Clockhouse Quarry Restoration

Environmental Permit Application, Hydrogeological Risk Assessment

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SLR Project No.: 402.065294.00001

17 December 2025

Revision: 2

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
01	7 October 2025	SR	JC	PS
02	16 December 2025	SR	JC	GS
	Click to enter a date.			
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1.0 INTRODUCTION

SUEZ Recycling and Recovery UK Limited ("SUEZ") has instructed SLR Consulting Limited ("SLR") to prepare a Deposit for Recovery ("DfR") Environmental Permit ("EP") application. The application seeks approval for the use of suitable inert material in the restoration of Clockhouse Quarry (the Site), located at Horsham Road, Capel, Surrey, RH5 5JL, as a DfR operation under the Environmental Permitting (England and Wales) Regulations 2016.

The proposed restoration area is approximately 13.5 Ha, and covers Clockhouse Quarry Areas 2 and 3. The site presently comprises several partially flooded quarried voids, as well as partially backfilled void in Area 2. The proposed restoration scheme involves partial backfilling to develop a surface water drainage system with cascading ponds and a gravity outfall to the south-east towards an unnamed tributary of the Fylls Brook.

1.1 Site Location and Topography

1.1.1 Location

The Site is situated approximately 1.8km south of the village of Capel and approximately 10km west of Crawley. The Site is accessed off Horsham Road (A24) which runs to the west of the site. The National Grid Reference (NGR) for the site is TQ 17719 38525. The site location is presented on Drawing 001.

The majority of the land surrounding the Site is characterised by open/agricultural land, apart from the western vicinity which comprises the previously infilled Area 1 of Clockhouse Quarry, Clockhouse Brickworks, Horsham Road (A24) and the railway line. The site is situated within the Clock House Brickworks Site of Special Scientific Interest (SSSI) which contains exposed beds from the lower part of the Weald Clay Group. The Auclaye SSSI is located approximately 400m to the west of the Site.

1.1.2 Topography

Regional topography generally falls in accordance with the valley of Fylls Brook and therefore, prior to quarrying, the natural slope in the vicinity of the application site was towards the south. The quarried voids are sunken below the surrounding area with water levels maintained by pumping at around 77.4m AOD.

1.2 Objectives

This report presents the conceptual site model (CSM) developed for the Site and assesses the risk to the hydrogeological regime posed by the proposed restoration of the Site as a DfR operation using suitable waste material.

The objectives of the assessment are to demonstrate that the Site will be compliant with Schedule 22 (Groundwater Activities) of the Environmental Permitting Regulations 2016 (as amended) and the Inert Waste Guidance (2020). These Regulations require that certain substances (Hazardous Substances) are not discharged to groundwater such that they are discernible, and that the discharge of other substances (Non-Hazardous Pollutants) is limited "*so as to prevent pollution*".

2.0 CONCEPTUAL HYDROGEOLOGICAL SITE MODEL

The conceptual hydrogeological site model is based on the source-pathway-receptor linkages. Key elements of the hydrogeological model are discussed in further detail within the following sections:

- Inert fill source;
- aquifer characteristics;
- groundwater flow and quality;
- groundwater quality;
- licensed groundwater abstractions; and
- Source Protection Zones.

A plan view of the current site is presented as Drawing 002, whilst Drawing Clh-INF-1223-01a presents a plan view of the restored site. Cross sections of the restored site are presented on Drawing 003.

2.1 Inert Fill Source

Planning permission MO/2023/0789 was granted by SCC on 17 June 2025 for "*the importation and deposit of inert materials and soils on 14.5 hectares of land to facilitate the restoration of quarry voids to a nature conservation afteruse with drainage*".

The proposed development can be summarised as follows:

- the Weald Clay has been worked to a lowest depth of c.68mAOD in Clockhouse Quarry Area 3, while the partially restored void elevation in Area 2 is c. 80 mAOD;
- infilling using c. 686,000m^3 of suitable imported inert material will take place over approximately 14 years to facilitate a low-level restoration of the mineral workings to a mixture of grassland and woodland with a series of attenuation ponds draining by gravity outflow at c. 80 mAOD;
- inert materials to be accepted for clean infill below the water table and for a 2m thick attenuation layer on the upper sidewalls of the site for c.2m above the water table will comprise:
    - selected waste codes from exploration mining waste, quarrying and physical /chemical treatment of minerals;
    - selected waste codes from construction and demolition wastes;
    - garden, park, cemetery wastes and soil and stones from municipal wastes;
    - it is noted that none of these waste codes require WAC testing if they come from a single source, are well characterised, and carry no risk of contamination;
- inert materials to be accepted for "general" fill will include the above types plus:
    - selected waste codes from thermal processes including 10.13.14 'waste concrete and concrete sludge', the latter requiring WAC testing;
    - selected waste codes from waste management facilities;
    - it is noted that none of these waste codes require WAC testing (except the two identified in the bullet points just above) with the same caveats as further above;
- inert materials to be accepted for the restoration soil profile will include the below water table waste types plus below. The only types needing WAC testing are mentioned below:

  - wastes from beet washing 02.04.01 which require WAC testing;
  - selected waste codes from waste management facilities;
  - 17.05.06 dredging spoil which requires WAC testing;
- no basal or sidewall geological barrier is proposed at the site; and
- there is no requirement for an engineered cap due to the 'inert' nature of the proposed recovery infill materials.

Whilst it is proposed that this development is a DfR activity, it is considered appropriate to follow applicable guidance on inert landfills. The source term has therefore been defined based upon Waste Acceptance Criteria (WAC) limit values for inert wastes, as summarised in Table 2-1 and Table 2-2.

Table 2-1: Limit values for waste acceptable at Landfills for Inert Waste

Component	L/S = 2 l/kg (mg/kg dry substance)	L/S = 10 l/kg (mg/kg dry substance)
Arsenic	0.1	0.5
Barium	7	20
Cadmium	0.03	0.04
Chromium (Total)	0.2	0.5
Copper	0.9	2.0
Mercury	0.003	0.01
Molybdenum	0.3	0.5
Nickel	0.2	0.4
Lead	0.2	0.5
Antimony	0.02	0.06
Selenium	0.06	0.1
Zinc	2	4
Chloride	550	800
Fluoride	4	10
Sulphate	560*	1000*
Phenol	0.5	1
DOC**	240	500
TDS***	2500	4000

* If the waste does not meet these values for sulphate, it may still be considered as complying with the acceptance criteria if the leaching does not exceed either of the following values: 1,500mg/l as C0 at L/S = 0.1l/kg and 6000mg/kg at L/S = 10l/kg.

** If the waste does not meet these values for DOC at its own pH value, it may alternatively be tested at L/S = 10 l/kg and a pH between 7,5 and 8,0. The waste may be considered as complying with the acceptance criteria for DOC, if the result of this determination does not exceed 500 mg/kg.

*** The values for total dissolved solids (TDS) can be used alternatively to the values for sulphate and chloride.

Table 2-2: Limits for Total Content of Organic Contaminants

Parameter	Value (mg/kg)
TOC (total organic carbon)	30 000 (*)
BTEX (benzene, toluene, ethylbenzene and xylenes)	6.0
PCBs (polychlorinated biphenyls, 7 congeners)	1.0
Mineral oil (C10 to C40)	500
PAHs (polycyclic aromatic hydrocarbons)	100
* In the case of soils, a higher limit value may be admitted by the competent authority, provided the DOC value of 500 mg/kg is achieved at L/S = 10 l/kg, either at the soil's own pH or at a pH value between 7,5 and 8,0.	

Environment Agency guidance '*Testing for Disposal to Landfill*[1]' clarifies: "*While limits are set for these tests in the Council Decision annex, the Environmental Permitting Regulations, schedule 10 state that the L:S 10 l/kg test must be used.*". It is therefore proposed that the L:S 10l/kg WAC limits will be used for determining priority contaminants.

2.2 Pathways

2.2.1 Regional Geology

2.2.1.1 Superficial Deposits

Published online mapping by the British Geological Survey (BGS)[2] and Defra mapping of historic landfills[3], indicates that the superficial deposits are absent across the Site.

Thee Cranfield Institute Soilscapes identifies the site as lying in an area of '*slowly permeable seasonally wet loamy and clayey soils'*, however much of this is expected to have been stripped before quarrying.

2.2.1.2 Bedrock

Published geological mapping by the BGS indicates that the bedrock across the Site comprises the Weald Clay Mudstone which covers the majority of the site area. In addition to this, mapping confirms the presence of the following:

- **Weald Clay Sandstone** – present as two east-west trending bands of limited areal spread (80-100m) width along the site's northern boundary and through the central portion of the Site; and
- **Weald Clay Limestone** – present along the site's southern and south-eastern boundary;

Both the limestone and sandstone members are interpreted to be interbedded between significant thicknesses of mudstone and clay deposits which are typically associated with the Weald Clay. Contradicting the mapping, the GI only encountered the Weald Clay limestone in BH22/1 in the northern boundary of the site.

[1] Environment Agency (March 2013). *Waste Sampling and Testing for Disposal to Landfill.* Ref. EBPRI 11507B Final

[2] BGS Geoindex Superficial Deposits 1:50,000 Scale Mapping, available at: https://mapapps2.bgs.ac.uk/geoindex/home.html (Accessed August 2025)

[3] Defra mapping of Historic Landfills at Defra Spatial Data Download

It is further noted that BGS borehole TQ13NE40 (located within the land ownership boundary of SUEZ) confirms the presence of clay to a depth of 114.6m, although quarrying only extended down to c.35m deep with the base of the main void at c. 67 mAOD.

2.2.2 Site-Specific Geology

The last ground investigation was undertaken in 2022 to confirm the site's geological condition. Eight boreholes were drilled as part of the 2022 GI, with their locations displayed on Drawing 002. Geological logs are included in Appendix A, and borehole details summarised in Table 2-3.

