by industrial structures and its associated land/walkways/rail sidings. Such conditions would generally make it more likely that obvious signs of UXO - such as bomb entry holes – would have been noticed and recorded soon after they occurred. However, following any recorded damage on site and in the surrounding area, ground obstructions such as rubble and debris may have obstructed the potential detection of UXO incidents (as the diameter of a UXB entry hole could be as small as 20cm in diameter).
Access Frequency *UXO in locations where access was irregular would have a greater chance of passing unnoticed than at those that were regularly occupied.*	Given the site was occupied and surrounded by numerous structures within an urban, developed environment, it is expected the site was subject to a frequent and regular level of access at the start of WWII. However, following the bombing around the Alexandra Docks, it is possible the levels of access would have been temporarily reduced for evacuations, with rubble also potentially obstructing people from accessing the properties in and around the site boundary. Evidence of UXO is more likely to go unnoticed and unrecorded within areas of infrequent access.
Bomb Failure Rate	There is no evidence to suggest that the bomb failure rate in the locality of the site would have been dissimilar to the 10% normally used.
Abandoned Bombs	1st Line Defence holds no records of abandoned bombs at or within the site vicinity.
Bombing Decoy sites	1st Line Defence could find no evidence of bombing decoy sites within the site vicinity.
Bomb Disposal Tasks	1st Line Defence could find no evidence of bomb disposal tasks within the site boundary and immediate area.

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12. Introduction to Allied Ordnance

12.1. General

Many areas across the UK may be at risk from Allied UXO because of both wartime and peacetime military use. Typical military activities and uses that may have led to a legacy of military UXO at a site include former minefields, home guard positions, anti-aircraft emplacements, training and firing ranges, military camps, as well as weapons manufacture and storage areas.

Although land formerly used by the military was usually subject to clearance before returned to civilian use, items of UXO are sometimes discovered and can present a potential risk to construction projects.

This section of the report discusses the generic types of Allied ordnance typically encountered on areas associated with former military activity.

12.2. Defending the UK From Aerial Attack

During WWII the War Office employed a number of defence tactics against the Luftwaffe from bombing major towns, cities, manufacturing areas, ports and airfields. These can be divided into passive and active defences (examples are provided in the table below).

Active Defences	Passive Defences
• Anti-aircraft gun emplacements to engage enemy aircraft. • Fighter aircraft to act as interceptors. • Rockets and missiles were used later during WWII.	• Blackouts and camouflaging to hinder the identification of Luftwaffe targets. • Decoy sites were located away from targets and used dummy buildings and lighting to replicate urban, military, or industrial areas. • Barrage balloons forced enemy aircraft to greater altitudes. • Searchlights were often used to track and divert adversary bomber crews during night raids.

Active defences such as anti-aircraft artillery present a greater risk of UXO contamination than passive defences. Unexploded ordnance resulting from dogfights and fighter interceptors is rarely encountered and difficult to accurately qualify.

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12.3. Anti-Aircraft Artillery (AAA)

During WWII three main types of gun sites existed: heavy anti-aircraft (HAA), light anti-aircraft (LAA) and 'Z' batteries (ZAA). If the projectiles and rockets fired from these guns failed to explode or strike an aircraft they would descend back to land. The table below provides further information on the operation and ordnance associated with these type of weapons.

Anti-Aircraft Artillery				
Item	Description			
HAA	These large calibre guns such as the 3.7" QF (Quick Firing) were used to engage high flying enemy bombers. They often fired large HE projectiles, which were usually initiated by integral fuzes, triggered by impact, area, time delay or a combination of aforementioned mechanisms.			
LAA	These mobile guns were intended to engage fast, low flying aircraft. They were typically rotated between locations on the perimeters of towns and strategically important industrial works. As they could be moved to new positions with relative ease when required, records of their locations are limited. The most numerous of these were the 40mm Bofors gun which could fire up to 120 x 40mm HE projectiles per minute to over 1,800m.			
Variations in HAA and LAA Ammunition	Gun type	Calibre	Shell Weight	Shell Dimensions
	3.0 Inch	76mm	7.3kg	76mm x 356mm
	3.7 Inch	94mm	12.7kg	94mm x 438mm
	4.5 Inch	114mm	24.7kg	114mm x 578mm
	40mm	40mm	0.9kg	40mm x 311mm
Z-AA	Rockets were commonly designed to destroy heavily armoured military vehicles (anti-tank weapon). The device contains an explosive head (warhead) that can be accelerated using internal propellants to an intended target. Anti-aircraft rocket batteries were also utilised as part of air defence measures.			

The conditions in which anti-aircraft projectiles may have fallen unnoticed within a site area are analogous to those regarding air delivered ordnance. Unexploded anti-aircraft projectiles could essentially have fallen indiscriminately anywhere within range of the guns. The chance of such items being observed, reported and removed during the war depends on factors such as land use, ground cover, damage and frequency of access – the same factors that govern whether evidence of a UXB is likely to have been noted. More information about these factors with regards to this particular site can be found in the German Air Delivered Ordnance section of this report.

Illustrations of Anti-Aircraft artillery, projectiles and rockets are presented at **Appendix iv**.

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12.4. Land Service Ammunition

The term LSA covers items of ordnance that are propelled, placed, or thrown during land warfare. These items may be filled or charged with explosives, smoke, incendiary, or pyrotechnics and can be divided into five main groups:

Land Service Ammunition (LSA)	
Item	Description
Mortar Rounds	A mortar round is normally nosed-fused and fitted with its own propelling charge. Its flight is stabilised by the use of a fin. They are usually tear-drop shaped (though older variants are parallel sided), with a finned 'spigot tube' screwed or welded to the rear end of the body which houses the propellant charge. Mortars are either High Explosive or Carrier (i.e. smoke, incendiary, or pyrotechnic).
Grenades	A grenade is a short range weapon designed to kill or injure people. It can be hand thrown or fired from a rifle or a grenade launcher. Grenades either contain high explosive or smoke producing pyrotechnic compounds. The common variants have a classic 'pineapple' shape.
Projectiles	A projectile (or shell) is propelled by force, normally from a gun, and continues in motion using its kinetic energy. The gun a projectile is fired from usually determines its size. A projectile contains a fuzing mechanism and a filling. Projectiles can be high explosive, carrier or Shot (a solid projectile).
Rockets	Rockets were commonly designed to destroy heavily armoured military vehicles (anti-tank weapon). The device contains an explosive head (warhead) that can be accelerated using internal propellants to an intended target. Anti-aircraft rocket batteries were also utilised as part of air defence measures.
Landmines	A landmine is designed to be laid on or just below the ground to be exploded by the proximity or contact of a person or vehicle. Landmines were often placed in defensive areas of the UK to obstruct potential invading adversaries.

In the UK unexploded or partially exploded mortars and grenades are the most common items of LSA encountered, as they could be transported and utilised anywhere. They are mostly encountered in areas used for military training and are often found discarded on or near historical military bases.

Images of the most commonly found items of LSA are presented in **Appendices v - vii**.

12.5. Small Arms Ammunition

The most common type of ordnance encountered on land used by the military are items of Small Arms Ammunition (SAA). SAA refers to the complete round or cartridge designed to be discharged from varying sized hand-held weapons such as rifles, machine guns and pistols. SAA can include bullets, cartridge cases and primers/caps. Example images of the most SAA are presented in **Appendix viii**.

13. The Likelihood of Contamination from Allied Ordnance

13.1. Introduction

There are several factors that may serve to either affirm, increase, or decrease the level of risk within a site with a history of military usage. Such factors are typically dependent upon the proximity of the proposed area of works to training activities, munition productions and storage, as well as its function across the years.

This section will examine the history of the proposed site and assess to what degree, if any, the site could have become contaminated as a result of the military use of the surrounding area.

13.2. Alexandra Dock, Newport

The Alexandra Dock was constructed between 1868 and 1875. It covered an area of 28.5 acres and was extended in 1919 further to the south. Following this extension, the original dock became known as the 'North Dock.'

The original Alexandra Dock basin included a long rectangular structure - parallel to the River Usk. It had two operational quays along its eastern and western sides - with general goods being shipped from the east Quay - where they were loaded by travelling hydraulic cranes.[2]

The long rectangular structure (situated on site) was notably used during WWI for reconditioning shell casts and ammunition boxes. Furthermore, the 'No.9 transit shed' (see Annex D2) was believed to have been used by the RAF as a maintenance unit from 1941. However, like the factory, this unit was likely used for repair purposes. See Section 13.3 for more details.

13.3. National Cartridge and Box Repair Factory, Newport

According to anecdotal information, a shell cast and ammunition boxing factory utilised during WWI and WWII was on-site (see Annex D).

As expressed in Section 9.2, the factory was first established in 1917 to repair 18lbr and 4.5-inch shell cases and ammunition boxes. It was one of the two National Factories established to salvage and repair ammunition and ammunition boxes. A regularly maintained line of ships was formed to transport shell cases and boxes between France and Newport, where a line of conveyors took the material into the factory itself (see Annex N). From there, the boxes were transported to the National Shell Filling Factories outside the Glamorgan and Gwent areas, with millions of items being handled during the conflict.[3][4]

It is estimated that between 2,000 to 3,000 people worked at the factory, which covered 13 acres. Nevertheless, considering its specialisation in repairing damaged cases and boxes, it is believed that no explosive ordnance was handled, stored, or utilised in or around the site.[5]

[2] https://www.llyw.cymru/sites/default/files/publications/2017-11/m4-corridor-around-newport-environmental-statement-appendix-8.5-newport-docks-historic-built-e_0.pdf

[3] https://heritagecalling.com/2014/08/14/britains-home-front-9-remarkable-aerial-images-that-reveal-the-impact-of-wwi/#:-:text=The%20National%20Box%20and%20Cartridge,was%20built%20at%20Dagenham%20Dock.

[4] https://www.britainfromabove.org.uk/cy/image/WAW005370

[5] https://www.southwalesargus.co.uk/news/19262073.newport-mutiny-100-years-ago/

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13.4. Evaluation of Contamination Risk from Allied UXO

1st Line Defence has considered the following potential sources of Allied ordnance contamination:

Allied UXO Records Summary	
Sources of Allied UXO Contamination	**Conclusion**
Military Camps *Military camps present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training.*	1st Line Defence could find no evidence of a military camp within the site.
Anti-Aircraft Defences *Anti-Aircraft defences were employed across the country. Proximity to anti-aircraft defences increases the chance of encountering AA projectiles.*	1st Line Defence could find no evidence of Anti-Aircraft defences such as a HAA or LAA gun emplacement occupying or bordering the site. The closest HAA was located approximately 1.55km southeast of the site, in the vicinity of the RSPB Newport Wetlands. Despite this distance the maximum effective range of an AA projectile can be up to 15km. The conditions in which HAA or LAA projectiles may have fallen unnoticed within a site footprint are generally analogous to those regarding German air delivered ordnance.
Home Guard Activity *The Home Guard regularly undertook training and ordnance practice in open areas, as well as burying ordnance as part of anti-invasion defences.*	Evidence of Home Guard activity is often difficult to locate, owing to the ad-hoc nature of Home Guard activity within each local area. Such training was often conducted on a small scale at the discretion of individual commanders and as such was seldom recorded officially. As such, no positive evidence could be found to confirm the presence of HG units within proximity to the site.
Defensive Positions *Defensive positions suggest the presence of military activity, which is often indicative of ordnance storage, usage or disposal.*	There is no evidence of any pillbox, emplacement or other defensive features formerly located on or bordering the site footprint.
Training or firing ranges *Areas of ordnance training saw historical ordnance usage in large numbers, often with inadequate disposal of expended and live items. The presence of these ranges significantly impact on the risk of encountering items of ordnance in their vicinity.*	No evidence of training or firing ranges could be found within the site or surrounding area.
Defensive Minefields *Minefields were placed in strategic areas to defend the country in the event of a German invasion. Minefields were not always cleared with an appropriate level of vigilance.*	There is no evidence of defensive minefields affecting the site.

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Ordnance Manufacture *Ordnance manufacture indicates an increased chance that items of ordnance were stored, or disposed of, within a location.*	During WWII, the site was located within the National Cartridge and Box Repair Factory, Newport. According to anecdotal information, this factory was primarily focused on repairing 18lbr and 4.5-inch shell cases and ammunition boxes. It was seen as an important work, and a regularly maintained line of ships was formed to transport shell cases and boxes between France and Newport - where a line of conveyors took the material into the factory itself. After the boxes were repaired, they were transported to the National Shell Filling Factories outside the Glamorgan and Gwent areas. As such, it is considered unlikely that any ammunition or explosive material was handled or stored in or around the site itself.
Military Related Airfields *Military airfields present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training or bombing practice.*	The site was not situated within the perimeters or vicinity of a military airfield.

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14. The Likelihood of UXO Contamination Summary

The following table assesses the likelihood that the site was contaminated by items of German air delivered and Allied ordnance. Factors such as the risk of UXO initiation, remaining, and encountering will be discussed later in the report.

UXO Contamination Summary	
Quality of the Historical Record	The research has evaluated pre- and post-WWII Ordnance Survey maps, Luftwaffe reconnaissance imagery, Adolf Hitler Directive No.9, 29th November 1949, Newport Bomb Census mapping, an overlay of bombing incidents, Monmouthshire Air Raid Message Files, Monmouthshire ARP Incident Records, Newport WWII Bombing Files, the National Cartridge and Box Repair Factory photography, the Alexandra Docks Photography, the RAF Aerial photography and available anecdotal information. While the National Archives and Gwent Archives were consulted during the production of this report, the record set is generally considered to be of mixed quality. However, all consulted record sets indicated that there was no positive evidence of bombing on site.
German Air-Delivered Ordnance	• During WWII, the site was situated within the County Borough of Newport. According to official Home Office bombing statistics, this district was subject to an overall low density of bombing, with an average of 12.9 items of ordnance recorded per 1,000 acres. Any incidents were likely due to Adolf Hitler's directive stating that British ports (including the Alexandra Docks) were important targets of bombing (see Annex H for more details). • During WWII, the site was primarily occupied by part of a large warehouse-like building (the National Cartridge and Box Repair Factory), with rail sidings to the east and north of the building, and smaller warehouses in the north fronting onto Alexandra Dock. • Available written bomb incident records and Newport Bomb maps recorded multiple bombing incidents within this general part of Newport (see Annexes K, L and M for more details). Most notably, a number of bombing incidents were recorded in proximity to the site's northern and western sections - most notably an HE strike located approximately 190m to the southwest and an incendiary bombing 'shower' near to and around the site boundary (see Annex J for more details). However, nothing could be found to indicate the site itself sustained any bombing or damage. • No evidence of obvious HE bomb damage was visible in or along the site boundary within WWII-era and post-war aerial photography. Some possible small roof repairs were noted on the main building, sometimes indicative of bomb or incendiary damage on post-war imagery. However, no direct evidence could be found of bombing. • The nature of the ground cover across the majority of the site should have been relatively conducive to the observation of evidence of UXBs. Any unexploded bombs falling directly on the warehouse structures on site are very likely to have been observed and reported. Similarly, cratering would probably have been noted on the hardstanding ground in the north of the site. It is conceivable that UXB entry holes could have been overlooked in the area of open rail sidings. However, generally, rail infrastructure would have been subject to post-raid checks to ensure it was undamaged. Potential evidence of UXBs such as disturbed ballast, or damaged sleepers/track is more likely to have been noted here than in the surrounding open ground. • Considering the use of the site, it would likely have been subject to a frequent and regular level of access at the onset of WWII, further increasing the likelihood that evidence of UXO would have been spotted, reported and dealt with at the time. It is possible that following any bombing/damage in the area, access may have been impeded for a short time until it was deemed safe to return, but research has not identified any positive evidence of this occurring. • In summary, no positive evidence of HE bombing on site could be found within the available record set. Although there were several incidents recorded within the site's wider area, the general bombing density in Newport was low. Given this and the use/composition of the site during WWII, the risk of German air-delivered UXO contamination on site is not considered to be significant. Overall, the risk of contamination is considered to be **Low**. Because it has not been possible to entirely discount the risk from UXO, it is recommended that UXO Safety and Awareness Briefings are provided to ground personnel, and that a UXO Risk Management Plan is compiled. If any suspect items are encountered during works, 1st Line Defence should be contacted for advice and to reassess the risk as necessary.

Allied Ordnance	• During WWI, the site was part of the National Cartridge and Box Repair Factory, which was established during WWI. Over the next few years, it was primarily used for repairing shell cases and ammunition boxes. Few specific details could be found regarding this factory, and no positive evidence suggesting that items of SAA were handled, stored or produced there could be found. Considering these cases/boxes were regularly transported to the National Shell Filling Factories outside the Glamorgan and Gwent areas, there is believed to have been a minimal risk that items of SAA/LSA were buried or discarded within the site area during this time. • Furthermore, from 1941 part of the site (highlighted as the No.9 transit shed, see Annex D2) was used as an RAF Maintenance Unit. While few details could be found regarding this unit's specific activities, it was believed to have been used for repair/maintenance purposes. This is largely because it was located near numerous industrial structures such as the Newport Cartridge and Box Repair Factory (see Annex N for more details). • Therefore, considering the high frequency of access regarding these developments, it is expected that any remaining ordnance (if it had been present) would already have been encountered. As such, it would be unlikely that any shallowly buried ordnance would remain. For these reasons, the overall risk from Allied Ordnance is considered **Low.**

15. The Likelihood that UXO Remains

15.1. Introduction

It is important to consider the extent to which any explosive ordnance clearance (EOC) activities or extensive ground works have occurred on site. This may indicate previous ordnance contamination or reduce the risk that ordnance remains undiscovered.

15.2. UXO Clearance

1st Line Defence has found no evidence in the public domain or within internal records that any official ordnance clearance operations have taken place on site. Note however that we have not received confirmation of this fact from the 33 EOD Regiment Archive (now part of 29 EOD & Search Group). It should also be noted that in addition to 29 EOD & Search Group archival information, 1st Line Defence also do not currently have access to data that may be relevant including 5131(BD)SQN Archive, SD Training Technical Advisory Section (TAS) and MACA Records (bomb disposal callouts).

If such information is available at a later date, it is recommended that it be reviewed as it will assist with understanding both levels and types of contamination likely to be present, and may indicate risk reduction in certain areas.

15.3. Post-War Redevelopment

There appears to have been considerable developments in and around the site since WWII. Most notably, numerous industrial warehouses associated with the 'Central Store Depot' had been removed and replaced by loading bays and smaller industrial structures.

The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site. For example, the risk from deep buried UXO will only have been mitigated within the volumes of any post-war pile foundations or deep excavations for basement levels. The risk will however remain within virgin geology below and amongst these post-war works, down to the maximum bomb penetration depth.

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16. The Likelihood of UXO Encounter

16.1. Introduction

For UXO to pose a risk at a site, there should be a means by which any potential UXO might be encountered on that site.

The likelihood of encountering UXO on the site of proposed works would depend on various factors, such as the type of UXO that might be present and the intrusive works planned on site. In most cases, UXO is more likely to be present below surface (buried) than on surface.

In general, the greater the extent and depth of intrusive works, the greater the risk of encountering. The most likely scenarios under which items of UXO could be encountered during construction works is during piling, drilling operations or bulk excavations for basement levels. The overall risk will depend on the extent of the works, such as the numbers of boreholes/piles (if required) and the volume of the excavations.

Generally speaking, the risk of encountering any type of UXO will be minimal for any works planned within the footprint and down to the depth of post-war foundations and excavations.

16.2. Encountering Air Delivered Ordnance

Since an air delivered bomb may come to rest at any depth between just below ground level and its maximum penetration depth, there is a chance that such an item (if present) could be encountered during shallow excavations (for services or site investigations) into the original WWII ground level as well as at depth.

16.3. Land Service/Small Arms Ammunition Encounter

Items of LSA and SAA are mostly encountered in areas previously used for military training. Such items could have been lost, burnt, buried or discarded during being in use by the military. Due to this, LSA are most likely to be encountered at relatively shallow depths – generally in the top 1m below ground level. Therefore, such items are most likely to be encountered during open excavation works. In some cases, there is the potential that LSA or SAA may be present on the surface of the ground – especially in areas with active military use or were recently in use by the MoD.

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17. The Likelihood of UXO Initiation

17.1. Introduction

UXO does not spontaneously explode. Older UXO devices will require an external event/energy to create the conditions for detonation to occur. The likelihood that a device will function can depend on a number of factors including the type of weaponry, its age and the amount of energy it is struck with.

17.2. Initiating Air Delivered Ordnance

Unexploded bombs do not spontaneously explode. All high explosive filling requires significant energy to create the conditions for detonation to occur.

In recent decades, there have been a number of incidents in Europe where Allied UXBs have detonated, and incidents where fatalities have resulted. There have been several hypotheses as to the reason why the issue is more prevalent in mainland Europe – reasons could include the significantly greater number of bombs dropped by the Allied forces on occupied Europe, the preferred use by the Allies of mechanical rather than electrical fuzes, and perhaps just good fortune. The risk from UXO in the UK is also being treated very seriously in many sectors of the construction industry, and proactive risk mitigation efforts will also have affected the lack of detonations in the UK.

There are certain construction activities which make initiation more likely, and several potential initiation mechanisms must be considered:

UXB Initiation	
Direct Impact	Unless the fuze or fuze pocket is struck, there needs to be a significant impact e.g. from piling or large and violent mechanical excavation, onto the main body of the weapon to initiate a buried iron bomb. Such violent action can cause the bomb to detonate.
Re- starting the Clock	A small proportion of German WWII bombs employed clockwork fuzes. It is probable that significant corrosion would have taken place within the fuze mechanism over the last 70+ years that would prevent clockwork mechanisms from functioning. Nevertheless, it was reported that the clockwork fuze in a UXB dealt with by 33 EOD Regiment in Surrey in 2002 did re-start.
Friction Impact	The most likely scenario resulting in the detonation of a UXB is friction impact initiating the shock-sensitive fuze explosive. The combined effects of seasonal changes in temperature and general degradation over time can cause explosive compounds to crystallise and extrude out from the main body of the bomb. It may only require a limited amount of energy to initiate the extruded explosive which could detonate the main charge.

17.3. Land Service/Small Arms Ammunition Initiation

Items of LSA generally do not become inert or lose their effectiveness with age. Time can cause items to become more sensitive and less stable. This applies equally to items submerged in water or embedded in silts, clays, or similar materials. The greatest risk occurs when an item of ordnance is struck or interfered with. This is likely to occur when mechanical equipment is used or when unqualified personnel pick up munitions.

If left alone, an item of LSA will pose little/no risk of initiation. Therefore, if it is not planned to undertake construction/intrusive works at the site, the risk of initiation of any LSA that may be present would be negligible. Similarly, those accessing a contaminated area would be at minimal risk if they do not interfere with any UXO present on the ground. Clearly for many end uses, however, the presence of UXO anywhere on a site would not be acceptable as it could not be guaranteed that the items will not be handled, struck or otherwise affected, increasing the likelihood of initiation.

Items of SAA are much less likely to detonate than LSA or UXBs, but can be accidentally initiated by striking the casing, coming into contact with fire, or being tampered with/dismantled. It is likely that the detonation of an item of SAA would result in a small explosion, as the pressure would not be contained within a barrel. Detonation would only result in local overpressure and very minor fragmentation from the cartridge case.

18. Consequences of Initiation/Encounter

18.1. Introduction

The repercussions of the inadvertent detonation of UXO during intrusive ground works, or if an item or ordnance is interfered with or disturbed, are potentially profound, both in terms of human and financial cost. A serious risk to life and limb, damage to plant and total site shutdown during follow-up investigations are potential outcomes. However, if appropriate risk mitigation measures are put in place, the chances of initiating an item of UXO during ground works is comparatively low.

The consequences of encountering UXO can be particularly notable in the case of high-profile sites (such as airports and train stations) where it is necessary to evacuate the public from the surrounding area. A site may be closed for anything from a few hours to a week with potentially significant cost in lost time. It should be noted that even the discovery of suspected or possible item of UXO during intrusive works (if handled solely through the authorities), may also involve significant loss of production.

18.2. Consequences of Detonation

When considering the potential consequences of a detonation, it is necessary to identify the significant receptors that may be affected. The receptors that may potentially be at risk from a UXO detonation on a construction site will vary depending on the site specific conditions but can be summarised as follows:

- People – site workers, local residents and general public.
- Plant and equipment – construction plant on site.
- Services – subsurface gas, electricity, telecommunications.
- Structures – not only visible damage to above ground buildings, but potentially damage to foundations and the weakening of support structures.
- Environment – introduction of potentially contaminating materials.

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19. 1st Line Defence Risk Assessment

19.1. Risk Assessment Stages

Taking into account the quality of the historical evidence, the assessment of the overall risk from unexploded ordnance is based on the following five considerations:

1. That the site was contaminated with unexploded ordnance.
2. That unexploded ordnance remains on site.
3. That such items will be encountered during the proposed works.
4. That ordnance may be initiated by the works operations.
5. The consequences of encountering or initiating ordnance.

19.2. Assessed Risk Level

1st Line Defence has assessed that there is an overall **Low Risk** from German and anti-aircraft unexploded ordnance at the site of proposed works. There is an assessed **Low Risk** from Allied unexploded ordnance.

Ordnance Type	Risk Level			
	Negligible	Low	Medium	High
German Unexploded HE Bombs		✓		
German 1kg Incendiary Bombs		✓		
Anti-Aircraft Artillery Projectiles		✓		
Allied Land Service and Small Arms Ammunition		✓		

Please note – although the risk from unexploded ordnance on this site has been assessed as 'Low', this does not mean there is 'no' risk of encountering UXO. This report has been undertaken with due diligence, and all reasonable care has been taken to access and analyse relevant historical information. By necessity, when dealing historical evidence, and when making assessments of UXO risk, various assumptions have to be made which we have discussed and justified throughout this report. Our reports take a common-sense and practical approach to the assessment of risk, and we strive to be reasonable and pragmatic in our conclusions.

It should however be stressed that if any suspect items are encountered during the proposed works, 1st Line Defence should be contacted for advice/assistance, and to re-assess the risk where necessary. The mitigation measures outlined in the next section are recommended as a minimum precaution to alert ground personnel to the history of the site, what to look out for, and what measures to take in the event that a suspect item is encountered. It should also be noted that the conclusions of this report are based on the scope of works outlined in the 'Proposed Works' section of this report. Should the scope of works change or additional works be proposed, 1st Line Defence should be contacted to re-evaluate the risk.

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20. Proposed Risk Mitigation Methodology

20.1. General

The following risk mitigation measures are recommended to support the proposed works at Proposed Cemminerals Facility, South Docks, Newport:

Recommended Risk Mitigation Measures	
Activity	Recommended Risk Mitigation Measure
All Works	• **UXO Risk Management Plan** It is recommended that a site-specific plan for the management of UXO risk be written for this site. This plan should be kept on site and be referred to in the event that a suspect item of UXO is encountered at any stage of the project. It should detail the steps to be taken in the event of such a discovery, considering elements such as communication, raising the alarm, nominated responsible persons etc. Contact 1st Line Defence for help/more information. • **Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.** As a minimum precaution, all personnel working on the site should be briefed on the basic identification of UXO and what to do in the event of encountering a suspect item. This should in the first instance be undertaken by a UXO Specialist. Posters and information on the risk of UXO can be held in the site office for reference.

In making this assessment and recommending these risk mitigation measures, if known, the works outlined in the 'Scope of the Proposed Works' section were considered. Should the planned works be modified or additional intrusive engineering works be considered, 1st Line Defence should be consulted to see if a re-assessment of the risk or mitigation recommendations is necessary.

1st Line Defence Limited **12/07/2024**

This Report has been produced in compliance with the Construction Industry Research and Information Association (CIRIA) C681 guidelines for the writing of Detailed UXO Risk Assessments.

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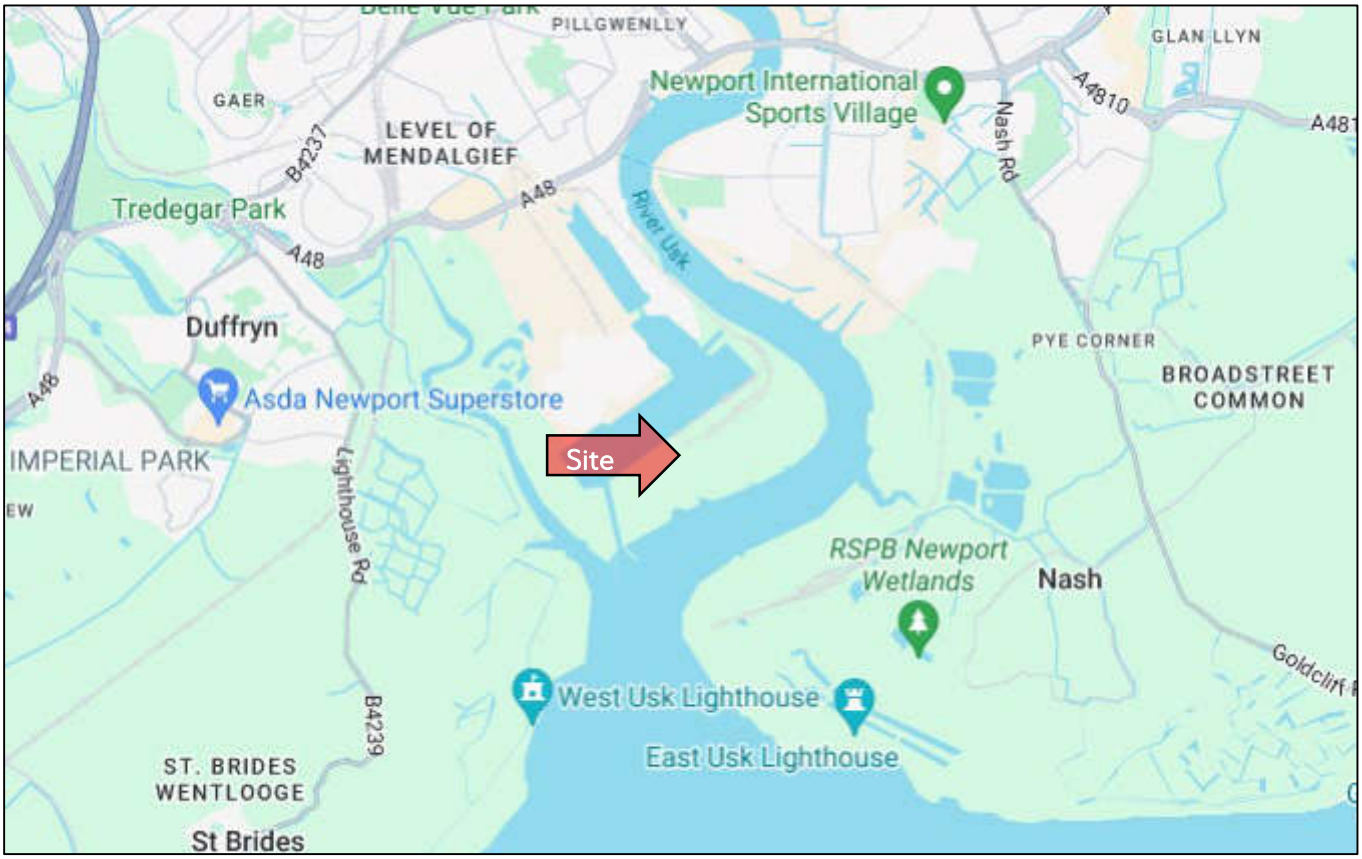



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Approximate site boundary

N

Project: Proposed Cemminerals Facility, South Docks, Newport

Ref: DA10337b-00

Source: Google Maps

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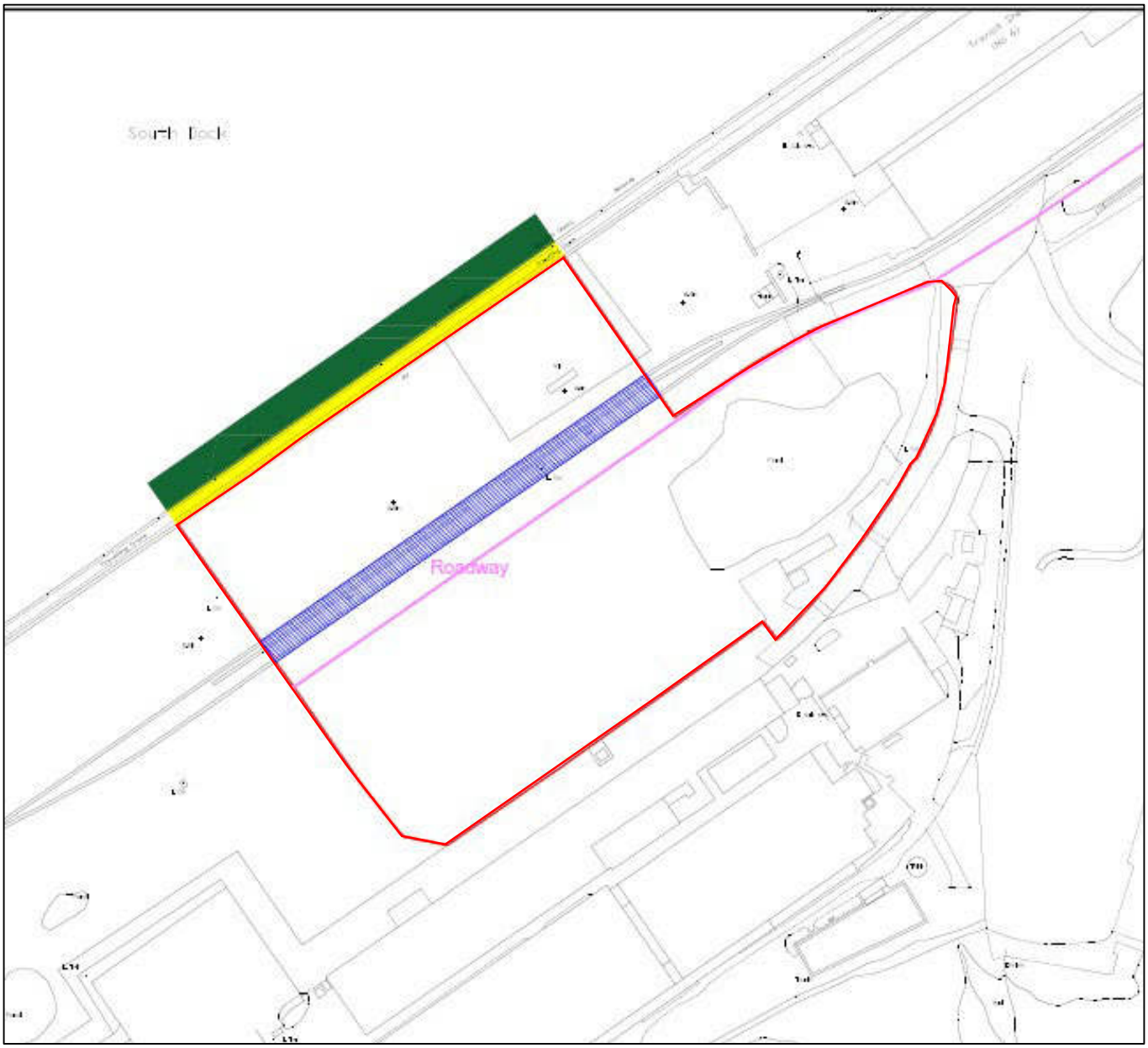
Client Provided Site Plan

Annex: C



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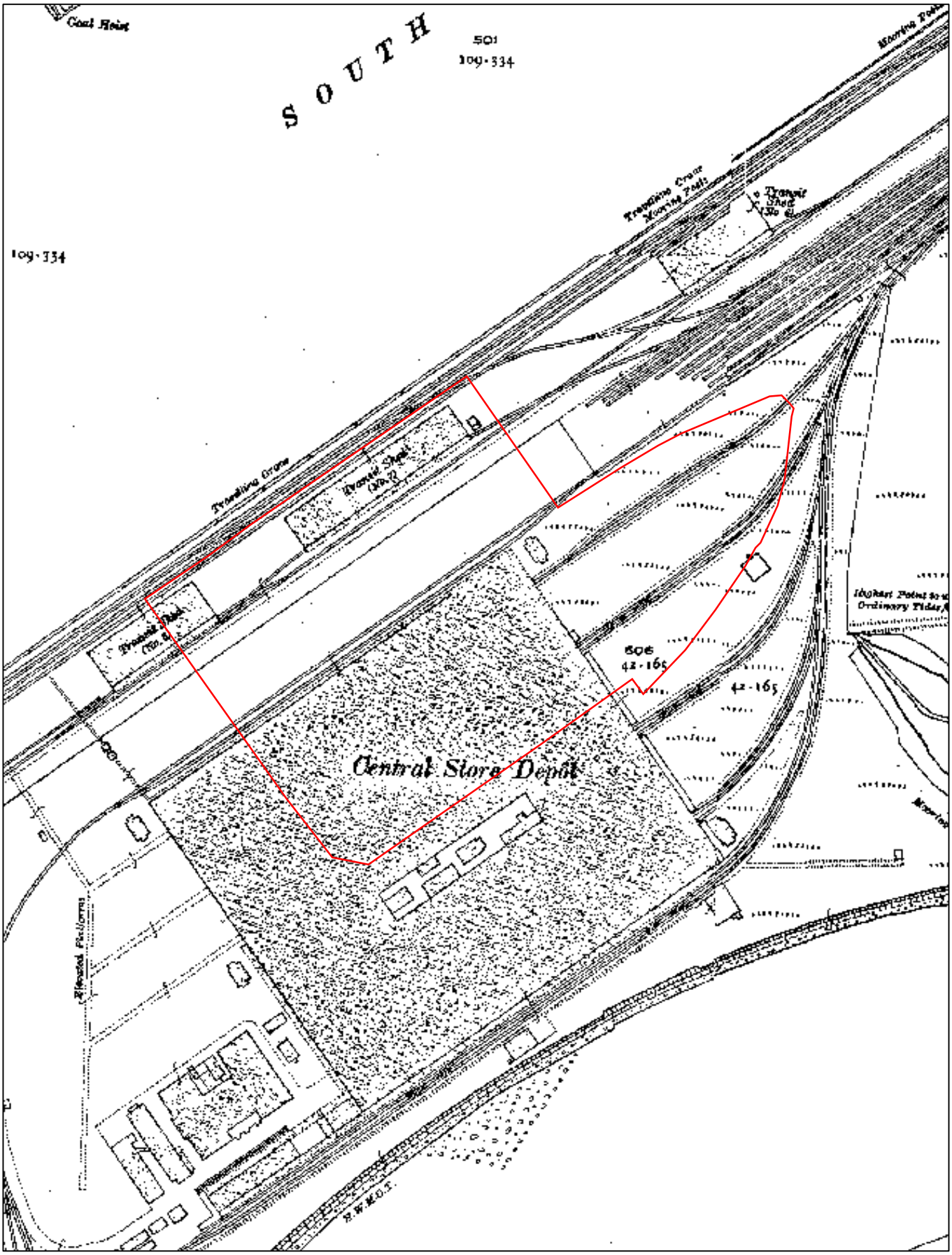

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Source: Landmark Maps

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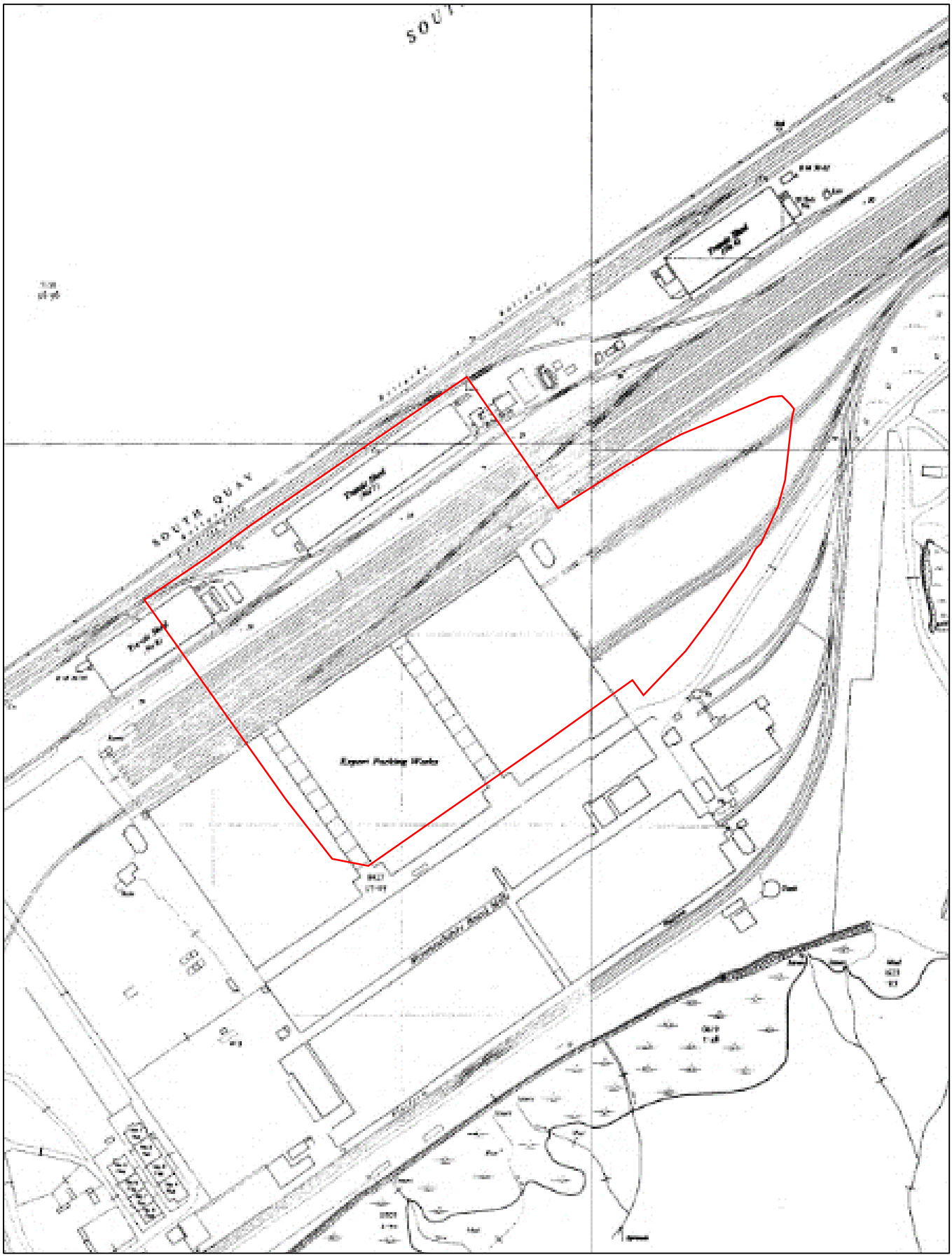

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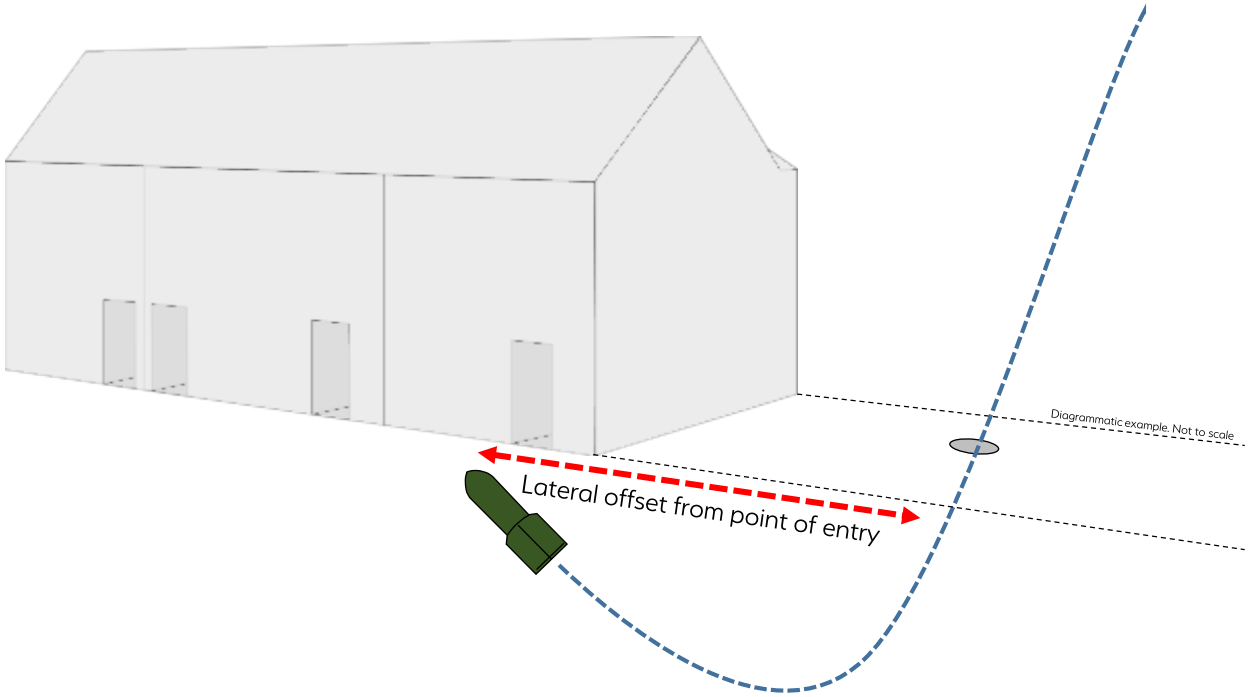







Top: J-curve Effect - Due to angle of entry, unexploded bombs would often end their trajectory at a lateral offset from point of entry, often ending up beneath adjacent extant structures/sites.

The photograph **above** shows a 250kg unexploded bomb found in Bermondsey in 2015, pointing upwards, demonstrating 'J-curve'.

One of the most common scenarios for UXO going unnoticed was when a UXB fell into a 'bomb site' (such as the area shown **Top Left**), the entry hole of the bomb obscured by any debris and rubble present. Note that the entry hole of a 50kg UXB could be as little as 20cm in diameter (**Left**).

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BBC NEWS

WW2 bomb found near London City Airport blown up



An unexploded World War Two bomb found near London City Airport has been detonated.

The 500kg device was discovered at the King George V Dock on Sunday during planned work at the airport.

It was closed and all flights were cancelled on Monday after an exclusion zone was put in place.

The detonation, which took take place off Shoeburyness, Essex, was postponed on Tuesday because of high winds and dangerous conditions for divers.

The 1.5m-long German bomb - which was found in a bed of silt, 15m underwater - was carefully removed from the Thames and placed in a secure location a mile away from the coast of Essex.

500kg German HE Bomb, February 2018

BBC NEWS



Exeter WW2 bomb is detonated after homes evacuated

More than 2,600 households and 12 university halls of residence were cleared before the 2,200lb (1,000kg) device **was destroyed** on Saturday.

Police said the blast left a crater about the size of a double-decker bus.

Police have reported large pieces of metal debris hitting buildings and said some properties in the 100m (330ft) exclusion zone had sustained "structural damage".



1000kg German HE bomb, February 2021

BBC NEWS



Great Yarmouth: Huge blast after unplanned WW2 bomb detonation

A World War Two bomb found in Great Yarmouth has detonated while work was being done to defuse it, causing a huge blast that was heard for miles.

Army specialists were attempting to disarm it when there was an unplanned detonation at about 17:00 GMT.

People on social media said they heard a loud bang and felt buildings shake 15 miles (24km) away.

There have been no reports of injuries among the Army, emergency services or the public, Norfolk Police said.

Cordons were put in place when the bomb was first discovered close to two gas pipes on Tuesday, and work began to make it safe.

250kg German HE Bomb, February 2023

BBC NEWS



Plymouth unexploded WW2 bomb: Thousands of people displaced

A 500kg (1,102lb) German World War Two bomb that forced the evacuation of thousands of people in Plymouth has been detonated at sea.

The unexploded device was **found in a garden** on St Michael Avenue on Tuesday, sparking four days of disruption.

On Friday police closed roads and rail and bus services were stopped as the bomb was transported 1.4 miles (2.3km) through the city's streets.

The device was taken by boat beyond the breakwater and detonated at 21:51 GMT.





500kg German HE Bomb, February 2024

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Ref:	DA10337b-00
Source:	BBC News

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BASF has confirmed that an explosive device, most likely a World War II-era bomb, caused the blast that left one person injured Tuesday at a plant construction site in Germany.

The explosion was reported at BASF's Ludwigshafen toluene diisocyanate (TDI) plant, which recently broke ground for a 300,000 metric tons per year TDI production plant and other construction to expand its facilities.



BASF Provides Some Details

Responding to a request from *PaintSquare News* for more information on Wednesday (Feb. 27), BASF's manager of media relations and corporate communications Europe, Ursula von Stetten, wrote in an email, "So here [are] the facts: The detonation took place at 10.00 a.m. One person was injured; the injury is not serious. He will be kept in the hospital for some days.

"Cause of the detonation was an explosive device, presumably a bomb deriving from the Second World War. The device detonated when grounding work was done. No details on [a] delay [are] available. At the moment, the exact circumstances of the incident are [being] evaluated."

1st March 2013

WWII bomb injures 17 at Hattingen construction site



Seventeen people were injured on Friday when a construction crew unwittingly detonated a buried World War II-era bomb in Hattingen.

An excavator apparently drove over a 250-kilogramme (550 pound) American bomb, damaging surrounding buildings. Most of the injured suffered auditory trauma from the blast, and the excavator operator suffered injuries to his hands, police in the German state of North Rhine-Westphalia said.

"The hole was astoundingly small for such a large bomb full of so many explosives," Armin Gebhard, head of the Arnsberg department for military ordnance removal, told The Local. "But of course it damaged all the surrounding buildings too. We are really happy it wasn't worse."

19th September 2013

SPIEGEL ONLINE

Blast Kills One

World War II Bomb Explodes on German Motorway

A highway construction worker in Germany accidentally struck an unexploded World War II bomb, causing an explosion which killed him and wrecked several passing cars.



A World War II bomb has exploded during construction work on a German highway, killing one worker and injuring several motorists who were driving past at the time.

The worker had been cutting through the road surface near the south-western town of Aschaffenburg, when the machine struck the bomb and triggered the blast. They were not sure yet what type of bomb it was. "The explosion seems to have been too small for it to have been an aircraft bomb," the spokesman said.

23rd October 2006

BBC NEWS

World War II bomb kills three in Germany



A special commission is investigating the causes of the explosion, while prosecutors are considering whether the team leader should face charges of manslaughter through culpable negligence, the BBC's Oana Lungescu reports from Berlin.

The blast happened an hour before the defusing operation was due to start.

Officials said the three men who died were experienced sappers, or combat engineers, who over 20 years had defused up to 700 bombs.

More than 7,000 people were immediately evacuated when the 500kg bomb was found. Several schools, a kindergarten and local companies remain closed.

2nd June 2010



June 2006

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BBC NEWS

Unexploded WW1 artillery shell found in Newark



Kirby residents react after grenade is detonated on housing estate



Residents react after wartime grenade 'with pin still in it' is detonated on housing estate

By George King

1 Comments

Essex Police officers were called to the Taylor Wimpey housing development in Thorpe Road, Kirby Cross, after the 70 plus-year-old hand grenade was discovered.

YORKSHIRE POST

Army called after unexploded WW2 shell found in village near Ilkley

Police have released photos of an old wartime mortar shell that was found in a rural Yorkshire village.