Table 2-3: On-Site Depth and Elevations

BH ID	Ground Elevation (mAOD)	Made Ground (mbgl)	Weathered Weald Clay (mbgl)	Stiff/Firm Weald Clay (mbgl)	Limestone Horizons (mbgl)	Sandstone Horizons (mbgl)	Slotted Screen (mbgl)	No Recovery (mbgl)
BH22/1	91.92	0 – 0.65	0.65 – 2.2	2.2 – 13.95	3.2 – 3.3	13.95 – 14	3 - 14	0 - 0
BH22/2	90.90	None recorded	None recorded	0 – 1.2 (F) 9.0 – 10.5 17.1 – 18	None recorded	None recorded	3 - 21	1.2 – 9 10.5–17.1 18 – 21
BH22/3	91.18	0 – 0.5	None recorded	0.5 – 1.2 (F) 9.3 – 10.5 15 – 16.5	None recorded	15.11–15.23 15.41–15.49	3 - 22	1.2 – 9.3 10.5 – 15 16.5 – 22
BH22/4	88.64	None recorded	0 – 0.4 (R)	0.4 – 1.2 9.44 – 10.5	None recorded	None recorded	3 – 10.5	1.2 – 9.4
BH22/5	87.94	None recorded	None recorded	0 – 0.8 0.8 – 1.2 (F) 9 – 10.5 15 – 16.5	None recorded	None recorded	3 - 18	1.2 – 9 10.5 – 15 16.5 - 18
BH22/6	90.51	0 – 0.5	0.5 – 2.7	2.7 – 14.8	None recorded	None recorded	3 – 14.8	0 - 0
BH22/8	90.64	0 – 0.3	0.3- 0.8 (R)	0.8 – 1.2 (F) 9 – 10.5 16.5 - 18	None recorded	None recorded	3 - 21	1.2 – 9 10.5–16.5 18 - 21
BH22/9	81.88	0 – 0.6	0.6 – 1.2 (R)	6.2 – 7.5 10.65 - 12	None recorded	None recorded	3 - 12	1.2– 6.2 7.5–10.65
(R) = Reworked (F) = Firm								

The borehole logs indicate that the geology is exclusively stiff Weald Clay with rare sandstone and limestone horizons of limited thickness (incl. a 10cm thick limestone band at BH22/1, a 5cm thick sandstone band at BH22/1 and 12cm thick and 8cm thick sandstone bands at BH22/3).

2.2.3 Hydrogeology

2.2.3.1 Recharge Mechanisms

The Met Office 1991-2020 climate average for Charlwood (situated c.6km east of the site) confirms that the average annual rainfall is 834 mm/year.

Across the application Site, infiltration rates are likely to be low due to the predominance of mudstone-dominated bedrock. Current recharge rates into the quarry void are likely to be high but will be reduced in the future due to the restoration of the site with relatively low permeability infill materials.

2.2.3.2 Aquifer Classification and Vulnerability

The Weald Clay is generally classified by the EA as Unproductive Strata, however the sandstone and limestone horizons within the Weald Clay are classified as Secondary A aquifers, described as:

> …"*Permeable layers of rock or drift deposits that are capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.*."

Given the rare incidence of sandstone and limestone in the site-specific geology, and in order to be conservative, the assessment assumes all of the site is underlain by a Secondary A aquifer.

The groundwater vulnerability of the Weald Clay in the vicinity of the Site is classified by the EA "High Vulnerability" where the bedrock geology is Weald Clay – Sandstone. However, the majority of the site underlain by bedrock comprising the Weald Clay – Mudstone for which the aquifer status is considered "Unproductive" and so no vulnerability rating is attributed.

2.2.3.3 Groundwater Levels and Flow

Groundwater levels are measured across eight site monitoring boreholes on a monthly basis. Collated data, as recorded between July 2023 and March 2025, are summarised in Table 2-4 whilst a hydrograph is presented in Appendix B.

A groundwater contour plan is presented on Drawing 002.

Table 2-4: Site Groundwater Levels July 2023 – March 2025

BHID	Groundwater Elevations (m AOD)				
	Count	Minimum	Average	Maximum	Range (m)
BH22/1	33	80.2	80.34	80.47	0.27
BH22/2	33	80.22	80.34	80.45	0.23
BH22/3	33	80.33	80.46	80.62	0.29
BH22/4	33	83.41	83.78	84.3	0.89
BH22/5	33	78.95	80.16	80.65	1.7
BH22/6	33	81.44	84.49	86.84	5.4
BH22/8	33	79.66	81.32	83.25	3.59
BH22/9	33	77.72	77.94	78.22	0.5

The above data indicate that groundwater levels in the vicinity of Clockhouse Quarry range from a minimum of 77.72 mAOD in the south at BH22/9, to 86.84 mAOD in BH22/6 situated

in the west of the site. Groundwater levels range seasonally by 0.23m at BH22/2 up to 3.59m at BH22/8.

It is noted that the above groundwater levels were measured at a time when the Clockhouse Quarry void had been partially dewatered. These data may therefore not be representative of the natural groundwater flow direction, but instead show the current inward gradient towards the central dewatered void.

However, groundwater levels recorded at BH22/5 are likely influenced by the nearby watercourse (an unnamed tributary of the Fylls Brook to which the site discharges). The watercourse commences at c. 80.5 mAOD, and is also potentially fed partly by groundwater seepages from the Weald Clay.

Although northern boreholes BH22/1, B22/2 and BH22/3 have a higher ground elevation, groundwater levels are lower than those to the south, due to partial dewatering of the void. It is likely that these boreholes intercept a sandstone band within the Weald Clay, which has a higher permeability, allowing greater water level connectivity with the reduced water level in the void.

As the base of the void is below 70 mAOD, no unsaturated zone is considered to be present beneath the deposit for recovery.

Following the completion of dewatering, groundwater levels are likely to recover to an approximate range of 83 mAOD (or higher) along the northern site perimeter, to 80.5 mAOD at BH22/5 near the watercourse. The post-rebound hydraulic gradient is estimated at c. 3m across 300m i.e. 0.01, from north to south across the restored void.

Consequently, under natural flow conditions, boreholes BH22/1, BH22/2 and BH22/3 are considered to be up-gradient of the site and would be representative of background groundwater quality., Boreholes BH22/5 and BH22/8 would be considered down-gradient under natural conditions. Groundwater levels recorded in BH22/6 appears to be elevated relative to adjacent boreholes; it is interpreted that this borehole potentially screens perched groundwater and therefore it is not included as a naturally down-gradient borehole.

Attributed values of permeability, as determined from hydraulic testing of site boreholes, ranges from 4.0 x 10^{-6} m/s at BH22/8, to 9.6 x 10^{-6} m/s at BH22/4.

2.2.3.4 Groundwater Quality

Groundwater quality around the main void of Clockhouse Phase 2 has been characterised through monitoring of eight boreholes installed in the Weald Clay. The data, which comprise 20 monitoring rounds completed between September 2023 and May 2025, are summarised in Table 2-5, whilst time-series graphs are presented in Appendix C.

The data indicate that groundwater quality within the Weald Clay is generally within the relevant UK Drinking Water Standards (DWS), with the exception of the following:

- All monitoring boreholes recorded sulphate concentration which were elevated above the UK DWS of 250 mg/l. The values range from 487 mg/l in BH22/06 to 1,590 mg/l in BH22/05 and are well distributed within that range. The elevated concentrations are likely to derive from natural geochemistry of the Weald Clay;
- All monitoring boreholes recorded maximum ammoniacal nitrogen concentrations elevated above the UK DWS of 0.39mg/l, with concentrations ranging from 0.6mg/l in BH22/06, to 1.2mg/l in BH22/05.

There were negligible detections of BTEX or phenols during these monitoring rounds. Speciated petroleum hydrocarbons, polyaromatic hydrocarbons (PAHs), volatile organic hydrocarbons (VOCs) were not analysed.

Table 2-5: On-Site Groundwater Quality Monitoring Data – BH22/1 to BH22/8 (Sept 2023 – April 2025)

mg/l	DWS/ MRV	LOD	BH22/1		BH22/2		BH22/3		BH22/4		BH22/5		BH22/6		BH22/8	
			Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
Amm. Nitrogen	0.39	<0.01	0.26	1	0.73	1.1	0.62	1	0.21	1.1	0.28	1.2	0.25	0.6	0.34	0.9
Cadmium (Diss)	0.005	<0.00002	-	0.0029	-	0.00002	-	0.00002	-	0.00009	-	0.0001	-	0.0001	-	0.00003
Chromium (Diss)	0.05	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001
Copper (Diss)	2.0	<0.001	-	0.002	-	<0.001	-	<0.001	-	0.004	-	0.001	-	0.003	-	<0.001
Mercury (Diss)	0.00001 (1)	<0.00003	-	<0.00003	-	<0.00003	-	<0.00003	-	0.00003	-	<0.00003	-	<0.00003	-	<0.00003
Nickel (Diss)	0.02	<0.001	0.0033	0.006	-	<0.001	-	<0.001	-	0.004	-	0.003	0.0032	0.006	0.0036	0.007
Lead (Diss)	0.0002 (2)	<0.001	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01
Zinc (Diss)	-	<0.002	0.0062	0.013	0.0033	0.008	-	0.016	0.0072	0.026	0.0075	0.016	0.0063	0.016	0.0052	0.01
Chloride	250		51	72	51	74	62	95	89	191	71.6	107	9.3	13	14	54
Sulphate	250		401	566	674	816	593	742	413	1,010	679	1,430	387	487	610	938
pH	6.5 to 8.5	N/A	7.34	7.6	7.41	7.9	7.53	8.1	7.3	7.4	7.3	7.6	7.02	7.2	7.03	7.2
Benzene	0.001 (1)		-	0.001	-	0.001	-	0.001	-	0.001	-	<0.001	-	<0.001	-	<0.001
Toluene	0.004 (1)	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001
Ethylbenzene	0.001 (1)	<0.0005	-	0.0012	-	0.0011	-	0.0014	-	0.001	-	<0.0005	-	<0.0005	-	<0.0005
m & p-Xylene	0.003 (1)	<0.001	-	0.001	-	<0.001	-	0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001
Total Phenols		<0.0020	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.002

(1) MRV based on Hazardous Substances to Groundwater EA Guidance: [https://www.gov.uk/government/publications/values-for-groundwater-risk-assessments/hazardous-substances-to-groundwater-minimum-reporting-values] (2) MRV based on Limit of Quantification (LoQ) from UK Technical Advisory Group (UKTAG) on the Water Framework Directive (September 2016): Technical Report in Groundwater Hazardous Substances [https://www.wfduk.org/resources/groundwater-hazardous-substances-standards]

2.3 Receptors

2.3.1 Abstractions and Source Protection Zones

A review of DEFRA's Magic Map confirms that there are no Source Protection Zone (SPZs) within a 2km radius of the site. The Environment Agency has indicated[4] that there are no licensed groundwater or surface water abstractions within a 2km radius of the site.

Mole Valley District Council (CBC) has indicated that there are no private unlicensed groundwater abstractions that they are aware of within a 2km radius of the site.

2.3.2 Receptor Locations for Modelling

The primary receptors assumed for this assessment are in accordance with those required by Schedule 22 (Groundwater Activities) of the Environmental Permitting Regulations 2016. This is as follows:

- for Hazardous Substance, the receptor is assumed to be the groundwater within the Weald Clay beneath the Site taking account of immediate dilution in the aquifer[5] but without any dispersion or attenuation in the aquifer pathway; and
- for Non-Hazardous Pollutants, the receptor is assumed to be the groundwater at the down-gradient Site boundary (down-gradient boreholes in the Weald Clay).

2.4 Priority Contaminants & Environmental Assessment Limits

Environmental Assessment Limits (EALs) have been calculated for all relevant substances, to allow assessment of the risk posed from the Site. The EALs are based upon the requirements of the Environmental Permitting Regulations 2016 (as amended), whereby no discernible release of Hazardous Substances is permitted, and the release of Non-Hazardous Pollutants is sufficiently limited as to avoid pollution.

The EALs have been set as follows:

- for Hazardous Substances, the EALs shall be the minimum reporting values (MRV's) as defined in the current EA HRA guidance[6]; and
- for Non-Hazardous Pollutants the EALs have been set mid-way between baseline groundwater quality (if below DWS) and respective DWS, or at maximum baseline if above DWS. Baseline includes all boreholes.

IWAC limits have been used to typify the worst-case leachate source likely to be present within the inert fill, apart from chloride and sulphate for which 3x derogation has been used. In Table 2-6 below, IWAC limits (which have been converted to mg/l) have been assessed against EALs to determine which substances pose the highest risk to the groundwater receptor for inorganic substances. Table 2-7 presents a similar assessment for hazardous organic substances, dividing the maximum potential leachable values by respective MRVs. The potential leachable values are derived from potential mg/kg concentrations of individual determinands using the EA P20 model and typical inert waste characteristics.

[4] EA response dated October 0222 as presented in Environmental Statement, SUEZ, 2023

[5] UK Government, *Groundwater Protection Technical Guidance*, Available at: https://www.gov.uk/government/publications/groundwater-protection-technical-guidance/groundwater-protection-technical-guidance (Accessed 22/07/2020)

[6] UK Government, *Hazardous Substances to Groundwater: Minimum Reporting Values Guidance*, Available at: https://www.gov.uk/government/publications/values-for-groundwater-risk-assessments/hazardous-substances-to-groundwater-minimum-reporting-values (Accessed 22/07/2020)

Table 2-6: Inorganic Inert Waste Acceptance Criteria Risk Factors

Substance (mg/l)	L/S = 10 l/kg (mg/kg dry substance)	Conversion to mg/l (L/S=10 value div. by 10)	Type	UK DWS (mg/l)	MRV / LOQ / Detection Limit	Mean GW Baseline BH22/1 to BH22/8	Max GW Baseline BH22/1 to BH22/8	Proposed EAL (MRV for Haz)	Risk Factor
Amm-N	Rogue load, low-risk site (0.3, 1, 5)		Non-Haz	0.39	Non-Haz	0.39	1.2	1.2	4.16
Arsenic	0.5	0.05	Haz	0.01	0.005	NA	NA	0.005	10 (1)
Barium	20	2	Non-Haz	1.30(a)	Non-Haz	NA	NA	0.65	3
Cadmium	0.04	0.004	Non-Haz	0.005	Non-Haz	0.000034	0.00029	0.0025	1.6
Chromium	0.5	0.05	Non-Haz(b)	0.05	Non-Haz	<0.001	<0.001	0.025	2
Copper	2.0	0.2	Non-Haz	2.0	Non-Haz	<0.00003	0.004	1.0	0.2
Mercury	0.01	0.001	Haz	0.001	0.00001	<0.00003	0.00003	0.00001	100
Molybdenum	0.5	0.05	Non-Haz	0.07(a)	Non-Haz	NA	NA	0.035	1.43
Nickel	0.4	0.04	Non-Haz	0.02	Non-Haz	<0.001	0.007	0.012	3.33
Lead	0.5	0.05	Haz	0.01	0.0002	<0.01	<0.01	0.0002	250
Antimony	0.06	0.006	Non-Haz	0.005	Non-Haz	NA	NA	0.0025	2.4
Selenium	0.1	0.01	Non-Haz	0.01	Non-Haz	NA	NA	0.005	2
Zinc (h)	4	0.4	Non-Haz	-	Non-Haz	0.0058	0.026	-	-
Chloride	800	80 (240)	Non-Haz	250	Non-Haz	50	191	150	0.53 (1.6(2))
Fluoride	10	1	Non-Haz	1.5	Non-Haz	NA	NA	0.75	1.33
Sulphate	1000 (3000)	100 (300)	Non-Haz	250	Non-Haz	537	1590	537	0.07 (0.21(2))
DOC	500	50	N/A	-	-	NA	NA	-	-
TDS	4000	400	N/A	-	-	-		-	-

Notes:
(1) Arsenic. Barium, Molybdenum, Antimony, Selenium, Fluoride not monitored, therefore no maximum GW baseline. Risk factor based on MRV.
(2) Assuming 3 x IWAC

Table 2-7: Organics Results for Inert Waste Acceptance Criteria

Component	Speciated Substance	Max Solid Conc. (WAC Limit) (mg/kg)	Max Leachable (mg/l)	Haz / Non-Haz	MRV (mg/l)	Max. Background Conc. (mg/l)	Risk Factor [d]
BTEX	Benzene	6.0	1.26 [(a)]	Hazardous	0.001 [(1)]	0.001	1260
	Toluene		0.464 [(a)]	Hazardous	0.004 [(1)]	<0.001	116
	Ethylbenzene		0.218 [(a)]	Hazardous	0.001 [(1)]	0.0014	218
	Xylene		0.218 [(a)]	Hazardous	0.003 [(1)]	0.001	72.7
PAHs	Acenaphthene	100	0.141 [(b)]	Hazardous	0.0001 [(3)]	-	1410
	Acenaphthylene		0.397 [(b)]	Not specified	-	-	-
	Anthracene		0.0339 [(b)]	Hazardous	0.00001 [(2)]	-	3390
	Benzo(a)anthracene		0.0129 [(b)]	Not specified	-	-	-
	Benzo(a)pyrene		0.00776 [(b)]	Hazardous	0.00001 [(3)]	-	776
	Benzo(b)fluoranthene		0.00955 [(b)]	Hazardous	0.00005 [(2)]	-	191
	Benzo(g,h,i)perylene		0.0024 [(b)]	Hazardous	0.00005 [(2)]	-	48
	Benzo(k)fluoranthene		0.00676 [(b)]	Hazardous	0.00005 [(2)]	-	135.2
	Chrysene		0.0182 [(b)]	Not specified	-	-	-
	Dibenzo(a,h)anthracene		0.00537 [(b)]	Not specified	-	-	-
	Fluoranthene		0.0549 [(b)]	Hazardous	0.0001 [(3)]	-	549
	Fluorene		0.0724 [(b)]	Not specified	-	-	-
	Indeno(1,2,3-cd) pyrene		0.0115 [(b)]	Hazardous	0.00004 [(2)]	-	287.5
	Naphthalene		1.52 [(b)]	Non-Haz	-	-	-
	Phenanthrene		0.0436 [(b)]	Not specified	-	-	-
	Pyrene		0.0616 [(b)]	Not specified	-	-	-
	Aliphatics >C10-C12	500				-	-

Component	Speciated Substance	Max Solid Conc. (WAC Limit) (mg/kg)	Max Leachable (mg/l)	Haz / Non-Haz	MRV (mg/l)	Max. Background Conc. (mg/l)	Risk Factor [d]
Mineral Oil C10 – C40	Aliphatics >C12-C16		Not assessed further as low risk (EA TPH Guidance 2009)			-	-
	Aliphatics >C16-C21					-	-
	Aliphatics >C21-C35					-	-
	Aromatics >C10-C12		1.99[(c)]	Hazardous	0.009 [(2)]	-	221.1
	Aromatics >C12-C16		0.997[(c)]	Hazardous	0.009 [(2)]	-	110.8
	Aromatics >C16-C21		Not assessed further as low risk (EA TPH Guidance 2009)			-	-
	Aromatics >C21-C35					-	-

[(a)] Speciated max leachable concentrations back-calculated using remedial target worksheet based on typical porosity & bulk density of inert waste and substance specific Henry's Law and soil water partition coefficients (assuming any one speciated substance will provide no more than 33% of the Total BTEX (i.e. 2.0mg/kg)

[(b)] Back-calculated using remedial target worksheet based on typical porosity & bulk density of inert waste and substance specific Henry's Law and soil water partition coefficients (assuming any one speciated substance will provide no more than 20% of the Total PAH (i.e. 20mg/kg)

[(c)] Back-calculated using remedial target worksheet based on typical porosity & bulk density of inert waste and substance specific Henry's Law and soil water partition coefficients (assuming any one speciated substance will provide no more than 20% of the Total Mineral Oil (i.e. 100mg/kg)

[(d)] Risk factor calculated as assumed maximum leachable concentration divided by MRV

[(1)] MRV based on Hazardous Substances to Groundwater EA Guidance: [https://www.gov.uk/government/publications/values-for-groundwater-risk-assessments/hazardous-substances-to-groundwater-minimum-reporting-values]

[(2)] MRV based on Limit of Quantification (LoQ) from UK Technical Advisory Group (UKTAG) on the Water Framework Directive (September 2016): Technical Report in Groundwater Hazardous Substances [https://www.wfduk.org/resources/groundwater-hazardous-substances-standards]

[(3)] MRV based on worst case DWS which is lower than UKTAG LoQ

Based on the risk factors outlined in Table 2-6, the highest risk is posed by hazardous metal lead.