By Grace Newton

Army bomb disposal experts from the Royal Logistics Corps were called to Addingham, near Ilkley, yesterday to make the device safe.



EveningNews

Police warning after discovery of unexploded mortar shell in Glossop moorland



This unexploded mortar shell was found on moorland above Glossop

The force said officers were alerted to the large metal shell on Saturday (February 20) by a member of the public.

It was identified by experts as an unexploded mortar shell, which the force described as 'very dangerous and unusual'.

Express & Star

Dozens more mortar shells found during work on Burntwood housing estate

By Luke Bartlett | Burntwood | Published: May 24, 2018 | 1 Comments

A large number of mortar shells have been discovered on a building site in Burntwood forcing businesses to evacuate.



The shells were found by Staffordshire Police on the site near Milestone Way, in Chasetown, and a 200m (656ft) cordon was soon after put in place.

Members of the public are being advised to stay away from the area near Morrisons supermarket while police deal with the shells.

Developers Taylor Wimpey and Barratt Homes were behind the plans to build 150 homes at Milestone Way.

Unexploded WW2 bomb found at Kenfig Pool, Bridgend



Bomb experts have been called to a south Wales nature reserve after an unexploded World War Two shell was discovered by a walker in Bridgend.

Dean Smith, 38, of Pyle, was walking near Kenfig Pool on Saturday when he saw a fin sticking out of the sand.

He reached down to pick it up, but ending up falling and landed with the 2ft-long (0.6m) bomb on top of him.

The site has been cordoned off by police and the Royal Logistics Corps will carry out a controlled explosion.

SwindonAdvertiser

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Worker on old school site in Swindon finds buried explosives



At around 9.30am, the digger rubbed against the lid of something which was approximately 600mm below ground - and would have blown up instantly if broken.

AW Bombs are yellow phosphorous hand grenades in half pint clear glass bottles weighing 1.5lbs each, which ignite instantly once their liquid contents react with the outside air.

deadline.

Locals on Isle of Wight find 1ft long unexploded WW2 bomb



SuffolkNews

Icklingham mortar bomb is blown up by Army

Published: 16:46, 25 February 2015



Police had to guard an unexploded WW2 4lb 7oz (2kg) mortar bomb overnight in a field near Icklingham until Army bomb disposal could blow it up on Tuesday.

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Shropshire STAR

March 16th, 2022

Controlled explosion after discovery of suspected Second World War mortar shell

A controlled explosion has been carried out on what is believed to have been a Second World War mortar shell.



Stafford Road in Newport. Photo: Google

West Mercia Police sent a specialist team to Newport this morning after the shell was discovered in a garden on Stafford Road yesterday afternoon.

The force said they had removed the item this morning and taken it to a "safe location" to carry out a controlled explosion.

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Newport Safer Neighbourhood Team
@NewportCops · **Follow**

PCSO Wills and PC Westcott along with colleagues from @TelfordCops have this morning assisted EOD with a controlled explosion of a WW1 shell which was located buried in a garden on Stafford Road. Thanks to @HarperAdamsUni for allowing us to use their land. #MultiAgencyWorking



A spokesman said: "At around 4.15pm yesterday we received a report that an unexploded ordnance was discovered in a garden on Stafford Road in Newport.

"EOD (Explosives Ordnance Disposal) attended the scene this morning and moved the device to a safe location where they conducted a controlled explosion."

Some properties on the road had been temporarily evacuated by police on Tuesday evening after the discovery. People were allowed to return shortly after.

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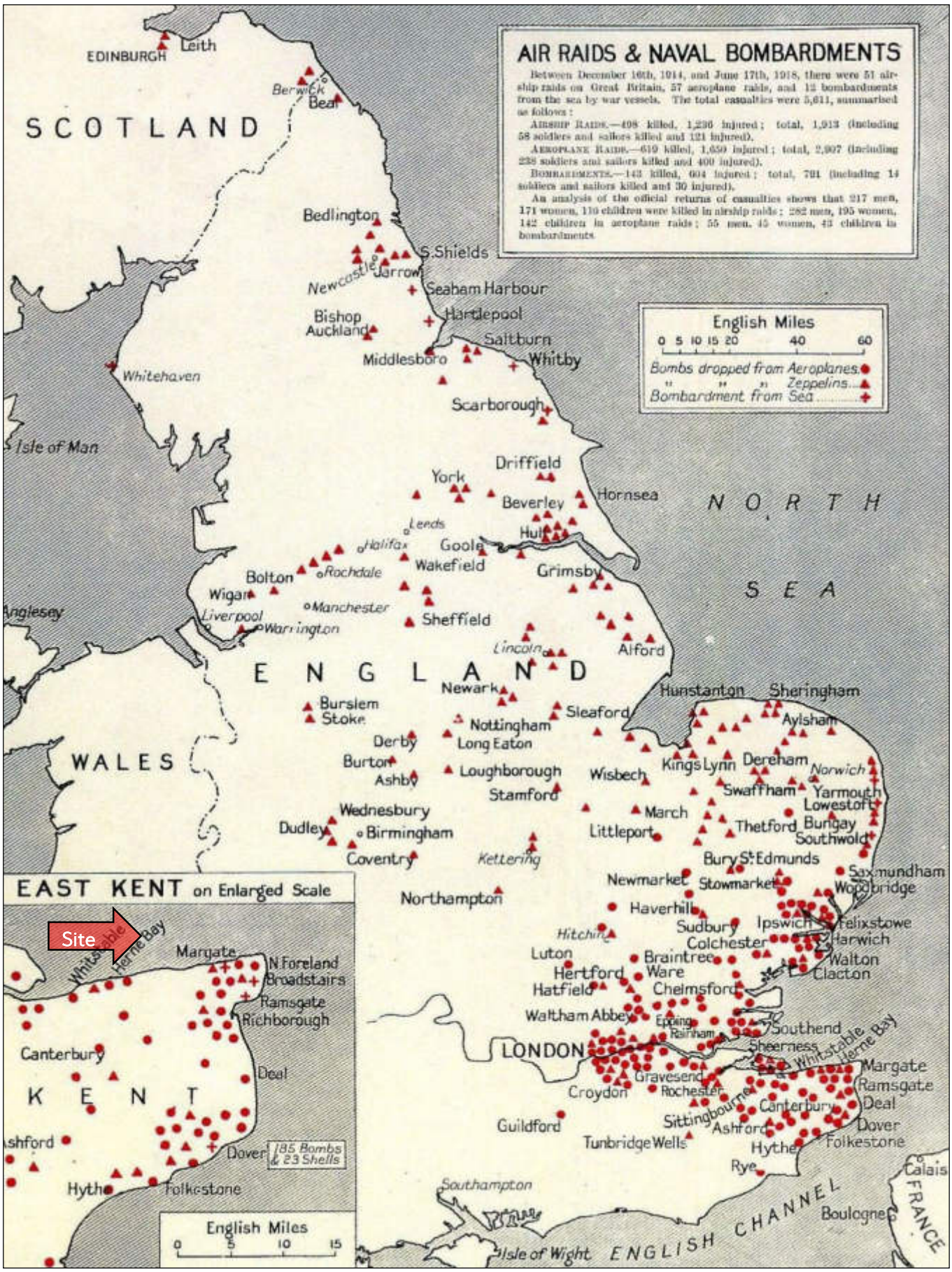
WWI Map of Air Raids and Naval Bombardments



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Client: ABO nv

Project: Proposed Cemminerals Facility, South Docks, Newport

Ref: DA10337b-00

Source: J. Morris, German Air Raids on Britain

N

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Newport Docks
GB7BB27: South Alexandra Dock in Newport

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Approximate site boundary

Project: Proposed Cemminerals Facility, South Docks, Newport

Ref: DA10337b-00

Source: Ramsey, W, *The Blitz Then and Now Volume I*

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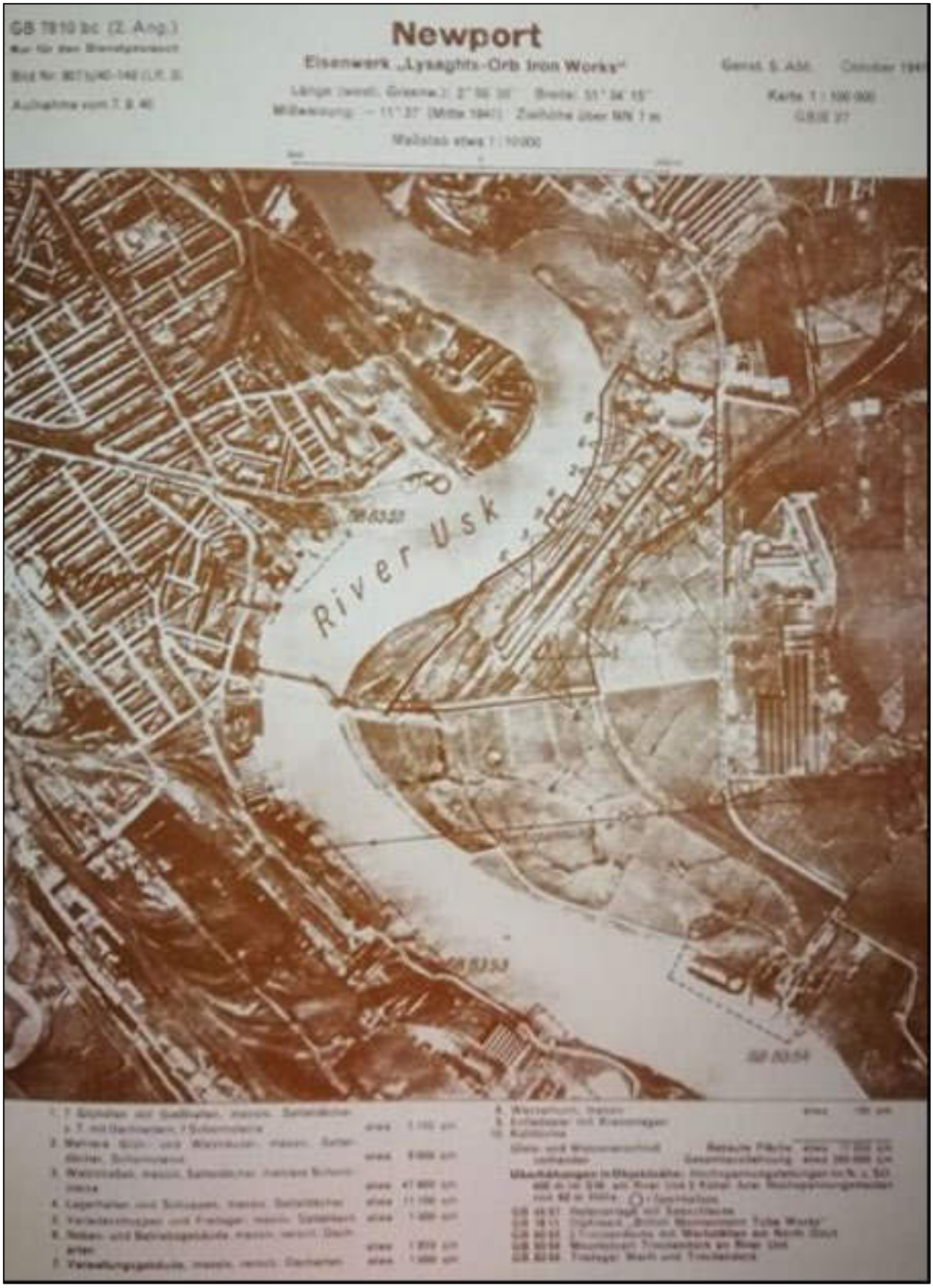

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In our fight against the Western Powers England has shown herself to be the animator of the fighting spirit of the enemy and the leading enemy power. The defeat of England is essential to final victory.

The most effective means of ensuring this is to cripple the English economy by attacking it at decisive points . . .

Should the Heer succeed in defeating the Anglo-French Armies in the field and in seizing and holding a sector of the coast of the Continent opposite England, the task of the Kriegsmarine and the the Luftwaffe to carry the war to English industry becomes paramount. Efforts will be made to secure the co-operation of the Sabotage and Fifth Column organisations.

The Kriegsmarine and Luftwaffe will then carry out the following tasks, given in the order of importance.

1. *Attacks on the principal English ports by mining and blocking the sea lanes leading to them, and by the destruction of important port installations and locks. In this connection aircraft are extremely valuable in minelaying, particularly outside English west coast ports, in narrow waterways and in river estuaries.*
2. *Attacks on English merchant shipping and on enemy warships protecting it.*
3. *Destruction of English depots, oil storage plants, food in cold storage and grain stores.*
4. *Interruption of the transport of English troops and supplies to the French mainland.*
5. *The destruction of industrial plant whose loss would be of decisive significance for the military conduct of the war, in particular key points of the aircraft industry and factories producing heavy artillery, anti-aircraft guns, munitions and explosives.*

The most important English ports, which handle 95 per cent of foreign trade and which could not be adequately replaced by other harbours, are:

London, Liverpool and Manchester — for the import of foodstuffs, timber and oil. These three ports account for 58 per cent of the total imports in peacetime and are of decisive importance.

Newcastle, Swansea, Blythe, Cardiff, Sunderland, Barry and Hull — for the export of coal.

Alternative ports, of limited capacity, and for certain types of cargo only, are: Grangemouth, Holyhead, Leith, Bristol, Middlesbrough, Belfast, Grimsby, Newport, Southampton, Goole, Glasgow and Dundee.

ADOLF HITLER, DIRECTIVE No. 9, NOVEMBER 29, 1939

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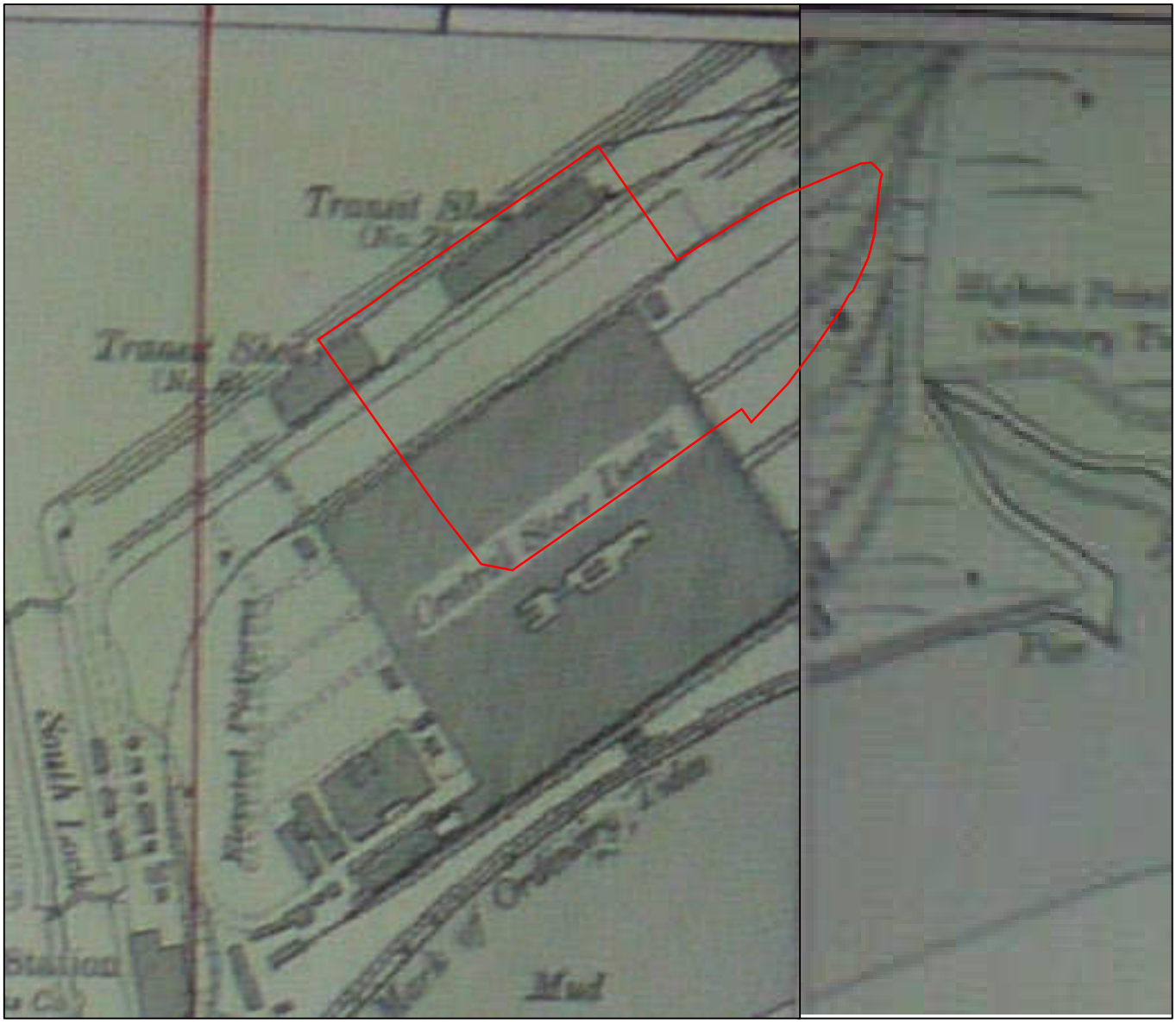

Oil Bomb
50kg HE
250kg HE
500kg HE
1,000kg HE
Parachute Mine
1,800kg HE
2,500kg HE (or larger)
Unclassified
Unexploded (E.g. of UX 50kg HE)

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Approximate site boundary

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Project: Proposed Cemminerals Facility, South Docks, Newport

Ref: DA10337b-00

Source: The National Archives, Kew

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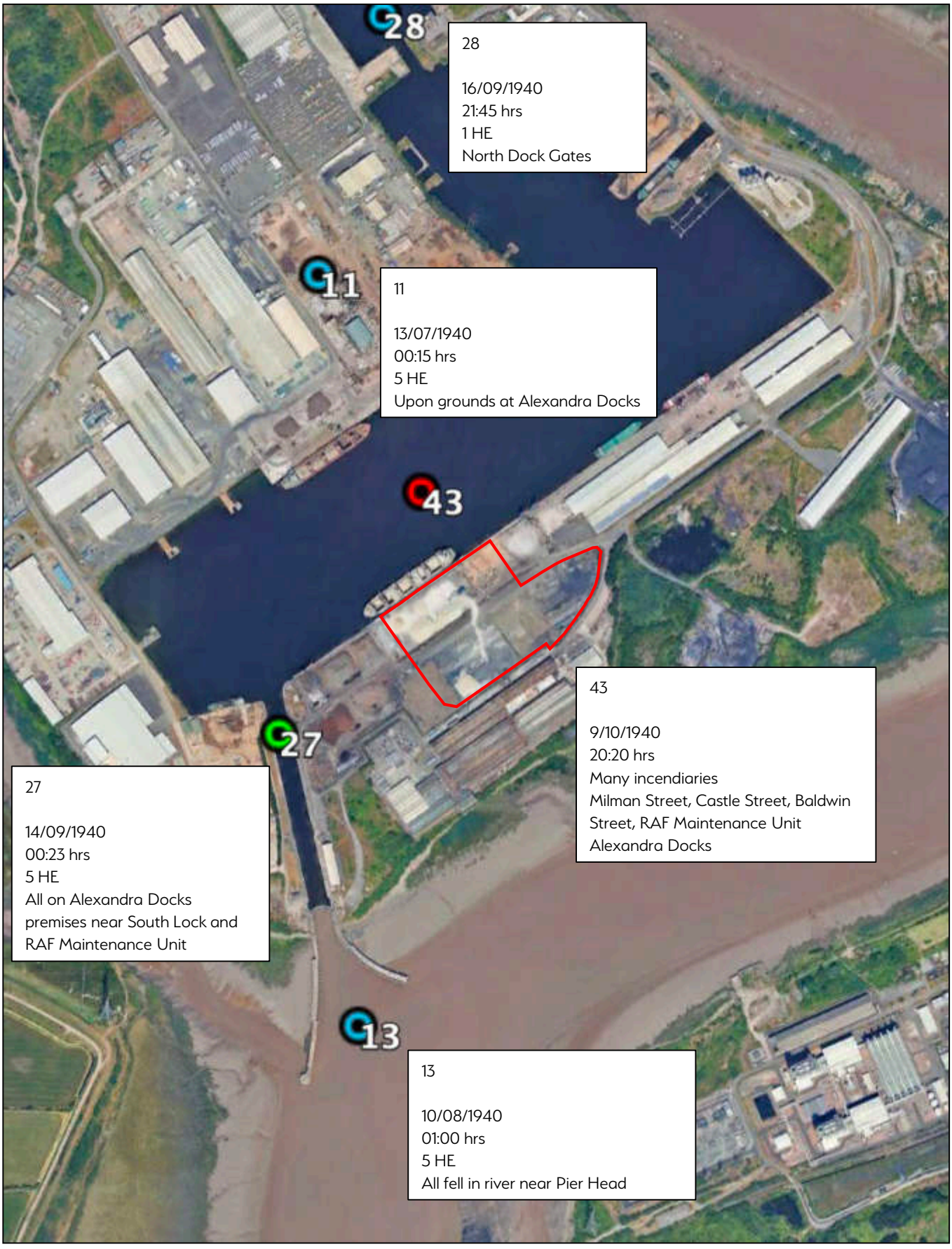
Newport Overlay of Bombing Incidents

Annex: J



V-1 Flying Bomb

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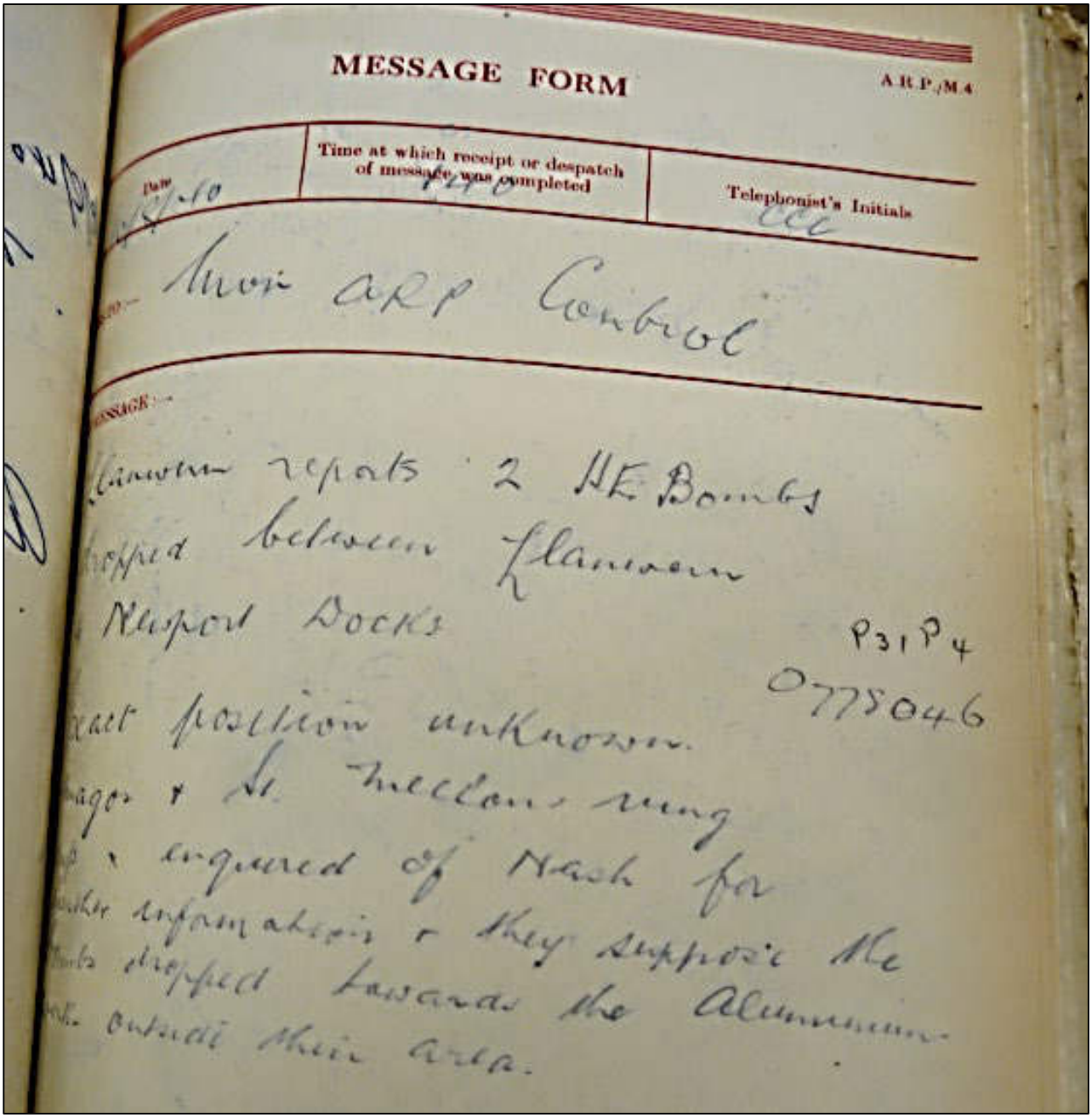

MESSAGE FORM

A.R.P./M.4

Time at which receipt or despatch of message was completed

Telephonist's Initials

To: Mon ARP Control

Message:

Llanwern reports 2 HE Bombs dropped between Llanwern & Newport Docks

P31P4
0778046

Exact position unknown.

Enquiries & Messages sent

Enquired of Noah for further information & they suppose HE bombs dropped (?) the aluminium works outside (?) (?).

Relevant Transcription: (Date) 10/8/40. (Message) Llanwern reports 2 HE bombs dropped between Llawern and Newport Docks. P31P4. 0778046. Exact position unknown...Inquired of Noah for further information and they supposed HE bombs dropped (?) the aluminium works outside (?) (?).

The site was located within Newport Docks.
The mentioned grid reference was located approximately 1.8km to the southeast – too far from the site to be of concern.

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11. 13/07/1940 @ 00:15 hrs 5 H.E. Upon grounds at Alexandra Docks. B
12. 13/07/1940 @ 00:15 hrs 1 H.E. On Neptune Works of Braithwaites, Alexandra Docks. A

27. 14/09/1940 @ 00:23 hrs 5 H.E. All on Alexandra Docks premises near South Lock and R.A.F. Maintenance Unit. A
28. 16/09/1940 @ 21:45 hrs 1 H.E. North Dock Gates. B

43. 09/10/1940 @ 20:20 hrs Many unknown number INC Millman Street, Castle Street, Baldwin Street, R.A.F.Maintenance Unit, Alexandra Docks. B

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In June 1940 bombs hit Newport in the St. Julian's and Dewstow areas. The first recorded bomb is just after midnight on 26 June 1940 in the HE Aluminium Works in the grounds of Cleveland Oil Company. On September 13 a barrage balloon brought down a German Heinkel bomber in Stow Park Avenue causing unfortunate casualties see the amazing full story here.

Date & Time Bomb Total Bomb Type Hit Location 26/06/1940 @ 00:12 hrs 1 H.E. Aluminium Works field to grounds of Cleveland Oil Company. 26/06/1940 @ 00:12 hrs 1 H.E. Petrol Depot nearby. 26/06/1940 @ 00:12 hrs 1 H.E. Cleveland Oil Company. 26/06/1940 @ 00:12 hrs 2 H.E. In dry Dock. (Eastern Dry Docks)

river near Pier Head. 10/08/1940 @ 01:00 hrs 7 H.E. All fell in river off Nash Point 14/08/1940 @ 17:38 hrs 7 H.E. All fell in river near Eastern Dry Docks and British Aluminium Company Works. 23/08/1940 @ 23:15 hrs 1 H.E. Fell on numbers 27&28 Capel Street. 23/08/1940 @ 23:15 hrs 1 H.E. Fell on 56&59 Capel

Locks Farm, Nash Road. 13/07/1940 @ 00:15 hrs 1 H.E. Waste Land Mendalgief Road near Belle Vue Railway Crossing. 13/07/1940 @ 00:15 hrs 5 H.E. Upon grounds at Alexandra Docks. 13/07/1940 @ 00:15 hrs 1 H.E. On Neptune Works of Braithwaites, Alexandra Docks. 10/08/1940 @ 01:00 hrs 5 H.E. All fell in

Gwastad Mawr, Malpas. 13/9/1940 @ 03:30 hrs 1 German Plane Plane unknown recorded crashed at 32 Stow Park Avenue. 14/09/1940 @ 00:23 hrs 5 H.E. All on Alexandra Docks premises near South Lock and R.A.F. Maintenance Unit. 16/09/1940 @ 21:45 hrs 1 H..E. North Dock Gates 16/09/1940 @ 21:45 hrs 1 H.E.

H..E. Baldwin Street. 09/10/1940 @ 20:20 hrs 1 H.E. Railway Line at Capel Street. 09/10/1940 @ 20:20 hrs 1 H.E. Alexandra Dock near number 3 Hoist. 09/10/1940 @ 20:20 hrs Many unknown number INC Millman Street, Castle Street, Baldwin Street, R.A.F.Maintenance Unit, Alexandra Docks. 26/02/1941 @

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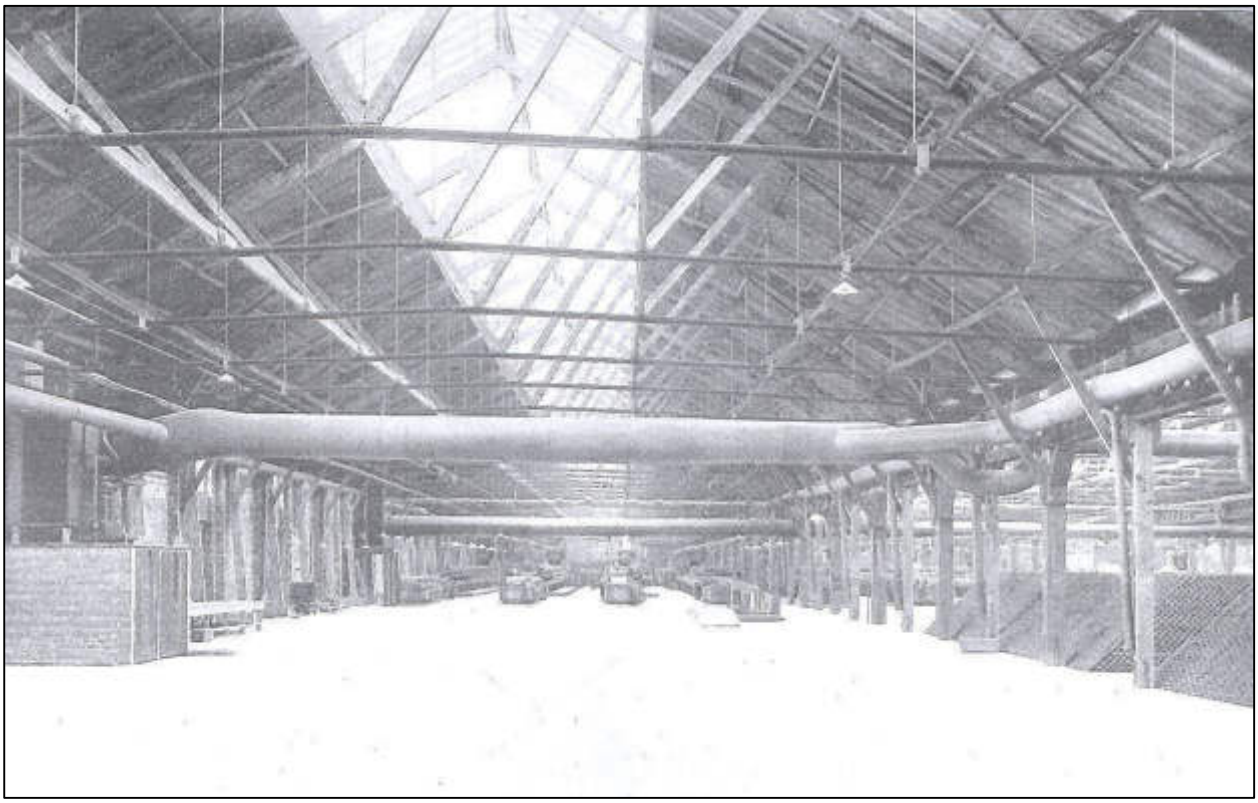
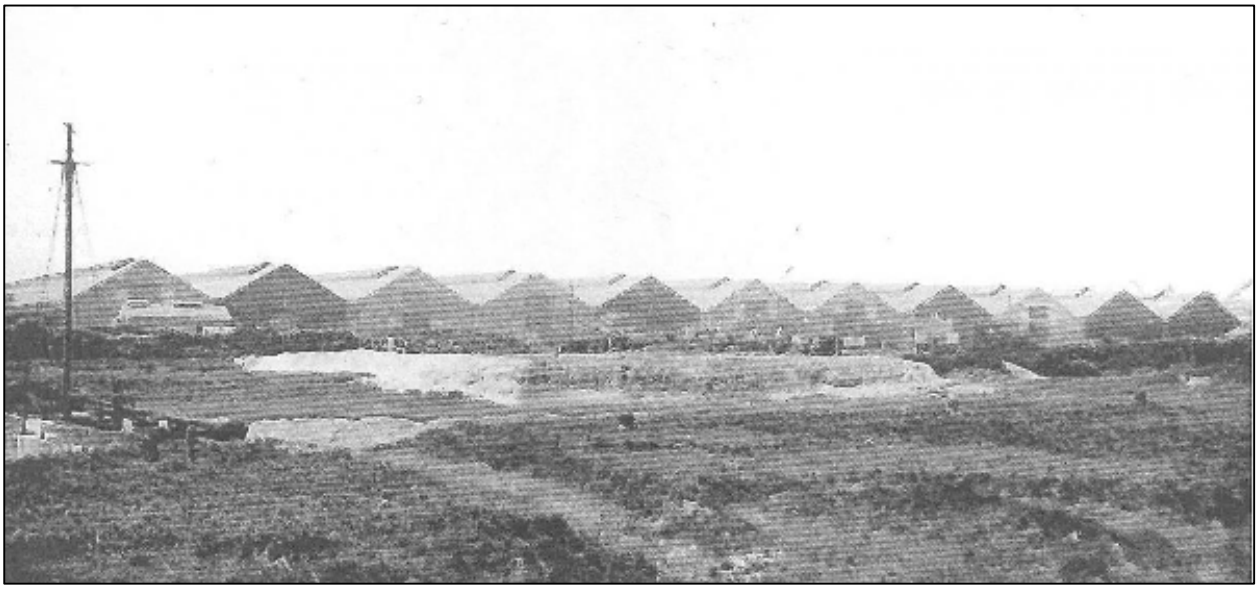


A bay at the Newport National Cartridge and Box Repair Factory, 1920



An outside view of the Newport National Cartridge and Box Repair Factory

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Project: Proposed Cemminerals Facility, South Docks, Newport

Ref: DA10337b-00 **Source:** South Wales Argus

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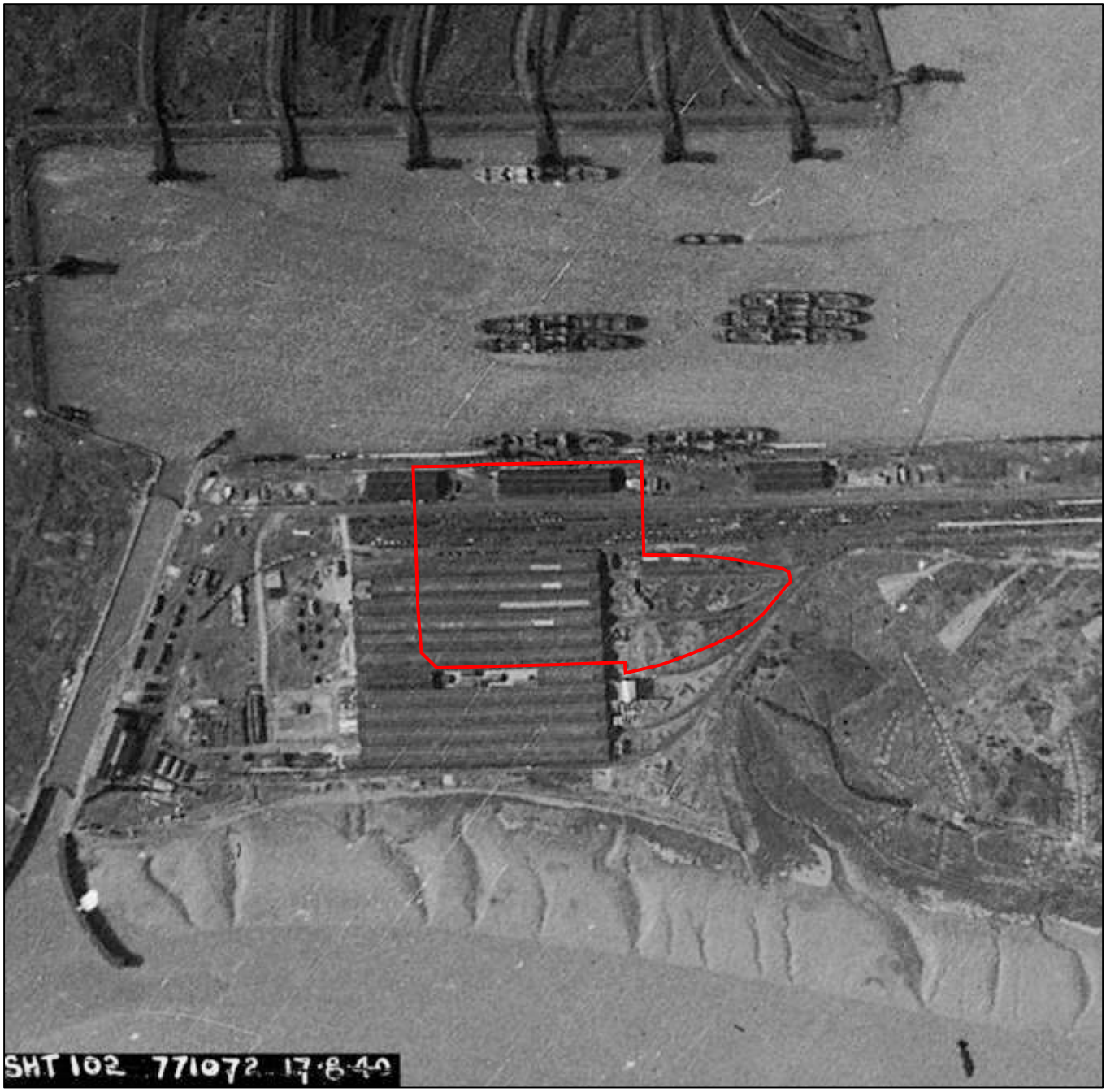

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Approximate site boundary

N

Project: Proposed Cemminerals Facility, South Docks, Newport

Ref: DA10337b-00

Source: National Monuments Record Office (Historic England)

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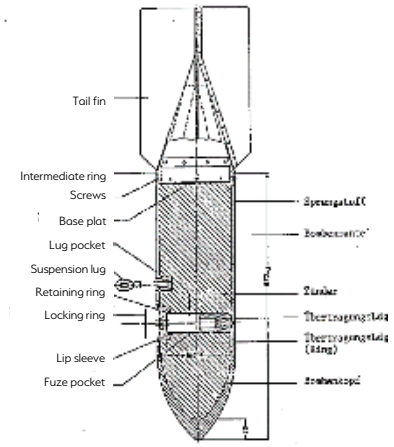
SC 50kg High Explosive Bomb

Bomb Weight	40-54kg (88-119lb)
Explosive Weight	25kg (55lb)
Fuze Type	Impact fuze/electro-mechanical time delay fuze
Bomb Dimensions	1,090 x 280mm (42.9 x 11.0in)
Body Diameter	200mm (7.87in)
Use	Against lightly damageable materials, hangars, railway rolling stock, ammunition depots, light bridges and buildings up to three stories.
Remarks	The smallest and most common conventional German bomb. Nearly 70% of bombs dropped on the UK were 50kg.

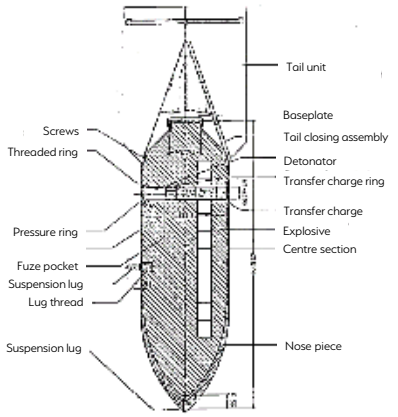






SC 250kg High Explosive Bomb

Bomb Weight	245-256kg (540-564lb)
Explosive Weight	125-130kg (276-287lb)
Fuze Type	Electrical impact/mechanical time delay fuze
Bomb Dimensions	1640 x 512mm (64.57 x 20.16in)
Body Diameter	368mm (14.5in)
Use	Against railway installations, embankments, flyovers, underpasses, large buildings and below-ground installations.
Remarks	It could be carried by almost all German bomber aircraft and was used to notable effect by the Junkers Ju-87 Stuka (*Sturzkampfflugzeug*, or dive-bomber).

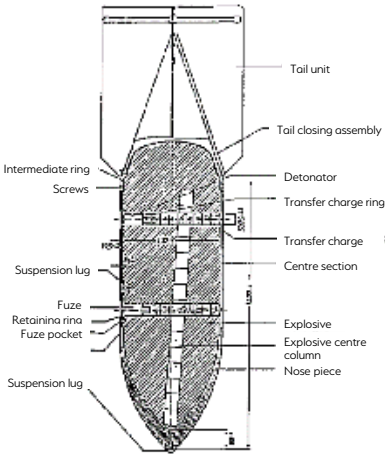




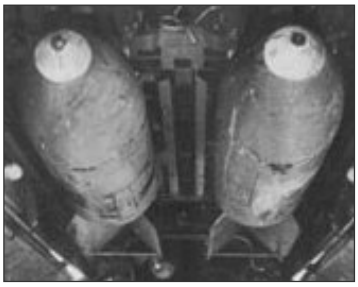


SC 500kg High Explosive Bomb

Bomb Weight	480-520kg (1,058-1,146lb)
Explosive Weight	250-260kg (551-573lb)
Fuze Type	Electrical impact/mechanical time delay fuze
Bomb Dimensions	1957 x 640mm (77 x 25.2in)
Body Diameter	470mm (18.5in)
Use	Against fixed airfield installations, hangars, assembly halls, flyovers, underpasses, high-rise buildings and below-ground installations.
Remarks	40/60 or 50/50 Amatol TNT, Trialene. Bombs recovered with Trialen filling have cylindrical paper-wrapped pellets, 1-15/16in. in length and diameter.







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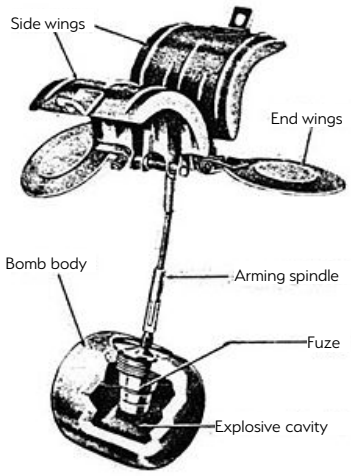
SD2 Anti-Personnel 'Butterfly Bomb'

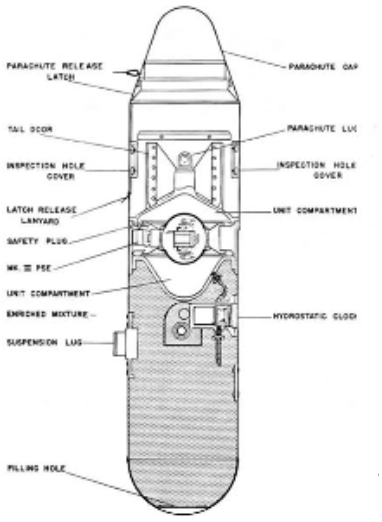
Bomb Weight	Approx. 2kg (4.41lb)
Explosive Weight	Approx. 7.5oz (225 grams) of Amatol surrounded by a layer of bituminous composition.
Fuze Type	41 fuze (time) , 67 fuze (clockwork time delay) or 70 fuze (anti-handling device)
Body Diameter	3in (7.62 cm) diameter, 3.1in (7.874) long
Use	Designed as an anti-personnel/fragmentation weapon. They were delivered by air, being dropped in containers of 23-144 sub-munitions that opened at a predetermined height, thus scattering the bombs.
Remarks	Quite rare. First used against Ipswich in 1940, but were also dropped on Kingston upon Hull, Grimsby and Cleethorpes in June 1943, amongst various other targets in UK. As the bombs fell the outer case flicked open via springs which caused four light metal drogues with a protruding 5 inch steel cable to deploy in the form of a parachute & wind vane, which armed the device as it span.

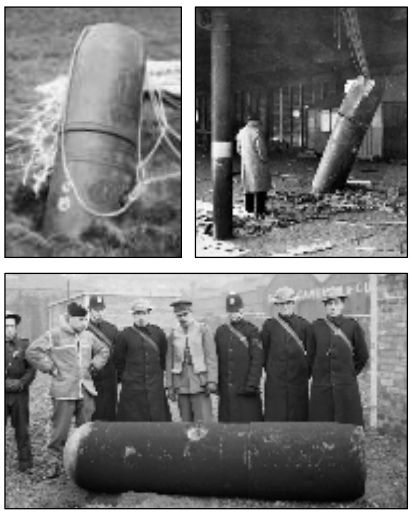




Parachute Mine (Luftmine B / LMB)

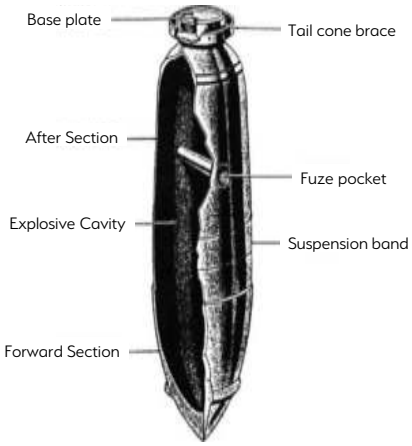
Bomb Weight	Approx. 990kg (2176lb)
Explosive Weight	Approx. 705kg (1,554lb)
Fuze Type	Impact/time delay/hydrostatic pressure fuze
Dimensions	2.64m x 0.64m (3.04m with parachute housing)
Use	Against civilian, military and industrial targets. Used as blast bombs and designed to detonate above ground level to maximise damage to a wider area.
Remarks	Deployed a parachute when dropped in order to control its descent. Had the potential to cause extensive damage within a 100m radius.





SC 1000kg High Explosive Bomb

Bomb Weight	Approx. 993-1027kg (2,189-2,264lb)
Explosive Weight	Approx. 530-620kg (1168-1367lb)
Fuze Type	Electrical impact/mechanical time delay fuze.
Filling	Mixture of 40% amatol and 60% TNT, but when used as an anti-shipping bomb it was filled with Trialen 105, a mixture of 15% RDX, 70% TNT and 15% aluminium powder.
Bomb Dimensions	2800 x 654mm (110 x 25.8in)
Body Diameter	654mm (18.5in)
Use	SC-type bombs were General Purpose Bombs used primarily for general demolition work. Constructed of parallel walls with comparatively heavy noses, they are usually of three-piece welded construction.





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Project: Proposed Cemminerals Facility, South Docks, Newport

Ref: DA10337b-00

Source: Various sources

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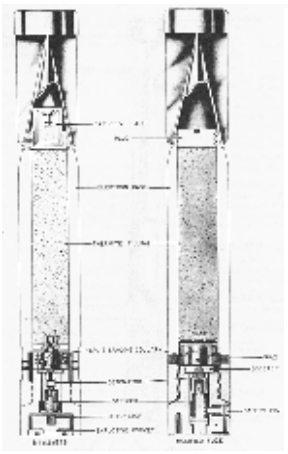
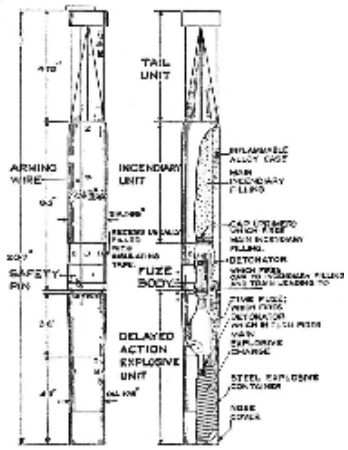
1kg Incendiary Bomb

Bomb Weight	Approx. 1.0 - 1.3kg (2.2 and 2.9lb)
Explosive Weight	Approx. 680g (1.5lb) Thermite 8-15gm Explosive Nitropenta
Fuze Type	Impact fuze
Bomb Dimensions	350 x 50mm (13.8 x 1.97in)
Body Diameter	50mm (1.97in)
Use	As incendiary – dropped in clusters on towns and industrial complexes.
Remarks	Magnesium alloy case. Sometimes fitted with high explosive charge. The body is a cylindrical alloy casting threaded internally at the nose to receive the fuze holder and fuze.

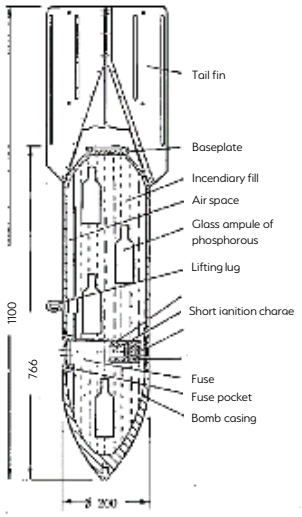


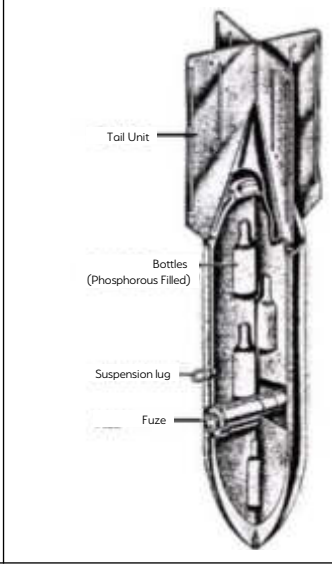




C50 A Incendiary Bomb

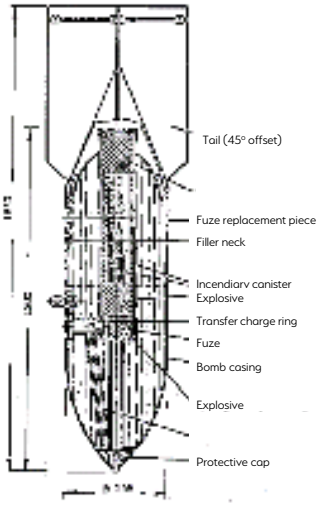
Bomb Weight	Approx. 41kg (90.4lb)
Explosive Weight	Approx. 0.03kg (0.066lb)
Incendiary Filling	12kg (25.5lb) liquid filling with phosphor igniters in glass phials. Benzine 85%; Phosphorus 4%; Pure Rubber 10%
Fuze Type	Electrical impact fuze
Bomb Dimensions	1,100 x 280mm (43.2 x 8in)
Use	Against any targets where an incendiary effect is required.
Remarks	Early fill was a phosphorous/carbon disulphide incendiary mixture.