The risk factors derived for most non-hazardous substances are significantly lower, with most substances at IWAC recording a risk factor value of less than 3 (with the exception of ammoniacal nitrogen and nickel). The three non-hazardous substances included in the modelling are nickel, ammoniacal nitrogen (as a potential rogue load) and chloride for which 3x derogation has been used. Sulphate has not been included as the source term is less than background groundwater quality and therefore no modelling is needed.

Based on Table 2-7 above, it is proposed that representative speciated PAHs are also included within the assessment. The highest risk factor to groundwater is posed from anthracene, whilst benzo(a)pyrene also has a high-risk factor and is typically used as a marker species for PAHs.

A summary of the substances proposed for modelling is provided in Table 2-8.:

Table 2-8: Summary of proposed Substances for Modelling

Deter-minand	Model	Reason for inclusion	Source Concentration (mg/l)	Justification for Source Conc. (mg/l)	Proposed EAL
Non-Hazardous					
Amm. Nitrogen	Modelled in general fill & clean inert fill	Conservative major ion, high-risk factor	Min.: 0.3, Avg.: 1, Max.: 5 Triangular Dist.	Rogue load for low-risk site based on EA requirements.	1.2
Chloride		Conservative major ion	240 Single Fixed Value	3 x Site-specific Inert WAC limits, outlined within the Landfill Directive council decision annex 2003/33/EC.	150
Nickel		Conservative non-haz. metal, high-risk factor	0.04 Single Fixed Value	Site-specific Inert WAC limits, outlined within the Landfill Directive council decision annex 2003/33/EC.	0.012
Hazardous					
Anthracene	Modelled in general fill only	Representative PAH, high-risk factor	0.0339 Single Fixed Value	Assumes 20% of the total PAH WAC limit of 100mg/kg is Anthracene – converted to mg/l using P20 calculations based on Henry's Law and partition coefficients.	0.00001
Benzo(a) pyrene		Representative PAH, high-risk factor	0.00776 Single Fixed Value	Assumes 20% of the total PAH WAC limit of 100mg/kg is Benzo(a)pyrene – converted to mg/l using P20 calculations based on Henry's Law and partition coefficients.	0.00001
Lead		Conservative haz. metal, high-risk factor	0.05 Single Fixed Value	Site-specific Inert WAC limits, outlined within the Landfill Directive council decision annex 2003/33/EC.	0.0002

2.5 Surface Water Management

The site presently constitutes three disconnected voidspaces which are flooded through a combination of surface water runoff and groundwater outfalling from the exposed mineral faces. A previous topographic survey undertaken in 2019 confirmed the water level as 77.4m AOD within the most northern pond.

There is an unnamed tributary of Fylls Brook which rises in the centre of the eastern boundary of the application site. While the original catchment of this tributary has been entirely quarried, pumped flows from the existing quarry voids are discharged intermittently to this channel by SUEZ under active discharge consent (no.P.12567/S/05).

It is proposed that the site shall be progressively restored through the partial infilling of the voidspaces, creating a naturalised profile which slopes to a series of cascading ponds (from north to south). In addition to the deposit for recovery and crushing/screening activities, the EP application seeks to permit the discharge of surface water run-off to a tributary of Fylls Brook.

The discharge consent will contain conditions that replicate the conditions an existing discharge consent (P12567/V002) held by Forterra Building Products Ltd ('Forterra'). SUEZ has an agreement with Forterra to use the discharge permit for the removal of collected runoff waters from the quarry void. It is, however, recognised that operating under another company's discharge permit is not conducive to SUEZ's long-term operation and management of the site. SUEZ therefore seek to incorporate the point source discharge to surface water into the permit, mirroring the conditions outlined in permit P12567/V002.

The active discharge permit requires monitoring of the site outfall to the Fylls Brook at NGR 1779 3854.SUEZ are currently required to monitor the concentration of suspended solids to a compliance limit of 40 mg/l.

To support the ongoing care of the closed south-western landfill site, SUEZ currently monitors adjacent waterbodies at three locations (SW1, SW3 and SW4). Of these, SW3 and SW4 are considered relevant to this assessment:

- **SW3**, which is situated on southern boundary at Fylls Brook and up-stream of the site discharge point, is considered analogous to the baseline water quality in the receiving Fyllls Brook.
- **SW4**, which is situated in the most southerly flooded voidspace, is considered analogous to the water quality expected within the restored ponds.

Surface water quality monitoring has been undertaken on a quarterly basis at these points since 2008. A summary of the data for key determinands is presented in Table 2-9 whilst chemographs are presented in Appendix D.

Table 2-9: Surface Water Quality Monitoring, SW3 and SW4 (2008 to present)

Determinand	SW3					SW4				
	Det.	Count	Min.	Avg.	Max.	Det.	Count	Min.	Avg.	Max.
Amm. Nitrogen	120	178	<0.01	0.13	1.1	115	174	<0.01	0.15	2.5
Chloride	177	177	6	37.40	102	174	174	5	23.55	100
E. Conductivity (uS/cm)	128	128	251	846.16	1940	125	125	276	946.50	3260
Lead	0	5	<0.001	-	0	0	5	<0.001	-	0
Nickel	9	9	0.002	0.0026	0.003	3	9	<0.001	-	0.002
pH	179	179	7.3	7.81	8.6	174	174	6.7	7.84	8.8
Sulphate	32	32	36	279.80	692	10	10	80	282.9	394

2.6 Summary of Hydrogeological Site Conceptual Model

The Site's hydrogeological conceptual model is summarised in Table 2-10.

Table 2-10: Summary of Hydrogeological Site Conceptual Model

Linkage	Site Details
Source	The voids created through the extraction of Weald Clay and overlying clays will be restored with imported inert fill materials. The fill materials placed within the void will comprise inert material only and will not exceed the IWAC limits as specified in guidance. No leachate collection system or artificial sealing liner is required, given the nature of the material streams. Due to the nature of the underlying and adjacent Weald Clay there is a requirement for two infill layers; - An upper "general" infill containing selected general inert material place **above** the water table. - A lower clean inert fill placed **below** the water table. The base and sidewalls will be constructed from clean inert fill which will comprise imported clays, which will be subject to WAC testing where considered necessary to confirm it is inert. The upper topsoil layer used for restoration will be imported.
Pathway	Any leachate generated through the infiltration of rainwaters through the selected general inert material will migrate through the clean inert fill and the Weald Clay in the unsaturated zone (where present at the sidewalls) into the underlying groundwater. Degradation and/or attenuation of potential contaminants will take place within the lower infill and the unsaturated zone.
Receptor	In order to comply with Schedule 22 (Groundwater Activities) of the Environmental Permitting Regulations, 2016, the following are considered appropriate receptors: • for Hazardous Substances, the receptor is assumed to be the groundwater within the Weald Clay Formation immediately beneath the Site (taking account of immediate dilution in the aquifer, but without any dispersion or attenuation in the aquifer pathway); and • for Non-Hazardous Pollutants, the receptor is considered to be the groundwater at the down-gradient site boundary (down-gradient boreholes) in the Weald Clay.
Compliance Points	For the purposes of defining receptors, the compliance points are taken to be at the down-gradient site boundaries. It is noted that there may be other physical receptors further away from the down-gradient Site boundary. Compliance with the Regulations at the points defined above will ensure that other receptors are adequately protected.

3.0 HYDROGEOLOGICAL RISK ASSESSMENT

3.1 Nature of the Hydrogeological Risk Assessment

As set out within current HRA technical guidance[7], the "*appropriate complexity of assessment for a site should be determined from the potential risks presented by the site, which are linked to the nature of potential hazards, the sensitivity of the surrounding environment, degree of uncertainty and likelihood of a risk being realised*."

Given this is a new site,, along with its environmental setting on a Secondary A aquifer, it is considered appropriate to carry out a detailed quantitative assessment.

The Site will accept inert materials comprising two varieties, "selected general inert fill" only accepted above the water table, and clean inert fill accepted below the water table. As stated in section 2.1, clean inert material will also be used as a 2m attenuation layer along the sidewalls above the water table. Waste codes accepted into each fill are defined in section 2.1.

Inert material is defined as follows;

1 it does not undergo any significant physical, chemical or biological transformations;

2 it does not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health; and

3 total leachability, pollutant content and the ecotoxicity of its leachate are insignificant and, in particular, do not endanger the quality of any surface water or groundwater.

Based on this definition of inert material, the Site should not produce any leachate that could result in any significant discharge of Hazardous Substances or Non-Hazardous Pollutants throughout the lifecycle of the Site.

Therefore, with regard to the proposed inert fill recovery materials, the Site:

- presents a negligible risk to groundwater and surface water quality; and
- does not require environmental management systems (artificial sealing liner, leachate management or other engineering and management structures), or the consideration of the degradation of such systems.

Following a review of the Environmental Permitting Regulations 2016 (Schedule 22 Groundwater Activities), it is considered that the site activities fall outside of it's scope with consideration for the above.

However, notwithstanding the above, it is considered that a quantitative risk assessment is required given that the Environment Agency Landfills for inert waste online guidance[8] states that a quantitative risk assessment is likely to be necessary for inert materials where the receiving environment is particularly sensitive, for example on a principal aquifer or below the water table.

The proposed site, whilst not underlain by a Principal Aquifer, does intend to accept inert infill below the water table. In order to assess the risk to the environment, it is considered

[7] EA and DEFRA (February 2016) Landfill developments: groundwater risk assessment for leachate guidance, Available at: https://www.gov.uk/guidance/landfill-developments-groundwater-risk-assessment-for-leachate (Accessed 22/07/2020)

[8] Environment Agency (30 January 2020) *Landfill Operators: Environmental Permits – Landfills for inert waste*, https://www.gov.uk/guidance/landfill-operators-environmental-permits/landfills-for-inert-waste

appropriate to assess the potential worst-case leachate quality that could potentially be generated from the Site (as presented in Table 2-8).

3.2 The Proposed Assessment Scenario

3.2.1 Lifecycle Phases

It is recognised that the HRA must assess the proposed development's compliance with the requirements of Schedule 22 of the Environmental Permitting Regulations 2016 (as amended), throughout the lifecycle of the recovery operation i.e. from the start of the operational phases until the point at which the inert infill no longer poses an unacceptable environmental risk.

Based on the hydrogeological conceptual site model (outlined within Section 2.0), the potential pathway for leachate to impact groundwater quality is advective migration through the unsaturated zone of the Weald Clay and through the sidewall directly into the aquifer.

3.2.2 Justification of Modelling Approach and Software

Detailed quantitative risk assessments are carried out using stochastic/probabilistic techniques to realise analytical solutions or mathematical solutions.

The HRA has been carried out using conservative, but realistic, assumptions regarding the source, pathways and receptors. Site specific data have been used wherever possible to parameterise the risk assessment. Using measured site data reduces uncertainty in the risk assessment process.

Given the two infill types above and below the water table respectively, it has been considered most appropriate based on SLR experience to use two separate models (as presented in Table 3-1.

Table 3-1: Assessed scenarios

Scenario	Modelling approach
Above water table, selected general infill material	LandSim Version 2.5.17
Below water table, clean infill material	RAM3 modelling software

The EA's LandSim software (version 2.5.17) has been used to provide an estimate of the potential risks associated with the general infill material above the water table. This software was used for the following reasons:

- it is the EA's recommended software for quantitative hydrogeological risk assessment modelling and allows consideration of the entire life of the Site;
- it uses Monte Carlo (stochastic) techniques and so allows a probabilistic appreciation of the Site's performance;
- it provides a consistent approach to the estimation of hydrogeological risks in respect to inert infill and groundwater;
- it provides an audited and verified code that is widely accessible;
- it aids comprehensive reporting of input values, assumptions and results;
- the model provides a good indication of the potential leakage rates. This is important as the installation's compliance with the requirements of Schedule 22 (Groundwater Activities) of Environmental Permitting Regulations 2016 (as amended) depends significantly upon the functioning of the containment system;

- it allows the estimation of the potential attenuation of contaminants through the unsaturated zone. This was particularly important for the consideration of Hazardous Substances; and
- it allows the dilution and attenuation of Non-Hazardous Pollutants within the aquifer's saturated zone.

RAM3 has been used to provide an estimate of the potential risks associated with the infill of clean inert infill below the water table. This software was used for the following reasons:

- it uses Monte Carlo (stochastic) techniques and so allows a probabilistic appreciation of the Site's performance;
- it provides a consistent approach to the estimation of hydrogeological risks in respect to inert fill and groundwater;
- it aids comprehensive reporting of input values, assumptions and results;
- Furthermore, based on SLR experience, LandSim functions poorly when the inert infill is below the water table. Accordingly, it was deemed more appropriate to use RAM3 for the model below the water table.

All modelling carried out for this risk assessment has been carried out in a stochastic fashion. Throughout this assessment the acceptable probability of an undesirable outcome occurring is set at the 95th percentile for stochastic estimations carried out for a complex hydrogeological risk assessment. In addition, the 95th percentile is commonly selected as a reasonable worst case, against which it is acceptable to make decisions taking into account the assumptions and limitations of the modelling process.

It is noted that the LandSim and RAM3 models have modelled different and parallel groundwater flow paths from north to south across the site, as the RAM3 model focusses on the central infill, whereas the LandSim model focusses on the western and eastern perimeter infill hence there is no need to derive cumulative model results.

3.2.3 Accidents and their Consequences

Details of accidental occurrences at the Site that could present a potential risk to groundwater quality adjacent to the site are provided in Table 3-2 below:

Table 3-2: Qualitative Assessment of Accidents and Mitigation

Accidental Occurrence	Risk to Groundwater	Likelihood of Occurrence	Mitigation and Corrective Measures
Deposition of non-inert wastes	Generation of leachate containing Hazardous Substances or Non-Hazardous Pollutants.	Low – due to the essential and technical precautions.	Any incorrectly accepted wastes will be immediately returned to the customer or moved to a suitable storage area prior to removal to a suitable site.
Spillage of fuels from storage tanks or vehicles	Release of hydrocarbons (Hazardous Substances) into the ground and migration to groundwater.	Low – fuel stores will be bunded in accordance with Regulations. A traffic system and speed limit will be imposed at the Site to reduce both the risk of accidents and the likelihood of spillage occurring.	Any spillage will be cleaned up immediately and any resulting contaminated soils removed to a suitable installation.

With respect to the deposition of potentially contaminated wastes, it is considered that the risks and potential consequences of such accidents are extremely low for the following reasons:

- all infill deliveries will be pre-arranged and come from known sources to ensure no contaminated material is delivered;
- if deemed necessary, characterisation testing will be undertaken to demonstrate that the infill will not give rise to polluting leachate, prior to the acceptance of infill at the Site;
- if deemed necessary compliance testing will be undertaken to ensure the continued acceptability of the infill materials;
- visual inspection will be undertaken of every load of infill materials deposited at the Site; and
- in the event of suspicion regarding the acceptability of the infill materials, quarantine procedures will be enforced.

In the unlikely event of contaminants from a rogue load being deposited at the Site, attenuation processes will occur within the infill materials, and most organic Hazardous Substances are very likely to be degraded and retarded during migration through the surrounding inert infill materials within the void. Other processes such as volatilisation can also be expected for volatile and semi-volatile organic substances resulting in a mass loss of any contaminant from the infill materials.

3.3 Numerical Modelling

3.3.1 Model Parameterisation

The nature of all of the input parameters used, together with the appropriate probability distributions used to describe them are presented in the following:

- Appendix E, which presents the detailed LandSim parameterisation
- Appendix G, which presents the RAM3 parameterisation

Parameter values were determined from information directly measured at Site wherever possible. If no site data were available, conservative parameter values were taken from authoritative sources or after previous SLR experience at similar sites.

3.3.2 Assessment Methodology

In order to represent worst case conditions and assess the most sensitive determinands, risk factors were used to choose suitable determinands which pose the greatest risk of causing either pollution to the aquifer or a derogation of groundwater quality. As detailed within Section 2.0 the following determinands have been modelled:

- Hazardous Substances: lead, anthracene, benzo(a)pyrene;
- Non-Hazardous Pollutants: ammoniacal nitrogen, chloride, and nickel.

As detailed in Section 3.2.2 above, the fate of Hazardous Substances and Non-Hazardous Pollutants has been considered using LandSim v2.5.17 for the upper infill and RAM3 for the lower clean fill. It is noted that the LandSim and RAM3 models have modelled different and parallel groundwater flow paths from north to south across the site, as the RAM3 model focusses on the central infill, whereas the LandSim model focusses on the western and eastern perimeter infill, hence there is no need to derive cumulative model results.

3.4 Assessment Results

The predicted discharge from the development has been assessed against EALs presented in Table 2-6 for inorganic substances and the MRVs presented in Table 2-7 for organic substances to determine whether the Site complies with the requirements of Schedule 22 (Groundwater Activities) of the Environmental Permitting Regulations 2016.

The results of the LandSim model are presented in Appendix F, whilst the results for the RAM3 model are presented in Appendix I.

3.4.1 Hazardous Substances

Hazardous Substances have been assessed at the notional LandSim 'monitoring well' beneath the Site at the outside edge of the inert fill i.e. after immediate dilution but without any dispersion or attenuation in the aquifer. The model results are summarised within Table 3-3.

Table 3-3: Hazardous Substances – Maximum Predicted Concentration at Monitoring Well, Upper General Infill

Determinand (mg/l unless otherwise stated)	EAL / MRV	95th percentile Concentration
		Upper General Infill
Lead	0.0002	<1E-09
Anthracene	0.00001	<1E-09
Benzo(a)pyrene	0.00001	<1E-09

3.4.2 Non-Hazardous Pollutants

The modelling results for Non-Hazardous Pollutants are presented within Table 3-4 and Table 3-5. As a conservative worst case the resulting 95th percentile concentrations have been assessed at the notional LandSim 'monitoring well' beneath the Site at the outside edge of the inert infill.