Flam C-250 Oil Bomb

Bomb Weight	480-520kg (1,058-1,146lb)
Explosive Weight	250-260kg (551-573lb)
Fuze Type	Electrical impact/mechanical time delay fuze
Bomb Dimensions	1957 x 640mm (77 x 25.2in)
Body Diameter	470mm (18.5in)
Use	Against fixed airfield installations, hangars, assembly halls, flyovers, underpasses, high-rise buildings and below-ground installations.
Remarks	40/60 or 50/50 Amatol TNT, Trialene. Bombs recovered with Trialen filling have cylindrical paper-wrapped pellets, 1-15/16in. in length and diameter.





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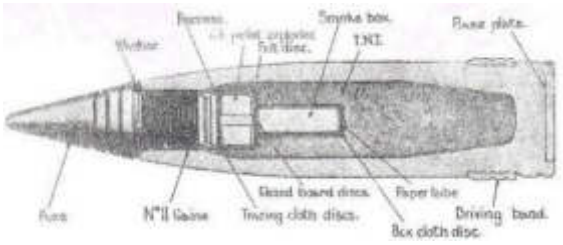
3.7 Inch QF Anti-Aircraft Projectile

Projectile Weight	28lb (12.6 kg)
Explosive Weight	2.52lbs
Fuze Type	Mechanical Time Fuze
Dimensions	3.7in x 14.7in (94mm x 360mm)
Rate of Fire	10 to 20 rounds per minute
Use	The 3.7in AA Mks 1-3 were the standard Heavy Anti-Aircraft guns of the British Army and were commonly used on the Home Front.
Ceiling	30,000ft to 59,000ft





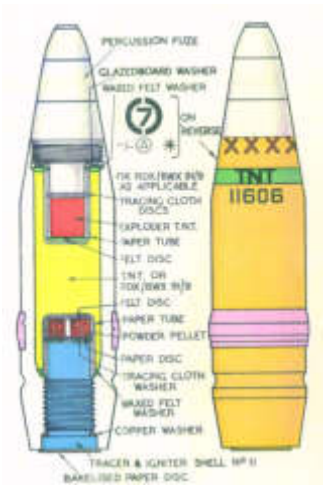


40mm Bofors Projectile

Projectile Weight	1.96lb (0.86kg)
Explosive Weight	300g (0.6lb)
Fuze Type	Impact Fuze
Rate of Fire	120 rounds per minute
Projectile Dimensions	40 x 180mm
Ceiling	23,000ft (7000m)
Remarks	Light quick fire high explosive anti-aircraft projectile. Each projectile fitted with small tracer element. If no target hit, shell would explode when tracer burnt out. Designed to engage aircraft flying below 2,000ft.



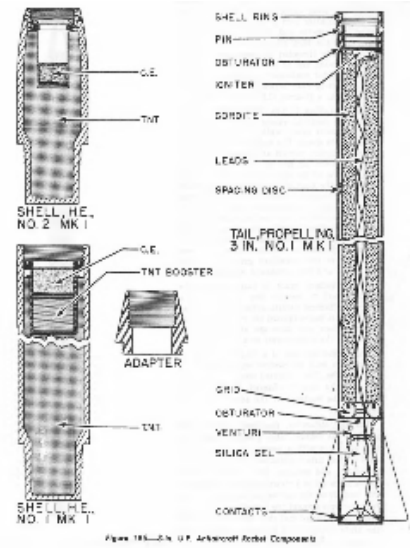




3in Unrotated Projectile (UP) Anti-Aircraft Rocket ("Z" Battery)

HE Projectile Weight	3.4kg (7.6lb)
Explosive Weight	0.96kg (2.13lb)
Filling	High Explosive – TNT. Fitted with aerial burst fuzing
Dimensions of projectile	236 x 83mm (9.29 x 3.25in)
Remarks	As a short range rocket-firing anti-aircraft weapon developed for the Royal Navy. It was used extensively by British ships during the early days of World War II. The UP was also used in ground-based single and 128-round launchers known as Z Batteries. Shell consists of a steel cylinder reduced in diameter at the base and threaded externally to screw into the shell ring of the rocket motor.





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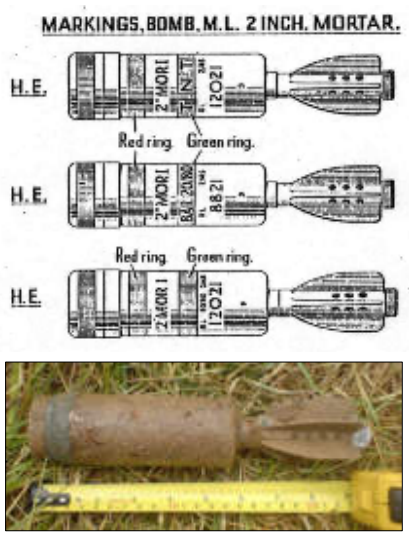
2 inch Mortar High Explosive

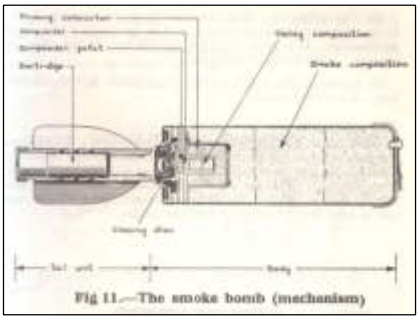
Weight	Approx. 1.02kg (2.25lb)
Maximum Range	460m (500yards)
Filling	200g RDX/TNT
Dimensions	51 x 290mm (2in x 11.4 in)
Fuze Type	An impact fuze which detonates the fuze booster charge and in turn the high explosive charge.
Use	It had greater range and firepower over hand and rifle grenades, and was used to attack targets behind cover with high explosive rounds.
Identification	HE has a rounded edge to a flat back. Can either be a black body colour with red and yellow band or dark green with yellow band. Brass cap on top. Practice will have hole all the way through the top.





2 inch Mortar Smoke

Weight	Approx. 910g (2lb)
Maximum Range	460m (500yards)
Filling	White phosphorus and smoke fill
Dimensions	51 x 290mm (2in x 11.4 in)
Fuze Type	An impact fuze which initiates a bursting charge. This ruptures the mortar bomb's body and disperses the phosphorus filler.
Identification	Smoke mortars have a recess and emission holes. May still see light green body paint. Look for stained ground around munition.
Use	As a screening device for unit movement or to impair enemy field of vision.

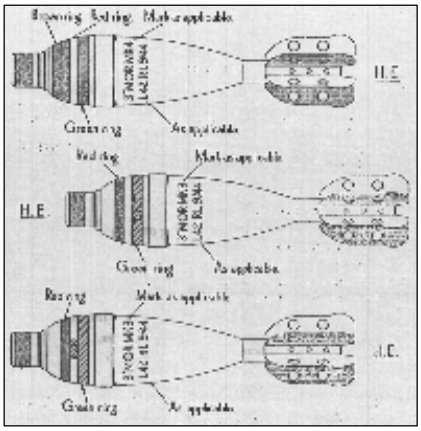




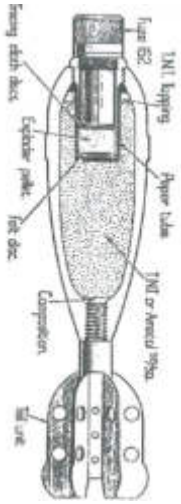


3 inch Mortar High Explosive

Weight	Approx. 4.5kg (10lb)
Maximum Range	1,460 (Mk1) – 2,560m (Mk2) (1,600 – 2,800yds)
Dimensions	81mm (3in)
Filling	Amatol
Firing Mechanism	Drop, fixed striker
Remarks	Fin-stabilised bomb fired by means of a charge consisting of a primary cartridge in the tail and four secondary cartridges.
Identification	An old style mortar. Often no way of telling if HE or practice, so treat as HE.







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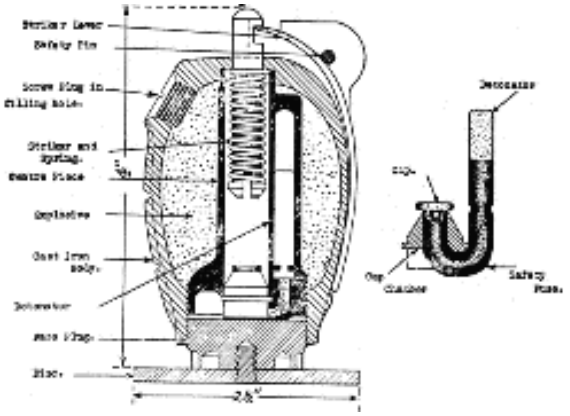
No. 36 'Mills' Grenade

Weight	Approx. 765g filled (1lb 11.25oz)
Explosive Weight	71g (2oz) filling.
Fuze Type	4-7 second delay hand-throwing fuze. No. 6 Detonator
Dimensions	95 x 61mm (4 x 2.4in)
Use	Fragmentation explosive at approx. 30m range 100m range of damage.
Remarks	First introduced in 1915, its classic grooved, cast-iron 'pineapple' design was designed to provide uniform fragmentation. The detonator is inserted before use after removing the base plug.

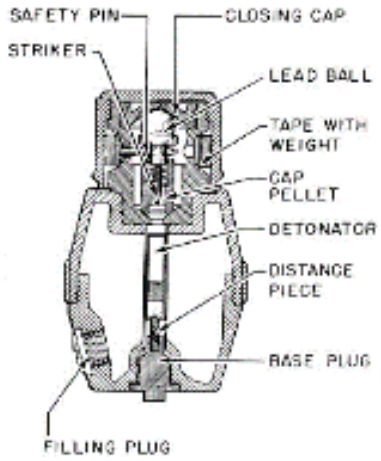




No. 69 Grenade

Weight	Approx. 383g (13.5oz)
Fill Weight	93g (3.25 oz) of either Amatol, Baratol or Lyddite
Fuze Type	'All-ways' fuze. Comprised of a safety cap, a weighted streamer attached to a steel ball bearing and a safety bolt designed to detonate from any point of impact.
Dimensions	115 x 60mm (4.5 x 2 .4 in)
Use	A blast grenade for use as an offensive weapon. Detonator was inserted before use.
Remarks	Introduced December 1940 and made from the plastic Bakelite as opposed to conventional metals. Detection is difficult due to this low metal content.

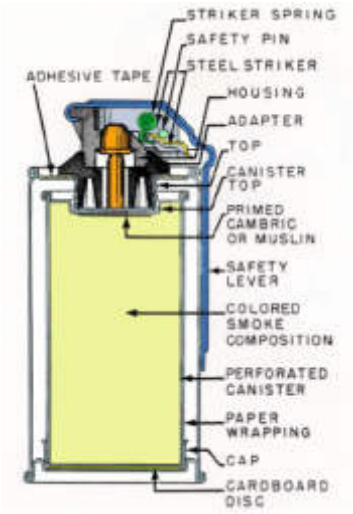




No. 83 Smoke Grenade

Weight	Approx. 680g (1.5lb)
Explosive Weight	Approx. 170-200g. (6-7 oz)
Fuze Type	Originally used a friction system using a match head composition. Later developed to a striker lever ignition system.
Dimensions	Approx. 62 x 140mm (2.44 x 5.5 in)
Use	Use as a target or landing zone marking device and as a screening method for troop / unit movement.
Remarks	This basic design stayed relatively unchanged up to the 1980's. The letters CCC were often etched into the body of the grenade in the colour of the smoke.





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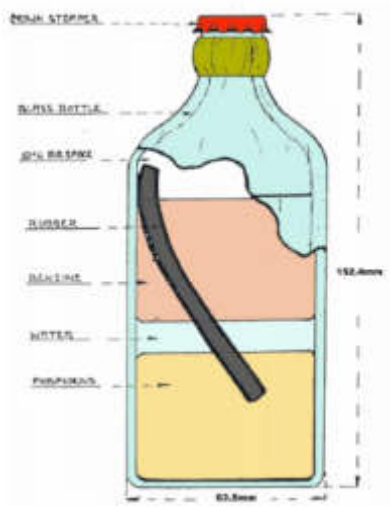
No. 76 Self Igniting Phosphorous (SIP) Grenade

Weight	Approx. 1lb 3oz
Filling	White Phosphorous and Benzene
Design	The filling was contained in a ½ pint sized glass bottle with water and a strip of rubber. Over time the rubber dissolved to create a sticky which would self ignite when the bottle broke.
Use	Originally intended as an anti-tank incendiary weapon deployed by hand. Designed to be produced cheaply without consuming materials needed to produce armaments on the front line.
Remarks	The Home Guard hid caches of these grenades during the war. Not all locations were officially recorded and some caches were lost and encountered post-war. In all cases, the grenades are still found to be dangerous.



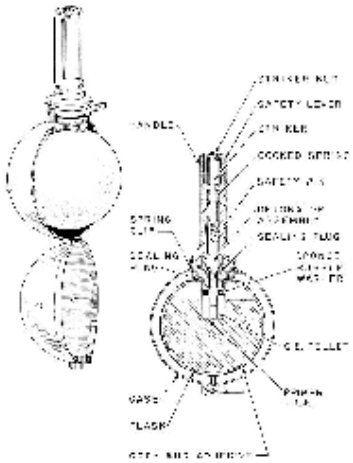


No. 74 Grenade ("Sticky Bomb") Mk1

Weight	Approx. 1.1kg (2.25lb)
Filling	Approx. 600g Nobel's No.283 (Nitro-glycerine) (1.33lb)
Design	A glass ball on the end of a Bakelite (plastic) handle. The inside of the ball would contain the explosive filling and the outside a very sticky adhesive coating.
Use	An anti-tank grenade primarily issued to the home guard. It required the user to come in very close proximity of the target and smash the glass explosive container against it.
Remarks	Timer fuze was located in the handle. This would explode after 3-6 secs.





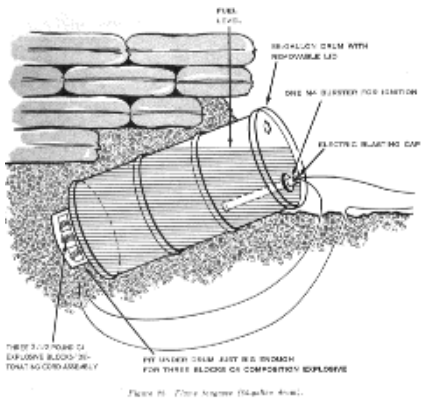


Flame Fougasse Bomb

Weight	Various
Filling	Initially a mixture of 40% petrol and 60% gas. Ammonal provided the propellant charge.
Design	Usually constructed from a 40-gallon drum dug into a roadside and camouflaged.
Use	As an improvised anti-tank bomb. When triggered the Fougasse could project a beam of burning sticky fuel in a fixed direction from up to 3m (10ft) wide and 27m (30yards) long.
Remarks	A highly unorthodox weapon designed by the Petroleum Warfare Department to address a critical lack of weapons in 1940. 50,000 are estimated to have been distributed around the UK.







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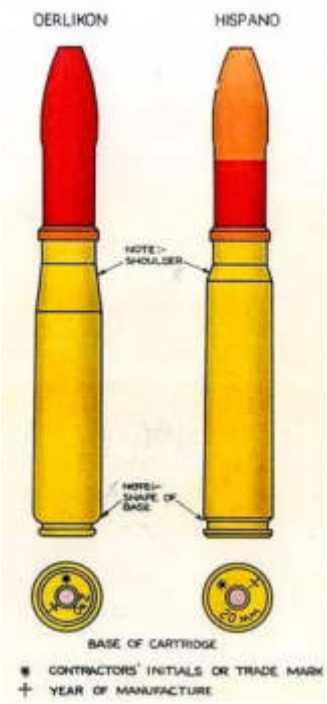
Common WWII-era Aircraft Mounted Gun Ammunition





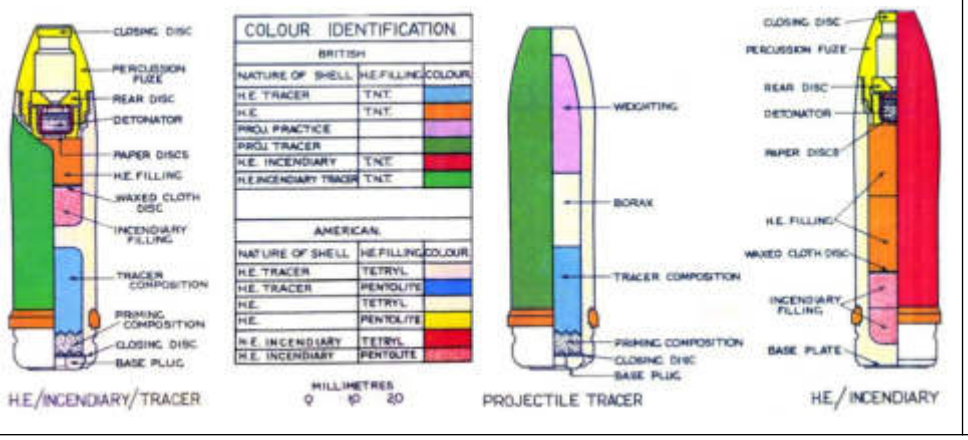
.303 British Rifle Ammunition

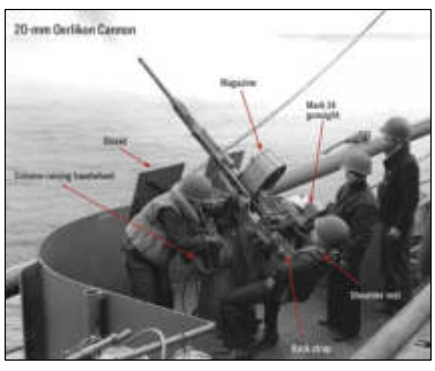
Bullet Diameter	7.92mm
Case length	56.44mm
Overall length	78.11mm
Type	Rifle Ammunition
Propellant	Originally black powder. Later Cordite followed by Nitrocellulose
Remarks	First produced in 1889 and still in use today, the .303inch cartridge has progressed through ten 'marks' which eventually extended to a total of around 26 variations.





20mm Oerlikon Cannon Rounds





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APPENDIX 10 UTILITIES SURVEY

Site Report

Client:

Project:

BH Clearance Works.
Alexandra Docks
Newport

Date of Survey: 17/18/23.07.2024

Weather Conditions: Sunny & Dry

Site Location



Utilimap Site Operatives

MM / SW / RN

Objectives

Carry out BH Clearance Works prior to drilling and ground investigations.

Site Boundary



BH Clearance works

The site was found to be relatively clear, some areas were in amongst operating plant and large metal stockpiles. Works were undertaken based around provided coordinates, and then adjusted to new coorindates, both lists are below.

Due to surface water, stock piles and access issues WS5, WS8, WS14, CPT1, CPT2, CPT3, CPT4, CPT5, CPT6, CPT8 & LCP2 all had to be moved. New coordinates are listted below.

CPT7 was changed to LCP1.

Supplied & New coordinates.

Name	Issued X	Issued Y	New X	New Y	New Z
CPT1	332020	184463	332009.350	184462.707	8.058
CPT2	332040	184477	332038.239	184499.260	8.501
CPT3	331891	184417	331884.756	184423.656	8.936
CPT4	332048	184458	332003.994	184433.483	7.692
CPT5	332039	184436	332011.833	184422.106	7.801
CPT6	331828	184372	331851.458	184396.104	9.025
CPT7	332048	184423	332047.903	184422.976	7.993
CPT8	332067	184437	332069.651	184433.976	8.332
WS1	331769	184415	331790.559	184437.721	8.755
WS2	331850	184473	331855.115	184477.654	8.766
WS3	331941	184540	331948.842	184544.795	8.791
WS4	331830	184425	331829.441	184424.824	8.751
WS5	331887	184415	331887.530	184420.325	9.015
WS6	331925	184486	331925.025	184484.221	8.687
WS7	331966	184473	331965.557	184473.610	8.975
WS8	331845	184345	331899.311	184295.432	8.527
WS9	331896	184342	331897.833	184337.183	7.913
WS10	331920	184401	331915.029	184399.768	8.273
WS11	331949	184341	331941.936	184331.909	8.019
WS12	331979	184411	331984.803	184419.866	7.870
WS13	332051	184405	332051.267	184404.897	8.662
WS14	332008	184474	332013.117	184468.464	8.106
WS15	332089	184506	332088.926	184505.934	8.294
LCP1	332048	184453	NOW CPT7	NOW CPT7	NOW CPT7
LCP2	331832	184374	331849.612	184399.357	8.956

WS1





WS2





WS3





WS4





WS5





WS6





WS7





WS8





WS9





WS10





WS11





WS12





WS13





WS14





WS15





CPT1





CPT2





CPT3





CPT4





CPT5





CPT6





CPT7





CPT8





LCP2





General Site Photos





















APPENDIX 11 CPT REPORT

IN SITU
SITE INVESTIGATION



STATIC CONE PENETRATION TEST

FACTUAL REPORT

CLIENT: ABO nv

PROJECT: ABO – Alexandra Docks Newport

Project	ABO – Alaxandra Docks Newport
Project No.	1240354
Client	ABO nv
Address	Derbystraat 55, 9051 Gent, Belgium

Attention: Jan De Vos

Dear Jan,

We have pleasure in providing a digital copy of our report and data in AGS format for the above project.

We hope that you are satisfied with the performance of our staff, equipment and reporting on this project. If you should have any queries about any aspect of the works carried out, please do not hesitate to contact us. We look forward to being of service to you in the future.

Yours faithfully,
In Situ Site Investigation Limited

Darren Ward
Director

Report Issue

Issue	Date	Prepared	Sign	Checked	Sign	Approved	Sign
01	14/08/2024	Chloe Donovan		Darren Ward		Darren Ward	

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1.0 INTRODUCTION

In Situ Site Investigation Limited (In Situ) was engaged in a geotechnical site investigation at Alexandra Docks Newport at the request of ABO nv. The site investigation consisted of completing 8 Static Piezocone Penetration Tests (CPTU), to provide information on the soil conditions and derived geotechnical parameters at:

Alexandra Docks,
South Docks
Newport,
Wales,
NP20 2WE - NP20 2NQ

All test locations were provided by the client. A site map is included in the end of Appendix A of this report (if provided by the client). The tests were stopped when they reached the target depth as per the client's technical specifications or for other technical reasons, as detailed in the *Project Summary Table* in *Appendix A.1* and on each CPTU log included in Appendix B of this report.

The fieldwork was carried out from 29th July 2024 to 30th July 2024 as per the client's request.

The work on site and the final factual reporting have been undertaken in accordance with the international technical standard *ISO 22476-1:2022(E)*.

2.0 FIELDWORK

2.1 CONE PENETRATION TESTS

The fieldwork activity is summarised in Table 2.1.

Table 2.1 Fieldwork Summary	
CPT Operator/s	Dave Roberts
Date Started	29th July 2024
Date Finished	30th July 2024
In Situ S.I. Project Manager	Darren Ward
Main Contractor's Site Manager	Jan De Vos

2.1.1 Rig Information

Details of CPTU rig used in this project are shown in Table 2.2. Full data sheet for the rig is presented in *Appendix A.2*.

Table 2.2 Rig Summary	
Rig Name	**Rig Description**
CPT017	20 Tonne Track Mounted CPT Rig

2.1.2 CPTU Cone

Details of electric CPTU cone (Type TE2) used in this project conforming to the requirements of Application Class 2 of *ISO 22476-1:2022*, are shown in Table 2.3.

Table 2.3 Cone Summary		
Number	**Cross-section area**	**Filter position**
S15-CFIP.2136	15cm^2	u_2

A full datasheet of the cone used is shown in *Appendix A.3*.

The cone's measured parameters are shown in Table 2.4.

Table 2.4 Completed Fieldwork Summary
8 CPTU to a maximum depth of 18.37m. Each test measured Cone Resistance, q_c, Sleeve Friction, f_s, Porewater Pressure in the shoulder position, u_2, Inclination in X and Y axes.
Provision of factual report with estimated soil type, derived geotechnical parameters & AGS data file.

2.1.3 CPTU Cone Calibration

The cone resistance and sleeve friction are recorded by calibrated load cells in the cone. The CPTU load cells and pressure transducers are regularly calibrated in line with *ISO 22476-1:2022(E)* standard by the cone manufacturer. The cone calibration certificate for the cone used at this site are presented in *Appendix A.4*.

2.1.4 CPTU Cone Saturation

The pore water pressure is recorded using a calibrated pressure transducer located in the piezocone. To ensure pore water pressure measurements are not affected by the presence of air in the measuring transducer, a de-airing procedure is carried out prior to each test. The cone and filter are saturated using a glycerine fluid with a viscosity of 10,000 CST.

2.1.5 Test Procedure

The tests are carried out in accordance with the *International Standard for Electrical Cone and Piezocone Penetration Test ISO 22476-1:2022(E)*.

The final depths of the tests were determined by either completion to the specified test depth or when the maximal safe capacity of the equipment was reached. A schedule of the tests performed is shown in *Appendix A.1*, which has been compiled from the operators' daily progress reports.

The data is transmitted from the digital CPTU through an umbilical cable that runs through the push rods to the data acquisition system. Results are displayed instantaneously on the computer logging screen. The results are recorded on the computer hard disc.

The rate of penetration is kept constant at 20 mm/s ± 5 mm/s except when penetrating very dense or hard strata. Before each test is carried out zero values are taken of the cone to check if it is within calibration. At the end of each test, zero values are taken again to see if there has been any drift during the test. These values are inspected during the post processing stage. This is a quality check on the data and the testing procedure. Individual test zero values are shown on their corresponding test results in *Appendix B*.

2.1.6 In Situ Pore Pressure (u_0)

The in situ or hydrostatic pore pressure is required for the calculation of several derived parameters included in this report. For this report, the groundwater level is assumed at 0.5m below ground surface, for calculation purposes. The in situ pore pressure, u_0 values are presented on the pore pressure plot, on *CPT Log 01,* which is included in *Appendix B*.

2.2 POSITIONING

Positioning and surveying of all investigated locations was the responsibility of the client.

3.0 CONE PENETRATION MEASURED PARAMETERS

All measured parameters of tests carried with the CPTU cone are shown in *Appendix B* and all the information about data processing and results are given in sections *3.1*, *3.2* and *3.3*.

3.1 DATA PROCESSING

The measured parameters, cone end resistance, q_c, sleeve friction, f_s, porewater pressure measurements with filter in shoulder position, u_2 and inclination for *x* and *y* axis, I_x, I_y, were recorded for every *10 mm* of penetration keeping a constant speed of *20 mm/s ± 5 mm/s*, which may slightly change when the cone is penetrating hard strata.

The measured data from the site works is processed and presented using specialised CPT software. The interpretations on the CPTU results were carried out following the recommendations of *ISO 22476-1:2022(E)*, *Lunne et al. (1997)* and *Robertson (2015)*. Measured parameters, mentioned in *Sections 3.2* and *3.3*, were used to derive all the geotechnical parameters, which are presented in *Chapter 4.0*. The soil behaviour type method used on this report is *Robertson et al. (1986)*, shown in *Figure 3.2*.

3.1.1 Zero Measurements

Before and after each CPTU test, zero measurements are recorded for each channel of the cone. The zero measurements are presented on the logs in *Appendix B*. This is a routine quality check carried out on site.

3.2 MEASURED PARAMETERS

3.2.1 Cone Resistance (q_c)

Cone resistance, q_c, is measured as the total force acting on the cone, divided by the projected area of the cone. The results are presented in *MPa*, on *CPT Log 01*, in *Appendix B*, scale *0-20 MPa* with a minor scale printing on the same graph at *0-4 MPa*.

3.2.2 Sleeve Friction (f_s)

Sleeve friction, f_s, is measured as the total frictional force acting on the friction sleeve divided by its surface area. The results are presented in *kPa*, on *CPT Log 01*, in *Appendix B*, using a scale of *0-500 kPa*.

3.2.3 Porewater pressure (u_2)

The pore pressure, u_2, is measured during the test. If the material is free draining and saturation is maintained it will normally measure hydrostatic pore pressure. In materials that are not free draining, it will record the total pore pressure (hydrostatic plus any excess pore pressures generated) created by the cone penetration through this material.

The filter element can be mounted in one of three positions. For all tests carried out in this project the filter was mounted in the u_2 position (see *Figure 3.1*).

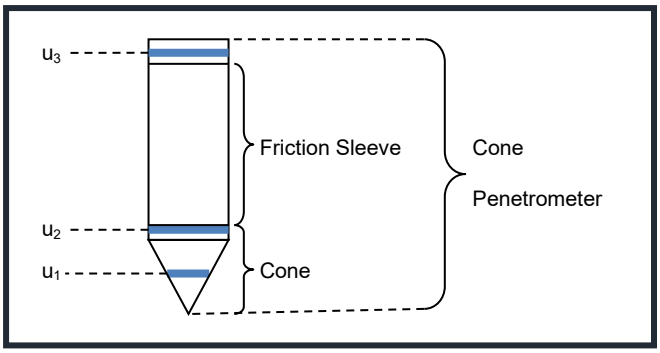

Figure 3.1: *Diagram showing pore pressure filter locations (after Lunne et al., 1997)*

3.2.4 Inclination (I_x, I_y)

The CPT rig was set up to obtain a thrust direction as near as possible to vertical. The CPTU cones have inclinometers incorporated to measure the non-verticality of the test. For test depths less than *15 m*, significant non-verticality is unusual, provided the initial thrust direction is vertical.

3.3 ESTIMATED SOIL BEHAVIOUR TYPE

3.3.1 Friction Ratio (R_f)

The friction ratio, R_f is the ratio between the sleeve friction and the cone resistance (Lunne *et al.,* 1997).

$$Fricton\ Ratio\ (R_f) = \left(\frac{Sleeve\ Friction\ (f_s)}{Cone\ Resistance\ (q_c)}\right) \times 100$$

3.3.2 Estimated Soil Behaviour Type (SBT)

The estimation of soil behaviour type, *SBT*, using measurements of cone resistance and sleeve friction is based upon the variations of the friction ratio and cone resistance. The friction

ratio varies depending upon whether the soil is cohesive or granular. The cone resistance varies depending on the strength and densities of the soil.

The interpretation used in this report is *Robertson et al. (1986)*, which is shown in Figure 3.2. The results are presented on *CPT Log 01*, in *Appendix B*.

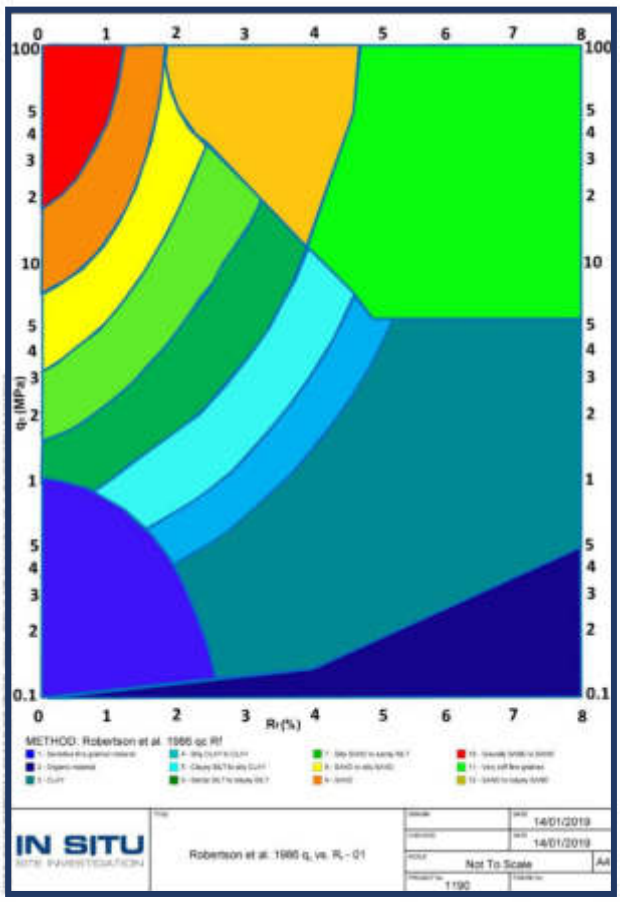

Figure 3.2: *Robertson et al., 1986 soil behaviour type chart.*

3.3.3 Pore Pressure Ratio (B_q)

Pore pressure ratio, B_q is the ratio between the measured pore pressure generated during penetration and the corrected cone resistance minus the total overburden stress.

Pore pressure ratio as defined by *Senneset and Janbu (1985)* is defined as:

$$B_q = \frac{u_2 - u_0}{q_t - \sigma_{vo}}$$

where

u_2	is pore pressure measured between the cone and the friction sleeve
u_0	is equilibrium pore pressure
σ_{vo}	is total overburden stress
q_t	is cone resistance corrected for unequal end area effects

3.4 APPLIED CORRECTIONS

3.4.1 Corrected Cone Resistance (q_t)

For each penetration test, the measured cone resistance, q_c, can be corrected for the ‘‘unequal area effect’’ due to the influence of the ambient pore water pressure acting on the cone.

The correction has been applied using the following equation by Lunne et *al.,* 1997:

$$q_t = q_c + [u_2.(1 - \alpha)]$$

where

α is the cone area ratio

The cone area ratio used for this project is stated on both the cone calibration certificate and the data footer. This value is geometrically measured.

3.4.2 Depth Correction

All tests in the report have been corrected for depth difference caused by inclination. This has been calculated using the method described in *ISO 22476-1:2022*.

To calculate the corrected depth the following formula is used:

$$z = \int_0^l C_{inc} \cdot dl$$

where

z is penetration depth, in *m*
l is penetration length, in *m*
C_{inc} is correction factor for the effect of the inclination of the CPTU relative to the vertical axis.

The equation for calculating the correction factor for the influence of the inclination for a bi-axial inclinometer is:

$$C_{inc} = \frac{1}{\sqrt{(1 + tan^2\beta_1 + tan^2\beta_2}}$$

where

β_1 is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane, in degrees
β_2 is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane that is perpendicular to the plane of angle β_1, in degrees

4.0 GEOTECHNICAL DERIVED PARAMETERS

A number of empirical correlations can be used to derive geotechnical parameters from CPTU data. This report includes only the parameters which are described in this chapter. The results of all correlations used to obtain the geotechnical derived parameters are presented on *CPT Log 02* and *CPT Log 03* in *Appendix B*.

Please, note that each empirical correlation is derived for a certain type of soil, and may not be appropriate for all the soil types encountered on this project.

4.1 SOIL BEHAVIOUR TYPE INDEX (I_c)

The soil behaviour type index, I_c, was derived by *Jefferies and Davies (1991)*, and was created to simplify the application of CPTU SBT chart shown in *Chapter 3*, *Figure 3.2*. This approach has been modified for use with the *Robertson (1990)* normalised CPT soil classification chart, *Figure 4.1*. The normalised cone parameters Q_t and F_r (for definitions see *Appendix A5* Symbol List) can be combined into one Soil Behaviour Type Index, I_c, *(Lunne et al., 1997)*.

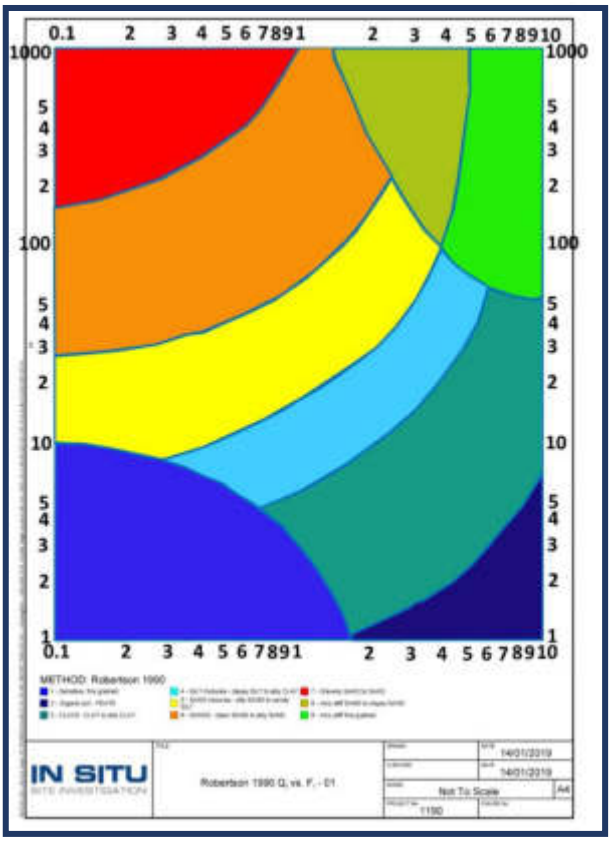

Figure 4.1: *Robertson 1990 soil behaviour type chart.*

The soil behaviour type index, I_c, can then be defined using *Robertson (2010)* formula, given below:

$$I_c = ((3.47 - logQ_t)^2 + (logF_r + 1.22)^2)^{0.5}$$

where

Q_t is the normalized cone resistance which represents the simple normalization with a stress exponent (n) of *1.0*, which applies well to clay-like soils

F_R is the normalized friction ratio, in *%*

The boundaries of soil behaviour type are then given in terms of the index, I_c, presented in *Table 4.1* below.

The soils behaviour type index does not apply to zones *1*, *8* and *9*. The profiles of I_c provide a simple guide to the continuous variation of soil behaviour type in a given soil profile based on CPTU results, with a reliability greater than *80%* compared with soil samples *(Robertson, 2015).*

Zone	Soil Behaviour Type	I_c
1	Sensitive fine grained	N/A
2	Organic Soils – clay	>3.6
3	Clays – silty clay to clay	2.95 – 3.6
4	Silt mixtures – clayey silt to silty clay	2.60 – 2.95
5	Sand mixtures – silty sand to sandy silt	2.05 – 2.6
6	Sands – clean sand to silty sand	1.31 – 2.05
7	Gravelly sand to dense sand	<1.31
8	Very stiff sand to clayey sand*	N/A
9	Very stiff fine grained *	N/A

** Heavily over consolidated or cemented*

Table 4.1: *Normalized CPTU Soil Behaviour Type (SBT_n) Index values, I_c.(Robertson, 2010)*

4.2 N VALUE OF STANDARD PENETRATION TEST (SPT) (N_{60})

The derived *N* value of *SPT,* N_{60}, is strongly and directly related to the cone resistance, q_c.

In this report the N_{60} value is derived using the following correlations, developed by *Robertson and Wride (1998)*, *Jefferies and Davies (1998)* and Robertson (2012):

1) *Robertson & Wride (1998)*

$$N_{60} = \frac{q_c}{8.5 \cdot p_a \left(1 - \frac{I_C}{4.6}\right)}$$

2) *Jefferies and Davies (1993)*

$$N_{60} = \frac{q_c}{0.85 \cdot \left(1 - \frac{I_C}{4.75}\right)}$$

3) *Robertson (2012)*

$$N_{60} = \frac{\frac{q_c}{p_a}}{10^{1.1268 - 0.2817 I_C}}$$

where

q_c	is the cone resistance
p_a	is the atmospheric pressure equal to *100 kPa*
I_c	is the soil behaviour type index calculated as given in *section 4.1*

It is suggested that these methods provide a better estimation of the N_{60} value than the actual measured *N*, due to the poor repeatability of SPT test. However, in fine grained soil with high sensitivity these methods may overestimate N_{60} *(Jefferies and Davies, 1991).* The third method suggested by *Robertson (2012)* provides improved estimates of N_{60} for insensitive clays.

4.3 RELATIVE DENSITY (D_r)

Relative density, D_r, is an intermediate parameter for coarse grained soils, widely used to describe sand deposits. All the research on deriving the relative density from CPTU tests results are carried out for ***clean predominantly quartz sands***. The studies have shown that CPTU resistance in granular soils is controlled by sand relative density, in situ effective stresses and compressibility. The more compressible sands tend to give lower penetration resistance for a given relative density then less compressible sands.

In this report relative density is calculated using the methods suggested by *Baldi et al., (1986)*, *Jamiolkowski et al., (2001)* and *Kulhawy and Mayne (1990)* as shown in the equations below:

1) Baldi et al., (1986)

$$D_r = \frac{1}{C_2} \cdot ln\left(\frac{q_c \cdot Wehr}{C_1 \cdot (\sigma'_{v0})^{0.55}}\right) \cdot 100$$

where

C_1 is a consolidation coefficient which is *157* for normally consolidated soils and *181* for over consolidated soils

C_2 is a consolidation coefficient which is *2.41* for normally consolidated soils and *2.46* for over consolidated soils

Wehr is a correction coefficient for calcareous soils

2) Jamiolkowski et al., (2001)

$$D_r = 100 \cdot \left[0.268 \cdot ln\left(\frac{q_t/\sigma_{atm}}{\sqrt{\sigma'_{v0}/\sigma_{atm}}}\right) + C_1\right]$$

where

C_1 is a compressibility coefficient which is *-0.675* for average compressible soils, ≤*1.0* for high compressible soils and carbonate or calcareous sands and ≥*-2.0* for low compressible soils

q_t is corrected cone resistance

σ_{atm} is the atmospheric pressure

3) Kulhawy and Mayne, (1990)

$$D_r = \left[\frac{q_{c1}}{305 \cdot C_1 \cdot OCR^{0.18} \cdot \left(1.2 + 0.05 \cdot log(t/100)\right)}\right]^{0.5} \cdot 100$$

where

q_{c1} is the cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula

$$q_{c1} = \frac{q_c}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

where

q_c is the cone resistance in *kPa*

σ'_{v0} is the initial vertical effective stress in *kPa*

C_1 is a compressibility coefficient which is *-0.91* for low compressible sands, *1.0* for medium compressible sands and *1.09* for high compressible sands

t is time in years

4.4 FRICTION ANGLE (φ')

Friction angle, *φ'*, is used to express the shear strength of uncemented, coarse grained soils. In this report friction angle is derived by the correlations of *Mayne and Campanella (2005)*, *Robertson and Campanella (1983)* and *Kulhawy and Mayne (1990)*.

1) Mayne and Campanella, (2005)

$$\varphi' = 29.5^0 \cdot B_q^{0.121} \cdot \left[0.256 + 0.336 \cdot B_q + logQ_t\right]$$

where

B_q is the pore pressure ratio, calculated as in Session 3.3

Q_t is the normalized cone resistance

2) Robertson and Campanella, (1983)

$$\varphi' = \tan^{-1}\left(0.1 + 0.38 \cdot log\left(\frac{q_t}{\sigma'_{v0}}\right)\right)$$

where

q_c is the cone resistance in *kPa*

σ'_{v0} is the initial vertical effective stress in *kPa*

3) Kulhawy and Mayne, (1990)

$$\varphi' = 17.6^0 + 11.0^0 \cdot log(q_{t1})$$

where

q_{t1} is the corrected cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula

$$q_{t1} = \frac{q_t}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

The method suggested by *Mayne and Campanella (2005)* will not provide reliable results for heavily over consolidated soils, fissured geomaterials and highly cemented or structures clays. This approach gives reliable results when pore pressure is positive and varies *0.1 < B_q < 1.0*. The correlation suggested by *Robertson and Campanella (1983)* estimates the peak friction angle for uncemented, unaged, moderately compressible, predominately quartz sands. For sands of higher compressibility, the method will tend to predict low friction angles. The method suggested by *Kulhawy and Mayne (1990)* is an alternate relationship for clean, rounded, uncemented, quartz sands.

4.5 FINES CONTENT (*FC*)

The fines content, *FC*, in this report is estimated using two different methods, one from *Robertson and Wride (1998)* and the other, *Suzuki et al. (1998)* as presented below:

1) Robertson and Wride (1998)

$$I_C < 1.26: FC = 0$$
$$1.26 \leq I_C \leq 3.5: FC(\%) = 1.75I_C^{3.25} - 3.7$$
$$3.5 < I_C: \ FC = 100\%$$

2) Suzuki et al. (1998)

$$FC(\%) = 2.8I_C^{2.6}$$

where

I_c is the soil behaviour type index, calculated as in section 4.1

4.6 UNDRAINED SHEAR STRENGTH (s_u)

Estimation of undrained shear strength, s_u, from CPTU tests using corrected cone resistance is carried out using the following correlation from *Lunne et al. (1981)*:

$$S_u = \frac{(q_t - \sigma_{v0})}{N_{kt}}$$

where

N_{kt} is the empirical cone factor, which varies from *10* (*6* for very soft sensitive fine grained soils) to *20*. In this report 3 values are considered: *15*, *17.5* and *20*. N_{kt} tends to increase with increasing plasticity and decrease with increasing soil sensitivity. It decreases as B_q increases. (*Lunne et al., 1997*)
σ_{vo} = total overburden stress.

This report only presents the undrained shear strength data on soils with soil behaviour type index, I_c values greater than *2.60*.

The value of undrained shear strength, s_u to be used in analysis depends on the design problem. In general, the simple shear in the direction of loading often represents the average undrained strength. For larger, moderate to high risk projects, where high quality field and laboratory data may be available, site specific correlations should be developed based on appropriate and reliable values of s_u.

4.7 SENSITIVITY (S_t)

The sensitivity, S_t of clays is defined as the ratio of undisturbed peak undrained shear strength to totally remoulded undrained shear strength.

In this report S_t is calculated using two correlations developed by *Schmertmann (1978)* and *Mayne (2007)*.

1) Schmertmann (1978)

$$S_t = \frac{s_u}{s_{u(rem)}} = \frac{q_t - \sigma_v}{N_{kt}} \left(\frac{1}{f_s}\right)$$

where

$s_{u(rem)}$ is the remoulded undrained shear strength. It can be assumed equal to the sleeve resistance, f_s.

2) Mayne (2007)

$$S_t = \frac{0.073 \cdot (q_t - \sigma_{v0})}{f_s}$$

For relatively sensitive clays, S_t > *10*, the value of f_s can be very low and not very accurate, hence the estimate of sensitivity should be used as a guide only.

4.8 SOIL UNIT WEIGHT (γ)

Soil unit weight, *γ* in this report is calculated by using one method for sands, considered under dry conditions and two methods for clays, considered under saturated conditions. These relationships are developed by *Mayne (2007)* and the equations are presented below:

Dry unit weight for sands:

$$\gamma_{dry} = 1.89 \cdot log(q_{t1}) + 11.82$$

Saturated unit weight for clays method 1

$$\gamma_{sat} = 8.32 \cdot log(V_S) - 1.61 \cdot log(z)$$

Saturated unit for clays method 2

$$\gamma_{sat} = 2.60 \cdot log(f_s) + 15 \cdot G_s - 26.5$$

where

q_{t1} is the corrected cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula:

$$q_{t1} = \frac{q_t}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

z is the depth

V_s is the shear wave velocity, calculated as $V_S = 118.8 \cdot log\left(f_s\right) + 18.5$

G_s is the specific gravity of solids, typically between *2.40* and *2.90*

5.0 REFERENCES

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APPENDIX A

APPENDIX A1 – Project Summary Sheet

Piezocone Tests Summary Sheet

HOLE ID	Final Depth (m)	Date of Test	Cone Used	Test Remarks
CPT01	16.04	30/07/2024	S15-CFIP.2136	Test refused on total pressure.
CPT02	16.09	30/07/2024	S15-CFIP.2136	Test refused on total pressure.
CPT03	18.37	29/07/2024	S15-CFIP.2136	Test refused on total pressure.
CPT04	15.78	29/07/2024	S15-CFIP.2136	Test refused on total pressure.
CPT05	16.02	29/07/2024	S15-CFIP.2136	Test refused on total pressure.
CPT06	18.22	29/07/2024	S15-CFIP.2136	Test refused on total pressure.
CPT07	16.40	29/07/2024	S15-CFIP.2136	Test refused on total pressure.
CPT08	18.15	30/07/2024	S15-CFIP.2136	Test refused on total pressure.

APPENDIX A2 – CPT Rig Datasheet

RIGS

20 TONNE CPT TRACK MOUNTED RIG (CPT017)

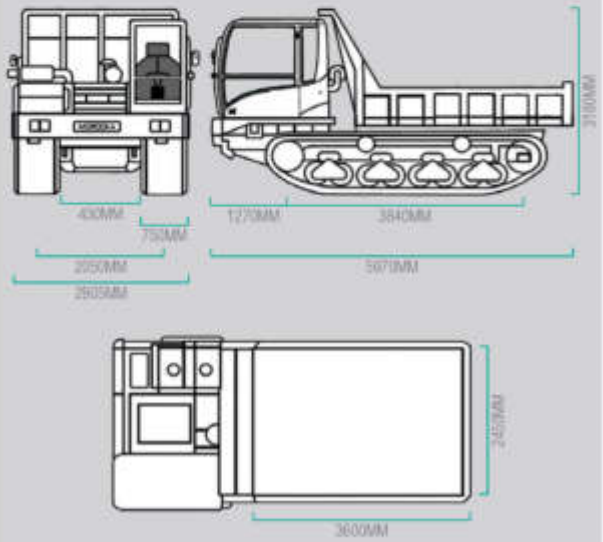
We have a variety of rigs giving us the capacity to meet our clients' needs and specifications for each individual project.

This rubber tracked rig weighs 20 tonnes and is able to push up to a depth of 40 metres, depending on the ground conditions. It has low ground bearing pressure and is ideal for soft, boggy sites which are inaccessible for our wheeled rigs.

CPT RIG DETAILS

DRIVE SYSTEM	RUBBER TRACKED
TOTAL WEIGHT	20 TONNES
GROUND BEARING PRESSURE	35KPA
CPT RAM THRUST CAPACITY	20 TONNES
MAXIMUM PENETRATION	30-40M DEPENDING ON THE GROUND CONDITIONS
PERFORMANCE RATES	100-150M OF TESTING A DAY, DEPENDING ON ACCESS TO POSITIONS
TYPICAL SITES FOR THIS RIG	SOFT, BOGGY SITES. THE RIG HAS LOW GROUND BEARING PRESSURE

CPT RIG DIMENSIONS




Shrewsbury



Heading North on our low loader


Falkirk, Scotland

IN SITU
SITE INVESTIGATION

INSITUSI.COM

APPENDIX A3 – Cone Datasheet

GeoPoint Systems bv
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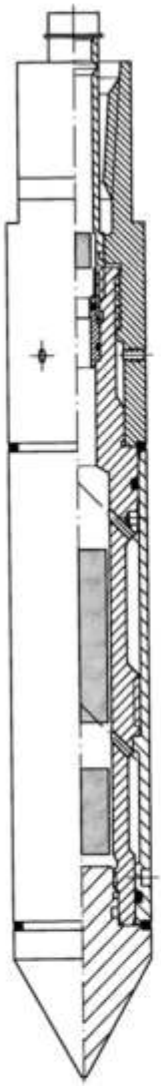
ING bank : 68.23.01.396
Postbank : 5226758
BTW nr. : NL806331677B01



SPECIFICATIONS
S15 SERIES
ELECTRICAL CONES

The electronic subtraction cones have been developed to address the durability problems inherent in other cone designs. The unit consists of a single element temperature compensated strain gauge transducer for measuring both cone resistance and local sleeve friction. This design is therefore more robust than a compression type cone. The cone support electronics package is located directly behind the transducer. The precision strain gauge amplifiers and power supply eliminate the effects of cable resistance on the measurements. A standard subtraction cone is capable of measuring simultaneously the following channels: Tip, Local friction, Pore pressure, Temperature and Inclination.