Table 3-4: Non-Hazardous Pollutants, Maximum Predicted Concentrations in Clockhouse Quarry, Upper Selected General Infill

Determinand (mg/l unless otherwise stated)	Max. Background Concentration	EAL	95th percentile Resultant Conc.
Amm. Nitrogen	1.2	1.2	0.0000036
Chloride (3x IWAC)	191	150	96
Nickel	0.007	0.012	0.000066

Table 3-5: Non-Hazardous Pollutants, Maximum Predicted Concentrations in Clockhouse Quarry, Lower Clean Infill

Determinand (mg/l unless otherwise stated)	Max. Background Concentration	EAL	95th percentile Resultant Conc.
Amm. Nitrogen	1.2	1,2	$<1x10^{-09}$
Chloride (3x IWAC)	191	150	126
Nickel	0.007	0.012	0.00088

Table 3-4 and Table 3-5 demonstrate that the predicted resultant concentrations at the compliance point are lower than the appropriate EALs. It is noted that the LandSim and

RAM3 models have modelled different and parallel groundwater flow paths from north to south across the site, hence there is no need to derive cumulative model results. It is therefore considered that the modelling has shown that the discharge of Hazardous Substances and Non-Hazardous Pollutants will be sufficiently limited so as to avoid pollution.

3.5 Assessment Conclusions

The modelling results demonstrate that the proposed importation of inert recovery material at the Site will remain compliant with the Environmental Permitting Regulations 2016 (as amended) provided that the infill material meets inert WAC limits (or 3 x IWAC limits for chloride and sulphate).

3.6 Review of Technical Precautions

Essential and technical precautions are those measures required to ensure that the site complies with Schedule 22 (Groundwater Activities) of the Environmental Permitting Regulations 2016 (as amended). Essential and technical precautions typically include both restrictions on infill types and the engineering and other environmental management measures. Given the proposed classification for recovery of inert material, the Site will not require leachate management. However, the following essential and technical precautions are proposed:

- a sidewall and basal attenuation layer with a minimum thickness of 2 metre comprising suitable clay materials;;
- all infill deliveries will be pre-arranged and come from known sources;
- all infill materials will be subjected to stringent acceptance criteria and acceptance procedures;
- all infill materials will be inspected at the weighbridge. All site operatives will be trained to inspect infill materials upon tipping to ensure that they meet the acceptance criteria and to implement an accident management plan to remove non-conforming materials immediately; and
- environmental monitoring, as specified in Section 4.0, will be undertaken.

3.7 Hydrogeological Completion Criteria

Due to the nature of the infill material, it is concluded that the Site will be complete (that is, the Site no longer has the potential to cause damage to or deterioration of the environment and risk to human health) with respect to groundwater quality immediately after the completion of restoration works.

4.0 REQUISITE SURVEILLANCE

4.1 The Risk Based Monitoring Scheme

The Environmental Permitting Regulations 2016 (as amended), require that "requisite surveillance" is undertaken where disposal of substances potentially giving rise to Hazardous Substances or Non-Hazardous Pollutants has been authorised by the EA. Therefore, environmental monitoring will be undertaken to provide assurance that the Site is not resulting in any detrimental effects on water quality.

4.2 Leachate Monitoring

WAC testing will be completed on selected infill material where necessary, prior to deposition at the Site. There is no requirement for leachate monitoring.

4.3 Groundwater Monitoring

The monitoring of groundwater quality around the perimeter of the proposed DfR site will be carried out using the existing network of monitoring boreholes.

In keeping with inert landfill guidance, it is proposed that ongoing groundwater level and quality monitoring is undertaken from at least one up-gradient and two down-gradient boreholes (at each part of the site) within the underlying / adjacent Weald Clay Formation.

Collated groundwater elevation data confirm that the site currently manages an inward hydraulic gradient as a result of the ongoing dewatering of the mineral void space. With the exception of BH22/5, the current groundwater monitoring points are considered to be representative of background groundwater quality with the current surface water discharge point "*OUTLET AND SAMPLE POINT*" considered the ultimate down-gradient point for discharging waters.

Following a cessation of dewatering, the natural groundwater flow regime is expected to be in a broadly southerly direction across the site. It is therefore proposed that the following boreholes are used for groundwater quality monitoring purposes going forward:

- Up-Gradient: BH22/1, and BH22/3
- Down-Gradient[9]: BH22/5, and BH22/9

The proposed monitoring schedule is outlined in Table 4-1 below, and monitoring locations are shown on Drawing 002. The proposed schedule is based on current EA landfill monitoring guidance and the results of this HRA.

[9] BH22/6 has been excluded as a down-gradient monitoring point as it is interpretated based upon recent groundwater level data that the boreholes screens perched waters rather than the wider aquifer.

Table 4-1: Proposed Groundwater Monitoring Schedule

	Groundwater Monitoring Locations	Monitoring Frequency	Measurement and Analytical Suite
Groundwater Quality	Up-gradient: BH22/1, BH22/3 Down-gradient: BH22/5, BH22/9	Quarterly	electrical conductivity, chloride, ammoniacal nitrogen, pH and sulphate,
		Annually	As above plus: total alkalinity, magnesium, potassium, calcium, sodium, arsenic chromium, copper, iron, zinc, manganese, nickel, lead, selenium, Monitoring well base (m BGL) VOC Suite to include BTEX
Groundwater Elevation	BH22/1 BH22/2 BH22/3 BH22/5 BH22/8 BH22/09 BH22/10 BH22/12	Quarterly	Groundwater level (m AOD)
		Annually	Monitoring well base (m BGL)

4.3.1 Groundwater Compliance

The HRA has demonstrated that the Site will limit the release of both Hazardous Substances and Non-Hazardous Pollutants.

As discussed in Section 2.2.3, BH22/5 is considered to be immediately up-gradient of the current and proposed site surface water discharge point. It therefore serves to use this monitoring borehole as an early warning point for impact on the watercourse via groundwater. Action limits have been set for BH22/5 and BH22/9 to reflect this.

The chosen determinands are the four modelled inorganic substances, one hazardous and two non-hazardous results. Lead is chosen as it is the only inorganic hazardous metal, nickel as a representative non-hazardous inorganic metal, and chloride and ammoniacal nitrogen as representative major ions.

The proposed action limits at the time of permit application are outlined in Table 4-2.

Table 4-2: Proposed Action Levels for BH22/5 and BH22/9

Determinand	Proposed GW Action Limits (mg/l)
Lead	0.0002
Nickel	0.012
Chloride	120
Amm. Nitrogen	1.2

Notes:	**Lead** – Hazardous substance - Compliance Limit set at typical LOD for labs (0.0002 mg/l). **Nickel** – Set at half the UK DWS of 0.013 mg/l, equivalent to average background (currently all GW monitoring locations) plus 3x Standard Deviations. **Chloride** – Set at 120 mg/l, based upon background groundwater monitoring data. **Amm. Nitrogen** – Set at 1.2 mg/l, equivalent to maximum background recorded in BH22-05, 09/10/2023.

Any exceedance of the proposed action limits will trigger site specific contingency actions which are outlined in Section 4.5 below.

4.4 Surface Water Monitoring

One surface water monitoring location exists on site, identified as "*OUTLET AND SAMPLE POINT*". This is regulated by an existing discharge permit operated by Forterra Building Products Ltd., for which SUEZ has an agreement in place to discharge waters collected within the mineral void.

As part of the EP application SUEZ shall seek to permit the point source emission of surface water run-off to a tributary of the Fylls Brook. SUEZ propose to retain the discharge location of the existing discharge permit, identifying it as "Discharge 1". An updated monitoring schedule is proposed, as presented in Table 4-3.

Table 4-3: Proposed Surface Water Monitoring Schedule

Monitoring Location	Monitoring Frequency	Parameter
Discharge 1	Monthly	Electrical conductivity, ammoniacal nitrogen, pH, chloride, suspended solids
	6 monthly	As above plus Calcium, iron, magnesium, manganese, potassium, sodium, sulphate, total oxidised nitrogen, alkalinity, nickel, lead

4.4.1 Surface Water Compliance

As discussed in Section 4.3, the current groundwater monitoring points are therefore considered to be representative of background groundwater quality with the discharge point "Discharge 1" considered to be the ultimate discharge point for groundwater.

It therefore serves to set action levels and compliance limits for Discharge 1, which are presented in Table 4-4.

Table 4-4: Proposed Action and Compliance Limits for Surface Water Discharge 1

Determinand	Proposed Action Limit (mg/l)	Proposed Discharge Compliance Limit (mg/l)
Flow Rate*	N/A	2,880m^3/day
Suspended Solids*	N/A	40
Lead	N/A	0.0002
Nickel	0.0038	0.012
Chloride	64	120
Amm. Nitrogen*	0.61	1.2

Notes:

The above limits are only applicable to flowing discharge(s) from the site through point Discharge 1.

Lead – No control level as hazardous. Compliance Limit set at typical LOD for labs (0.0002mg/l).

Nickel – Control level set at average conc. (SW3 and SW4) plus 2 standard deviations. Compliance limit set at proposed EAL, i.e. at 0.012mg/l.

Chloride – Control level set at average conc. (SW3 and SW4) plus 2 standard deviations. Compliance limit set at 120 mg/l, equivalent to Groundwater action limit.

*: Determinands and limits in current discharge consent (for pumped groundwater)

Amm. Nitrogen – Control level set at average conc. (SW3 and SW4) plus 2 standard deviations. Compliance limit set at 1.2 mg/l, equivalent to proposed groundwater EAL and maximum observed in surface

Any exceedance of the proposed action limits will trigger site specific contingency actions which are outlined in Section 4.5 below.

4.5 Contingency Actions

In response to exceedance on an Action Level of Compliance Limit set out above, SUEZ will undertake the following actions:

Table 4-5: Contingency Actions - Breach of Action Limits

Contingency Action	Response Time	Responsibility
Inform SUEZ Area Manager	24 Hours	Aftercare Technician
Verify accuracy of test with laboratory and QA procedures and trend analysis	1 week	Aftercare Technician
Resample and re-analyse	1 month	Aftercare Technician

Table 4-6: Contingency Actions - Breach of Compliance Limits

Contingency Action	Response Time	Responsibility
Inform SUEZ Area Manager	24 Hours	Aftercare Technician
Inform EA via Part A Notification	24 Hours	EIR Team
Verify accuracy of test with laboratory and QA procedures and trend analysis	1 week	Aftercare Technician
Resample and re-analyse	2 weeks	Aftercare Technician
Update EA via Part B Notification	4 weeks	EIR Team

5.0 CONCLUSIONS

5.1 Compliance with Schedule 10 of the Environmental Permitting Regulations, 2016

The results of this risk assessment have established the following:

- the proposed recovery operation will:
  - only accept selected clean inert infill streams below the water table; and
  - Above the water table, selected general infill containing hazardous substances will be accepted.

  The modelling undertaken has demonstrated that the proposed site design would limit any significant release of hazardous and non-hazardous substances to the Weald Clay aquifer. Accordingly, there is no significant contaminant source and leachate management is not required;
- a sidewall and basal fill of clean inert material with a minimum thickness of 2 metre which shall comprise will be provided;
- essential and technical precautions have been outlined;
- requisite surveillance, which includes the monitoring of groundwater around the site has been detailed to ensure the installation remains in compliance with the Environmental Permitting Regulations 2016 (as amended).
- control levels and compliance limits have been set in order to ensure the adequate protection of ground and surface water resources; and
- the Site should comply with the relevant requirements of the Schedule 10 of the Environmental Permit Regulations 2016 (as amended).

5.2 Compliance with Schedule 22 of the Environmental Permitting Regulations 2016

The results of this risk assessment have established the following:

- the proposed development poses a potential hazard to ground and surface water quality. Consequently, it falls within the scope of Schedule 22 (Groundwater Activities) of the Environmental Permitting Regulations 2016 (as amended);
- this assessment has outlined the CSM that must be developed for DfR operations;
- the proposed and installed technical precautions will prevent the discernible discharge of Hazardous Substances to groundwater throughout the Site's lifecycle;
- the proposed technical precautions will limit the introduction of Non-Hazardous Pollutants into groundwater to avoid pollution throughout the Site's lifecycle; and
- the following essential technical precautions have been identified as part of the HRA:
  - the selected general inert material to be accepted to the upper infill will meet WAC limits, and will require WAC testing;
  - the clean inert materials to be accepted to the lower infill do not require WAC testing if they come from a single source, are well characterised, and carry no risk of contamination. These materials are assumed to meet inert WAC limits;
  - a risk-based programme of groundwater monitoring shall be implemented, and control levels and compliance limits have been outlined.

The Site therefore complies with the relevant requirements of the Schedule 22 (Groundwater Activities) of the Environmental Permitting Regulations 2016 (as amended).

Appendix A Borehole Logs

Clockhouse Quarry Restoration

Environmental Permit Application Hydrogeological Risk Assessment

Suez Recycling and Recovery UK Ltd

SLR Project No.: 402.065294.00001

11 November 2025

CABLE PERCUSSIVE EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/1
05/12/2022 10:00	0.00			
05/12/2022 16:00	8.00	3.00	Dry	
07/12/2022 10:15	8.00	3.00	Dry	
07/12/2022 16:00	14.00	3.00	11.70	

Project	Capel			**Equipment**	Cut down cable rig/Insulated hand tools/Dando 1500	Sheet 1 of 2	
Client	Suez			**Method**	CP/IP	**Scale**	1:50
Project No	G22071	**Level**	91.92 mAOD	**Inclination**	90 degrees	**Drilled**	SL
Easting	517821.94	**Northing**	138891.44	**SPT Hammer Serial Number**		**Logged**	SC
Termination Reason	Refusal on bedrock			**SPT Hammer Energy Ratio**	%	**Checked**	SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Depth (Thickness)	Level (mAOD)	Description
			0.00		Soft dark brown silty sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of flint, brick, concrete and rare sandstone. Occasional rootlets. (MADE GROUND)
			(0.65)		
			0.65	91.27	Firm becoming very stiff yellowish brown occasionally mottled with bluish grey slightly silty CLAY. (Weathered WEALD CLAY FORMATION)
			(1.55)		
			2.20	89.72	Very stiff friable bluish grey mottled with yellowish brown slightly organic silty CLAY. Rare black speckling and rare black staining on partings. Occasional psudo-clasts of siltstone of medium to coarse gravel size. (WEALD CLAY FORMATION)
					3.20m - 3.30m Yellowish brown extremely weak LIMESTONE.
1 UT	4.00 - 4.45	Blows: 100 Rec: 45% Dia: 100mm Water: Dry			*4.00m - 4.45m Split and describe: Very stiff friable yellowish brown mottled with bluish grey slightly organic silty CLAY. Rare black speckling and rare black staining on partings. Occasional pseudo-clasts of siltstone of medium to coarse gravel size.*
			(5.80)		
					6.00m - 6.50m Redish brown silty CLAY.
			8.00	83.92	Very stiff friable blueish grey silty CLAY with rare white fossil fragments. Occasional medium to coarse gravel size psudo-clasts. (WEALD CLAY FORMATION)
					9.40m - 9.50m Abundant white fossil fragments. Rare ammonite (single fossil).
2 UT	10.00 - 10.45				

Continued on next Sheet

Scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00, 5.50, 6.00, 6.50, 7.00, 7.50, 8.00, 8.50, 9.00, 9.50, 10.00

Backfill

Chiseling				Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Duration (hh:mm)	Tool	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
13.95	14.00	01:00	Chisel	14.00	150mm	14.00	150mm	7.00	14.00	07/12/2022 14:03	3.00	13.80		11.70	20mins	

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Cable Percussive drilling from 1.20m to 14.00m depth. Change from standard to cut down rig 7th Dec.

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CABLE PERCUSSIVE EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/1
05/12/2022 10:00	0.00			
05/12/2022 16:00	8.00	3.00	Dry	Sheet 2 of 2
07/12/2022 10:15	8.00	3.00	Dry	
07/12/2022 16:00	14.00	3.00	11.70	

Project	Capel			**Equipment**	Cut down cable rig/Insulated hand tools/Dando 1500	**Scale**	1:50
Client	Suez			**Method**	CP/IP	**Drilled**	SL
Project No	G22071	**Level**	91.92 mAOD	**Inclination**	90 degrees	**Logged**	SC
Easting	517821.94	**Northing**	138891.44	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Refusal on bedrock			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Depth (Thickness)	Level (mAOD)	Legend	Description	Scale	Backfill
		Blows: 100 Rec: 55% Dia: 100mm Water: Dry	(5.95)			Very stiff friable blueish grey silty CLAY with rare white fossil fragments. Occasional medium to coarse gravel size psudo-clasts. (WEALD CLAY FORMATION) *10.00m - 10.45m Split and describe: Very stiff friable bluish grey silty CLAY with occasional pseudo-clasts of siltstone of medium to coarse gravel size. Very rare black speckling and single fossil fragment (ammonite).*	10.50 11.00 11.50 12.00 12.50 13.00 13.50	
			13.95 (0.05)	77.97 77.92		Light grey medium strong slightly calcareous fine grained SANDSTONE. (WEALD CLAY FORMATION) End of Exploratory Hole at 14.00m	14.00 14.50 15.00 15.50 16.00 16.50 17.00 17.50 18.00 18.50 19.00 19.50 20.00	

Chiseling				Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Duration (hh:mm)	Tool	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
13.95	14.00	01:00	Chisel	14.00	150mm	14.00	150mm	7.00	14.00	07/12/2022 14:03	3.00	13.80		11.70	20mins	

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Cable Percussive drilling from 1.20m to 14.00m depth. Change from standard to cut down rig 7th Dec.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth
21/06/2023 08:00	0.00		
21/06/2023 17:00	18.00	3.00	Wet
22/06/2023 08:00	18.00	3.00	Wet
22/06/2023 12:00	21.00	3.00	Wet

Exploratory Hole BH22/02

Sheet 1 of 5

Project	Capel		**Equipment**	Insulated hand tools/Comacchio 305	
Client	Suez		**Method**	IP/RO/RC	
Project No	G22071	**Level** 90.90 mAOD	**Inclination**	90 degrees	
Easting	517746.00	**Northing** 138878.42	**SPT Hammer Serial Number**		
Termination Reason	Scheduled depth		**SPT Hammer Energy Ratio**	%	

Scale 1:25 **Drilled** TP **Logged** TW **Checked** SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					0.00			Firm greyish brown mottled grey silty CLAY. (WEALD CLAY FORMATION)	
					(1.20)				
					1.20	89.70		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
								Continued on next Sheet	

Scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Backfill

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	21.00	Air/Mist	Brown/ Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
21.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 21.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/02
				Sheet 2 of 5

Project	Capel			**Equipment**	Insulated hand tools/Comacchio 305	**Scale**	1:25
Client	Suez			**Method**	IP/RO/RC	**Drilled**	TP
Project No	G22071	**Level**	90.90 mAOD	**Inclination**	90 degrees	**Logged**	TW
Easting	517746.00	**Northing**	138878.42	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
					(7.80)			NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		5.50	
			RO 1.20 - 9.00							6.00	
										6.50	
										7.00	
										7.50	
										8.00	
										8.50	
					9.00	81.90		Very stiff friable fissured grey silty CLAY with frequent pseudo-clasts of angular extremely weak grey siltstone (<10x20x15mm). Fissures are 0-10° extremely closely spaced planar smooth with occasional yellowish brown staining on faces. (WEALD CLAHY FORMATION)		9.00	
1 C	9.63 - 9.89		RC 9.00 - 10.50		(1.23)					9.50	
								Continued on next Sheet		10.00	