GENERAL SPECIFICATIONS

Cone Tip Section Area	1,500 mm2
Friction Sleeve Surface	22,500 mm2
Total Length	325 mm
Weight	4200 g
Power Supply	± 15 VDC, 100 mA.
Output	0 – 10 VDC*
Working Temperature	0 - 60˚C
Storage Temperature	- 40 to + 85˚C
Connector	Lemo 10 pins (others on request)

TIP RESISTANCE

Range	100/150* kN
Accuracy	0.25 % FS
Maximum Load	150 % of range
Cone Area Ratio	0.75

LOCAL SLEEVE FRICTION

Range	100/150* kN
Accuracy	0.50 % FS
Maximum Load	150 %
Sleeve Area Ratio	1.0 (EA)

PORE PRESSURE

Range	1/2/5/10* MPa
Accuracy	0.5 % FS
Maximum Load	150 % of range

INCLINATION

Range	25 ˚ (biaxial)
Accuracy	< 2 ˚

All our equipment complies with the ISSMGE, ASTM, DIN and NEN Standards.

*Other output and voltage ranges available on request. Loadcells may be calibrated for lower ranges.

APPENDIX A4 – Cone Calibration Certificate

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Down to Earth

Gouda Geo-Equipment B.V.
Satellietbaan 8
2181 MH Hillegom
The Netherlands

Tel. + 31 (0)715.318.475
E-mail: info@gouda-geo.com

Certificate of Calibration

Certificate No. CMI 24.05.6608

Instrument

Instrument Type:	Electrical Subtraction Cone	Calibration Result:	Certified
Manufacturer:	GP calibrated by Gouda Geo-Equipment BV		
Model No.:	S15-CFIIP	Date Calibrated:	2-5-2024
Serial No.:	2136	Next Due Date:	2-5-2025
Cone area factor:	0,86		
Used Calibration Procedure: GGECP008, ISO 22476-1:2012		Location: Hillegom (The Netherlands)	

Customer

In Situ Site Investigation Ltd.

Calibration Instruments

Instrument Type: CPT Logger	Instrument Type: CPT Logger	Instrument Type: Load-cell + amplifier
Manufacturer: Gouda Geo Equipment	Manufacturer: Gouda Geo Equipment	Manufacturer: Futek
Model No.: A	Model No.: A	Model No.: LCF500 + IAA100
Serial No.: 3010	Serial No.: 3129	Serial No.: 1016780 + 1013883
Accuracy: 0.01% + 2 Counts	Accuracy: 0.01% + 2 Counts	Accuracy: 0.1%
Date Calibrated: 8 February, 2024	Date Calibrated: 8 February, 2024	Date Calibrated: 19 September, 2023
Next Due Date: 8 February, 2025	Next Due Date: 8 February, 2025	Next Due Date: 19 September, 2024
Calibrated By: Manufacturer	Calibrated By: Manufacturer	Calibrated By: Futek
Traceability: CMI 24.02.6313	Traceability: CMI 24.02.6314	Traceability: 2309200019

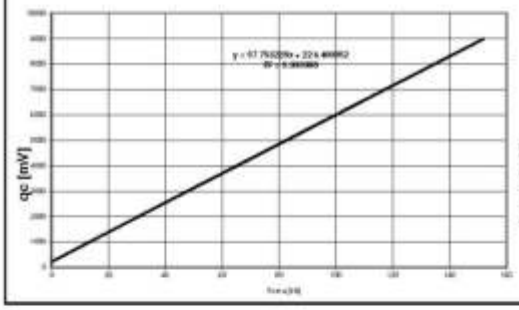
Calibration Conditions

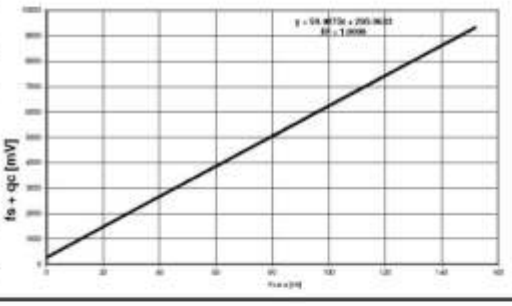
Environmental conditions whilst performing the calibration: Ambient Temperat 21.4 °C; Relative Humidity: 44.2 %

Condition of Calibrated Apparatus when Received: Fair

Measurement Parameters

zero value	221 mV	zero value	281 mV
Full scale	8663 @ 150 kN	Full scale	8925 @ 150 kN





Remarks

Data "As Received" = "As Left" unless otherwise noted. Calibration data for this item was derived from one or more of the following sources: the Nederlands Meetinstituut (NMI) or other national laboratory, a natural physical constant, or a ratio technique. The data is on file at the NMI. This calibration is compliant with Gouda Geo-Equipment's internal quality system, internal calibration procedure and meets the requirements of standard ISO 22476-1:2012.
The Calibration Interval will vary from customer use and different conditions. All calibrations are verified at a moment in time, and confirmed within controlled temperature, humidity specified standards. Gouda Geo-Equipment is not responsible for future calibrations. Improper use of the apparatus (e.g. dropping) may cause loss of calibration.

Calibration performed by:

Vincent Vermeer
(Engineer)

Approved by:

Rogier Tijn
(Senior Engineer)

This report shall not be reproduced or duplicated by any means, except in full, without the written approval of Gouda Geo-Equipment B.V.

APPENDIX A5 – Symbol List

English

a	is area ratio of the cone ($= {}^{A_n}/_{A_c}$)
A	is area
A_c	is projected area of the cone
A_n	is cross sectional area of load cell or shaft
A_s	is area of friction sleeve
A_{sb}	is bottom end area of friction sleeve
A_{st}	is top end area of friction sleeve
B_q	is pore pressure parameter ($= {}^{(u_2 - u_0)}/_{(q_t - \sigma_{v0})}$)
c_h	is horizontal coefficient of consolidation
c_v	is vertical coefficient of consolidation
D	is diameter
D_r	is relative density ($= \frac{e_{max} - e}{e_{max} - e_{min}} x100\%$)
e	is void ratio
e_{max}	is maximum void ratio
e_{min}	is minimum void ratio
E	is Young's modulus
f_s	is unit sleeve friction resistance
f_t	is sleeve friction corrected for pore pressure effects
F_s	is total force acting on friction sleeve
F_R	is normalized friction ratio ($= {}^{f_s}/_{(q_t - \sigma_{v0})}$)
FoS	is factor of safety
FC	is fines content
g	is acceleration due to gravity
G_0	is initial or maximum shear modulus, shear stiffness
I_c	is soil behavior type index
I_r	is rigidity index ($= {}^{G}/_{s_u}$)
I_p	is plasticity index
k	is coefficient of permeability
k_h	is coefficient of permeability in horizontal direction
k_v	is coefficient of permeability in vertical direction
K_0	is coefficient of earth pressure at rest ($= {}^{\sigma'_{h0}}/_{\sigma'_{v0}}$)
L	is length
m_v	is coefficient of volume change
M	is constrained deformation modulus
M7.5	is earthquake magnitude of 7.5 Richter scale
N	is number of blows of SPT
N_{60}	is SPT energy ratio
N_k	is cone factor
N_{ke}	is cone factor
N_{kt}	is cone factor
$N_{\Delta u}$	is cone factor
p_a	is reference stress ($= 100\ kPa$)
q_c	is measured cone resistance
q_e	is effective cone resistance ($= q_t - u_2$)
q_n	is net cone resistance ($= q_t - \sigma_{v0}$)
q_t	is corrected cone resistance ($= q_c - (1 - a)u_2$)
Q_c	is total force acting on the cone
Q_t	is normalized cone resistance ($= {}^{q_t - \sigma_{v0}}/_{\sigma'_{v0}}$)

R_f is friction ratio ($= \left({}^{f_t}/_{q_t}\right) x100\%$ or alternatively $= \left({}^{f_t}/_{q_t}\right) x100\%$)
s_u is undrained shear strength
s_{ur} is remoulded undrained shear strength
S_t is sensitivity
t is time
t_{50} is time for 50% dissipation of excess pore water pressure
T_{50} is time factor at $U = 50\ \%$
u is pore water pressure
u_0 is in situ pore pressure
u_1 is pore pressure measured on the cone
u_2 is pore pressure measured behind the cone
u_3 is pore pressure measured behind sleeve friction
Δu is excess pore water pressure
U is normalized excess pore pressure
V_s is shear wave velocity
z is depth

Greek

α is constant
α is cone roughness
β is constant
β_1 is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane, in degrees
β_2 is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane that is perpendicular to the plane of angle β_1, in degrees
γ is unit weight of soil
γ_w unit weight of water
Δ is change
Δu is excess pore pressure ($= u - u_0$)
μ is Poisson's ratio
ρ is density
ψ is state parameter
σ, σ' is normal stress (total, effective)
σ_h, σ_h' is horizontal stress (total, effective)
σ_v, σ_v' is horizontal stress (total, effective)
σ_{v0},σ_{v0}' is overburden stress (total, effective)
τ_{av} is average cyclic shear stress
τ_{cy} is cyclic shear stress
φ' is effective friction angle

APPENDIX A6 – Abbreviations

ASTM	American Society for Testing and Materials
CPTU	Cone Penetration Test with Pore Pressure Measurement (Piezocone Test)
CRR	Cyclic Resistance Ratio
CSR	Cyclic Stress Ratio
GWT	Ground Water Table
NC	Normally Consolidated
OC	Over consolidated
OCR	Over consolidation Ratio
PL	Limit Pressure
SCPT	Seismic Cone Penetration
SDMT	Seismic Dilatometer Marchetti
SPT	Standard Penetration Test
TC	Technical Committee

APPENDIX A7 – Glossary

CPT
Cone Penetration Test.

Cone
The part of the cone penetrometer on which the end bearing is developed.

Cone Penetrometer
The assembly containing the *cone*, *friction sleeve*, any other sensors and measuring systems, as well as the connections to the *push-rods.*

Cone resistance, q_c
The total force acting on the cone, Q_c, divided by the projected area of the cone, A_c. $q_c = {Q_c}/{A_c}$

Corrected cone resistance, q_t
The *cone resistance*, q_c corrected for pore water pressure effects.

Corrected sleeve friction, f_t
The *sleeve friction* corrected for pore water pressure effects on the ends of the *friction sleeve*.

Data acquisition system
The system used to measure and record the measurements made by the *cone penetrometer*.

Dissipation Test
A test when the decay of the pore water pressure is monitored during a pause in penetration.

Filter element
The porous element inserted into the cone penetrometer to allow transmission of the pore water pressure to the pore pressure sensor, while maintaining the correct profile of the *cone penetrometer*.

Friction ratio, R_f
The ratio, expressed as a percentage of the *sleeve friction*, f_s, to the *cone resistance*, q_c, both measured at the same depth.

Friction reducer
A local enlargement on the push-rod surface, placed at a distance above the cone penetrometer, and provided to reduce the friction on the *push-rods*.

Friction sleeve
The section of the *cone penetrometer* upon which the *sleeve friction* is measured.

Normalized cone resistance, Q_c or Q_t
The *cone resistance* expressed in a non-dimensional form and taking account of stress changes *in situ*, $Q_c = {(q_c - \sigma_{v0})}/{\sigma'_{v0}}$, or when the *corrected cone resistance* is used $Q_t = {(q_t - \sigma_{v0})}/{\sigma'_{v0}}$. where σ_{v0} and σ'_{v0} are the total and effective vertical stress respectively.

Net cone resistance, q_n
The *corrected cone resistance* minus the vertical total stress. $q_n = q_t - \sigma_{v0}$

Normalized friction ratio, F_r
The *sleeve friction* normalized by the *net cone resistance*.

Piezocone
A *cone penetrometer* containing a pore pressure sensor.

Pore pressure, *u*
The pore pressure generated during penetration and measured by a pore pressure sensor, u_1 when measured on the cone, u_2 when measured just behind the cone and u_3 when measured just behind the friction sleeve.

Pore pressure ratio, B_q
The *net pore pressure* normalized with respect to the *net cone resistance*.

Push-rods
The thick-walled tubes or rods used for advancing the cone penetrometer.

Rig machine
The equipment which pushes the cone penetrometer and rods into the ground.

Sleeve friction, f_s
The total frictional force acting on the *friction sleeve*, F_s, divided by its *surface area*, A_s. $f_s = {F_s}/{A_s}$

APPENDIX A8 – Soils Description Tables

GRANULAR SOILS (Sands and Gravels)

Description	Relative Density D_r (%)	SPT N value, N_{SPT}
Very Loose	0 – 15	0 - 4
Loose	15 – 35	4 - 10
Medium Dense	35 – 65	10 - 30
Dense	65 – 85	30 - 50
Very Dense	>85	>50

COHESIVE SOILS (Clays and Silts)

Term based on measurement	Undrained Shear Strength Classification, s_u (kPa)
Extremely low	<10
Very low	10 - 20
Low	20 - 40
Medium	40 - 75
High	75 - 150
Very high	150 - 300
Extremely high	>300

APPENDIX B

Cone Penetration Measured Parameters and Geotechnical Derived Parameters

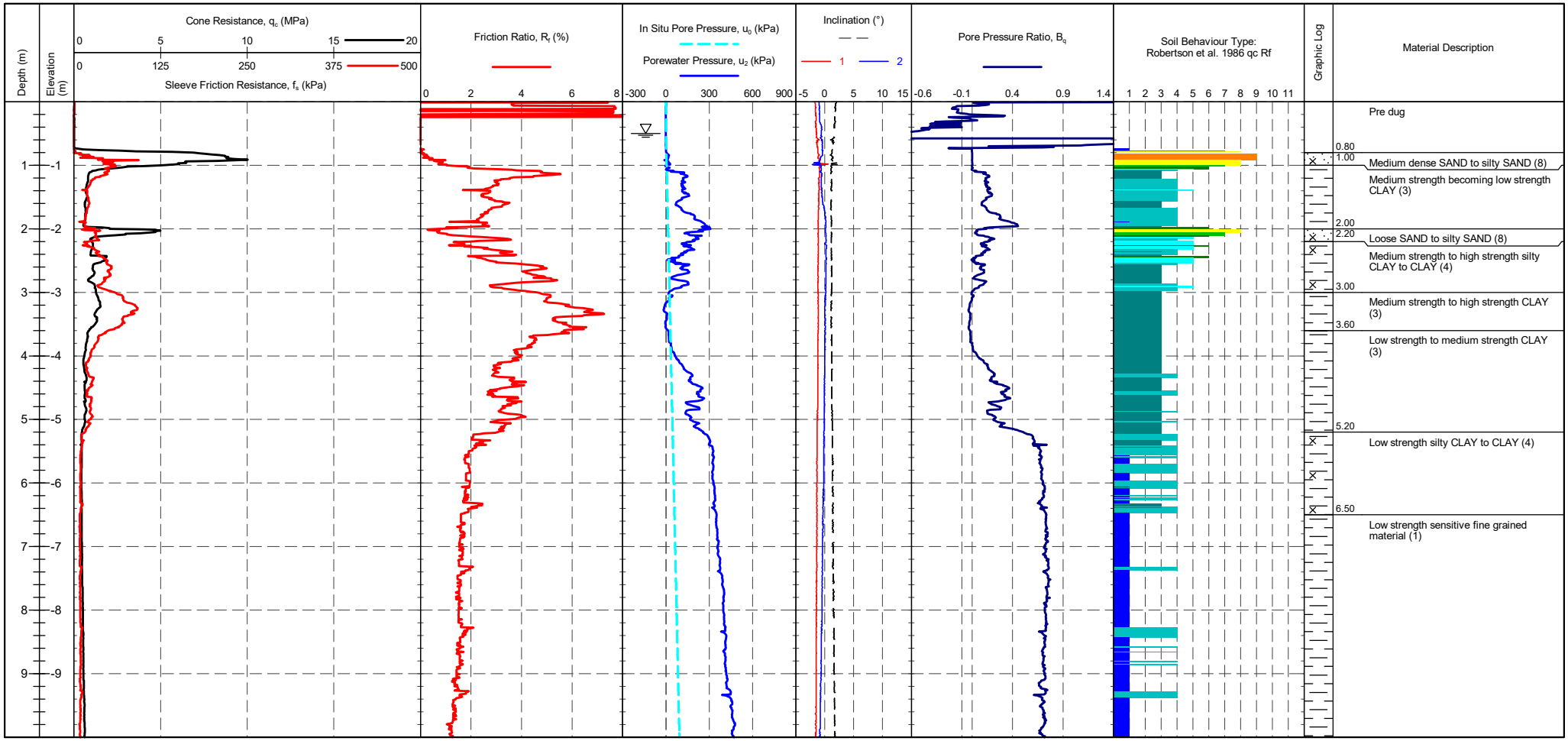
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT01**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 1 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 30/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2		
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen		
CONE AREA	: 15cm^2	OPERATOR	: DR		
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None		
FILTER POSITION	: u2	WEATHER	: Sunny & Hot		
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	258 mV	261 mV	0.035 MPa
Sleeve	321 mV	324 mV	0.002 kPa
Pore Pressure 2	282 mV	307 mV	0.006 kPa
X-Y Inclinometer	2385 mV	2364 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

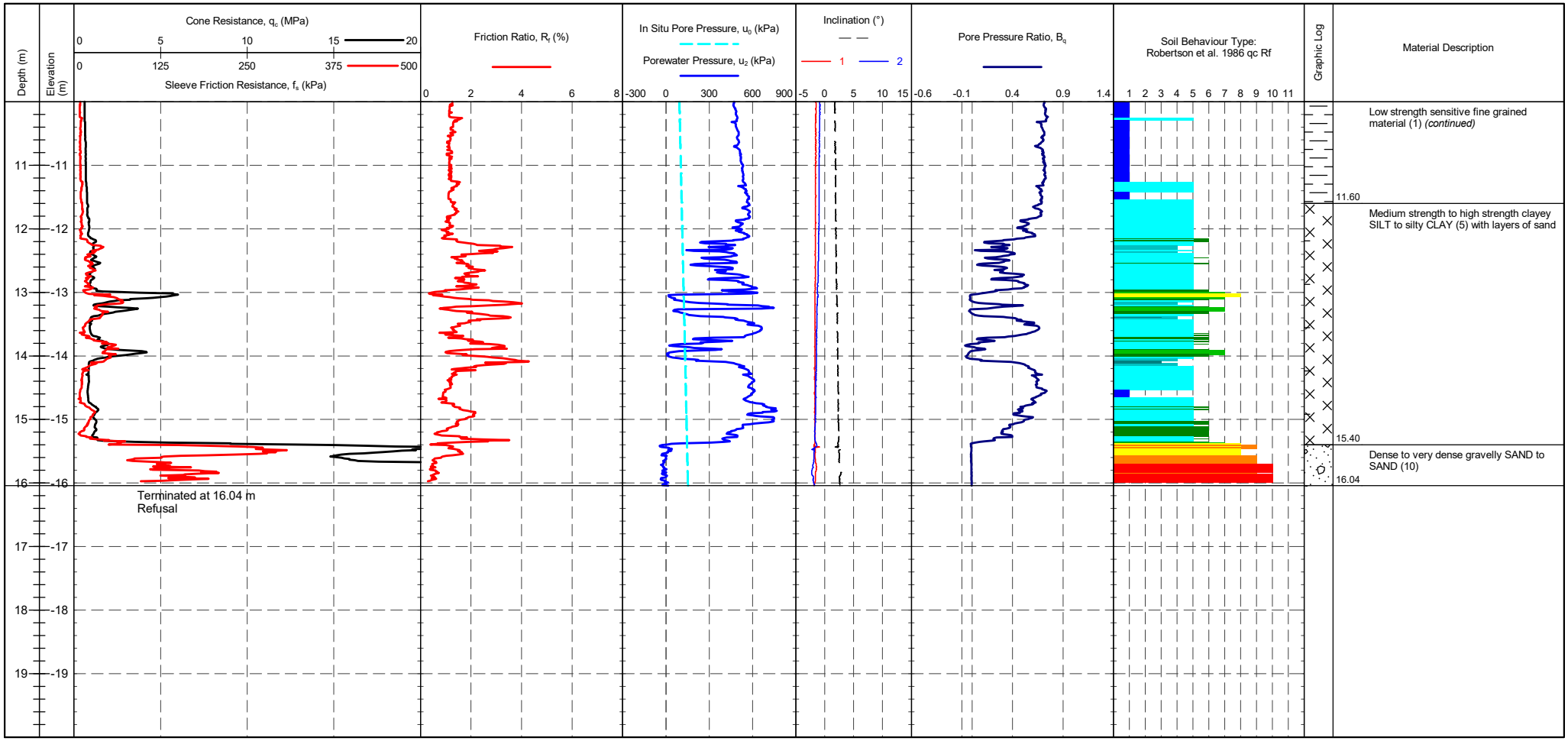
PointID: **CPT01**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 30/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen
CONE AREA	: 15cm²	OPERATOR	: DR
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None
FILTER POSITION	: u2	WEATHER	: Sunny & Hot
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	258 mV	261 mV	0.035 MPa
Sleeve	321 mV	324 mV	0.002 kPa
Pore Pressure 2	282 mV	307 mV	0.006 kPa
X-Y Inclinometer	2385 mV	2364 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

CPT LOG 02

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

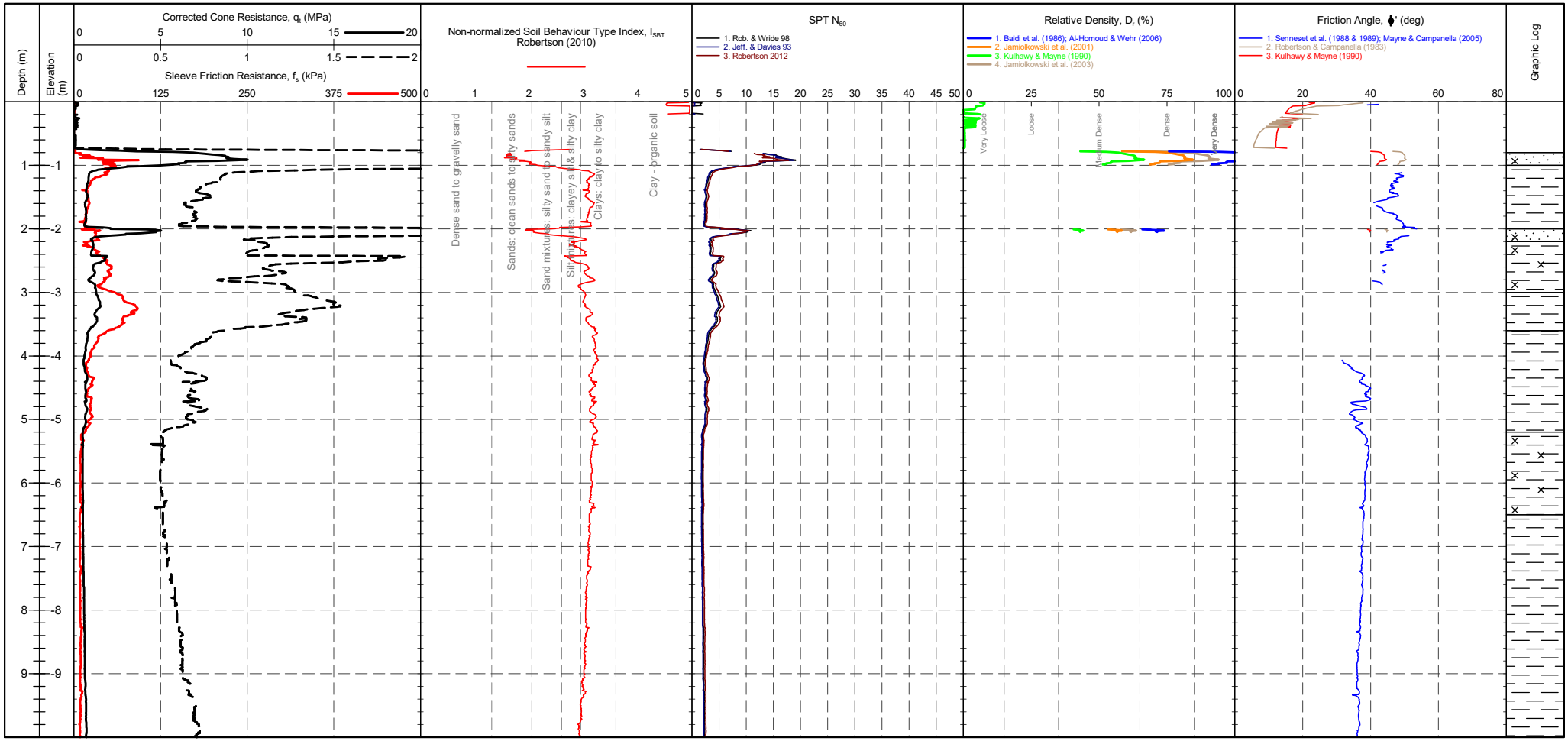
PointID: **CPT01**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 1 OF 2
STATUS : Final
TEST DATE : 30/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen	Tip	258 mV	261 mV	0.035 MPa
CONE AREA RATIO	: 0.79	OPERATOR	: DR	Sleeve	321 mV	324 mV	0.002 kPa
FILTER POSITION	: u2	FRICTION REDUCER	: None	Pore Pressure 2	282 mV	307 mV	0.006 kPa
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot	X-Y Inclinometer	2385 mV	2364 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

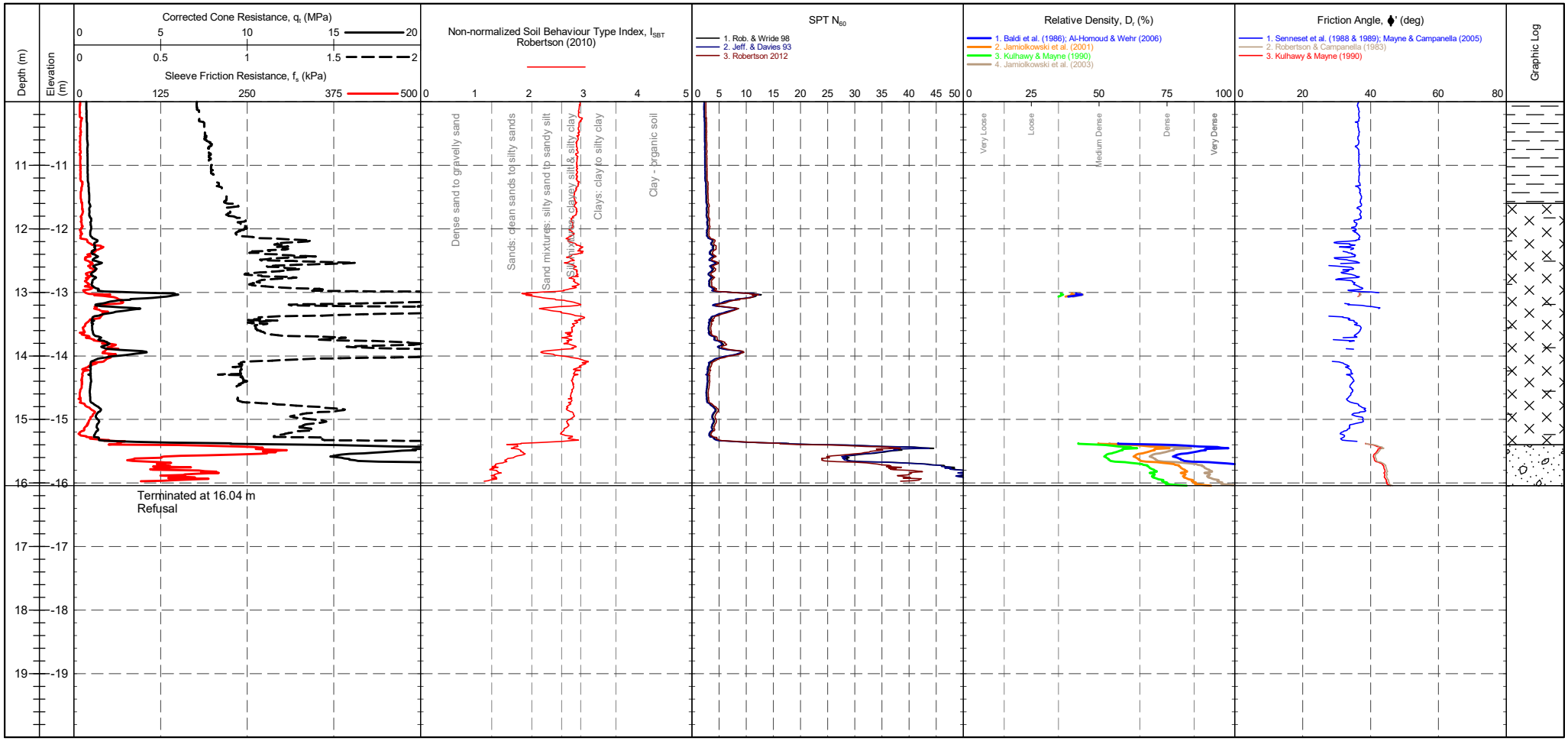
PointID: **CPT01**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 30/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	258 mV	261 mV	0.035 MPa
Sleeve	321 mV	324 mV	0.002 kPa
Pore Pressure 2	282 mV	307 mV	0.006 kPa
X-Y Inclinometer	2385 mV	2364 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

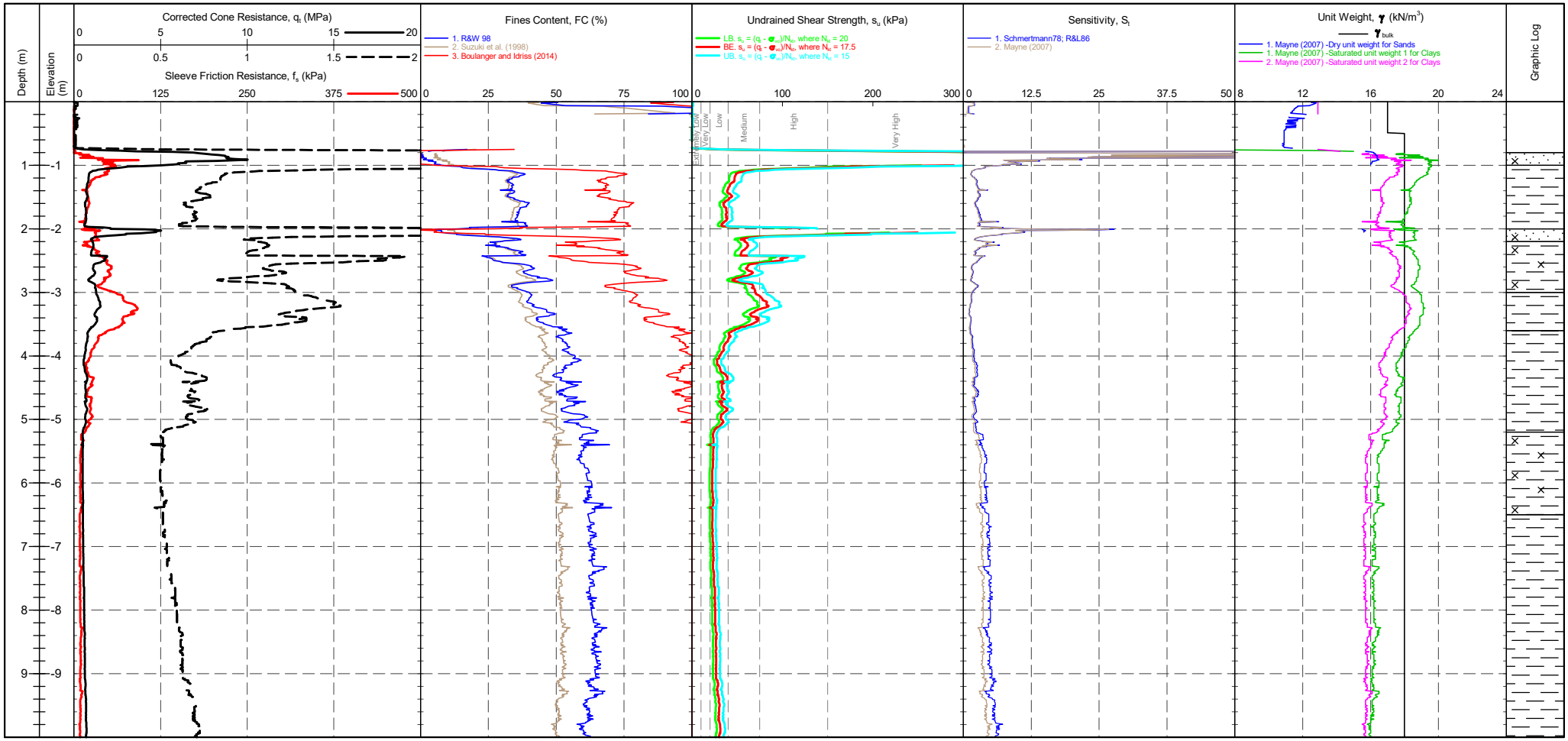
PointID: **CPT01**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING	: 0.000 m
NORTHING	: 0.000 m
ELEVATION	: 0.000 m OD
CHECKED BY	: DW
TERMINATION REASON	: Refusal

Remark:
Test refused on total pressure.

SHEET	: 1 OF 2
STATUS	: Final
TEST DATE	: 30/07/2024
PLOT DATE	: 14/08/2024
METHOD	: ISO 22476-1:2022



CONE ID	: S15-CFIP.2136
CONE MODEL	: Subtraction
CONE AREA	: 15cm^2
CONE AREA RATIO	: 0.79
FILTER POSITION	: u2
FILTER TYPE	: HDPE

TEST TYPE	: TE2
APPLICATION CLASS	: 2
RIG	: CPT 017 - Griffen
OPERATOR	: DR
FRICTION REDUCER	: None
WEATHER	: Sunny & Hot

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	258 mV	261 mV	0.035 MPa
Sleeve	321 mV	324 mV	0.002 kPa
Pore Pressure 2	282 mV	307 mV	0.006 kPa
X-Y Inclinometer	2385 mV	2364 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)
Extremely low strength	<10
Very low strength	10-20
Low strength	20-40

Term based on measurement	su (kPa)
Medium strength	40-75
High strength	75-150
Very high strength	150-300
Extremely high strength	>300

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

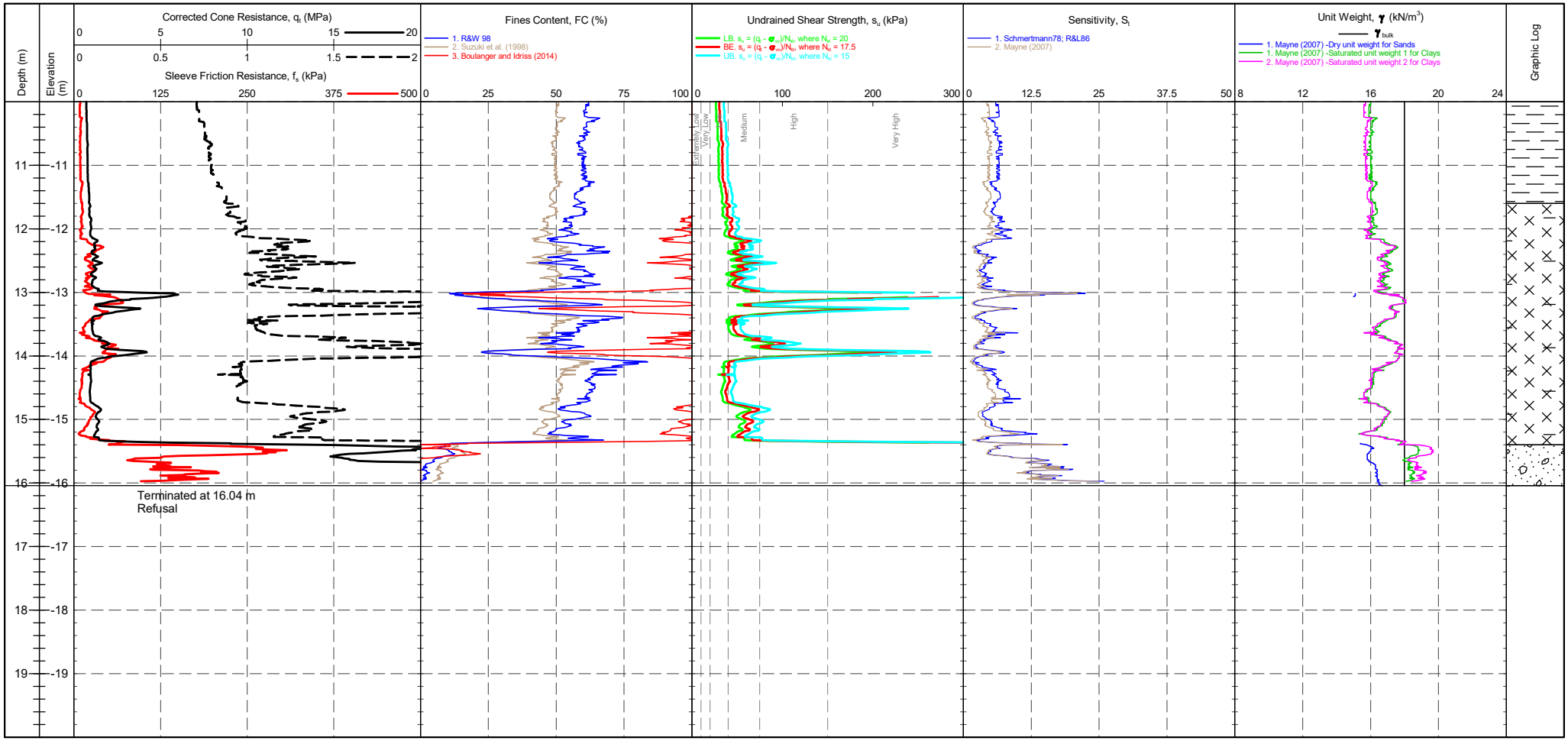
PointID: **CPT01**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING	: 0.000 m
NORTHING	: 0.000 m
ELEVATION	: 0.000 m OD
CHECKED BY	: DW
TERMINATION REASON	: Refusal

Remark:
Test refused on total pressure.

SHEET	: 2 OF 2
STATUS	: Final
TEST DATE	: 30/07/2024
PLOT DATE	: 14/08/2024
METHOD	: ISO 22476-1:2022



CONE ID	: S15-CFIP.2136
CONE MODEL	: Subtraction
CONE AREA	: 15cm^2
CONE AREA RATIO	: 0.79
FILTER POSITION	: u2
FILTER TYPE	: HDPE

TEST TYPE	: TE2
APPLICATION CLASS	: 2
RIG	: CPT 017 - Griffen
OPERATOR	: DR
FRICTION REDUCER	: None
WEATHER	: Sunny & Hot

CPTU ZERO VALUES

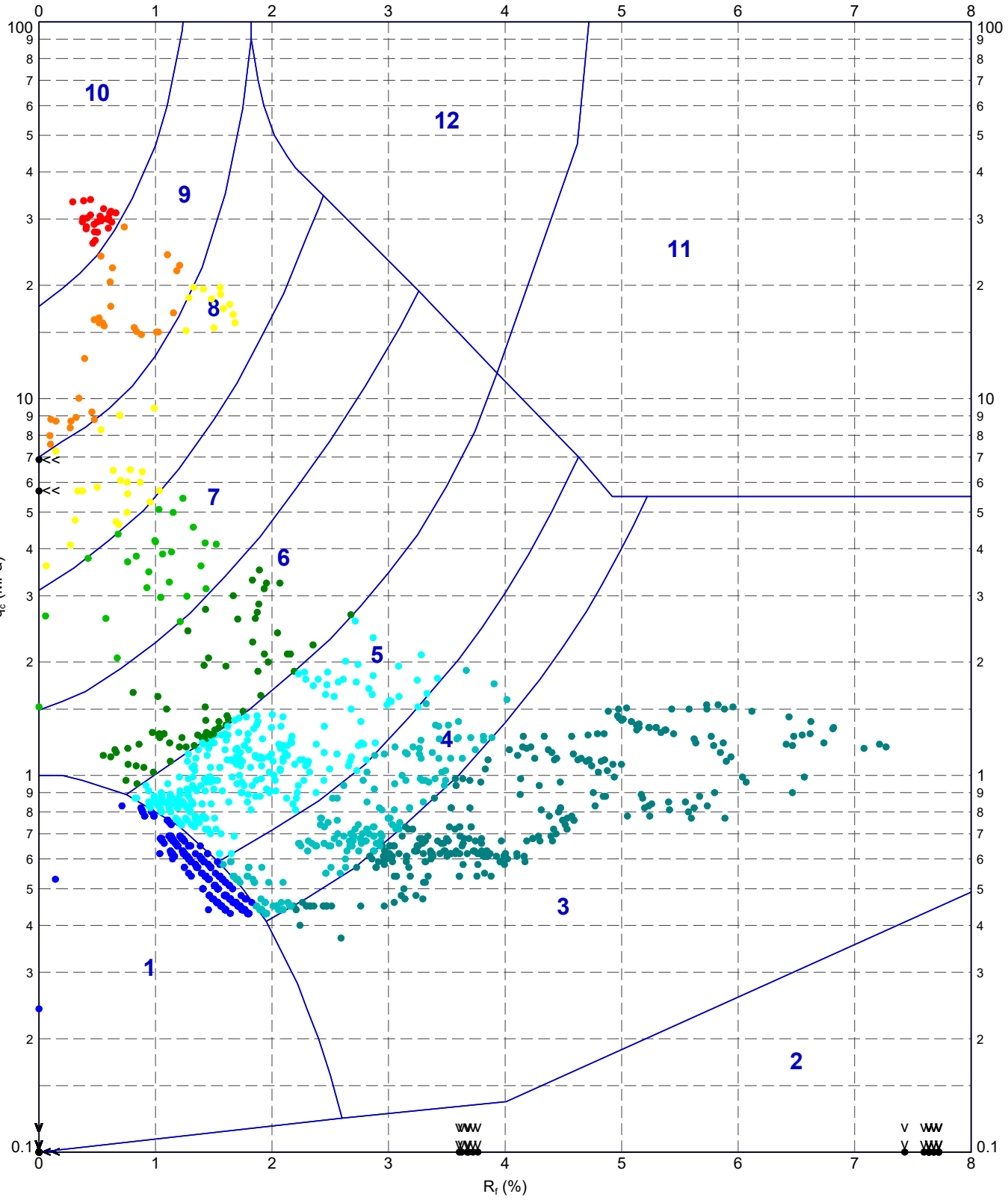
	Pre	Post	Difference
Transducer			
Tip	258 mV	261 mV	0.035 MPa
Sleeve	321 mV	324 mV	0.002 kPa
Pore Pressure 2	282 mV	307 mV	0.006 kPa
X-Y Inclinometer	2385 mV	2364 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)
Extremely low strength	<10
Very low strength	10-20
Low strength	20-40
Medium strength	40-75
High strength	75-150
Very high strength	150-300
Extremely high strength	>300

Groundwater Level

Dissipation Test



METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 2 - Organic material
- 3 - CLAY
- 4 - Silty CLAY to CLAY
- 5 - Clayey SILT to silty CLAY
- 6 - Sandy SILT to clayey SILT
- 7 - Silty SAND to sandy SILT
- 8 - SAND to silty SAND
- 9 - SAND
- 10 - Gravelly SAND to SAND
- 11 - Very stiff fine grained
- 12 - SAND to clayey SAND

IN SITU SITE INVESTIGATION

TITLE

ABO Consultancy
Newport
ABO-Alexandra Docks Newport
Robertson et al. 1986 q_c vs. R_f - CPT01

DRAWN	DATE 14/08/2024
CHECKED	DATE 14/08/2024
SCALE Not To Scale	A4
PROJECT No 1240354	FIGURE No

220629-ADVANCED REPORT INSITUSI 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. RF A4P 1240354-ABO-ALEXANDRA DOCKS NEWPORT.GPJ <<DrawingFile>> 14/08/2024 13:07 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Prj: In Situ SI 2.02.0 2017-07-10

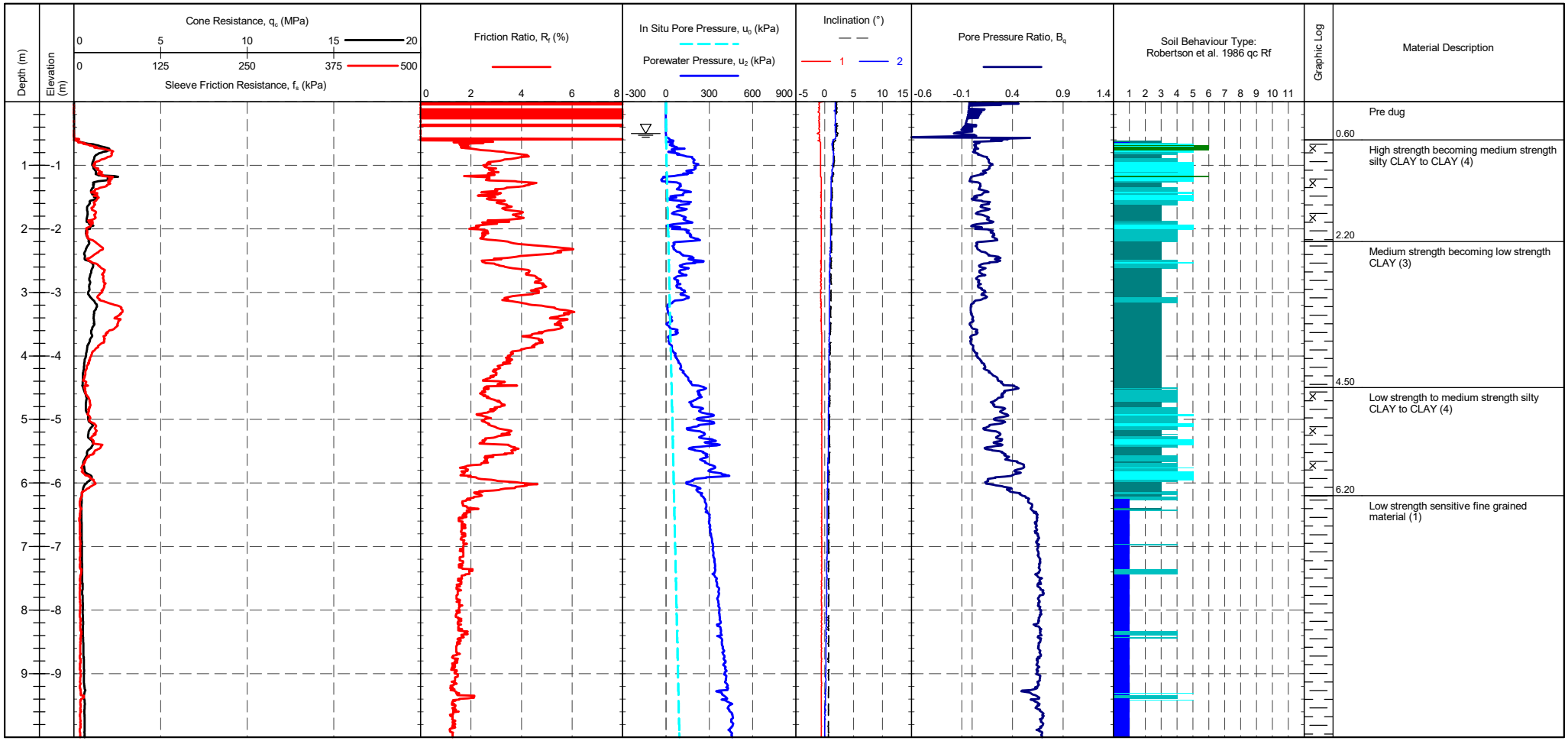
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT02**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 1 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 30/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen
CONE AREA	: 15cm^2	OPERATOR	: DR
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None
FILTER POSITION	: u2	WEATHER	: Sunny & Hot
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	258 mV	262 mV	0.046 MPa
Sleeve	322 mV	324 mV	0.001 kPa
Pore Pressure 2	289 mV	289 mV	0 kPa
X-Y Inclinometer	2532 mV	2481 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

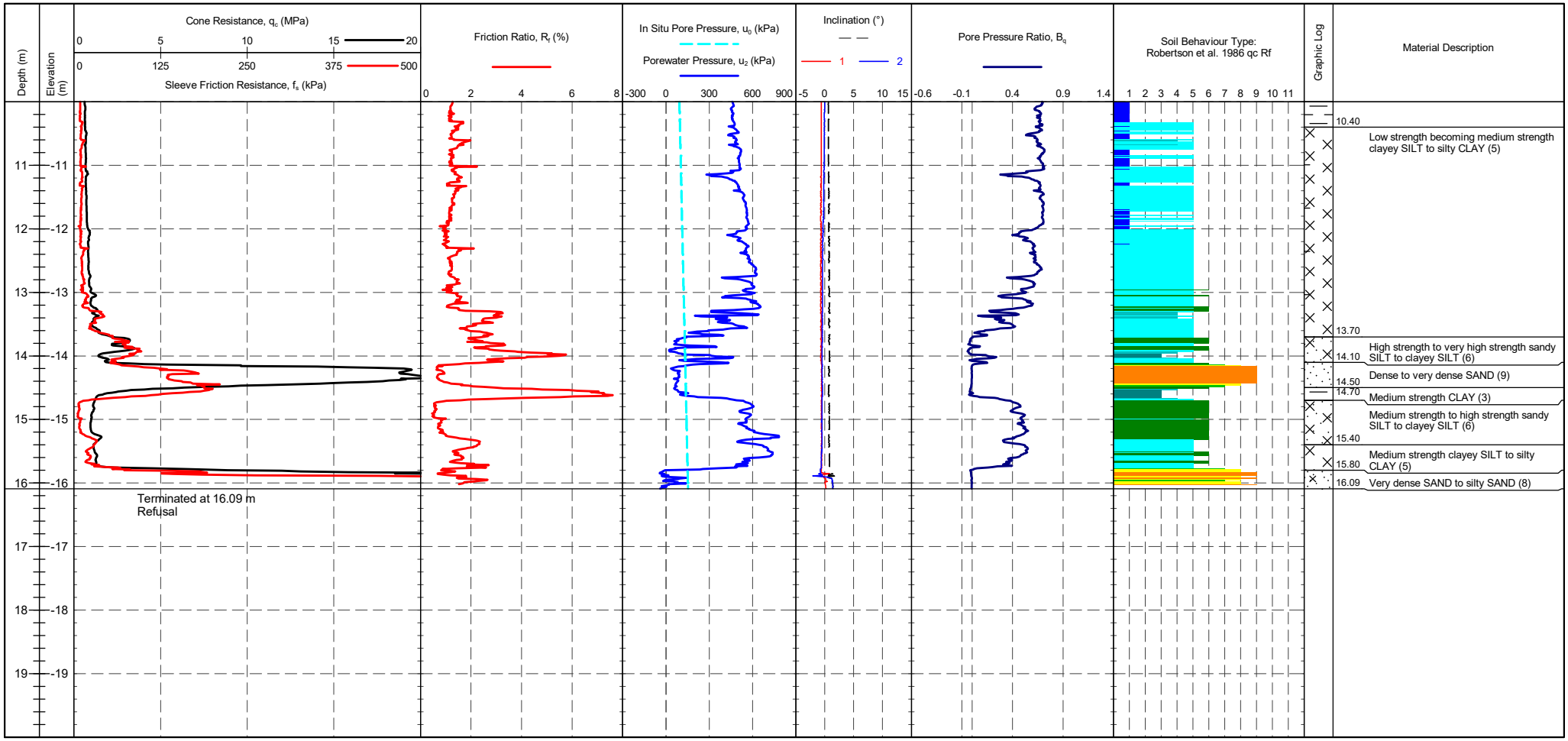
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT02**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 2 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 30/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen
CONE AREA	: 15cm^2	OPERATOR	: DR
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None
FILTER POSITION	: u2	WEATHER	: Sunny & Hot
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	258 mV	262 mV	0.046 MPa
Sleeve	322 mV	324 mV	0.001 kPa
Pore Pressure 2	289 mV	289 mV	0 kPa
X-Y Inclinometer	2532 mV	2481 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

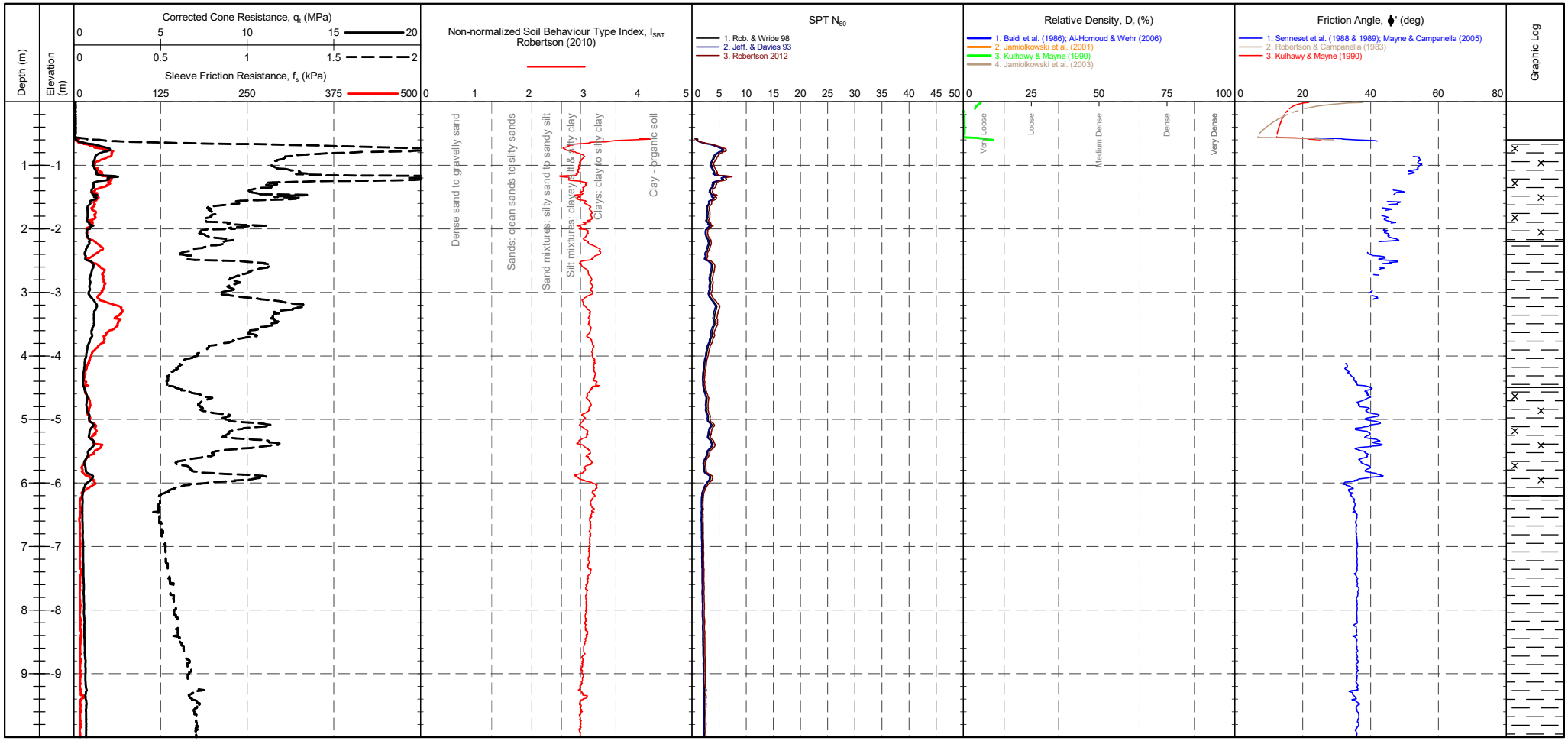
PointID **CPT02**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 1 OF 2
STATUS : Final
TEST DATE : 30/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136
CONE MODEL	: Subtraction
CONE AREA	: 15cm²
CONE AREA RATIO	: 0.79
FILTER POSITION	: u2
FILTER TYPE	: HDPE

TEST TYPE	: TE2
APPLICATION CLASS	: 2
RIG	: CPT 017 - Griffen
OPERATOR	: DR
FRICTION REDUCER	: None
WEATHER	: Sunny & Hot

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	258 mV	262 mV	0.046 MPa
Sleeve	322 mV	324 mV	0.001 kPa
Pore Pressure 2	289 mV	289 mV	0 kPa
X-Y Inclinometer	2532 mV	2481 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

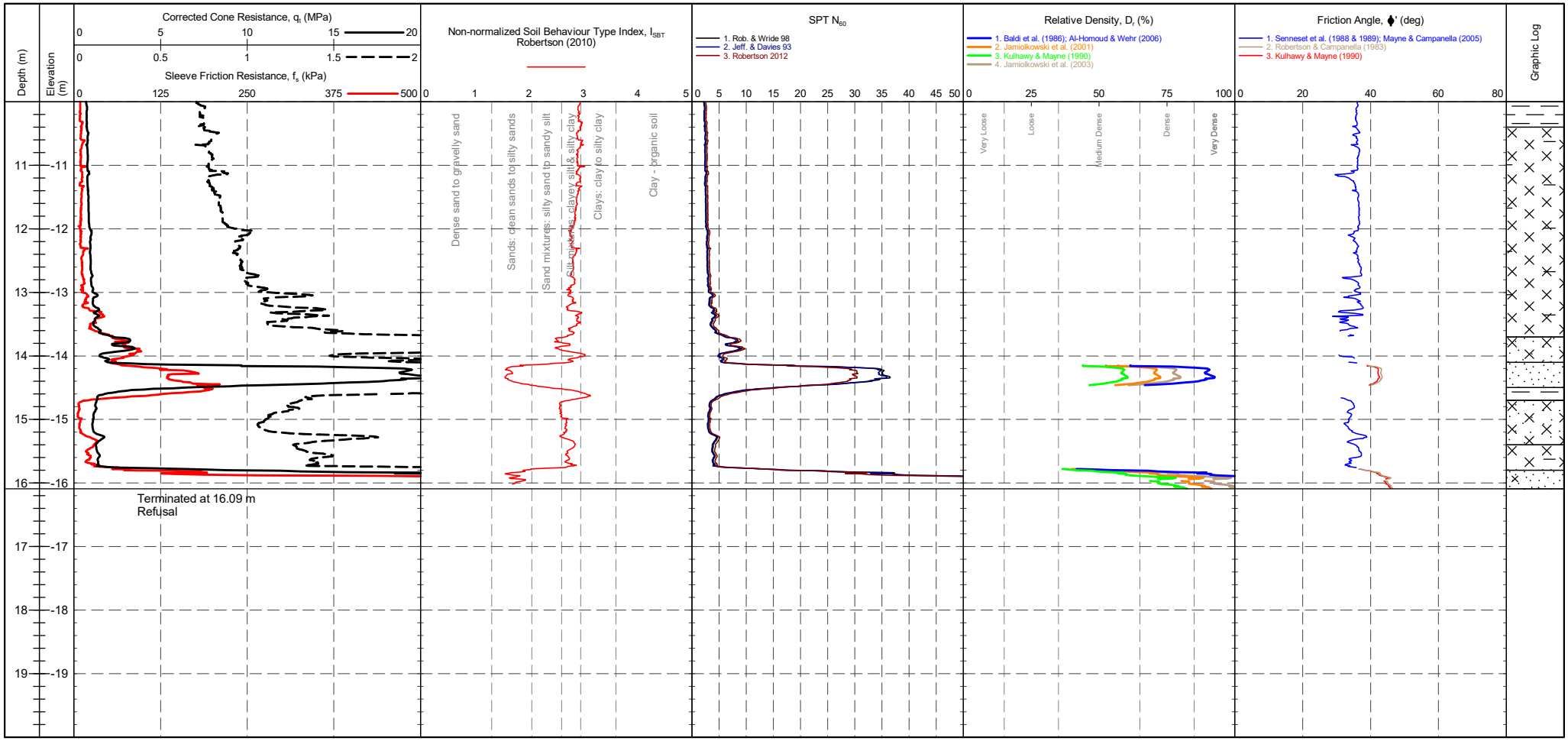
PointID **CPT02**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 30/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	258 mV	262 mV	0.046 MPa
Sleeve	322 mV	324 mV	0.001 kPa
Pore Pressure 2	289 mV	289 mV	0 kPa
X-Y Inclinometer	2532 mV	2481 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

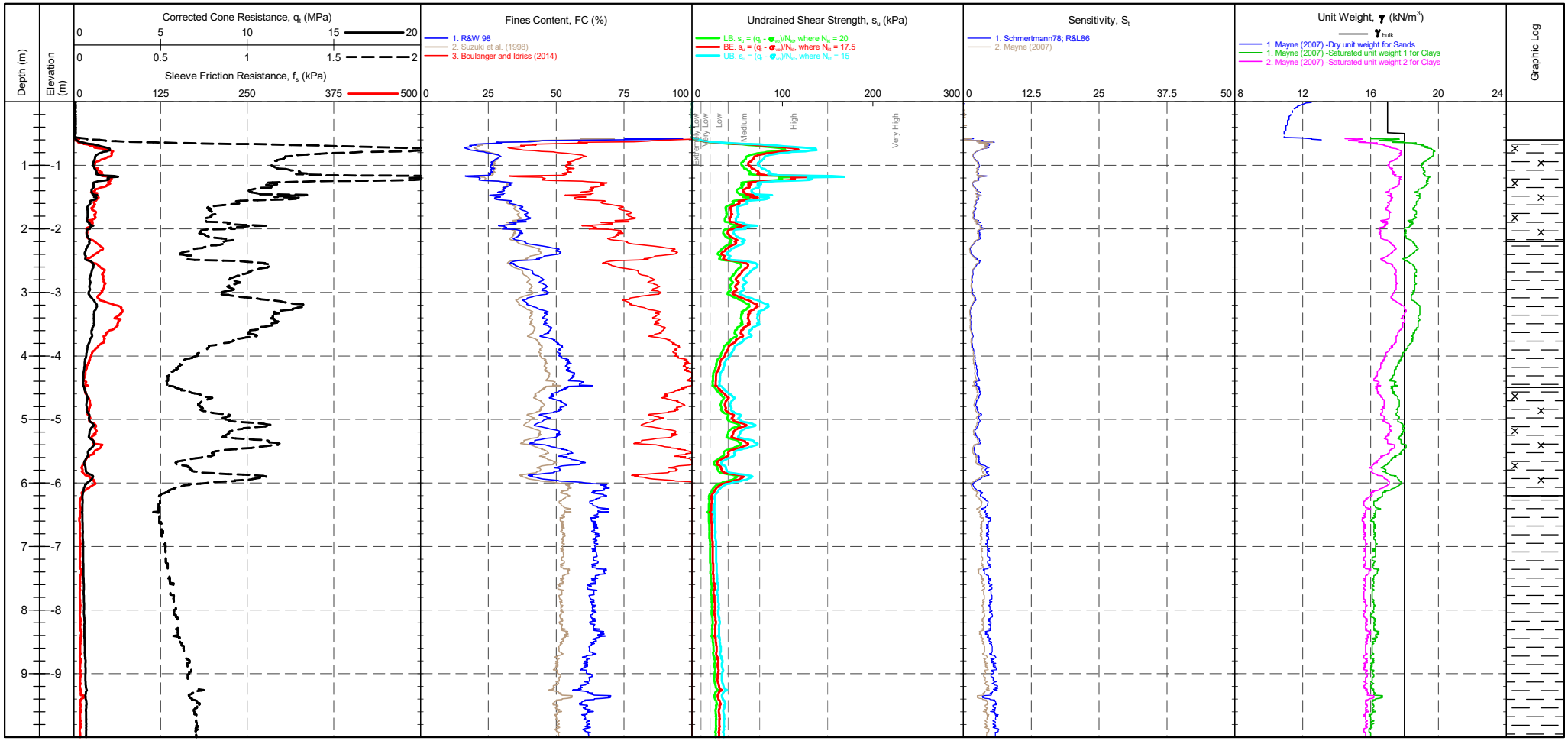
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 03

PointID: **CPT02**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 1 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 30/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen	Tip	258 mV	262 mV	0.046 MPa
CONE AREA RATIO	: 0.79	OPERATOR	: DR	Sleeve	322 mV	324 mV	0.001 kPa
FILTER POSITION	: u2	FRICTION REDUCER	: None	Pore Pressure 2	289 mV	289 mV	0 kPa
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot	X-Y Inclinometer	2532 mV	2481 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)	Term based on measurement	su (kPa)
Extremely low strength	<10	Medium strength	40-75
Very low strength	10-20	High strength	75-150
Low strength	20-40	Very high strength	150-300
		Extremely high strength	>300

Groundwater Level

Dissipation Test

CPT LOG 03

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

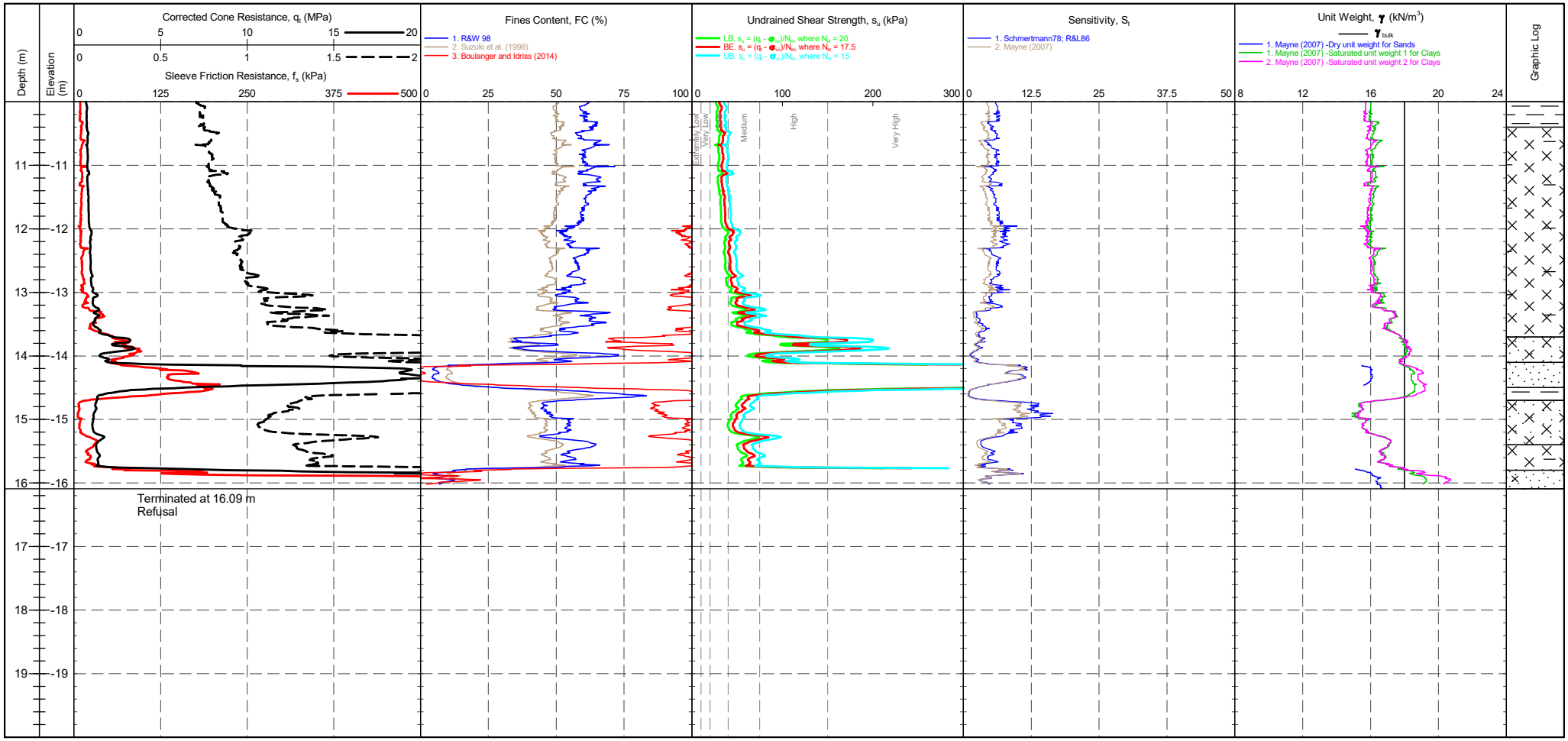
PointID: **CPT02**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING	: 0.000 m
NORTHING	: 0.000 m
ELEVATION	: 0.000 m OD
CHECKED BY	: DW
TERMINATION REASON	: Refusal

Remark:
Test refused on total pressure.

SHEET	: 2 OF 2
STATUS	: Final
TEST DATE	: 30/07/2024
PLOT DATE	: 14/08/2024
METHOD	: ISO 22476-1:2022



CONE ID	: S15-CFIP.2136
CONE MODEL	: Subtraction
CONE AREA	: 15cm^2
CONE AREA RATIO	: 0.79
FILTER POSITION	: u2
FILTER TYPE	: HDPE

TEST TYPE	: TE2
APPLICATION CLASS	: 2
RIG	: CPT 017 - Griffen
OPERATOR	: DR
FRICTION REDUCER	: None
WEATHER	: Sunny & Hot

CPTU ZERO VALUES

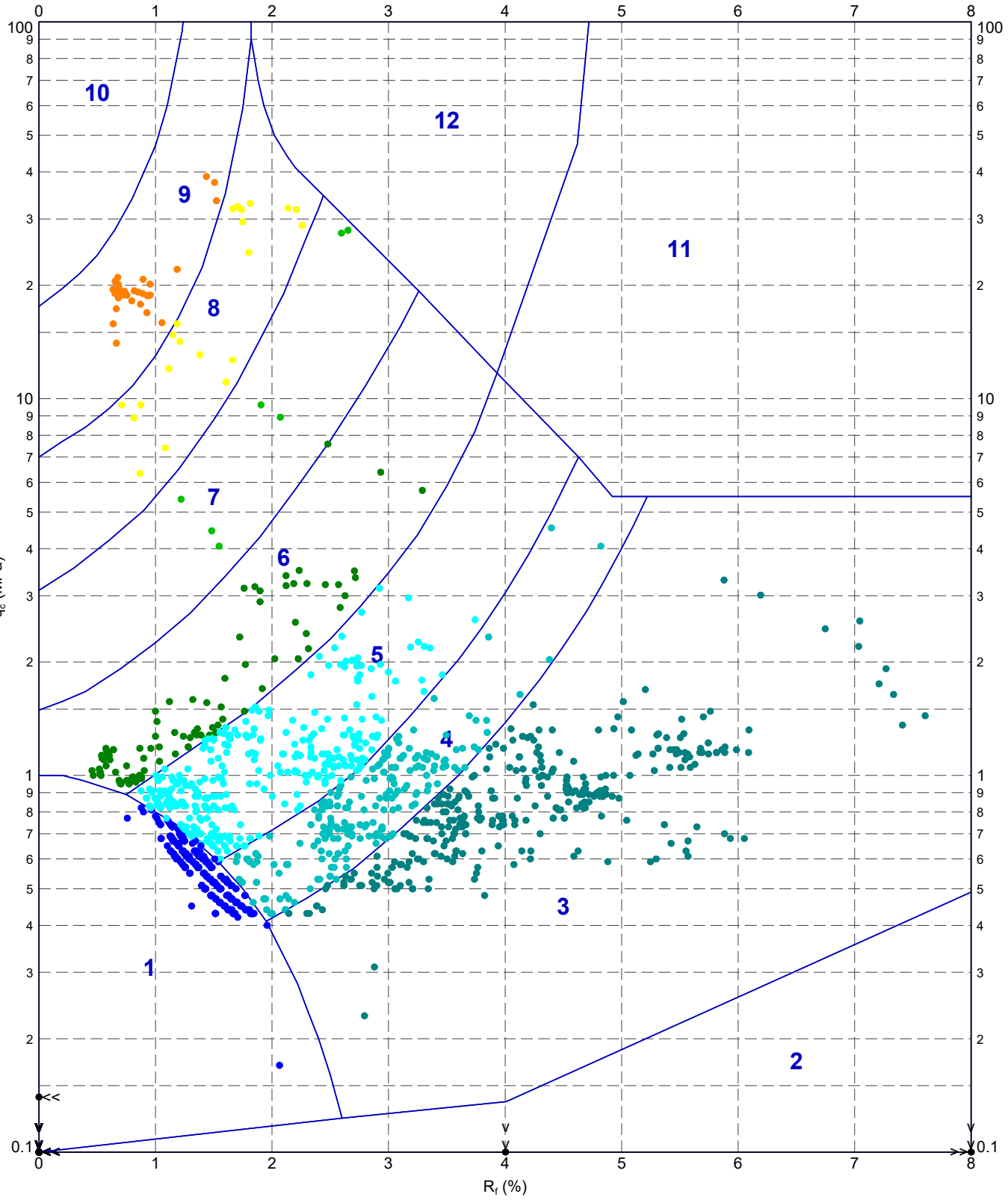
	Pre	Post	Difference
Transducer			
Tip	258 mV	262 mV	0.046 MPa
Sleeve	322 mV	324 mV	0.001 kPa
Pore Pressure 2	289 mV	289 mV	0 kPa
X-Y Inclinometer	2532 mV	2481 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)
Extremely low strength	<10
Very low strength	10-20
Low strength	20-40
Medium strength	40-75
High strength	75-150
Very high strength	150-300
Extremely high strength	>300

Groundwater Level

Dissipation Test



METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 2 - Organic material
- 3 - CLAY
- 4 - Silty CLAY to CLAY
- 5 - Clayey SILT to silty CLAY
- 6 - Sandy SILT to clayey SILT
- 7 - Silty SAND to sandy SILT
- 8 - SAND to silty SAND
- 9 - SAND
- 10 - Gravelly SAND to SAND
- 11 - Very stiff fine grained
- 12 - SAND to clayey SAND

IN SITU SITE INVESTIGATION

TITLE

ABO Consultancy
Newport
ABO-Alexandra Docks Newport
Robertson et al. 1986 q_c vs. R_f - CPT02

DRAWN	DATE 14/08/2024
CHECKED	DATE 14/08/2024
SCALE Not To Scale	A4
PROJECT No 1240354	FIGURE No

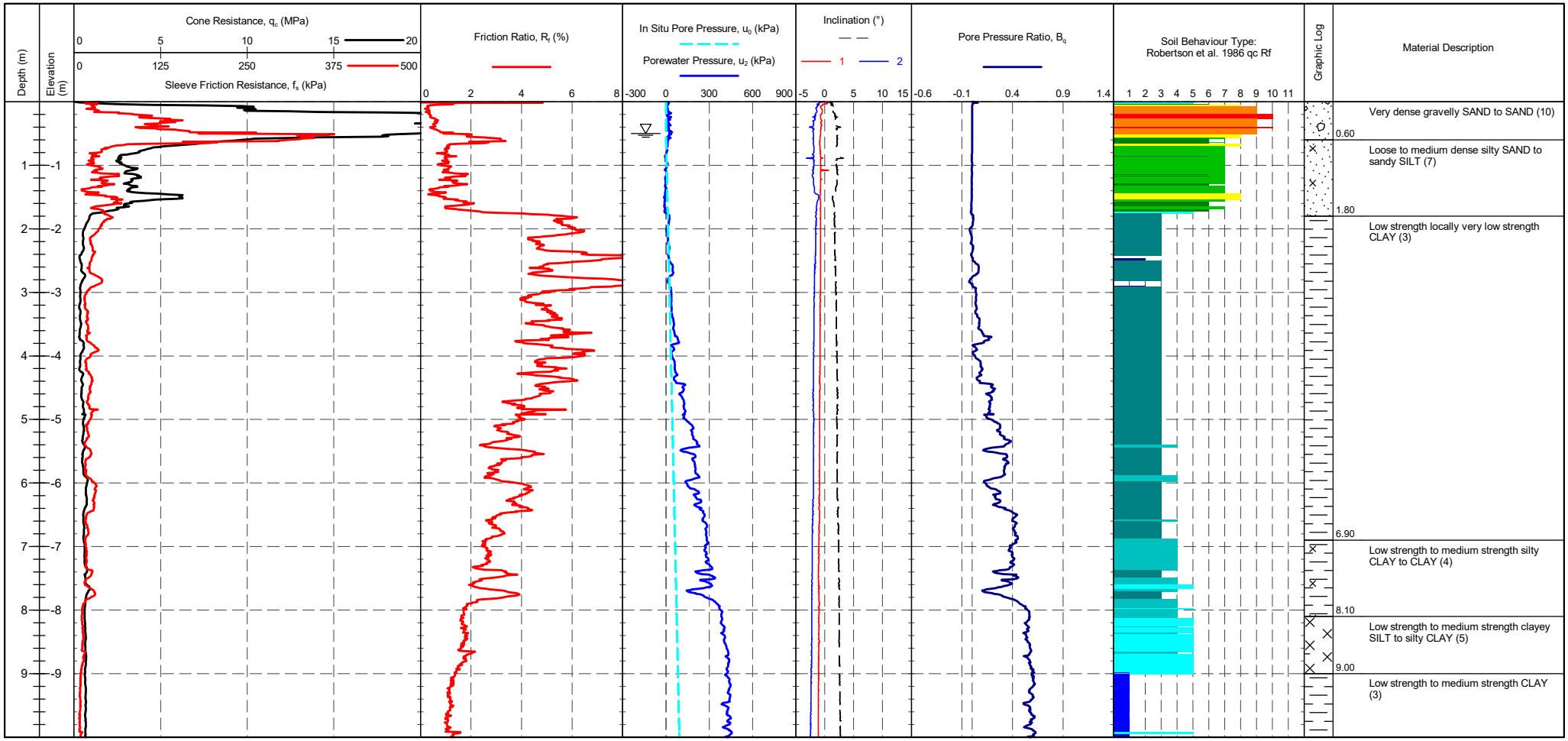
220629-ADVANCED REPORT INSITUSI 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. RF A4P 1240354-ABO-ALEXANDRA DOCKS NEWPORT.GPJ <<DrawingFile>> 14/08/2024 13:08 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Prj: In Situ SI 2.02.0 2017-07-10

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT03**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 1 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 29/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen
CONE AREA	: 15cm^2	OPERATOR	: DR
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None
FILTER POSITION	: u2	WEATHER	: Sunny & Hot
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	256 mV	262 mV	0.069 MPa
Sleeve	325 mV	331 mV	0.004 kPa
Pore Pressure 2	273 mV	283 mV	0.003 kPa
X-Y Inclinometer	2466 mV	2522 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

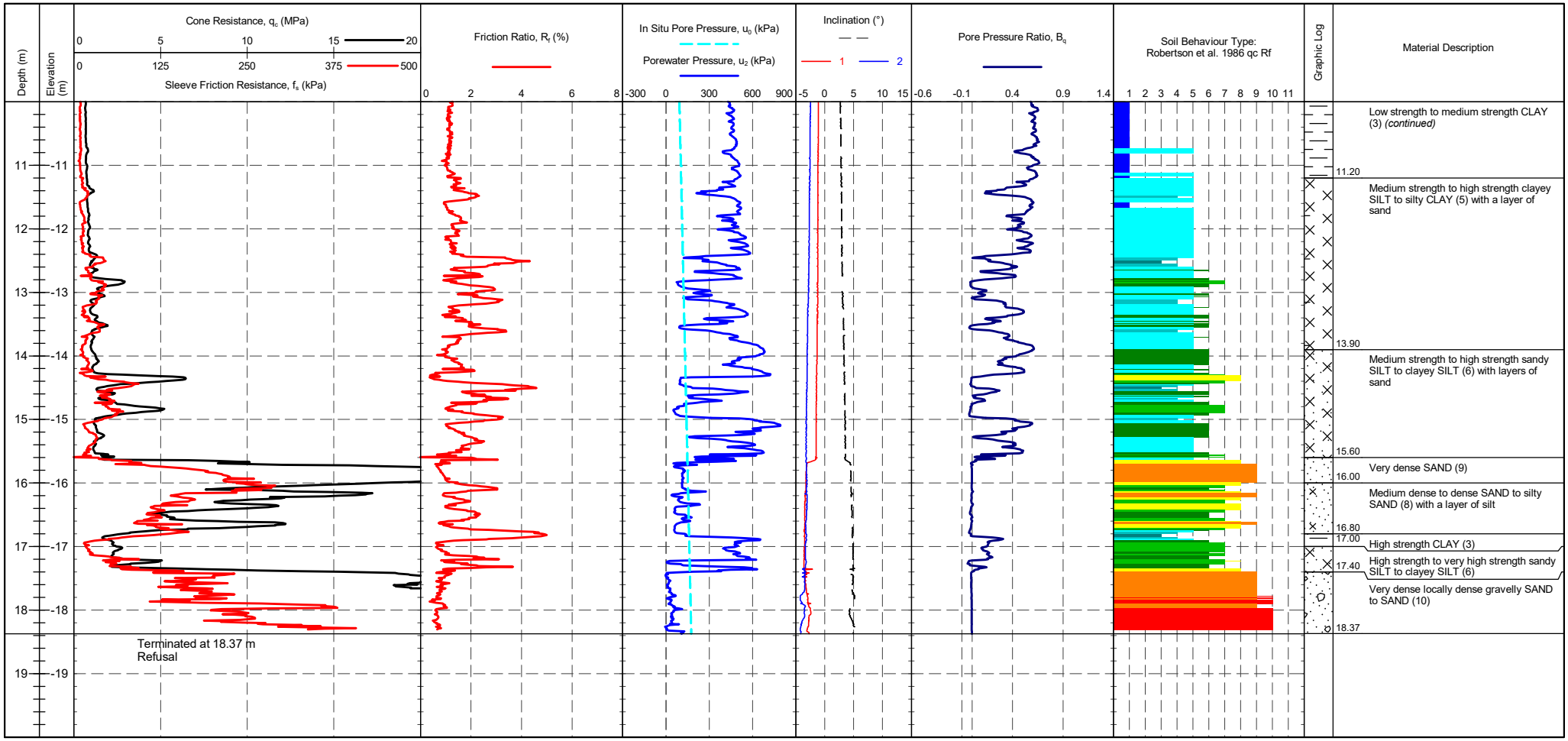
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT03**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 2 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 29/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen
CONE AREA	: 15cm²	OPERATOR	: DR
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None
FILTER POSITION	: u2	WEATHER	: Sunny & Hot
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	256 mV	262 mV	0.069 MPa
Sleeve	325 mV	331 mV	0.004 kPa
Pore Pressure 2	273 mV	283 mV	0.003 kPa
X-Y Inclinometer	2466 mV	2522 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

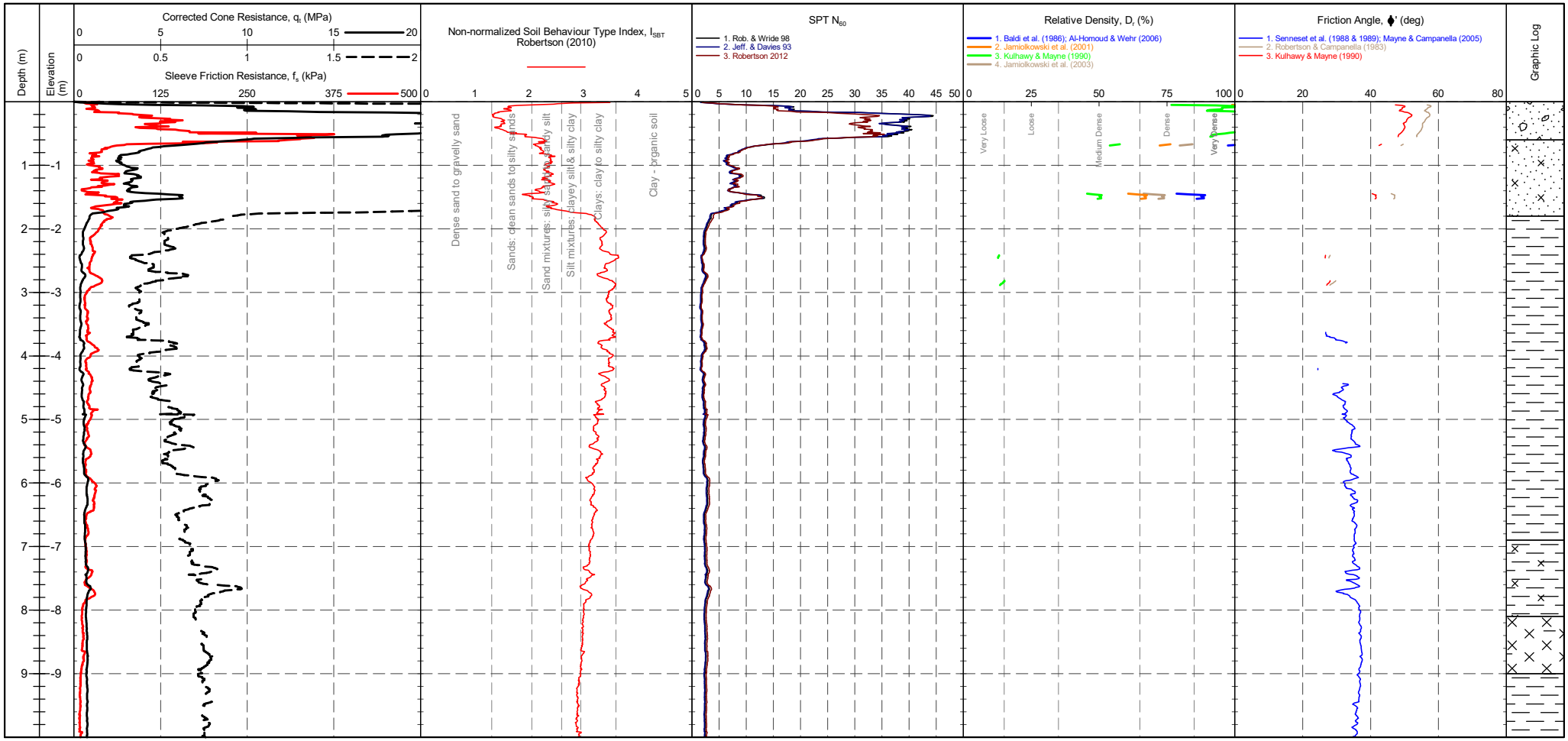
PointID: **CPT03**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 1 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	256 mV	262 mV	0.069 MPa
Sleeve	325 mV	331 mV	0.004 kPa
Pore Pressure 2	273 mV	283 mV	0.003 kPa
X-Y Inclinometer	2466 mV	2522 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

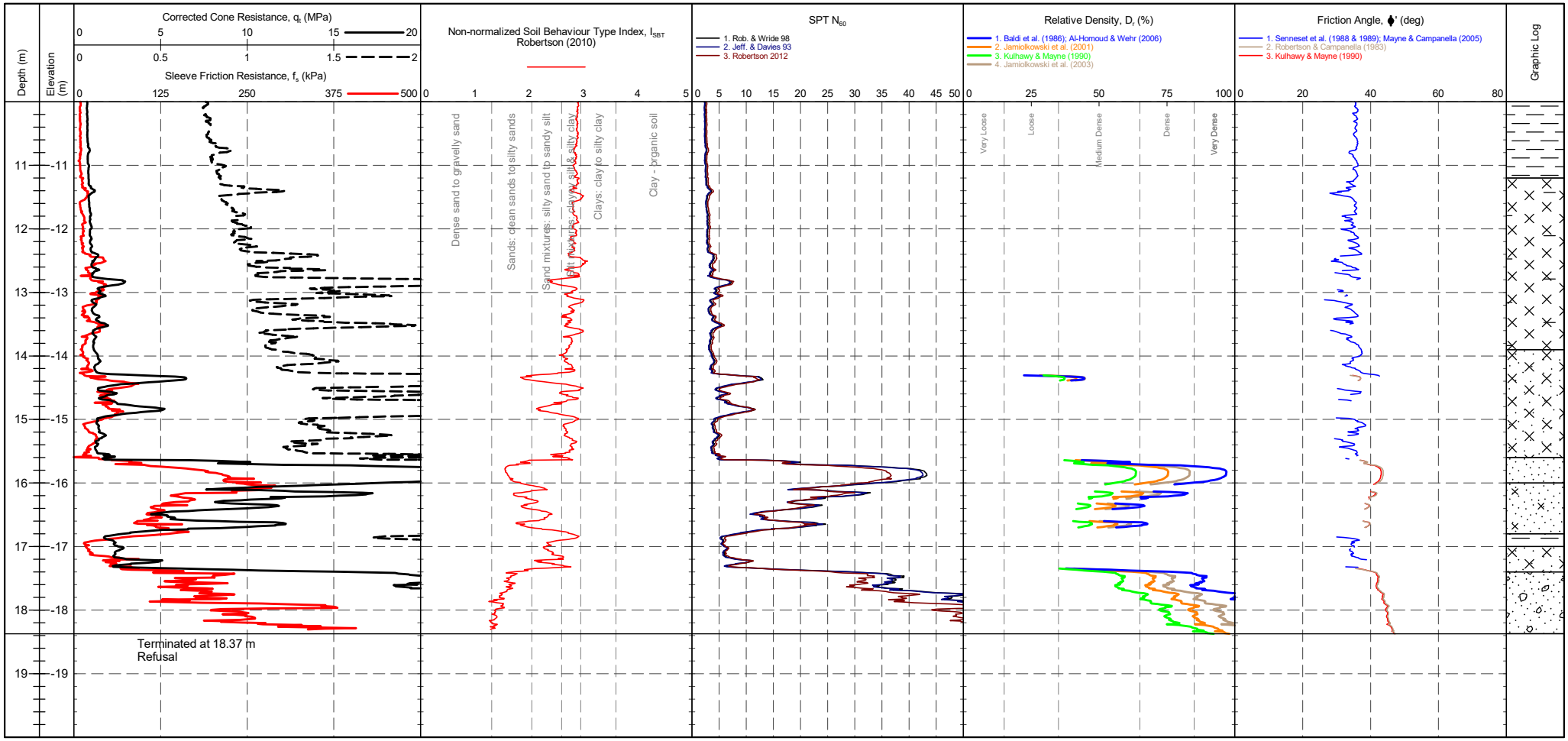
PointID: **CPT03**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136
CONE MODEL	: Subtraction
CONE AREA	: 15cm²
CONE AREA RATIO	: 0.79
FILTER POSITION	: u2
FILTER TYPE	: HDPE

TEST TYPE	: TE2
APPLICATION CLASS	: 2
RIG	: CPT 017 - Griffen
OPERATOR	: DR
FRICTION REDUCER	: None
WEATHER	: Sunny & Hot

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	256 mV	262 mV	0.069 MPa
Sleeve	325 mV	331 mV	0.004 kPa
Pore Pressure 2	273 mV	283 mV	0.003 kPa
X-Y Inclinometer	2466 mV	2522 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

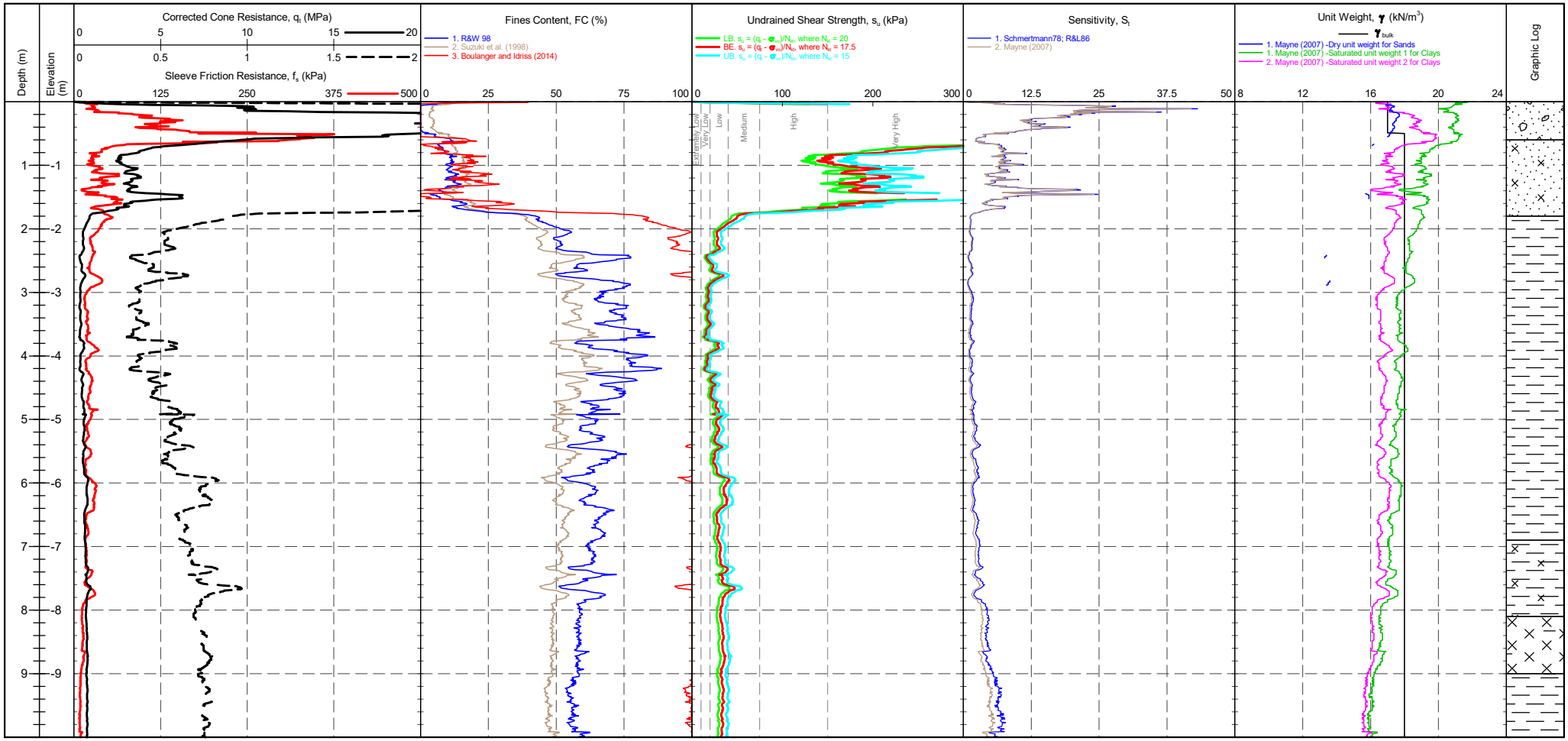
Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

PointID: **CPT03**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 1 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 29/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen	Tip	256 mV	262 mV	0.069 MPa
CONE AREA RATIO	: 0.79	OPERATOR	: DR	Sleeve	325 mV	331 mV	0.004 kPa
FILTER POSITION	: u2	FRICTION REDUCER	: None	Pore Pressure 2	273 mV	283 mV	0.003 kPa
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot	X-Y Inclinometer	2466 mV	2522 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)	Term based on measurement	su (kPa)
Extremely low strength	<10	Medium strength	40-75
Very low strength	10-20	High strength	75-150
Low strength	20-40	Very high strength	150-300
		Extremely high strength	>300

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

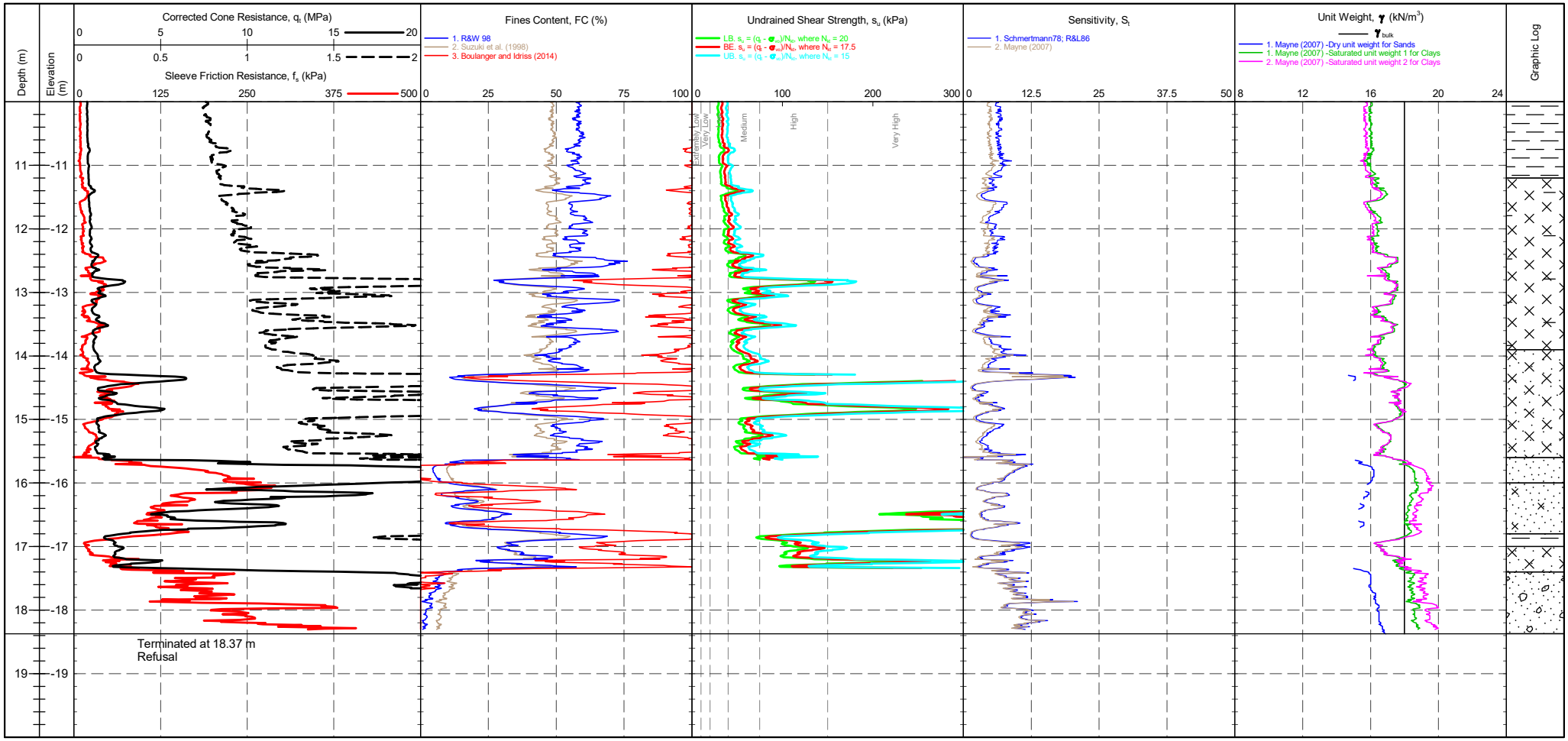
PointID: **CPT03**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



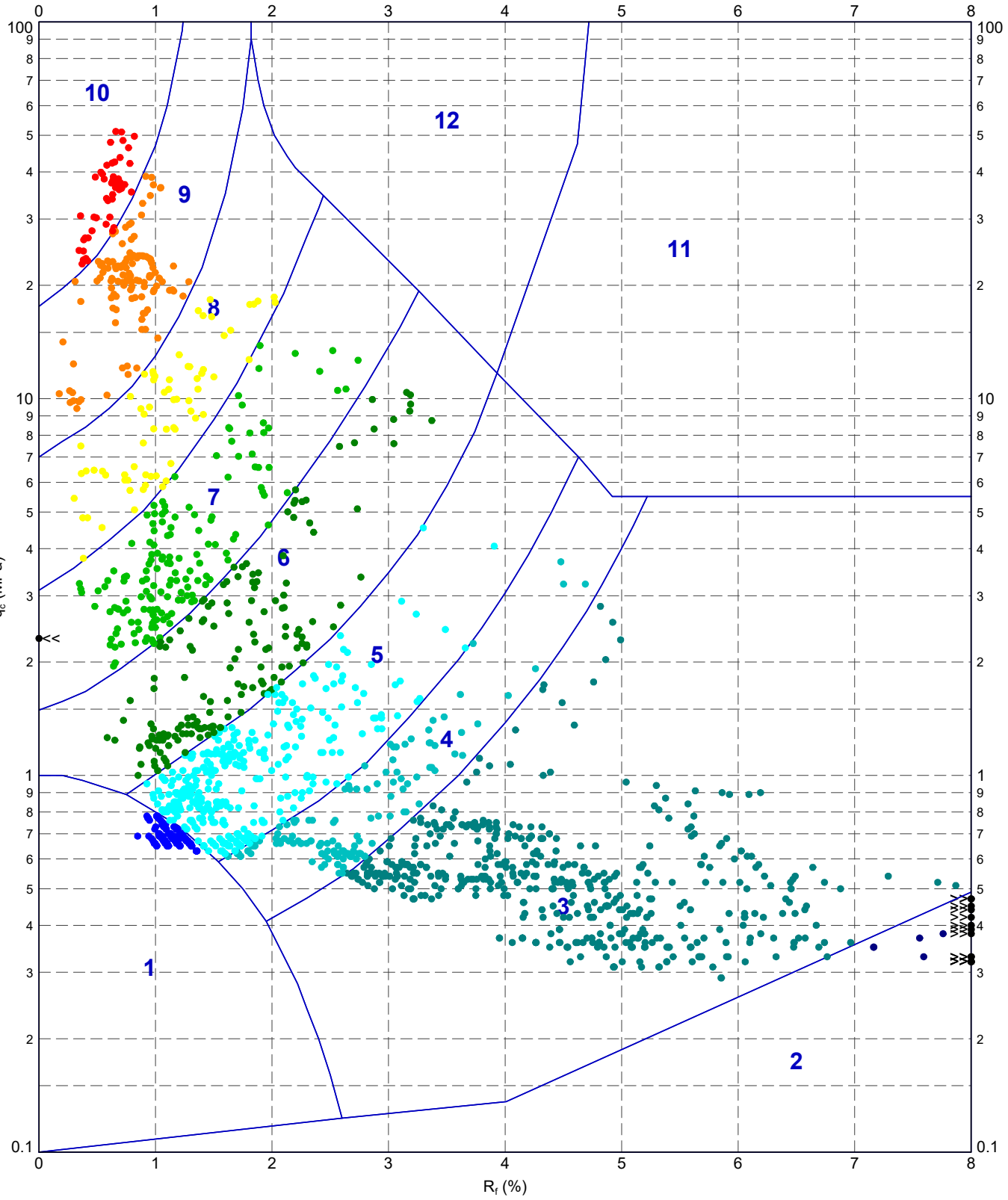
CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen	Tip	256 mV	262 mV	0.069 MPa
CONE AREA RATIO	: 0.79	OPERATOR	: DR	Sleeve	325 mV	331 mV	0.004 kPa
FILTER POSITION	: u2	FRICTION REDUCER	: None	Pore Pressure 2	273 mV	283 mV	0.003 kPa
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot	X-Y Inclinometer	2466 mV	2522 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)	Term based on measurement	su (kPa)
Extremely low strength	<10	Medium strength	40-75
Very low strength	10-20	High strength	75-150
Low strength	20-40	Very high strength	150-300
		Extremely high strength	>300

Groundwater Level

Dissipation Test



METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 2 - Organic material
- 3 - CLAY
- 4 - Silty CLAY to CLAY
- 5 - Clayey SILT to silty CLAY
- 6 - Sandy SILT to clayey SILT
- 7 - Silty SAND to sandy SILT
- 8 - SAND to silty SAND
- 9 - SAND
- 10 - Gravelly SAND to SAND
- 11 - Very stiff fine grained
- 12 - SAND to clayey SAND

IN SITU SITE INVESTIGATION

TITLE

ABO Consultancy
Newport
ABO-Alexandra Docks Newport
Robertson et al. 1986 q_c vs. R_f - CPT03

DRAWN	DATE 14/08/2024
CHECKED	DATE 14/08/2024
SCALE Not To Scale	A4
PROJECT No 1240354	FIGURE No

220629-ADVANCED REPORT INSITUSI 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. RF A4P 1240354-ABO-ALEXANDRA DOCKS NEWPORT.GPJ <<DrawingFile>> 14/08/2024 13:10 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Prj: In Situ SI 2.02.0 2017-07-10

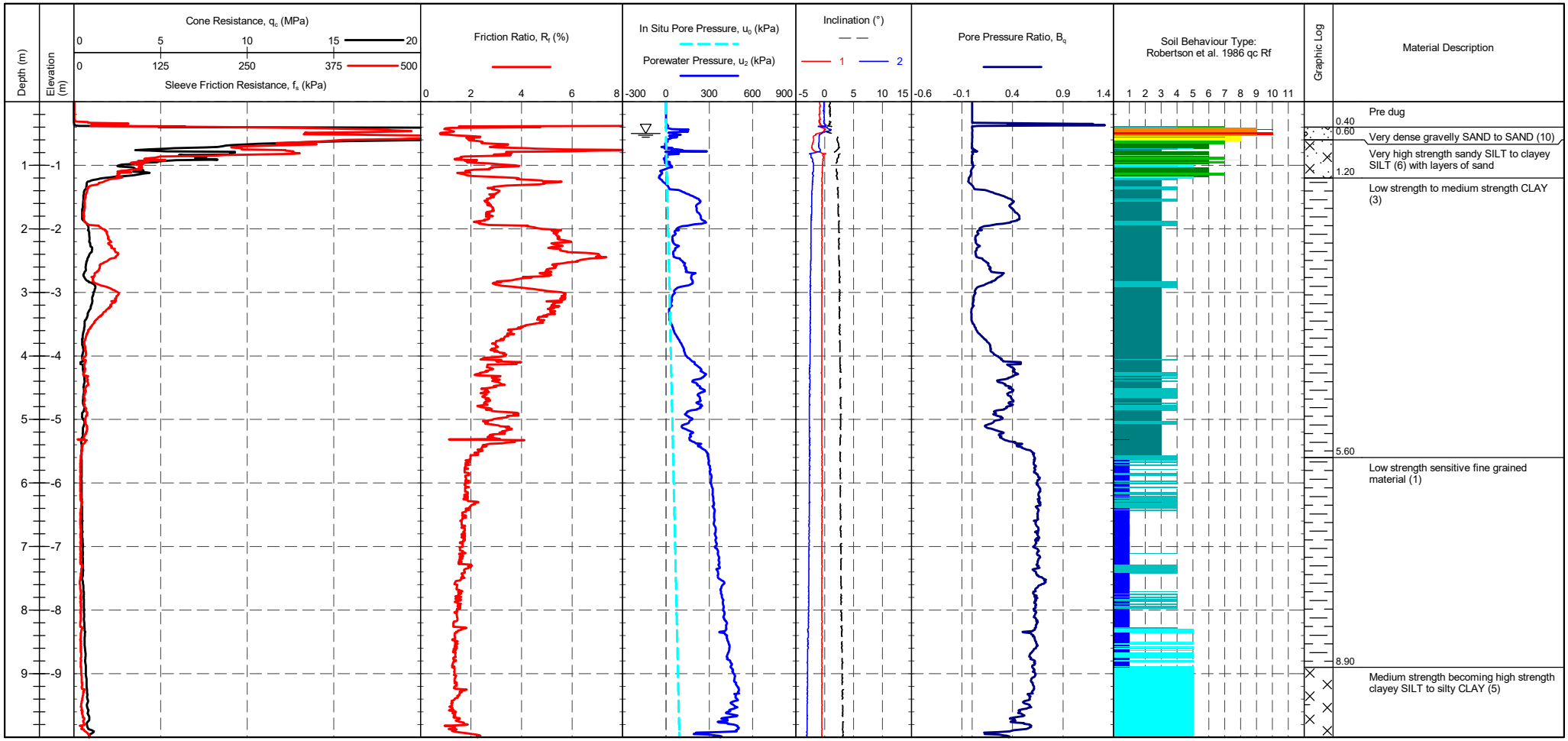
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT04**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 1 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 29/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2		
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen		
CONE AREA	: 15cm²	OPERATOR	: DR		
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None		
FILTER POSITION	: u2	WEATHER	: Sunny & Hot		
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	255 mV	261 mV	0.069 MPa
Sleeve	323 mV	328 mV	0.004 kPa
Pore Pressure 2	273 mV	284 mV	0.003 kPa
X-Y Inclinometer	2473 mV	2472 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 01

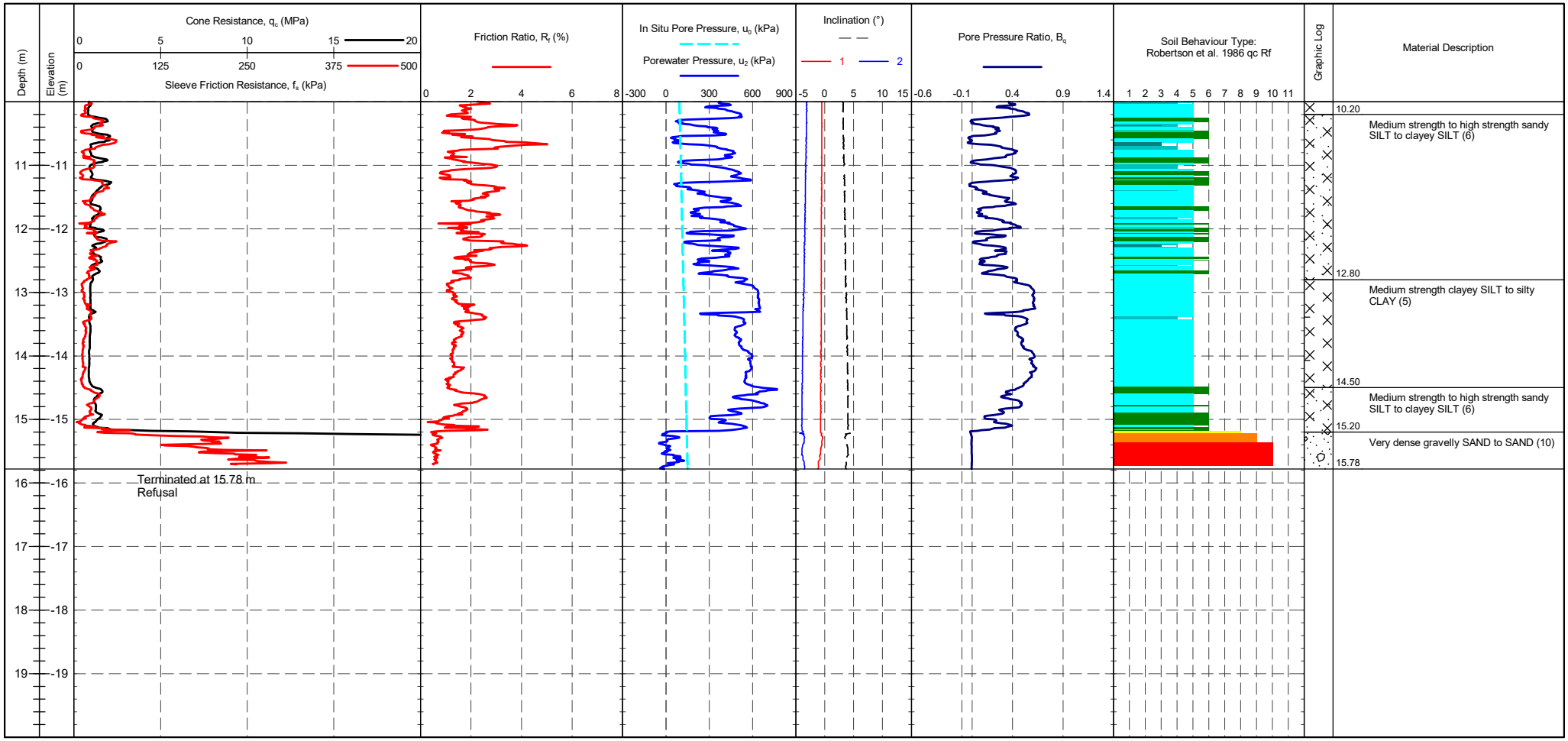
PointID: **CPT04**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen
CONE AREA	: 15cm²	OPERATOR	: DR
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None
FILTER POSITION	: u2	WEATHER	: Sunny & Hot
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	255 mV	261 mV	0.069 MPa
Sleeve	323 mV	328 mV	0.004 kPa
Pore Pressure 2	273 mV	284 mV	0.003 kPa
X-Y Inclinometer	2473 mV	2472 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level
Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

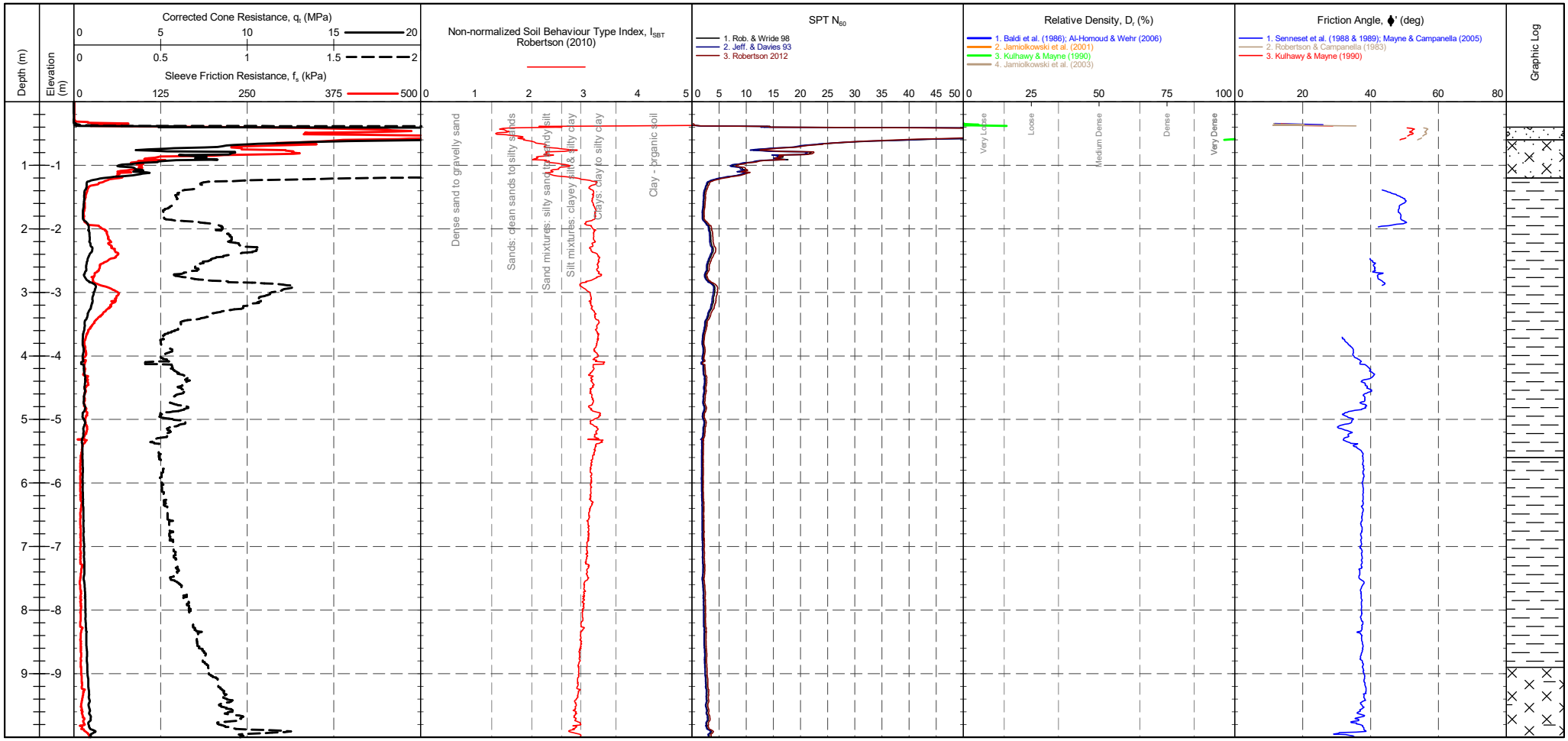
PointID **CPT04**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 1 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	255 mV	261 mV	0.069 MPa
Sleeve	323 mV	328 mV	0.004 kPa
Pore Pressure 2	273 mV	284 mV	0.003 kPa
X-Y Inclinometer	2473 mV	2472 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

CPT LOG 02

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

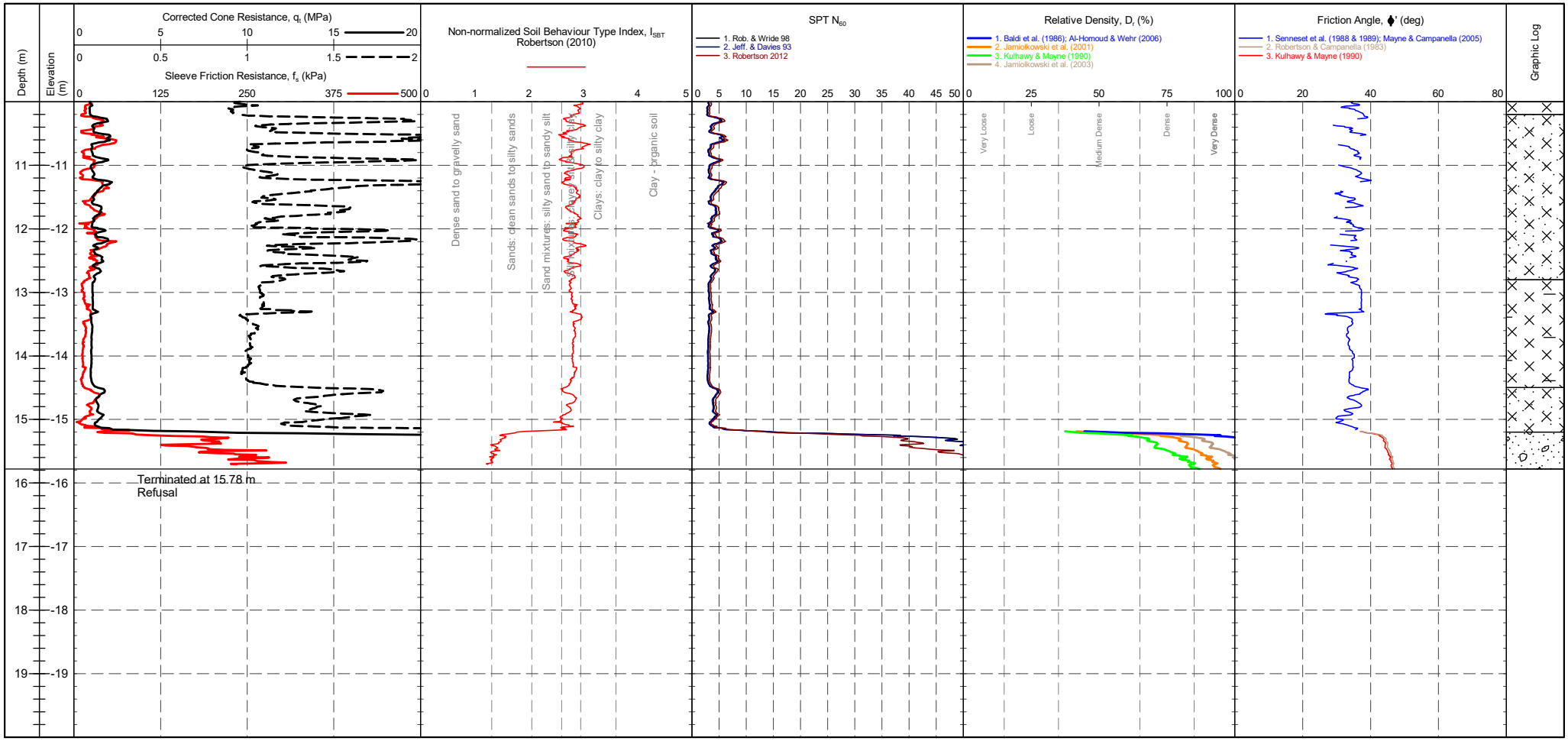
PointID: **CPT04**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	255 mV	261 mV	0.069 MPa
Sleeve	323 mV	328 mV	0.004 kPa
Pore Pressure 2	273 mV	284 mV	0.003 kPa
X-Y Inclinometer	2473 mV	2472 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 03

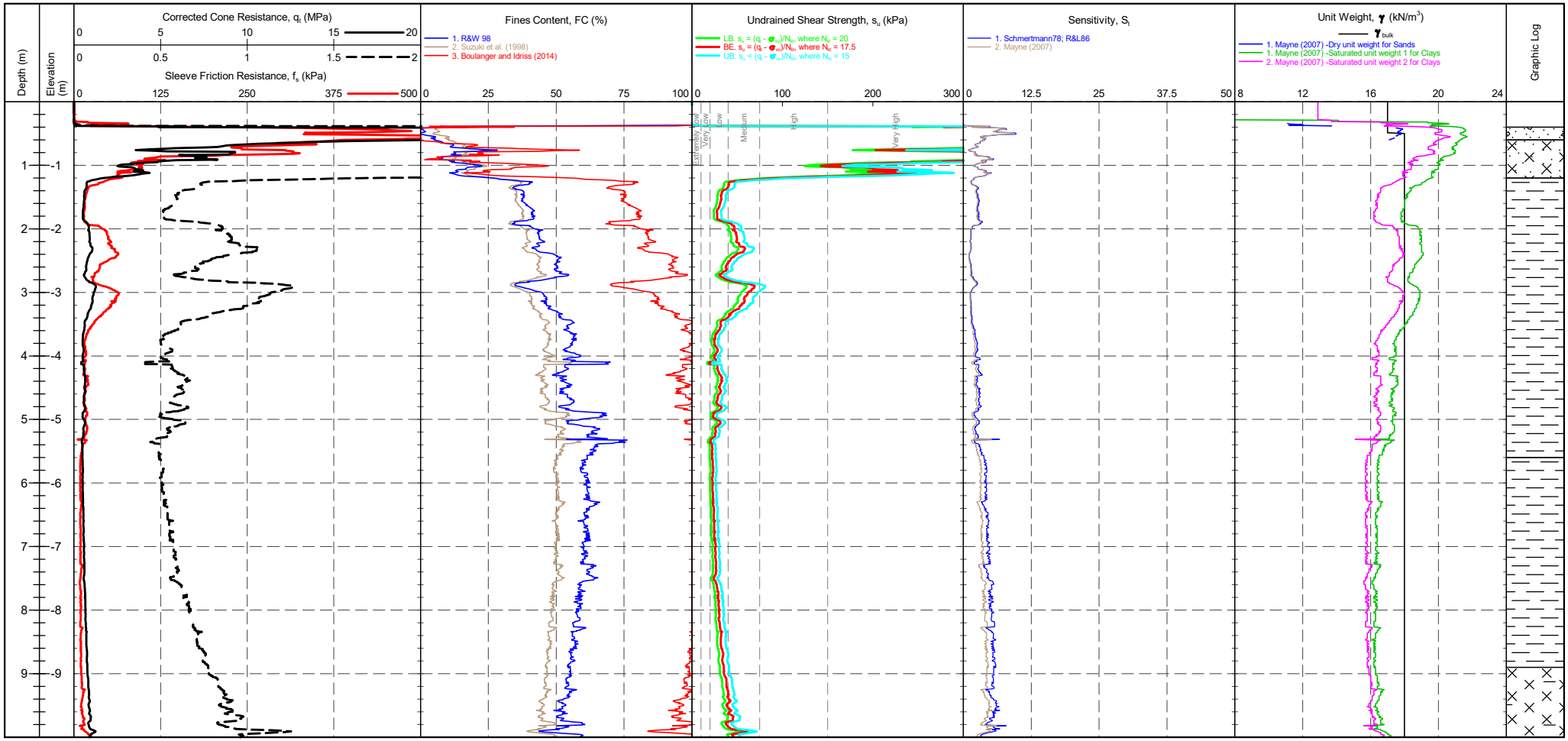
PointID: **CPT04**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 1 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	255 mV	261 mV	0.069 MPa
Sleeve	323 mV	328 mV	0.004 kPa
Pore Pressure 2	273 mV	284 mV	0.003 kPa
X-Y Inclinometer	2473 mV	2472 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)	Term based on measurement	su (kPa)
Extremely low strength	<10	Medium strength	40-75
Very low strength	10-20	High strength	75-150
Low strength	20-40	Very high strength	150-300
		Extremely high strength	>300

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

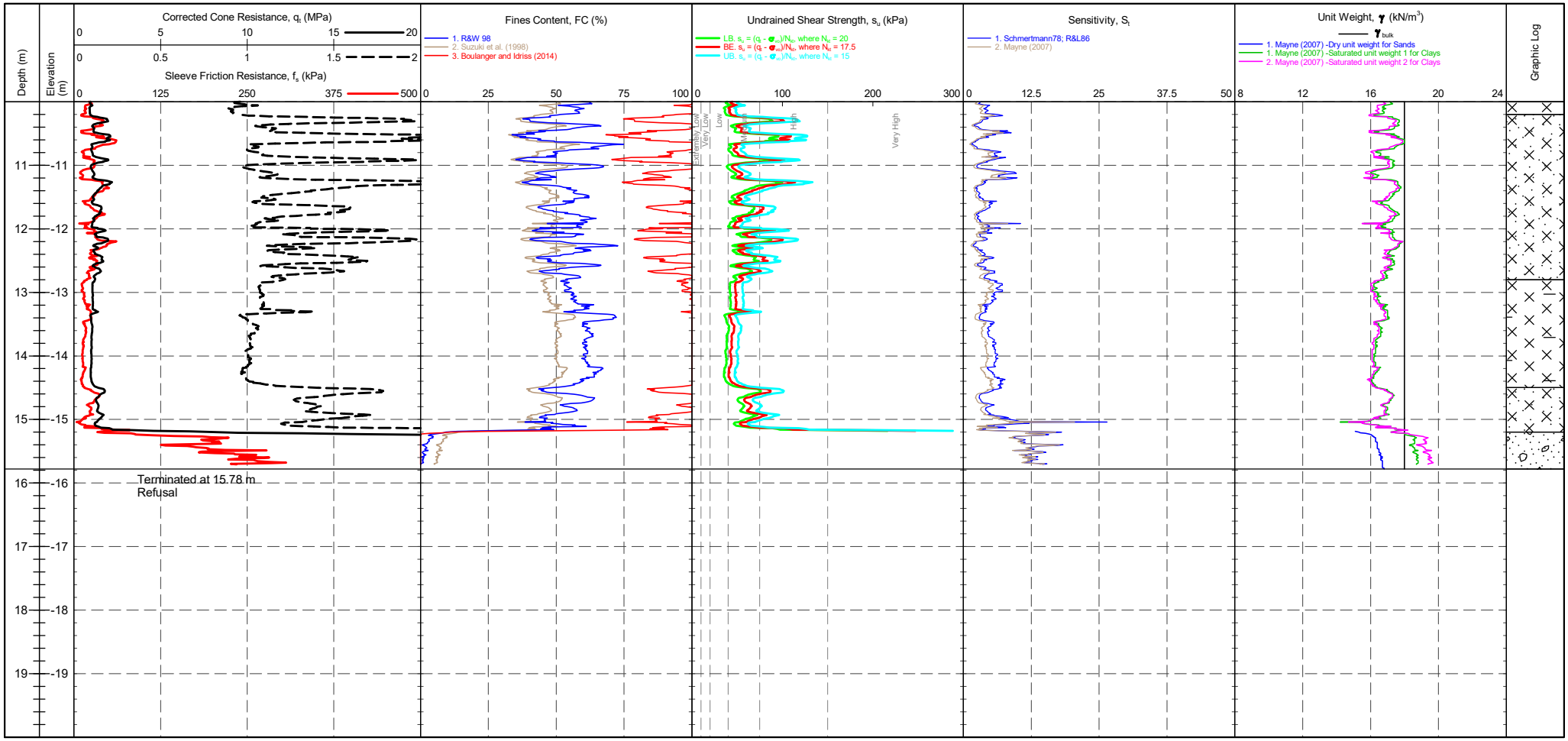
PointID: **CPT04**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

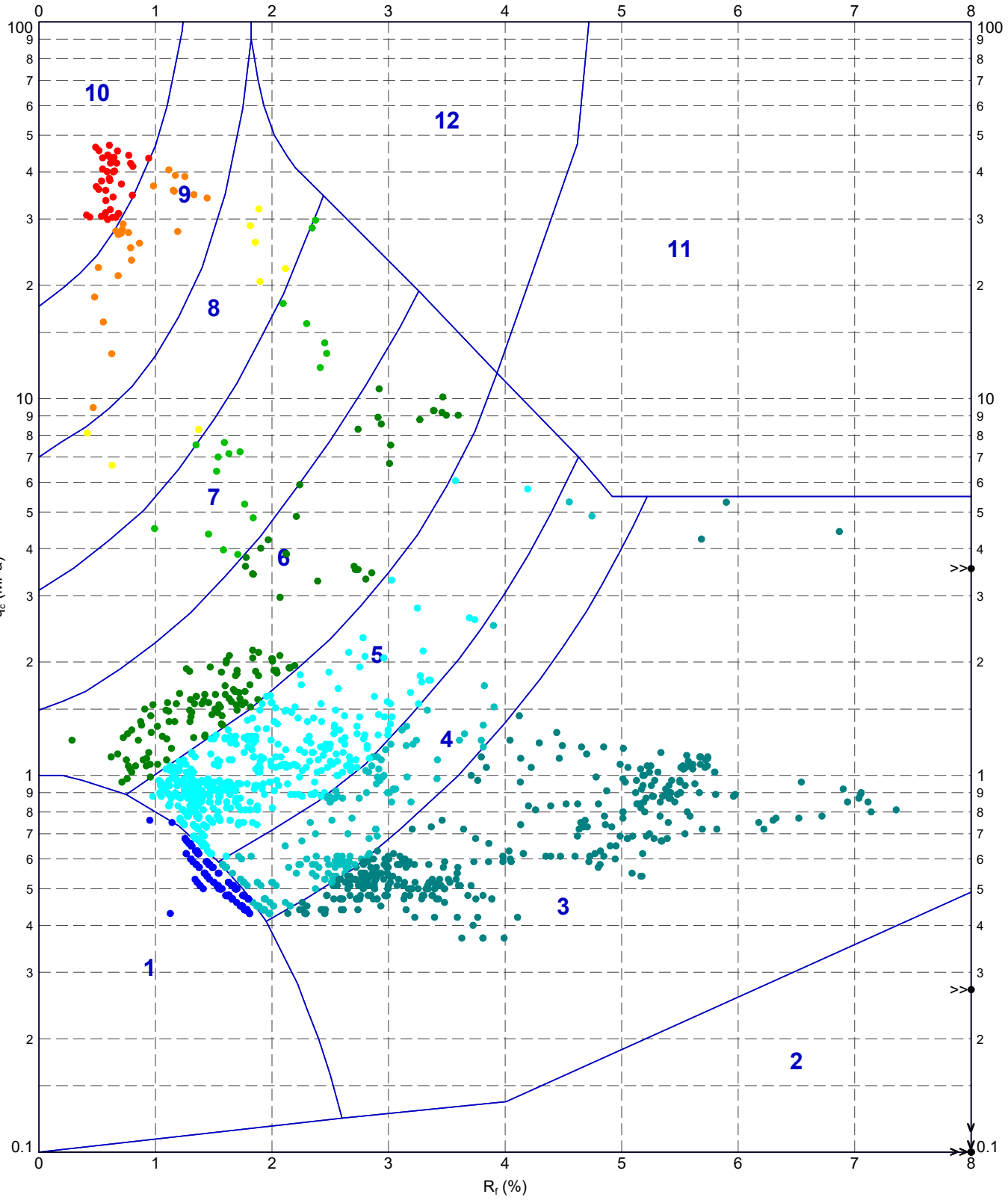
Transducer	Pre	Post	Difference
Tip	255 mV	261 mV	0.069 MPa
Sleeve	323 mV	328 mV	0.004 kPa
Pore Pressure 2	273 mV	284 mV	0.003 kPa
X-Y Inclinometer	2473 mV	2472 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)
Extremely low strength	<10
Very low strength	10-20
Low strength	20-40
Medium strength	40-75
High strength	75-150
Very high strength	150-300
Extremely high strength	>300

Groundwater Level

Dissipation Test



METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 2 - Organic material
- 3 - CLAY
- 4 - Silty CLAY to CLAY
- 5 - Clayey SILT to silty CLAY
- 6 - Sandy SILT to clayey SILT
- 7 - Silty SAND to sandy SILT
- 8 - SAND to silty SAND
- 9 - SAND
- 10 - Gravelly SAND to SAND
- 11 - Very stiff fine grained
- 12 - SAND to clayey SAND

IN SITU SITE INVESTIGATION

TITLE

ABO Consultancy
Newport
ABO-Alexandra Docks Newport
Robertson et al. 1986 q_c vs. R_f - CPT04

DRAWN	DATE 14/08/2024	
CHECKED	DATE 14/08/2024	
SCALE Not To Scale		A4
PROJECT No 1240354	FIGURE No	

220629-ADVANCED REPORT INSITUSI 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. RF A4P 1240354-ABO-ALEXANDRA DOCKS NEWPORT.GPJ <<DrawingFile>> 14/08/2024 13:11 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Prj: In Situ SI 2.02.0 2017-07-10

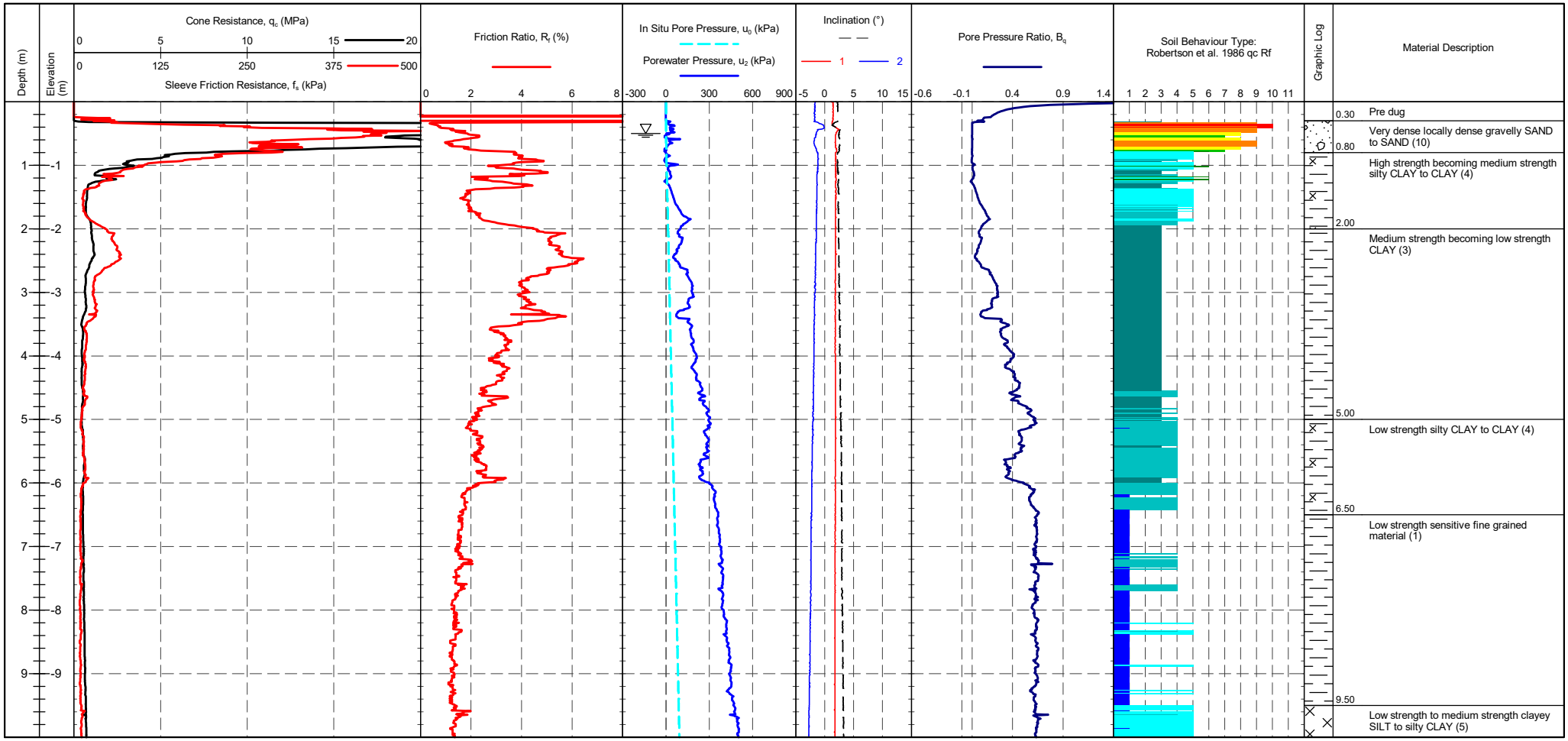
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT05**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 1 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 29/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID : S15-CFIP.2136	TEST TYPE : TE2		
CALIBRATION DATE : 20/06/2023	APPLICATION CLASS : 2		
CONE MODEL : Subtraction	RIG : CPT 017 - Griffen		
CONE AREA : 15cm^2	OPERATOR : DR		
CONE AREA RATIO : 0.79	FRICTION REDUCER : None		
FILTER POSITION : u2	WEATHER : Sunny & Hot		
FILTER TYPE : HDPE	GROUNDWATER DEPTH : Assumed for calculation purposes		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	256 mV	259 mV	0.035 MPa
Sleeve	325 mV	327 mV	0.001 kPa
Pore Pressure 2	279 mV	290 mV	0.003 kPa
X-Y Inclinometer	2661 mV	2693 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

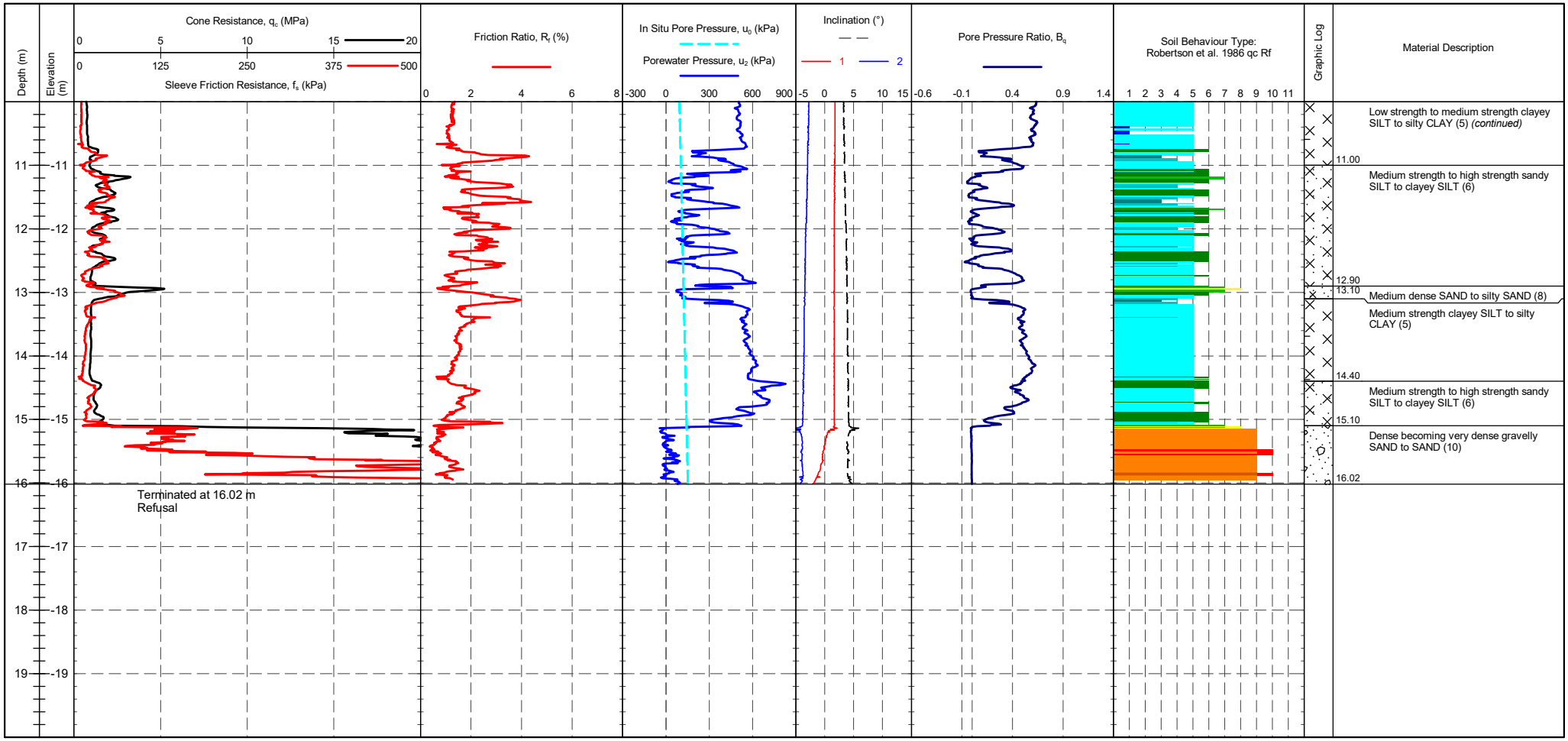
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT05**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 2 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 29/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen
CONE AREA	: 15cm^2	OPERATOR	: DR
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None
FILTER POSITION	: u2	WEATHER	: Sunny & Hot
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	256 mV	259 mV	0.035 MPa
Sleeve	325 mV	327 mV	0.001 kPa
Pore Pressure 2	279 mV	290 mV	0.003 kPa
X-Y Inclinometer	2661 mV	2693 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

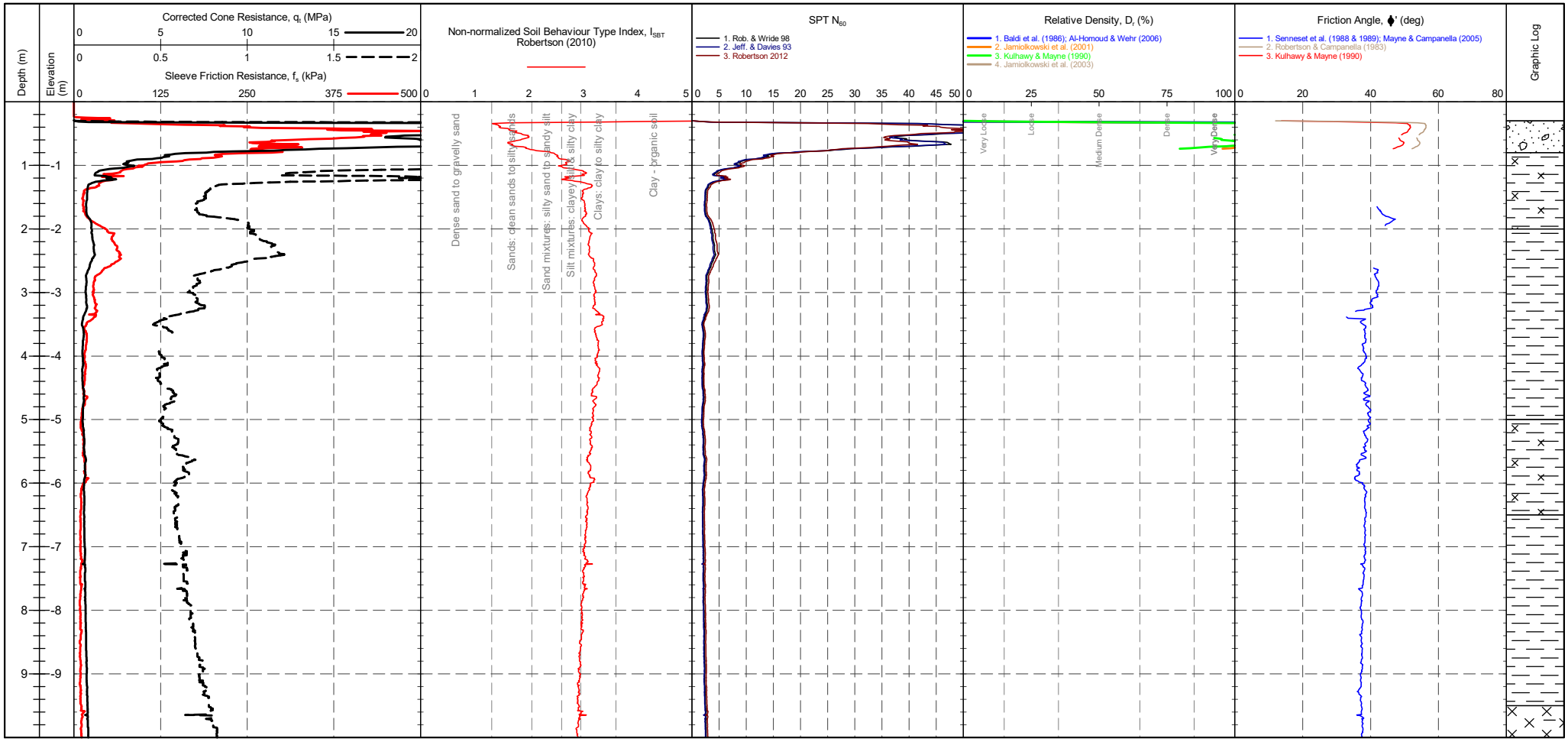
PointID **CPT05**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 1 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136
CONE MODEL	: Subtraction
CONE AREA	: 15cm²
CONE AREA RATIO	: 0.79
FILTER POSITION	: u2
FILTER TYPE	: HDPE

TEST TYPE	: TE2
APPLICATION CLASS	: 2
RIG	: CPT 017 - Griffen
OPERATOR	: DR
FRICTION REDUCER	: None
WEATHER	: Sunny & Hot

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	256 mV	259 mV	0.035 MPa
Sleeve	325 mV	327 mV	0.001 kPa
Pore Pressure 2	279 mV	290 mV	0.003 kPa
X-Y Inclinometer	2661 mV	2693 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

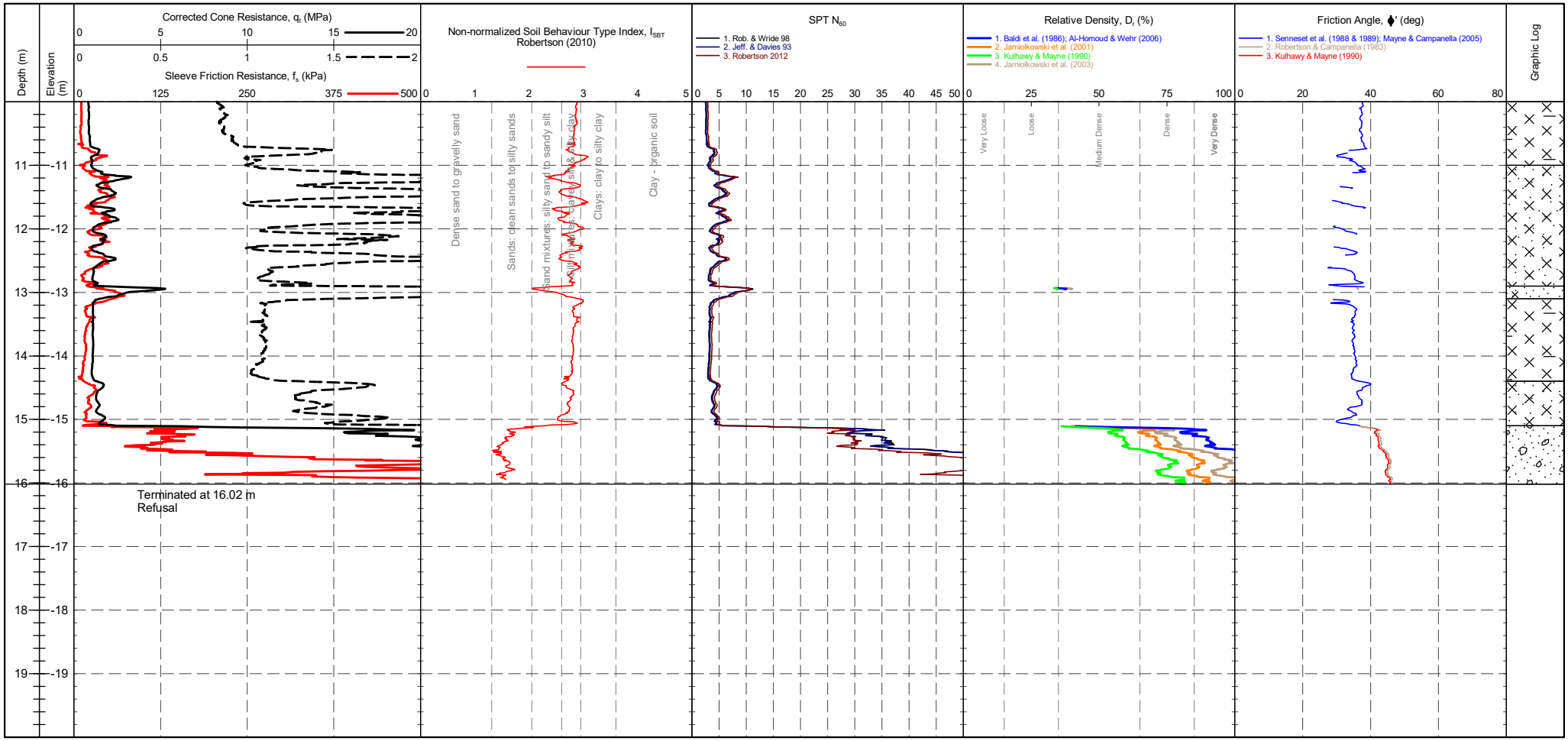
PointID **CPT05**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	256 mV	259 mV	0.035 MPa
Sleeve	325 mV	327 mV	0.001 kPa
Pore Pressure 2	279 mV	290 mV	0.003 kPa
X-Y Inclinometer	2661 mV	2693 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

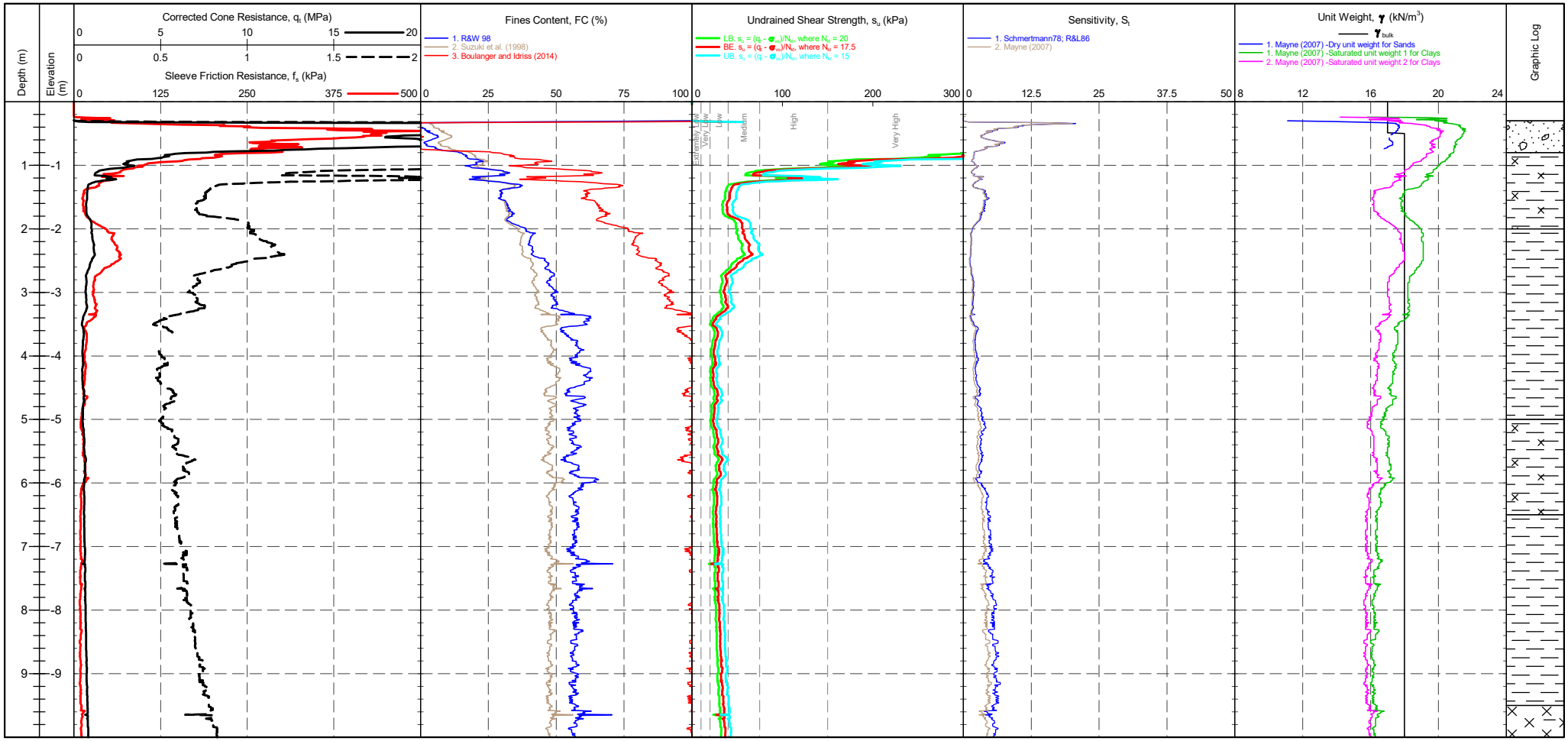
Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

PointID: **CPT05**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 1 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 29/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen	Tip	256 mV	259 mV	0.035 MPa
CONE AREA RATIO	: 0.79	OPERATOR	: DR	Sleeve	325 mV	327 mV	0.001 kPa
FILTER POSITION	: u2	FRICTION REDUCER	: None	Pore Pressure 2	279 mV	290 mV	0.003 kPa
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot	X-Y Inclinometer	2661 mV	2693 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)	Term based on measurement	su (kPa)
Extremely low strength	<10	Medium strength	40-75
Very low strength	10-20	High strength	75-150
Low strength	20-40	Very high strength	150-300
		Extremely high strength	>300

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

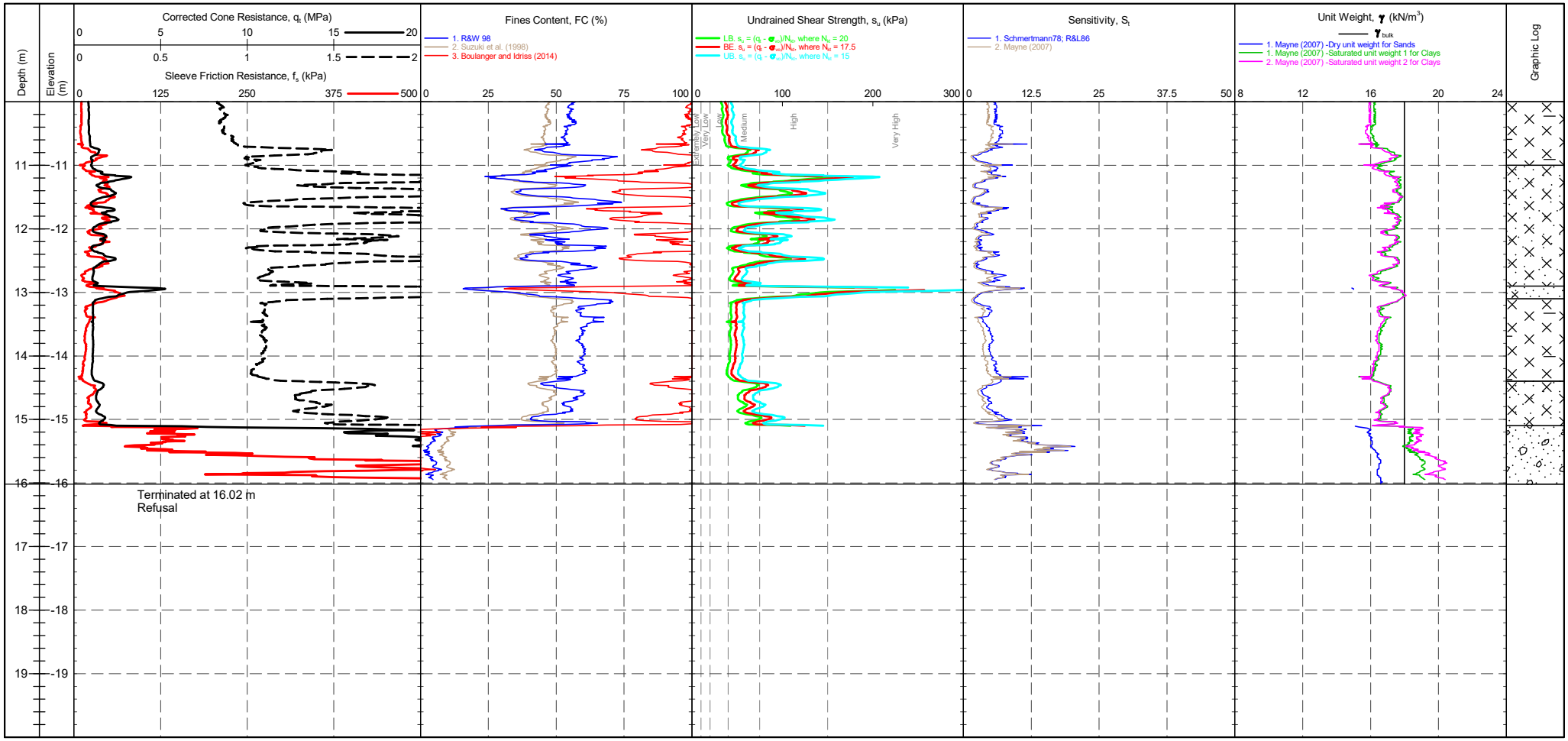
PointID: **CPT05**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



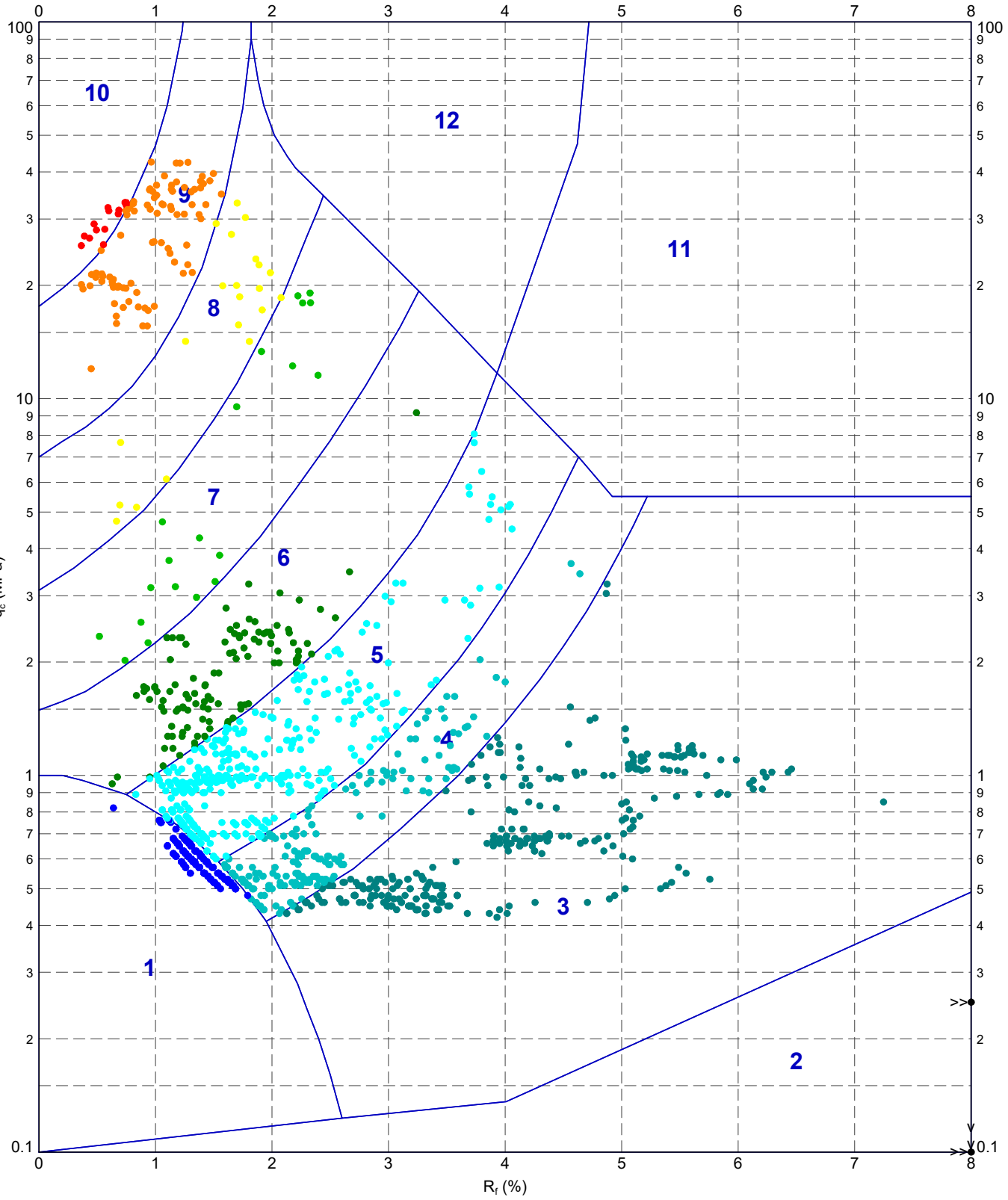
CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen	Tip	256 mV	259 mV	0.035 MPa
CONE AREA RATIO	: 0.79	OPERATOR	: DR	Sleeve	325 mV	327 mV	0.001 kPa
FILTER POSITION	: u2	FRICTION REDUCER	: None	Pore Pressure 2	279 mV	290 mV	0.003 kPa
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot	X-Y Inclinometer	2661 mV	2693 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)	Term based on measurement	su (kPa)
Extremely low strength	<10	Medium strength	40-75
Very low strength	10-20	High strength	75-150
Low strength	20-40	Very high strength	150-300
		Extremely high strength	>300

Groundwater Level

Dissipation Test



METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material	4 - Silty CLAY to CLAY	7 - Silty SAND to sandy SILT	10 - Gravelly SAND to SAND
2 - Organic material	5 - Clayey SILT to silty CLAY	8 - SAND to silty SAND	11 - Very stiff fine grained
3 - CLAY	6 - Sandy SILT to clayey SILT	9 - SAND	12 - SAND to clayey SAND

IN SITU SITE INVESTIGATION

TITLE

ABO Consultancy
Newport
ABO-Alexandra Docks Newport
Robertson et al. 1986 q_c vs. R_f - CPT05

DRAWN		DATE	14/08/2024
CHECKED		DATE	14/08/2024
SCALE	Not To Scale		A4
PROJECT No	1240354	FIGURE No	

220629-ADVANCED REPORT INSITUSI 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. RF A4P 1240354-ABO-ALEXANDRA DOCKS NEWPORT.GPJ <<DrawingFile>> 14/08/2024 13:12 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Prj: In Situ SI 2.02.0 2017-07-10

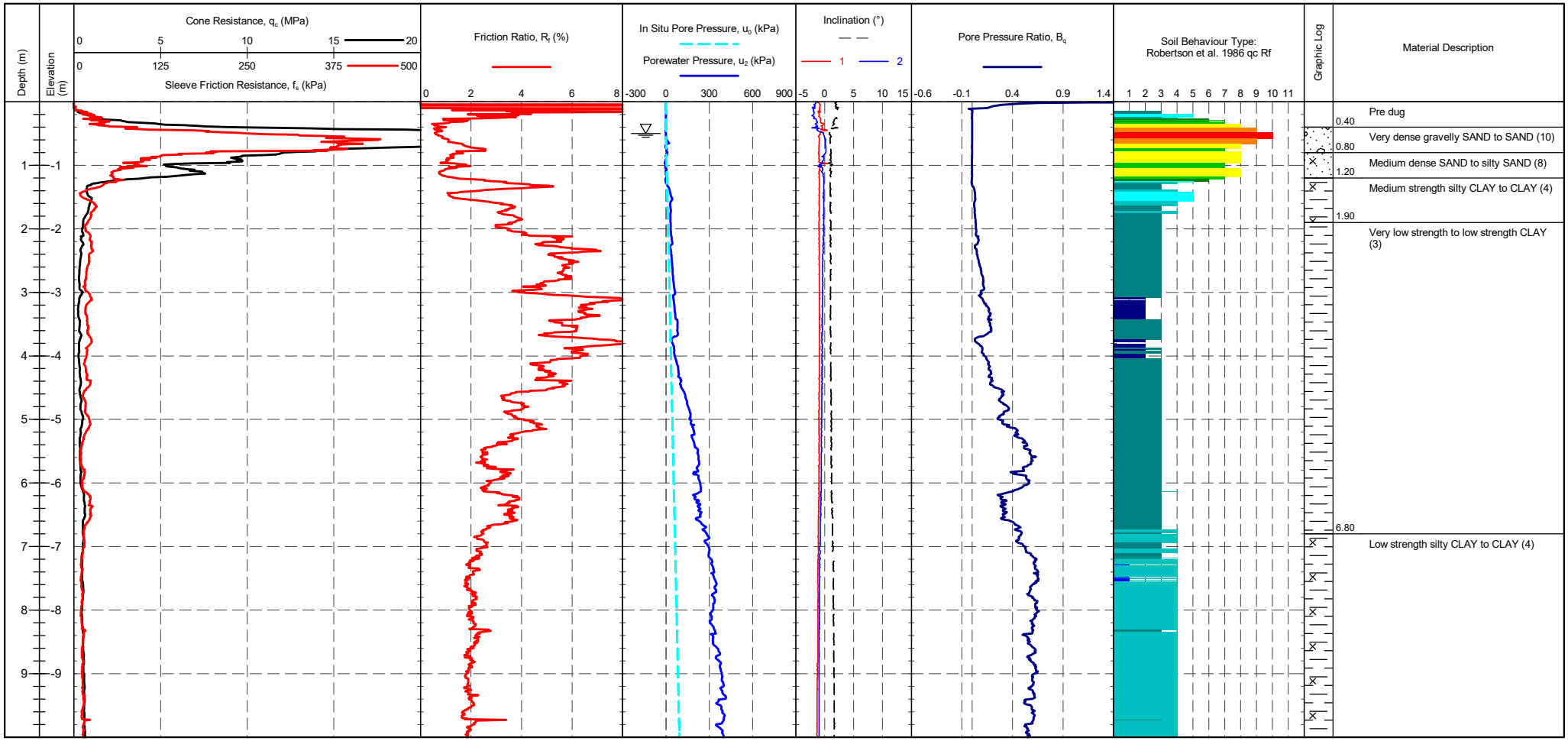
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT06**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 1 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 29/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen
CONE AREA	: 15cm^2	OPERATOR	: DR
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None
FILTER POSITION	: u2	WEATHER	: Sunny & Hot
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	256 mV	262 mV	0.069 MPa
Sleeve	325 mV	330 mV	0.004 kPa
Pore Pressure 2	250 mV	283 mV	0.009 kPa
X-Y Inclinometer	2415 mV	2467 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

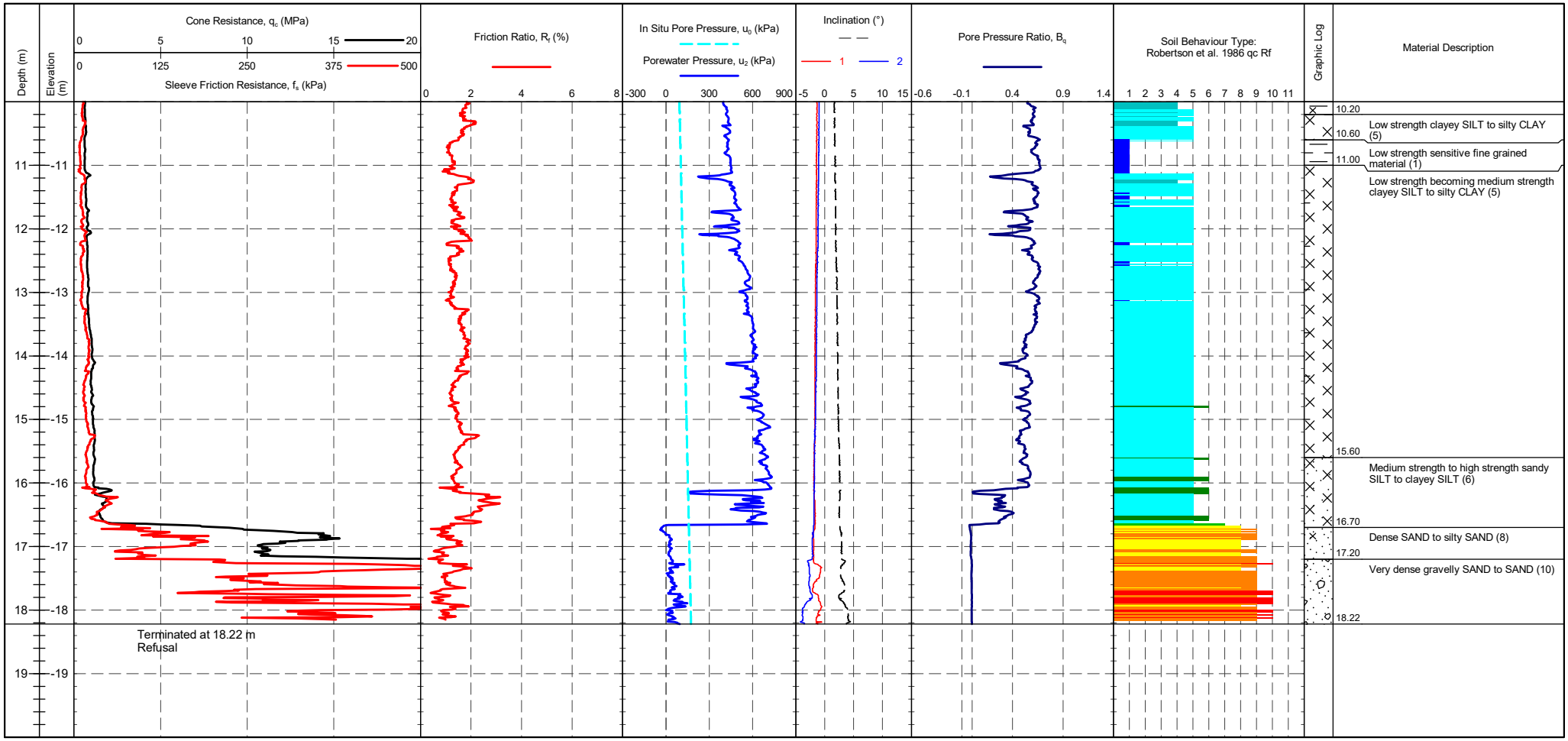
PointID: **CPT06**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen
CONE AREA	: 15cm²	OPERATOR	: DR
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None
FILTER POSITION	: u2	WEATHER	: Sunny & Hot
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	256 mV	262 mV	0.069 MPa
Sleeve	325 mV	330 mV	0.004 kPa
Pore Pressure 2	250 mV	283 mV	0.009 kPa
X-Y Inclinometer	2415 mV	2467 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

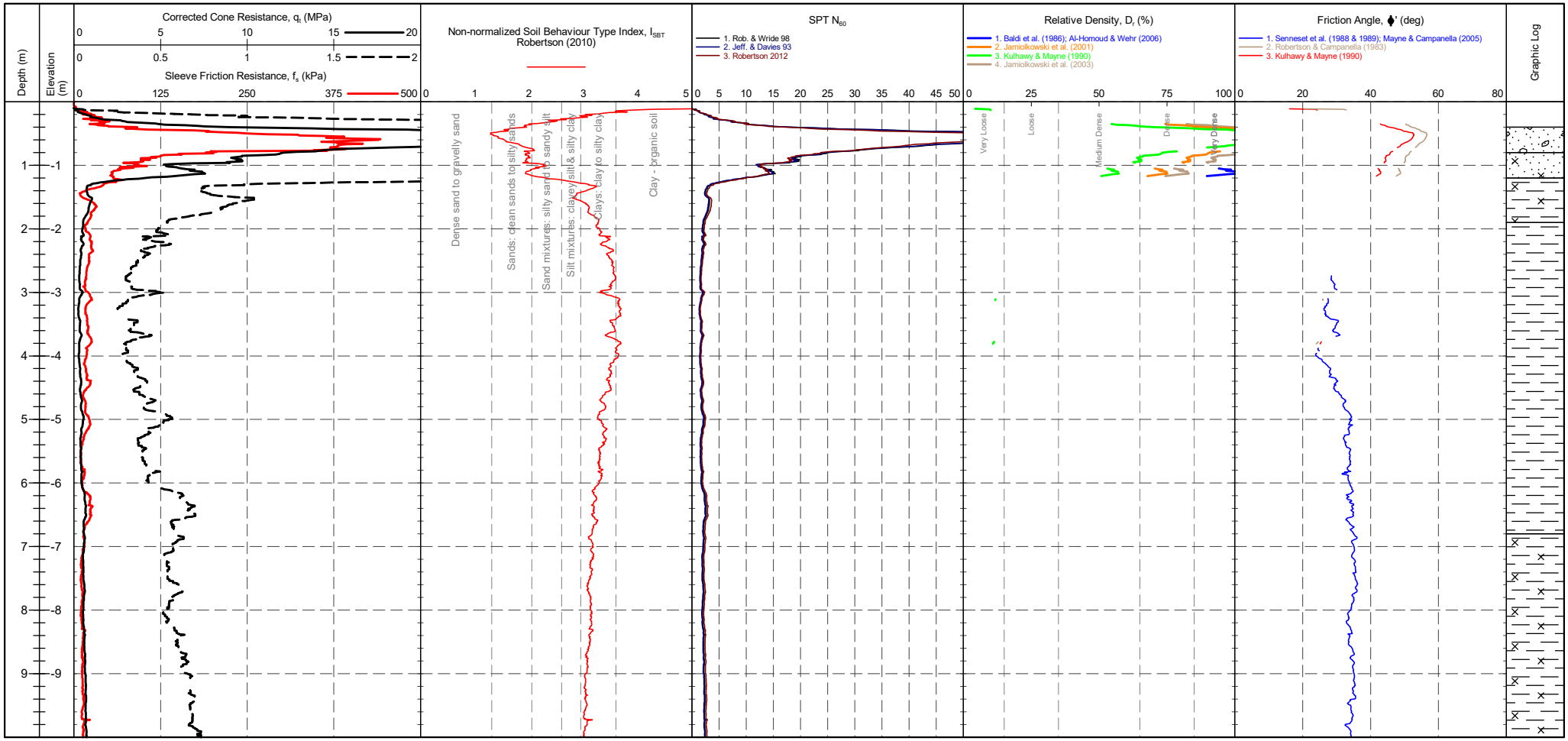
PointID **CPT06**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 1 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	256 mV	262 mV	0.069 MPa
Sleeve	325 mV	330 mV	0.004 kPa
Pore Pressure 2	250 mV	283 mV	0.009 kPa
X-Y Inclinometer	2415 mV	2467 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 02

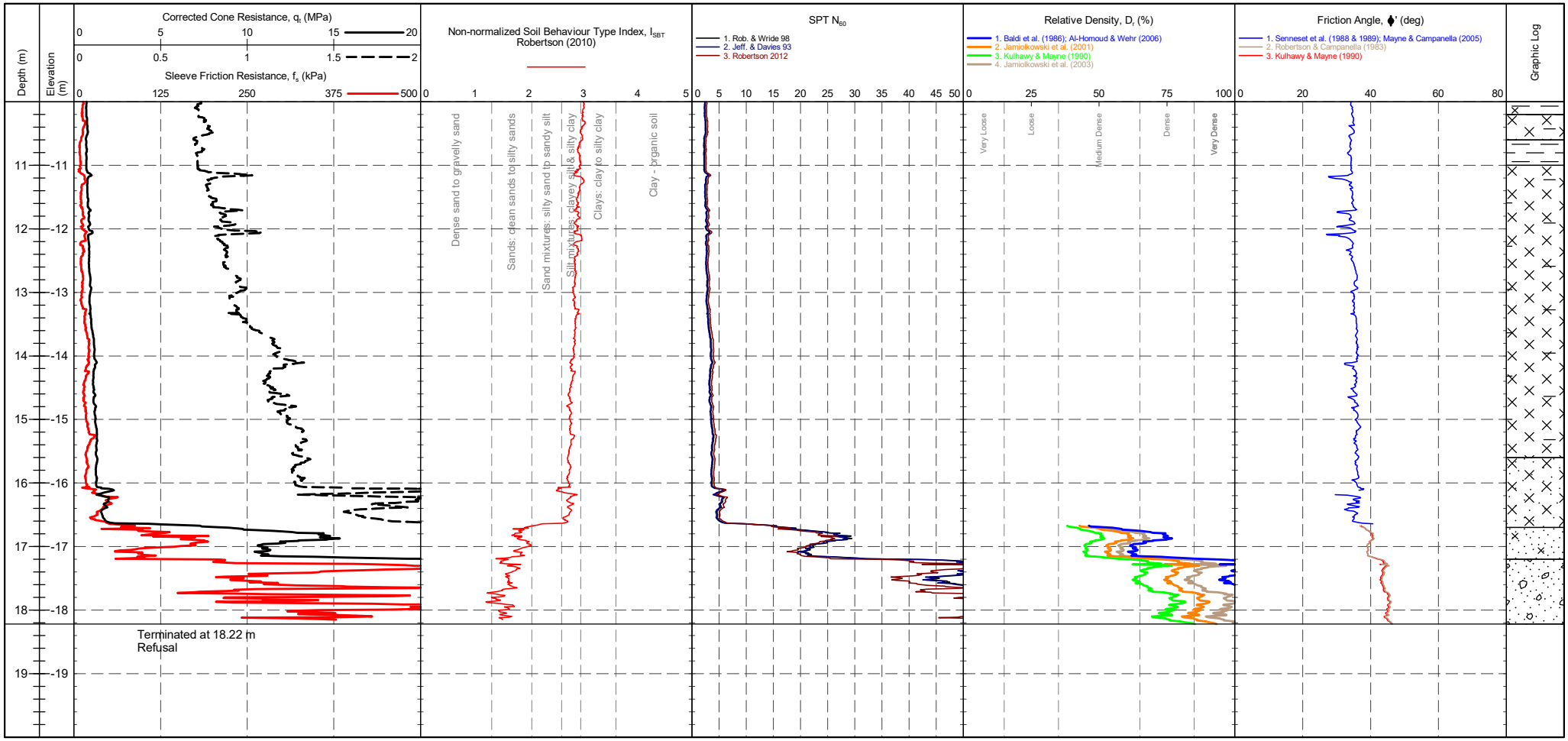
PointID: **CPT06**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	256 mV	262 mV	0.069 MPa
Sleeve	325 mV	330 mV	0.004 kPa
Pore Pressure 2	250 mV	283 mV	0.009 kPa
X-Y Inclinometer	2415 mV	2467 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

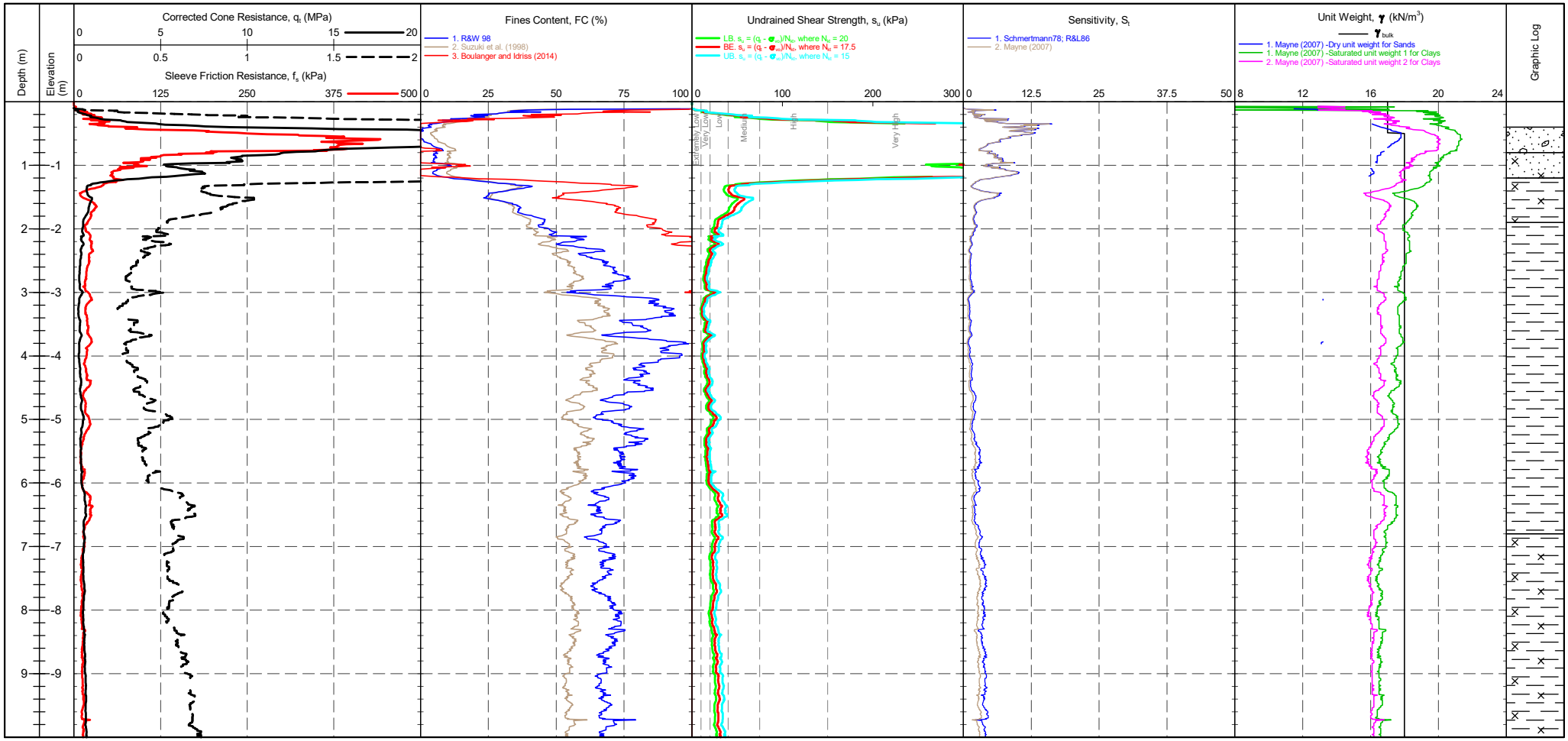
PointID: **CPT06**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING	: 0.000 m
NORTHING	: 0.000 m
ELEVATION	: 0.000 m OD
CHECKED BY	: DW
TERMINATION REASON	: Refusal

Remark:
Test refused on total pressure.

SHEET	: 1 OF 2
STATUS	: Final
TEST DATE	: 29/07/2024
PLOT DATE	: 14/08/2024
METHOD	: ISO 22476-1:2022



CONE ID	: S15-CFIP.2136
CONE MODEL	: Subtraction
CONE AREA	: 15cm^2
CONE AREA RATIO	: 0.79
FILTER POSITION	: u2
FILTER TYPE	: HDPE

TEST TYPE	: TE2
APPLICATION CLASS	: 2
RIG	: CPT 017 - Griffen
OPERATOR	: DR
FRICTION REDUCER	: None
WEATHER	: Sunny & Hot

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	256 mV	262 mV	0.069 MPa
Sleeve	325 mV	330 mV	0.004 kPa
Pore Pressure 2	250 mV	283 mV	0.009 kPa
X-Y Inclinometer	2415 mV	2467 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)
Extremely low strength	<10
Very low strength	10-20
Low strength	20-40

Term based on measurement	su (kPa)
Medium strength	40-75
High strength	75-150
Very high strength	150-300
Extremely high strength	>300

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

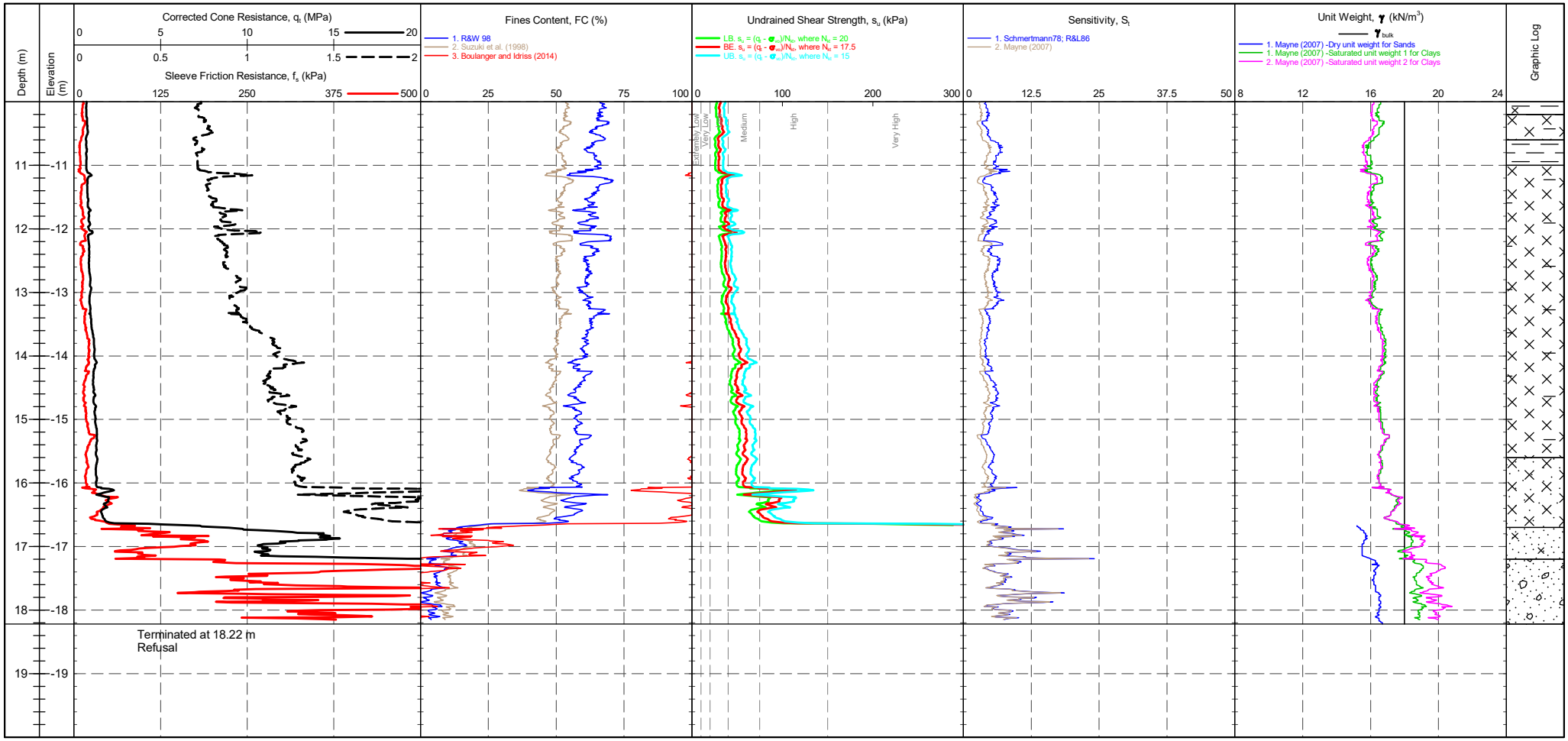
PointID: **CPT06**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



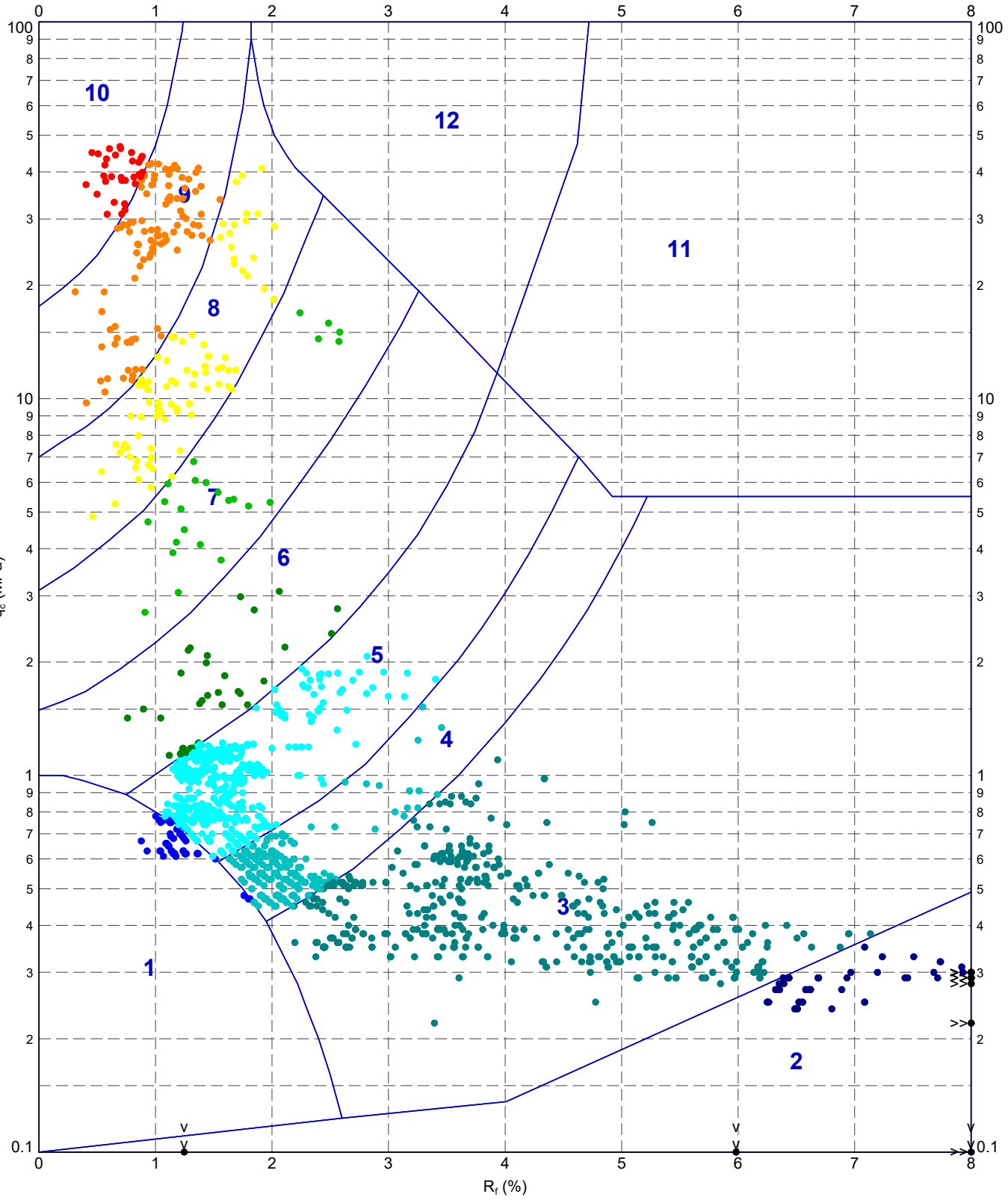
CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen	Tip	256 mV	262 mV	0.069 MPa
CONE AREA RATIO	: 0.79	OPERATOR	: DR	Sleeve	325 mV	330 mV	0.004 kPa
FILTER POSITION	: u2	FRICTION REDUCER	: None	Pore Pressure 2	250 mV	283 mV	0.009 kPa
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot	X-Y Inclinometer	2415 mV	2467 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)	Term based on measurement	su (kPa)
Extremely low strength	<10	Medium strength	40-75
Very low strength	10-20	High strength	75-150
Low strength	20-40	Very high strength	150-300
		Extremely high strength	>300

Groundwater Level

Dissipation Test



METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material	4 - Silty CLAY to CLAY	7 - Silty SAND to sandy SILT	10 - Gravelly SAND to SAND
2 - Organic material	5 - Clayey SILT to silty CLAY	8 - SAND to silty SAND	11 - Very stiff fine grained
3 - CLAY	6 - Sandy SILT to clayey SILT	9 - SAND	12 - SAND to clayey SAND

IN SITU SITE INVESTIGATION

TITLE

ABO Consultancy
Newport
ABO-Alexandra Docks Newport
Robertson et al. 1986 q_c vs. R_f - CPT06

DRAWN	DATE 14/08/2024	
CHECKED	DATE 14/08/2024	
SCALE Not To Scale		A4
PROJECT No 1240354	FIGURE No	

220629-ADVANCED REPORT INSITUSI 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. RF A4P 1240354-ABO-ALEXANDRA DOCKS NEWPORT.GPJ <<DrawingFile>> 14/08/2024 13:13 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Prj: In Situ SI 2.02.0 2017-07-10

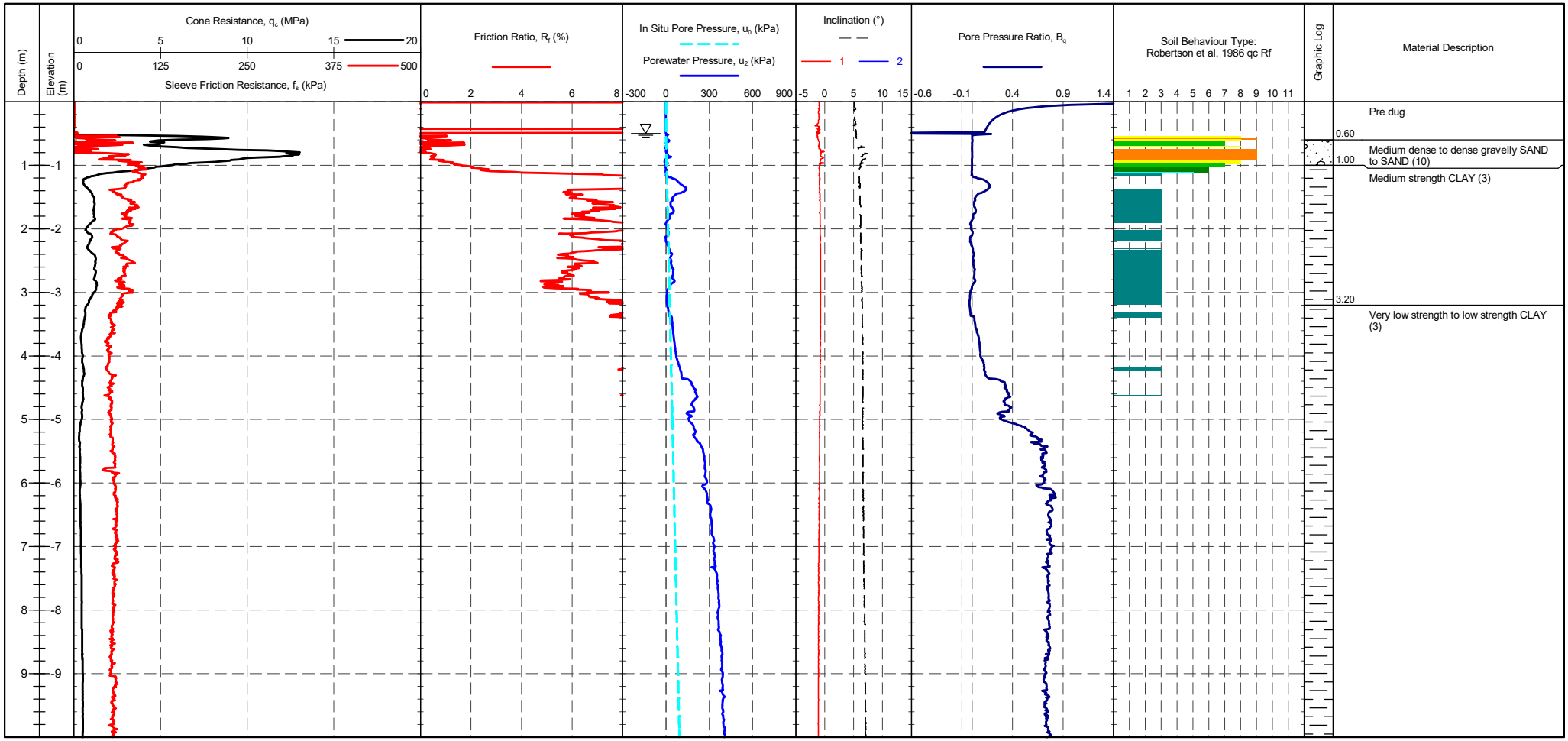
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT07**

CLIENT : ABO Consultancy PROJECT : ABO-Alexandra Docks Newport LOCATION : Newport PROJECT No. : 1240354	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : DW TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 29/07/2024 PLOT DATE : 14/08/2024 METHOD : ISO 22476-1:2022



CONE ID : S15-CFIP.2136 CALIBRATION DATE : 20/06/2023 CONE MODEL : Subtraction CONE AREA : 15cm² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : DR FRICTION REDUCER : None WEATHER : Sunny & Hot GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES	

Transducer	Pre	Post	Difference
Tip	256 mV	259 mV	0.035 MPa
Sleeve	159 mV	177 mV	0.013 kPa
Pore Pressure 2	259 mV	274 mV	0.004 kPa
X-Y Inclinometer	2463 mV	2418 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

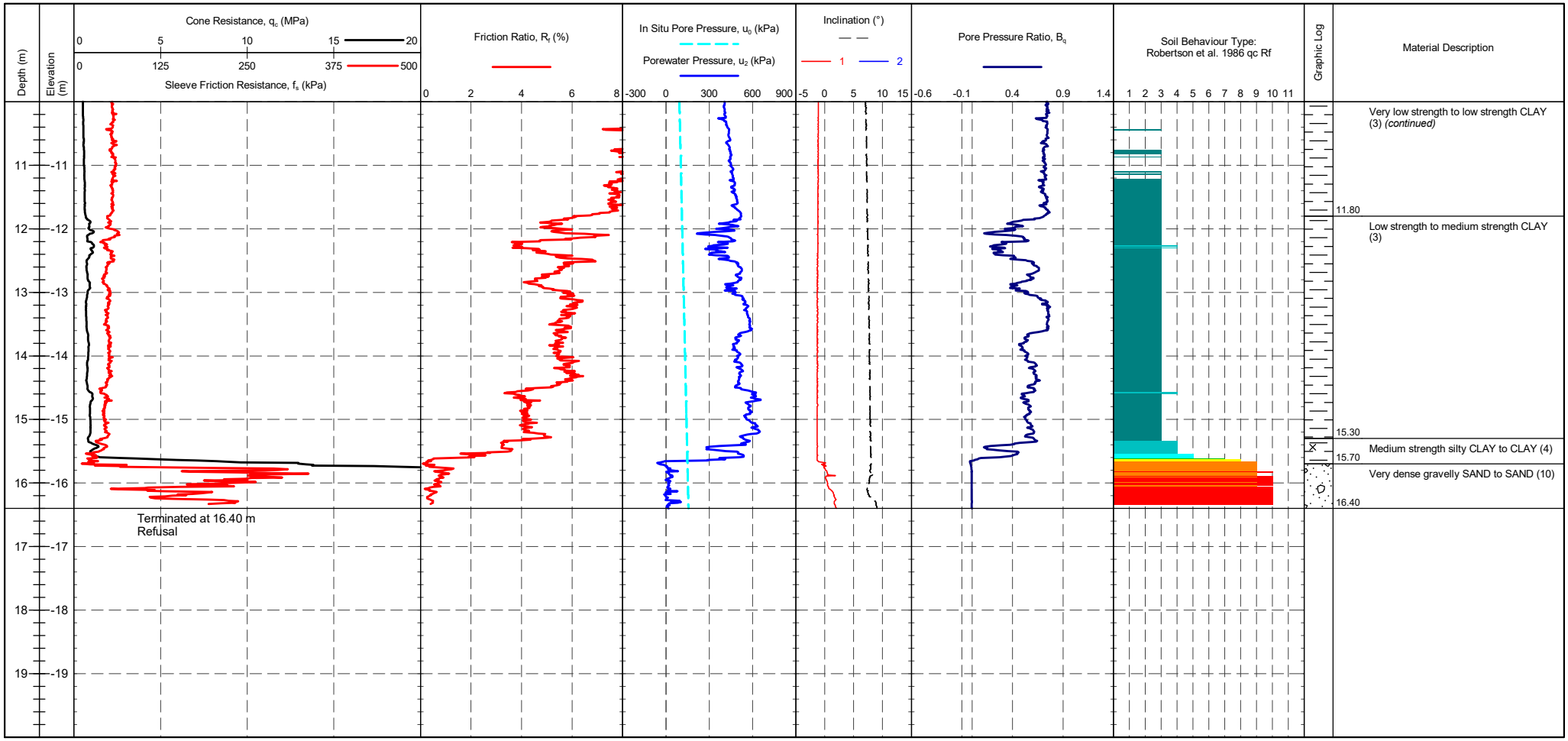
Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT07**

CLIENT : ABO Consultancy PROJECT : ABO-Alexandra Docks Newport LOCATION : Newport PROJECT No. : 1240354	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : DW TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 29/07/2024 PLOT DATE : 14/08/2024 METHOD : ISO 22476-1:2022



CONE ID : S15-CFIP.2136 CALIBRATION DATE : 20/06/2023 CONE MODEL : Subtraction CONE AREA : 15cm² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : DR FRICTION REDUCER : None WEATHER : Sunny & Hot GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES	

Transducer	Pre	Post	Difference
Tip	256 mV	259 mV	0.035 MPa
Sleeve	159 mV	177 mV	0.013 kPa
Pore Pressure 2	259 mV	274 mV	0.004 kPa
X-Y Inclinometer	2463 mV	2418 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

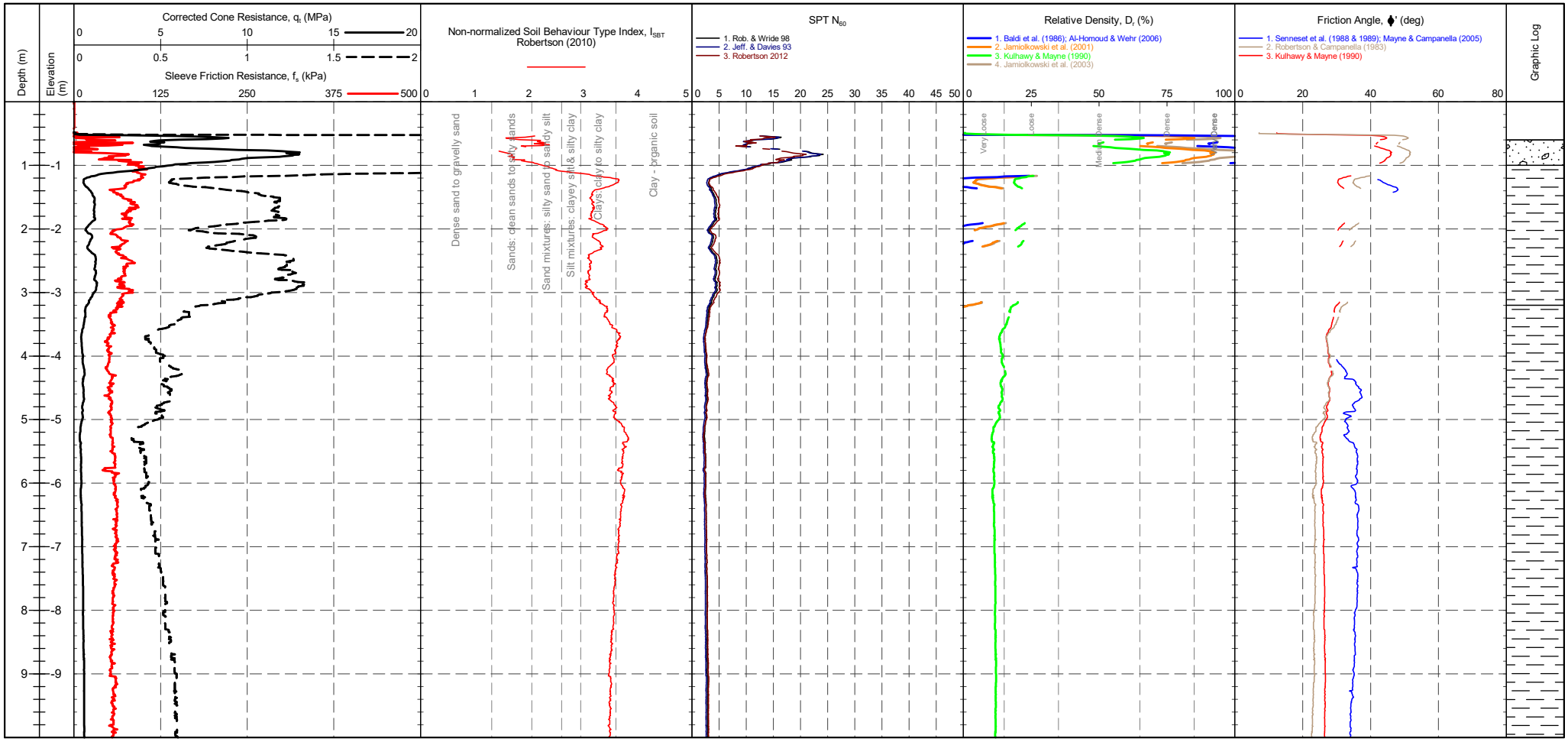
PointID **CPT07**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 1 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	256 mV	259 mV	0.035 MPa
Sleeve	159 mV	177 mV	0.013 kPa
Pore Pressure 2	259 mV	274 mV	0.004 kPa
X-Y Inclinometer	2463 mV	2418 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

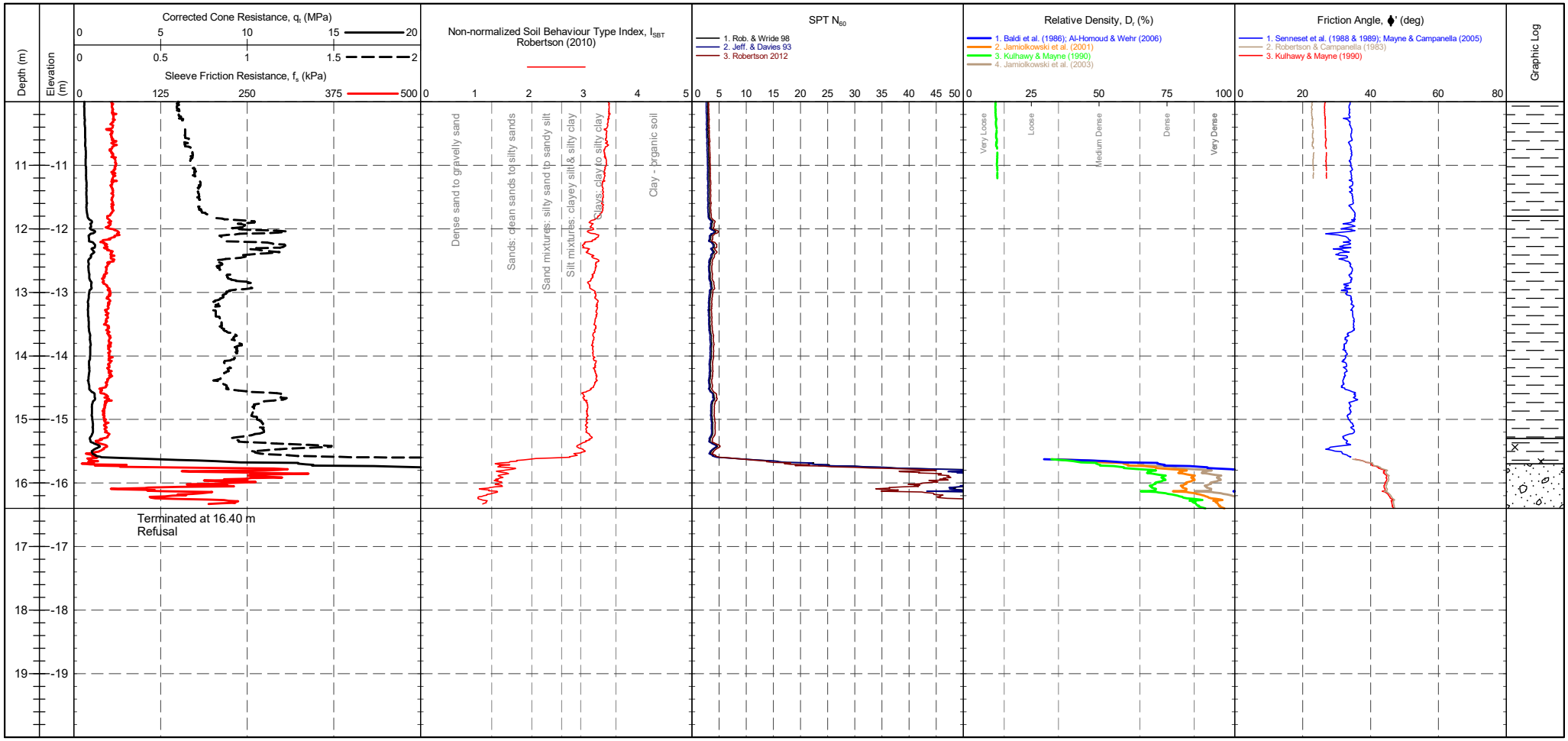
PointID **CPT07**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	256 mV	259 mV	0.035 MPa
Sleeve	159 mV	177 mV	0.013 kPa
Pore Pressure 2	259 mV	274 mV	0.004 kPa
X-Y Inclinometer	2463 mV	2418 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

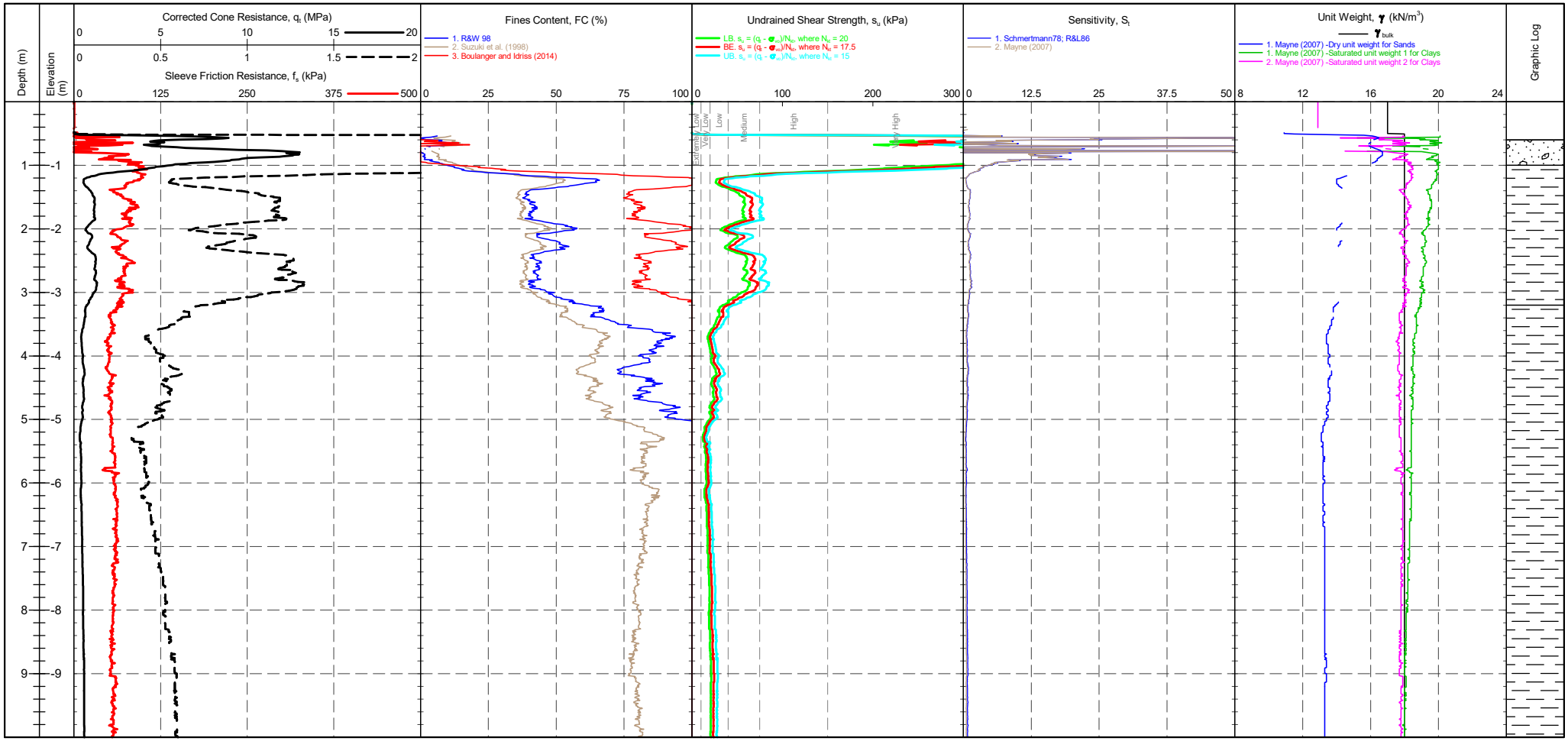
PointID: **CPT07**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING	: 0.000 m
NORTHING	: 0.000 m
ELEVATION	: 0.000 m OD
CHECKED BY	: DW
TERMINATION REASON	: Refusal

Remark:
Test refused on total pressure.

SHEET	: 1 OF 2
STATUS	: Final
TEST DATE	: 29/07/2024
PLOT DATE	: 14/08/2024
METHOD	: ISO 22476-1:2022



CONE ID	: S15-CFIP.2136
CONE MODEL	: Subtraction
CONE AREA	: 15cm^2
CONE AREA RATIO	: 0.79
FILTER POSITION	: u2
FILTER TYPE	: HDPE

TEST TYPE	: TE2
APPLICATION CLASS	: 2
RIG	: CPT 017 - Griffen
OPERATOR	: DR
FRICTION REDUCER	: None
WEATHER	: Sunny & Hot

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	256 mV	259 mV	0.035 MPa
Sleeve	159 mV	177 mV	0.013 kPa
Pore Pressure 2	259 mV	274 mV	0.004 kPa
X-Y Inclinometer	2463 mV	2418 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)
Extremely low strength	<10
Very low strength	10-20
Low strength	20-40
Medium strength	40-75
High strength	75-150
Very high strength	150-300
Extremely high strength	>300

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

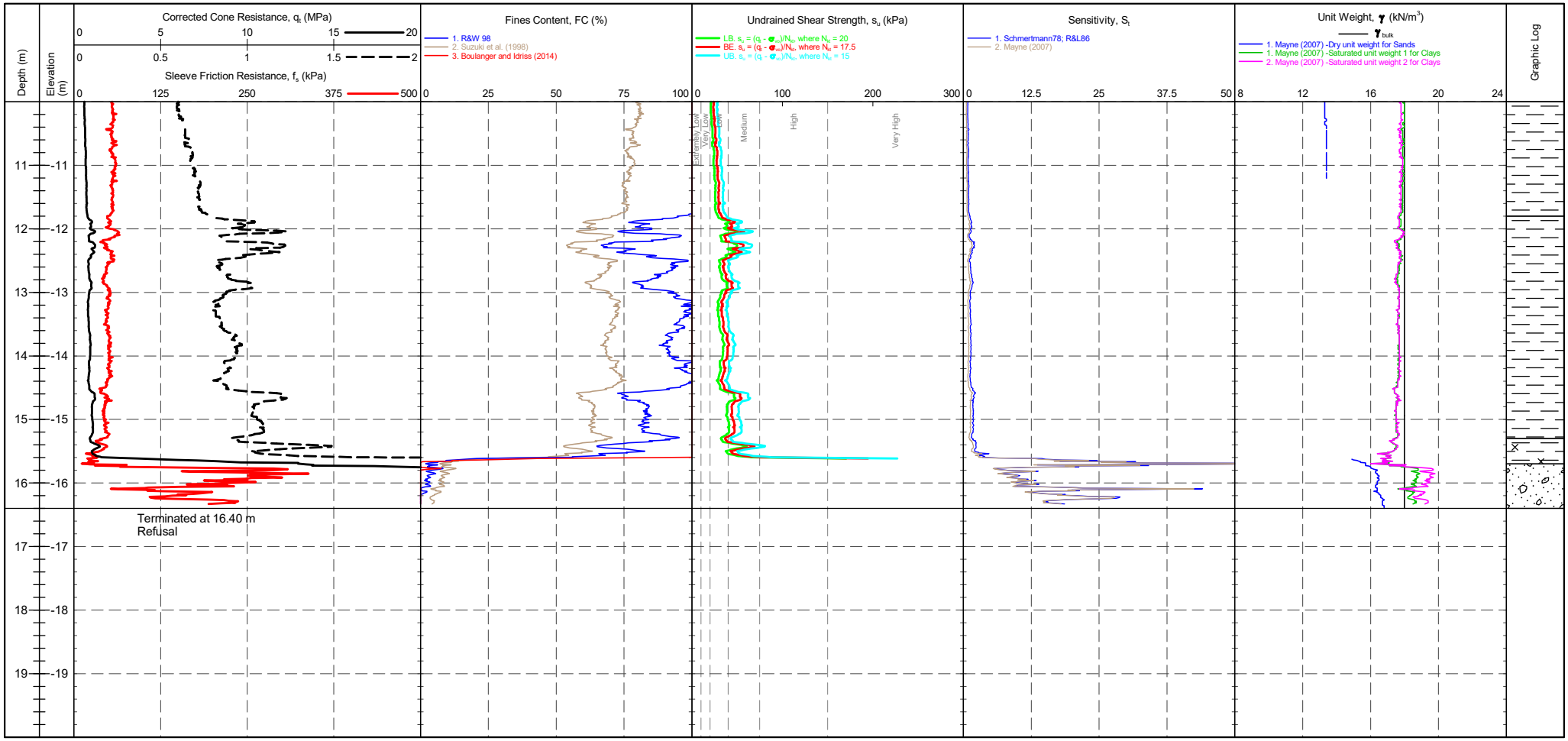
PointID: **CPT07**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 29/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



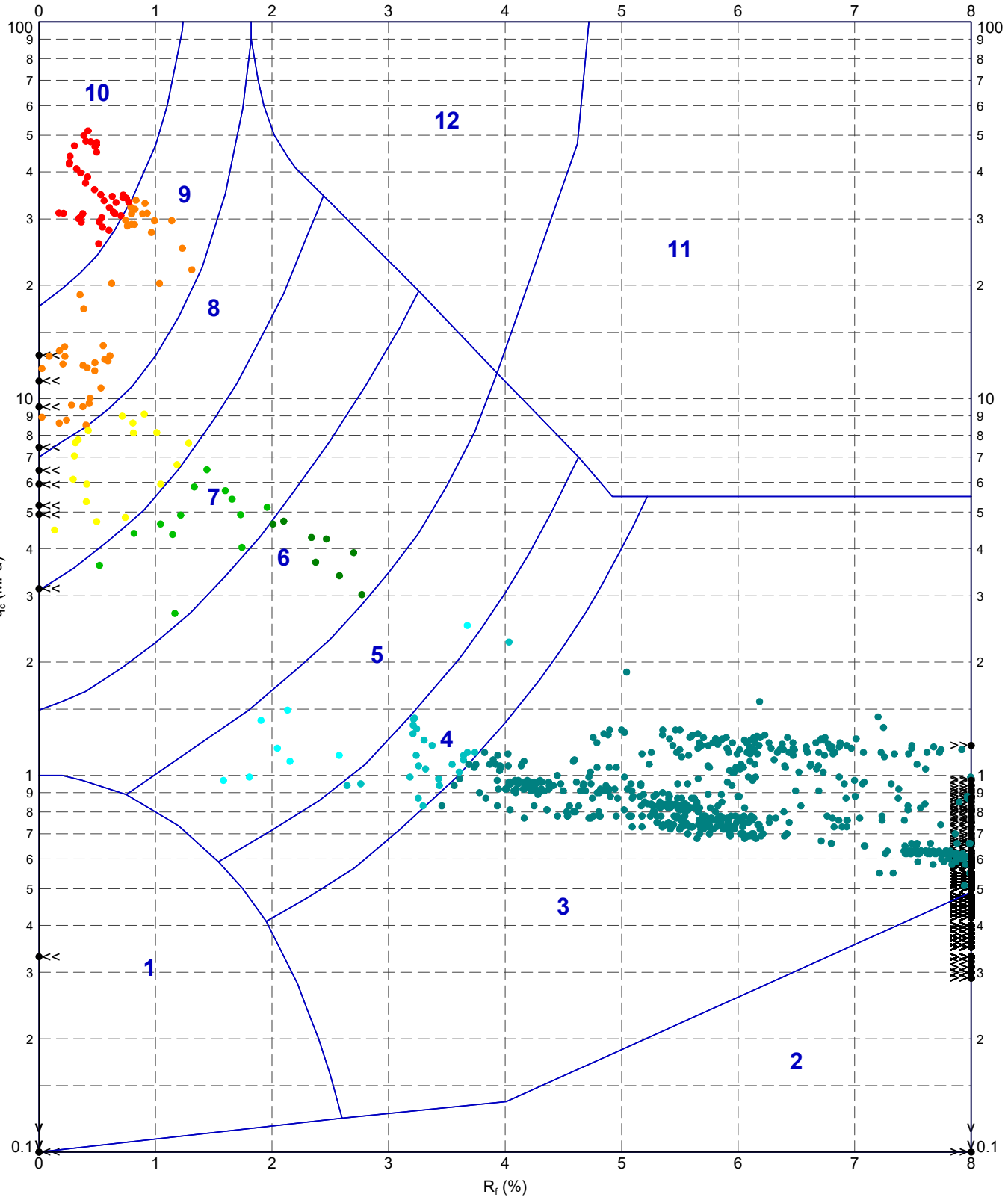
CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen	Tip	256 mV	259 mV	0.035 MPa
CONE AREA RATIO	: 0.79	OPERATOR	: DR	Sleeve	159 mV	177 mV	0.013 kPa
FILTER POSITION	: u2	FRICTION REDUCER	: None	Pore Pressure 2	259 mV	274 mV	0.004 kPa
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot	X-Y Inclinometer	2463 mV	2418 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)	Term based on measurement	su (kPa)
Extremely low strength	<10	Medium strength	40-75
Very low strength	10-20	High strength	75-150
Low strength	20-40	Very high strength	150-300
		Extremely high strength	>300

Groundwater Level

Dissipation Test



METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material	4 - Silty CLAY to CLAY	7 - Silty SAND to sandy SILT	10 - Gravelly SAND to SAND
2 - Organic material	5 - Clayey SILT to silty CLAY	8 - SAND to silty SAND	11 - Very stiff fine grained
3 - CLAY	6 - Sandy SILT to clayey SILT	9 - SAND	12 - SAND to clayey SAND

IN SITU SITE INVESTIGATION

TITLE

ABO Consultancy
Newport
ABO-Alexandra Docks Newport
Robertson et al. 1986 q_c vs. R_f - CPT07

DRAWN		DATE	14/08/2024
CHECKED		DATE	14/08/2024
SCALE	Not To Scale		A4
PROJECT No	1240354	FIGURE No	

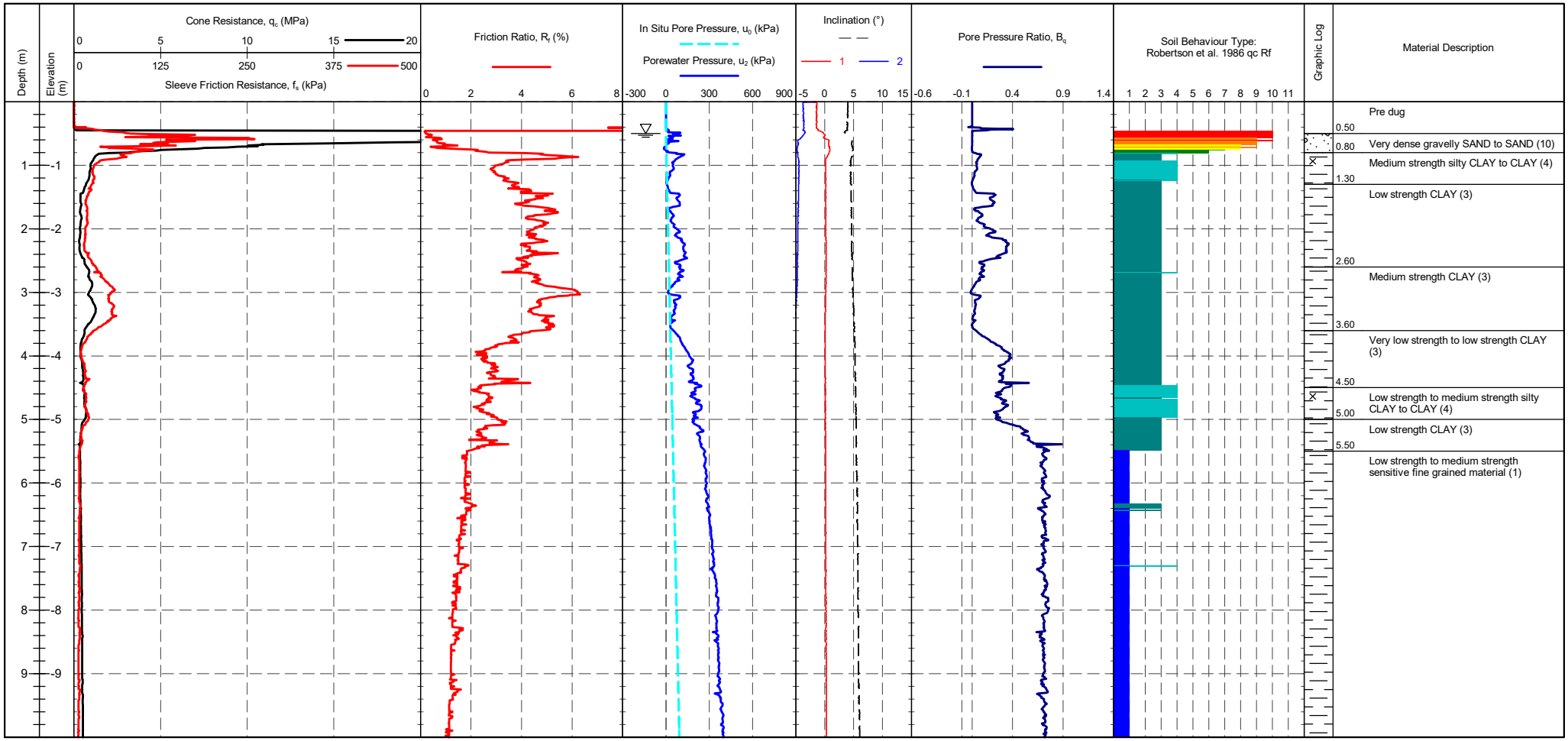
220629-ADVANCED REPORT INSITUSI 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. RF A4P 1240354-ABO-ALEXANDRA DOCKS NEWPORT.GPJ <<DrawingFile>> 14/08/2024 13:14 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Prj: In Situ SI 2.02.0 2017-07-10

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT08**

CLIENT : ABO Consultancy PROJECT : ABO-Alexandra Docks Newport LOCATION : Newport PROJECT No. : 1240354	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : DW TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 30/07/2024 PLOT DATE : 14/08/2024 METHOD : ISO 22476-1:2022



CONE ID : S15-CFIP.2136 CALIBRATION DATE : 20/06/2023 CONE MODEL : Subtraction CONE AREA : 15cm² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : DR FRICTION REDUCER : None WEATHER : Sunny & Hot GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES	

Transducer	Pre	Post	Difference
Tip	256 mV	261 mV	0.058 MPa
Sleeve	318 mV	323 mV	0.004 kPa
Pore Pressure 2	282 mV	297 mV	0.004 kPa
X-Y Inclinometer	2196 mV	2409 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

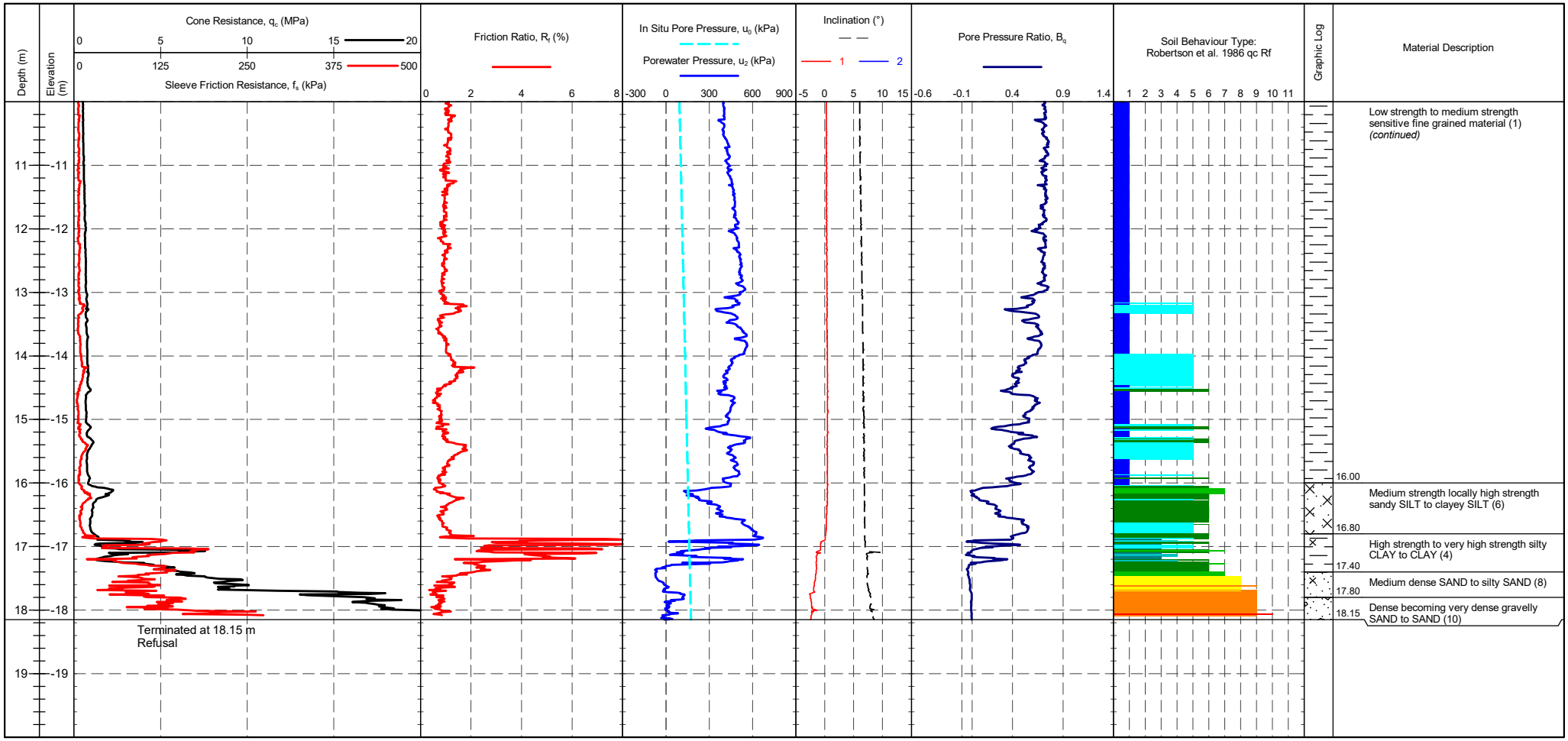
Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 01

PointID: **CPT08**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 2 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 30/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CALIBRATION DATE	: 20/06/2023	APPLICATION CLASS	: 2		
CONE MODEL	: Subtraction	RIG	: CPT 017 - Griffen		
CONE AREA	: 15cm^2	OPERATOR	: DR		
CONE AREA RATIO	: 0.79	FRICTION REDUCER	: None		
FILTER POSITION	: u2	WEATHER	: Sunny & Hot		
FILTER TYPE	: HDPE	GROUNDWATER DEPTH	: Assumed for calculation purposes		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	256 mV	261 mV	0.058 MPa
Sleeve	318 mV	323 mV	0.004 kPa
Pore Pressure 2	282 mV	297 mV	0.004 kPa
X-Y Inclinometer	2196 mV	2409 mV	

METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material
2 - Organic material
3 - CLAY
4 - Silty CLAY to CLAY
5 - Clayey SILT to silty CLAY
6 - Sandy SILT to clayey SILT
7 - Silty SAND to sandy SILT
8 - SAND to silty SAND
9 - SAND
10 - Gravelly SAND to SAND
11 - Very stiff fine grained
12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

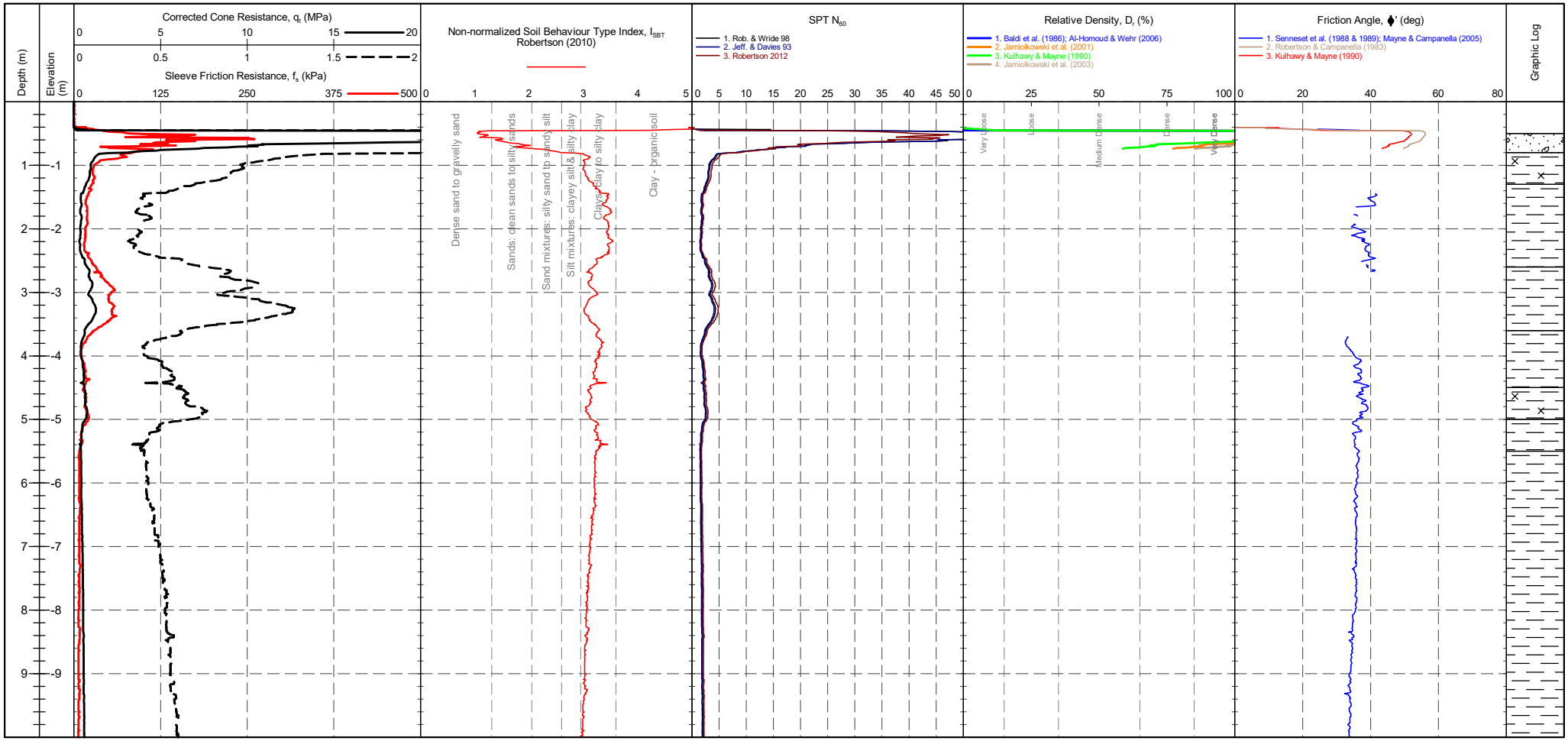
PointID **CPT08**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 1 OF 2
STATUS : Final
TEST DATE : 30/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	256 mV	261 mV	0.058 MPa
Sleeve	318 mV	323 mV	0.004 kPa
Pore Pressure 2	282 mV	297 mV	0.004 kPa
X-Y Inclinometer	2196 mV	2409 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 02

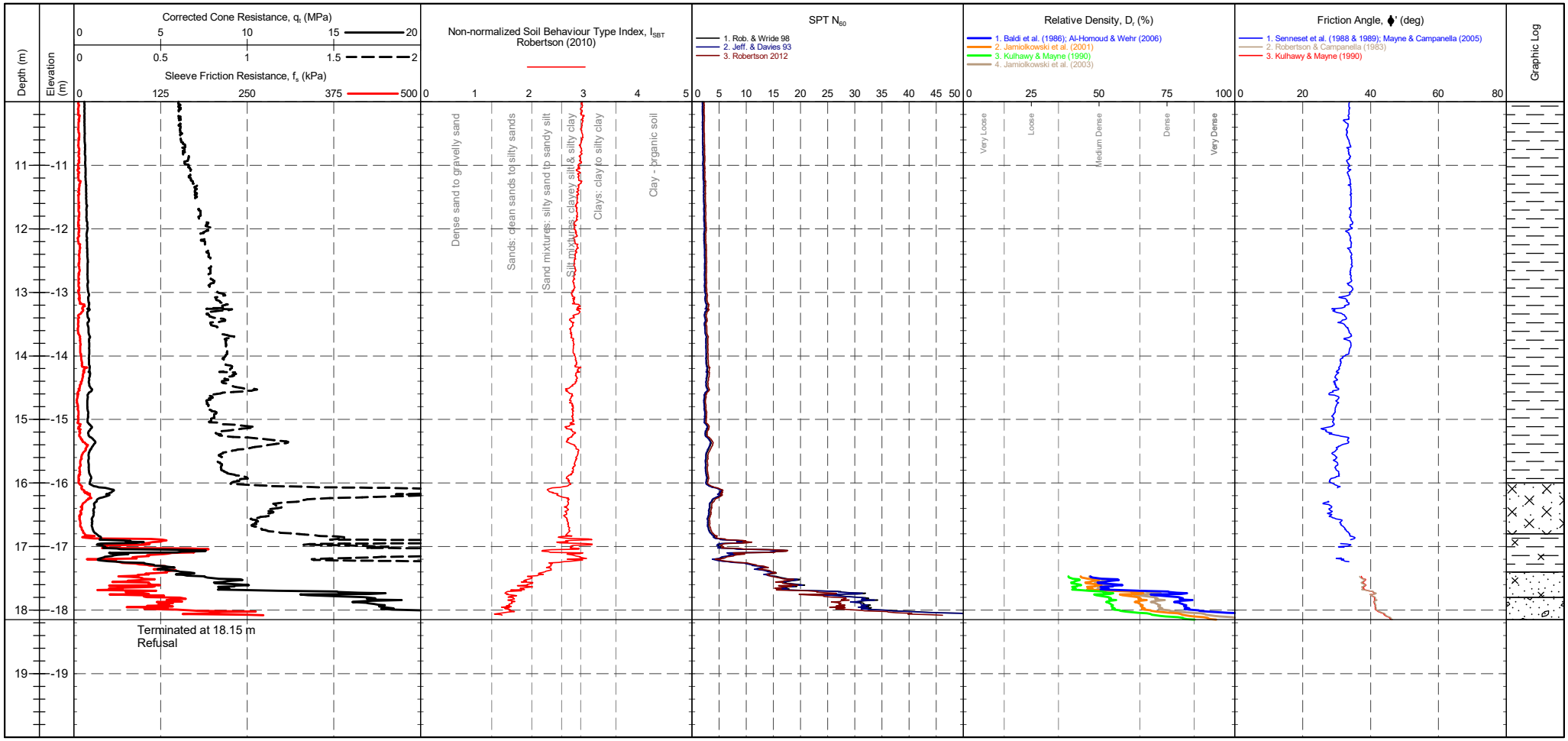
PointID: **CPT08**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 30/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm²	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	256 mV	261 mV	0.058 MPa
Sleeve	318 mV	323 mV	0.004 kPa
Pore Pressure 2	282 mV	297 mV	0.004 kPa
X-Y Inclinometer	2196 mV	2409 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, Ic	Description	SPT N value, NSPT	Description	Relative Density Dr (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

Groundwater Level

Dissipation Test

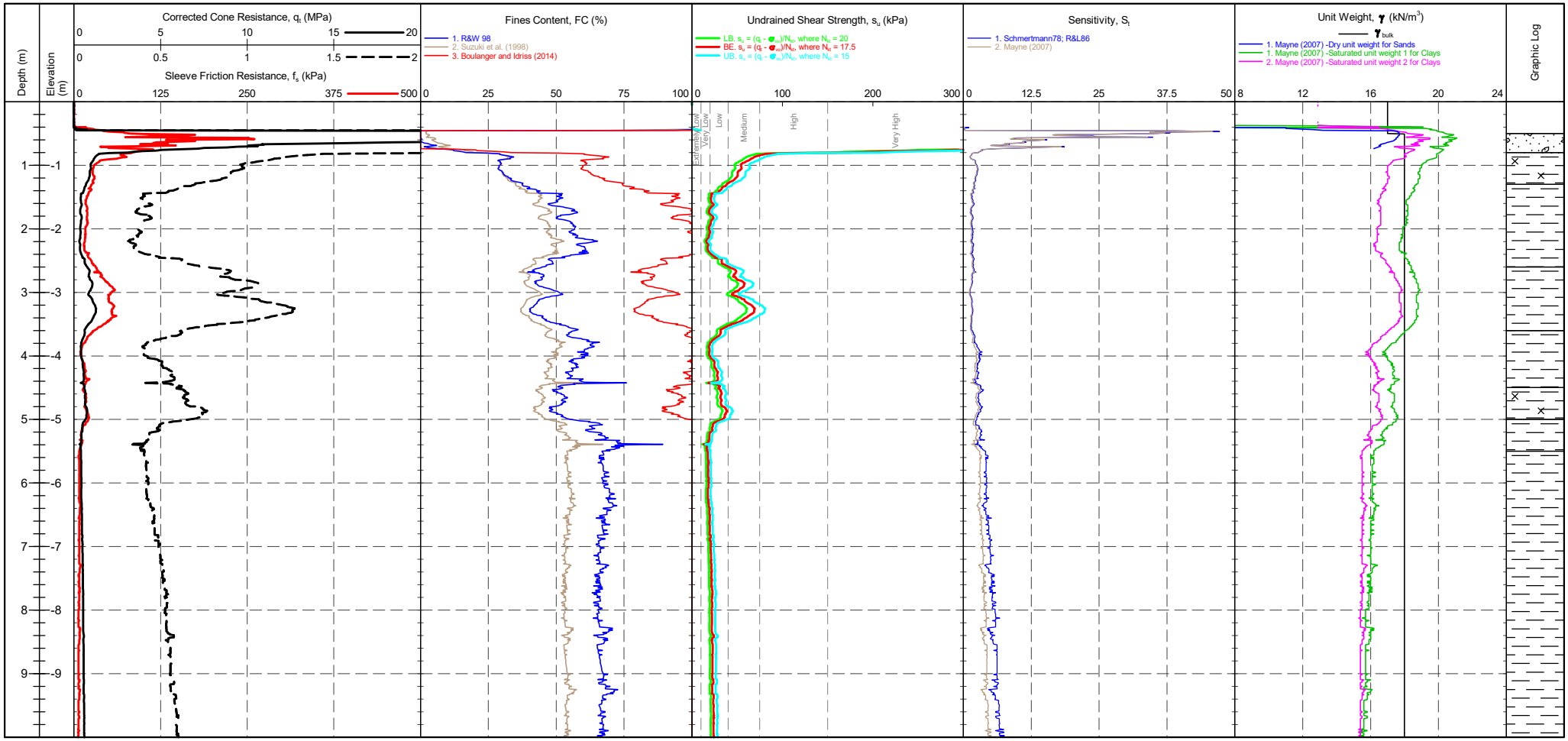
IN SITU SITE INVESTIGATION

Working with: ABO CONSULTANCY

CPT LOG 03

PointID: **CPT08**

CLIENT : ABO Consultancy	EASTING : 0.000 m	Remark:	SHEET : 1 OF 2
PROJECT : ABO-Alexandra Docks Newport	NORTHING : 0.000 m	Test refused on total pressure.	STATUS : Final
LOCATION : Newport	ELEVATION : 0.000 m OD		TEST DATE : 30/07/2024
PROJECT No. : 1240354	CHECKED BY : DW		PLOT DATE : 14/08/2024
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen	Tip	256 mV	261 mV	0.058 MPa
CONE AREA RATIO	: 0.79	OPERATOR	: DR	Sleeve	318 mV	323 mV	0.004 kPa
FILTER POSITION	: u2	FRICTION REDUCER	: None	Pore Pressure 2	282 mV	297 mV	0.004 kPa
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot	X-Y Inclinometer	2196 mV	2409 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)	Term based on measurement	su (kPa)
Extremely low strength	<10	Medium strength	40-75
Very low strength	10-20	High strength	75-150
Low strength	20-40	Very high strength	150-300
		Extremely high strength	>300

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with: ABO CONSULTANCY

CPT LOG 03

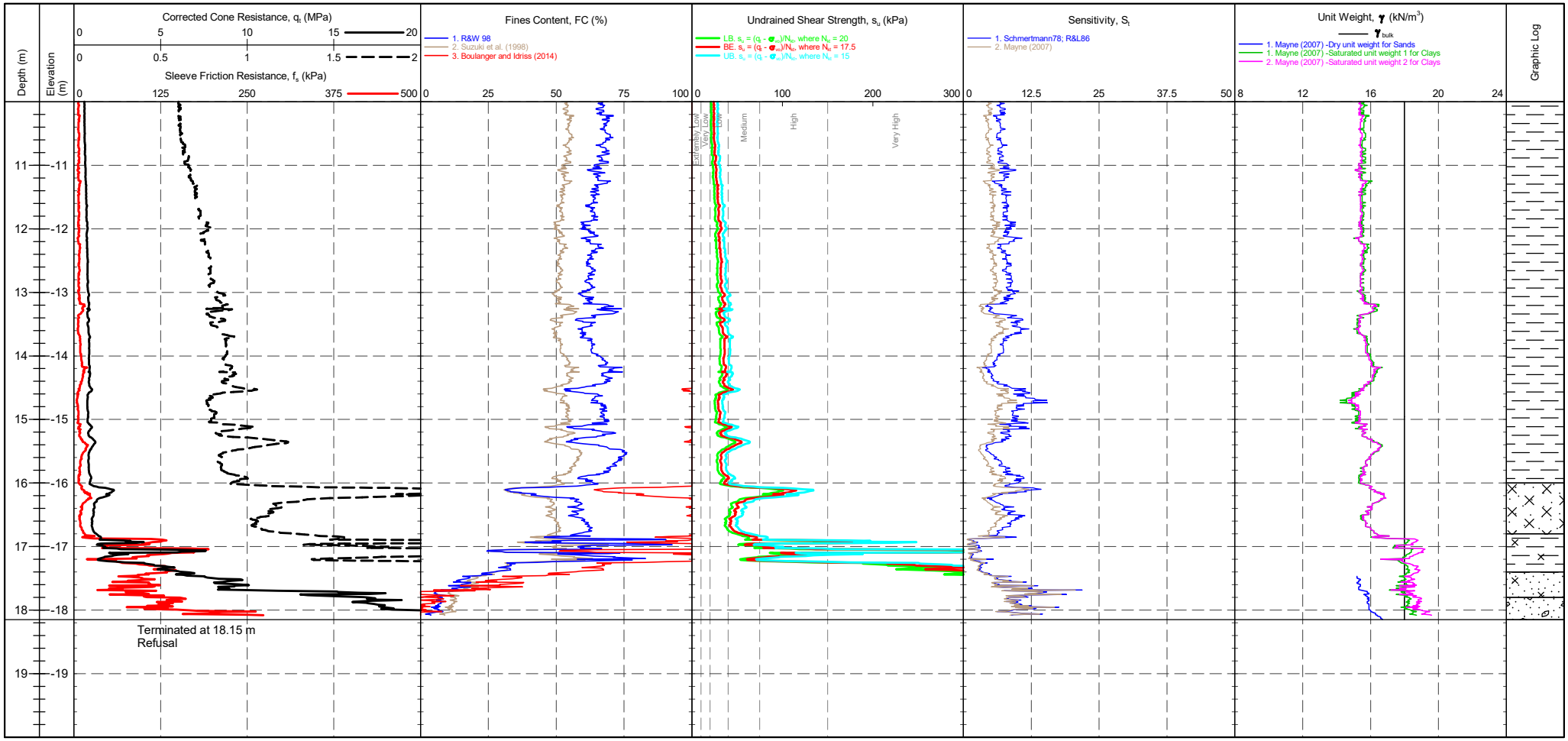
PointID: **CPT08**

CLIENT : ABO Consultancy
PROJECT : ABO-Alexandra Docks Newport
LOCATION : Newport
PROJECT No. : 1240354

EASTING : 0.000 m
NORTHING : 0.000 m
ELEVATION : 0.000 m OD
CHECKED BY : DW
TERMINATION REASON : Refusal

Remark:
Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 30/07/2024
PLOT DATE : 14/08/2024
METHOD : ISO 22476-1:2022



CONE ID	: S15-CFIP.2136	TEST TYPE	: TE2		
CONE MODEL	: Subtraction	APPLICATION CLASS	: 2		
CONE AREA	: 15cm^2	RIG	: CPT 017 - Griffen		
CONE AREA RATIO	: 0.79	OPERATOR	: DR		
FILTER POSITION	: u2	FRICTION REDUCER	: None		
FILTER TYPE	: HDPE	WEATHER	: Sunny & Hot		

CPTU ZERO VALUES

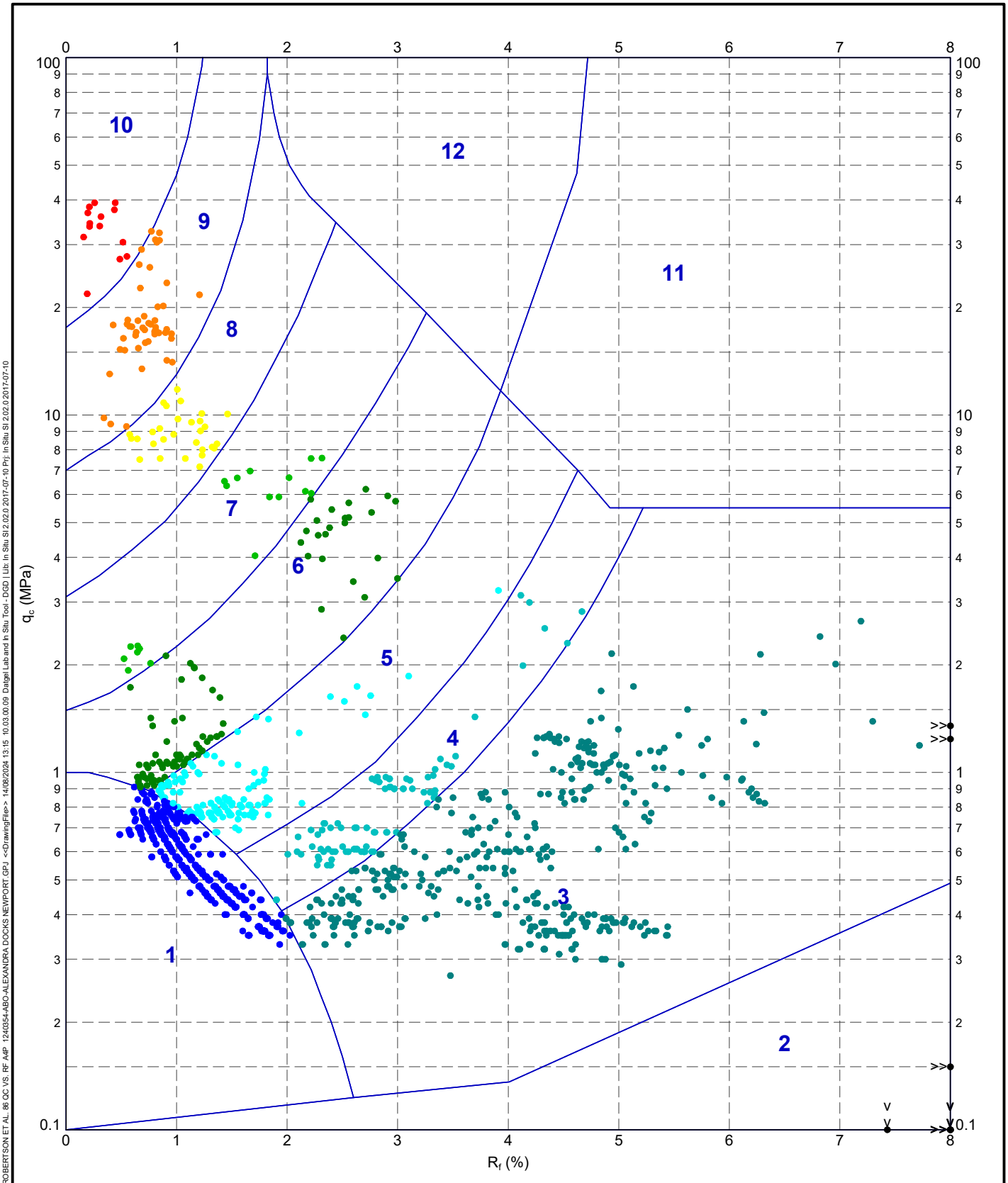
	Pre	Post	Difference
Transducer			
Tip	256 mV	261 mV	0.058 MPa
Sleeve	318 mV	323 mV	0.004 kPa
Pore Pressure 2	282 mV	297 mV	0.004 kPa
X-Y Inclinometer	2196 mV	2409 mV	

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11

Term based on measurement	su (kPa)	Term based on measurement	su (kPa)
Extremely low strength	<10	Medium strength	40-75
Very low strength	10-20	High strength	75-150
Low strength	20-40	Very high strength	150-300
		Extremely high strength	>300

Groundwater Level

Dissipation Test



METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 2 - Organic material
- 3 - CLAY
- 4 - Silty CLAY to CLAY
- 5 - Clayey SILT to silty CLAY
- 6 - Sandy SILT to clayey SILT
- 7 - Silty SAND to sandy SILT
- 8 - SAND to silty SAND
- 9 - SAND
- 10 - Gravelly SAND to SAND
- 11 - Very stiff fine grained
- 12 - SAND to clayey SAND

IN SITU SITE INVESTIGATION

TITLE

ABO Consultancy
Newport
ABO-Alexandra Docks Newport
Robertson et al. 1986 q_c vs. R_f - CPT08

DRAWN	DATE 14/08/2024
CHECKED	DATE 14/08/2024
SCALE Not To Scale	A4
PROJECT No 1240354	FIGURE No

220629-ADVANCED REPORT INSITUSI 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. RF A4P 1240354-ABO-ALEXANDRA DOCKS NEWPORT.GPJ <<DrawingFile>> 14/08/2024 13:15 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Prj: In Situ SI 2.02.0 2017-07-10



IN SITU SITE INVESTIGATION

Unit 23 Hastings Innovation Centre,
Highfield Drive
St. Leonards on Sea, East Sussex,
TN38 9UH, U.K.

Company No.: 6339499
VAT No.: 922 3561 41

Appendix 5 Architect's Excavation Design Note

Note Dewatering

6023 Cemminerals - Newport



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Projectdossier	6023
Projectomschrijving	Bouwen van nieuwe betoncentrale te Newport(Wales)
Opdrachtgevende partij	Cemminerals NV Christoffel Columbuslaan 37 9042 Gent - België
Bouwplaats	Alexandra Dock Newport – Wales - UK
Studiebureau	Arcade Groep Groeningenlei 132 2550 Kontich - België +32 3 239 58 75 info@arcade-eng.com
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Datum	02-07-1984
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1 Assumptions

Based on the ground investigation report of ABO from December 2024

+7.3 mODN

2 Locations in phase 2.1 and 2.2

2.1 Buffertank south + drainage components

2.1.1 Dewatering depth

+5m mODN (50cm below bottom of concrete)

2.1.2 Area bottom of pit

Ca 1200m² (including separators etc)

2.1.3 Duration

2-3 months

2.2 Warehouse

2.2.1 Dewatering depth

+6.2 mODN (40cm below top of piles)

2.2.2 Area bottom of pit

10.000m² if made as 1 big pit possibly the surface can be smaller, but probably 15m wide trenches will be needed at least, which will come down to a comparable amount of water to be evacuated

2.2.3 Duration

2-3 months till finishing of horizontal foundations (toc +7.65 mODN)

4-5 months if water is higher and also vertical walls construction needs dewatering