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	21.00	Air/Mist	Brown/ Grey	100%	1.20 3.00 21.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 21.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/02
				Sheet 3 of 5

Project	Capel			**Equipment**	Insulated hand tools/Comacchio 305	**Scale**	1:25
Client	Suez			**Method**	IP/RO/RC	**Drilled**	TP
Project No	G22071	**Level**	90.90 mAOD	**Inclination**	90 degrees	**Logged**	TW
Easting	517746.00	**Northing**	138878.42	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
2 U	10.23 - 10.50	Blows: 0 Rec: 100% Dia: 92mm Water:			10.23 (0.27) 10.50	80.67 80.40		Very stiff friable fissured grey silty CLAY with frequent pseudo-clasts of angular extremely weak grey siltstone (<10x20x15mm). Fissures are 0-10° extremely closely spaced planar smooth with occasional yellowish brown staining on faces. (WEALD CLAHY FORMATION) *10.19m - 10.21m Extremely weak grey siltstone.* Very stiff friable fissured grey silty CLAY with frequent pseudo-clasts of angular extremely weak grey siltstone (<10x15x10mm). Fissures are 0-10° very closely spaced planar smooth (rarely planar stepped). (WEALD CLAY FORMATION) *10.49m - 10.50m Highly persistent creamish white shell fragments (<2x15x5mm). Shells to damaged to identify.* NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).			
			RO 10.50 - 15.00		(6.00)			Continued on next Sheet			

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	21.00	Air/Mist	Brown/ Grey	100%	1.20 3.00 21.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 21.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/02

Project	Capel			**Equipment**	Insulated hand tools/Comacchio 305	Sheet 4 of 5	
Client	Suez			**Method**	IP/RO/RC	**Scale**	1:25
Project No	G22071	**Level**	90.90 mAOD	**Inclination**	90 degrees	**Drilled**	TP
Easting	517746.00	**Northing**	138878.42	**SPT Hammer Serial Number**		**Logged**	TW
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%	**Checked**	SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
			RC 15.00 - 16.50					NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
					16.50	74.40			
					(0.56)			AZCL. Stiff grey clay (Driller's Description).	
					17.06	73.83			
3 U	17.53 - 17.80	Blows: 0 Rec: 100% Dia: 92mm Water:			(0.63)			Very stiff bluish grey friable locally fissured silty CLAY with frequent pseudo-clasts of extremely weak grey siltstone (<15x15x10mm). Fissures are 0-10° extremely closely to closely spaced planar stepped to planar smooth. (WEALD CLAY FORMATION)	
					17.69	73.20			
					(0.31)			Very stiff becoming stiff bluish grey mottled greyish brown friable silty CLAY with occasional angular pseudo-clasts of extremely weak siltstone (<10x10x20mm). (WEALD CLAY FORMATION)	
					18.00	72.90			
			RO 16.50 - 21.00					NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
					(3.00)				
								Continued on next Sheet	

Scale: 15.50, 16.00, 16.50, 17.00, 17.50, 18.00, 18.50, 19.00, 19.50, 20.00

Backfill

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	21.00	Air/Mist	Brown/ Grey	100%	1.20 3.00 21.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 21.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/02
				Sheet 5 of 5

Project	Capel			**Equipment**	Insulated hand tools/Comacchio 305	**Scale**	1:25
Client	Suez			**Method**	IP/RO/RC	**Drilled**	TP
Project No	G22071	**Level**	90.90 mAOD	**Inclination**	90 degrees	**Logged**	TW
Easting	517746.00	**Northing**	138878.42	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		20.50	
						69.90		End of Exploratory Hole at 21.00m		21.00	
										21.50	
										22.00	
										22.50	
										23.00	
										23.50	
										24.00	
										24.50	
										25.00	

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	21.00	Air/Mist	Brown/ Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
21.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 21.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth
23/06/2023 08:00	0.00		
23/06/2023 17:00	16.50	3.00	Wet
26/06/2023 08:00	16.50	3.00	Wet
26/06/2023 13:00	22.00	3.00	Wet

Exploratory Hole BH22/03

Sheet 1 of 5

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools
Client	Suez			**Method**	RO/IP/RC
Project No	G22071	**Level**	91.18 mAOD	**Inclination**	90 degrees
Easting	517627.55	**Northing**	138858.11	**SPT Hammer Serial Number**	
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%

Scale 1:25 **Drilled** TP **Logged** SC/TW **Checked** SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					0.00			Firm brown slightly sandy slightly gravelly silty CLAY. Sand is fine. Gravel is angular to subangular fine to coarse siltstone and brick. (MADE GROUND)	
					(0.30)				
					0.30	90.88		Firm brown slightly gravelly silty CLAY with medium to high cobble content. Gravel is angular to subangular fine to coarse of siltstone and brick. Cobbles are angular of brick. (MADE GROUND)	
					(0.20)				
					0.50	90.68		Firm orangish brown mottled light reddish brown slightly gravelly silty CLAY with rare relic rootlets (<1mm). Gravel is angular fine to coarse of siltstone. (WEALD CLAY FORMATION)	
					(0.70)				
					1.20	89.98		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
								Continued on next Sheet	

Scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Backfill

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	22.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
22.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 22.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/03
				Sheet 2 of 5

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RO/IP/RC	**Drilled**	TP
Project No	G22071	**Level**	91.18 mAOD	**Inclination**	90 degrees	**Logged**	SC/TW
Easting	517627.55	**Northing**	138858.11	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
					(7.80)			NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		5.50	
			RO 1.20 - 9.00							6.00	
										6.50	
										7.00	
										7.50	
										8.00	
										8.50	
					9.00	82.18		AZCL. Stiff grey clay (Driller's Description).		9.00	
					(0.29)						
2 C	9.34 - 9.70		RC 9.00 - 10.50		9.29	81.89		Very stiff friable bluish grey mottled yellowish brown silty CLAY with occasional pseudo-clasts of subangular extremely weak siltstone (<10x20x20mm). (WEALD CLAY FORMATION) *9.31m - 9.31m Single creamish white bivalve shell.*		9.50	
3 U	9.70 - 10.00	Blows: 0 Rec: 100% Dia: 92mm Water:			(0.71)						
					10.00	81.18		Continued on next Sheet		10.00	

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	22.00	Air/Mist	Brown / Grey	100%	1.20 3.00 22.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 22.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/03
				Sheet 3 of 5

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RO/IP/RC	**Drilled**	TP
Project No	G22071	**Level**	91.18 mAOD	**Inclination**	90 degrees	**Logged**	SC/TW
Easting	517627.55	**Northing**	138858.11	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
					(0.50)			Very stiff friable bluish grey silty CLAY with rare yellowish brown staining and rare pockets of yellowish brown fine sand (<5x5x5mm). (WEALD CLAY FORMATION) *10.20m - 10.30m Extremely weak grey siltstone.*			
					10.50	80.68		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		10.50	
			RO 10.50 - 15.00		(4.50)					11.00	
										11.50	
										12.00	
										12.50	
										13.00	
										13.50	
										14.00	
										14.50	
					15.00	76.18		Continued on next Sheet		15.00	

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	22.00	Air/Mist	Brown / Grey	100%	1.20 3.00 22.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 22.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/03
				Sheet 4 of 5

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RO/IP/RC	**Drilled**	TP
Project No	G22071	**Level**	91.18 mAOD	**Inclination**	90 degrees	**Logged**	SC/TW
Easting	517627.55	**Northing**	138858.11	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
1 C	15.91 - 16.25		RC 15.00 - 16.50		(1.50)			Very stiff friable bluish grey silty CLAY with rare very thin beds of fine sand and occasional pseudo-clasts of angular extremely weak bluish grey siltstone (15x15x20mm). (WEALD CLAY FORMATION) *15.11m - 15.23m Medium strong grey fine grained sandstone.* *15.41m - 15.49m Medium strong grey fine grained sandstone.*		15.50	
4 U	16.25 - 16.50	Blows: 0 Rec: 100% Dia: 92mm Water:								16.00	
					16.50	74.68		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		16.50	
			RO 16.50 - 22.00		(5.50)					17.00	
										17.50	
										18.00	
										18.50	
										19.00	
										19.50	
								Continued on next Sheet		20.00	

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	22.00	Air/Mist	Brown / Grey	100%	1.20 3.00 22.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 22.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth

Exploratory Hole: BH22/03

Project	Capel		**Equipment**	Comacchio 305/Insulated hand tools	
Client	Suez		**Method**	RO/IP/RC	
Project No	G22071	**Level** 91.18 mAOD	**Inclination**	90 degrees	
Easting	517627.55	**Northing** 138858.11	**SPT Hammer Serial Number**		
Termination Reason	Scheduled depth		**SPT Hammer Energy Ratio**	%	

Sheet 5 of 5 | **Scale** 1:25 | **Drilled** TP | **Logged** SC/TW | **Checked** SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		20.50	
						69.18		End of Exploratory Hole at 22.00m		21.00	
										21.50	
										22.00	
										22.50	
										23.00	
										23.50	
										24.00	
										24.50	
										25.00	

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	22.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
22.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 22.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/04
28/06/2023 10:00 28/06/2023 17:00	0.00 10.50	3.00	3.74	Sheet 1 of 3

Project	Capel	**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez	**Method**	RC/RO/IP	**Drilled**	TP
Project No	G22071	**Level**	88.64 mAOD	**Logged**	SC
Easting	517891.30	**Northing**	138634.07	**Checked**	SSe
Inclination		**SPT Hammer Serial Number**			
Termination Reason	Terminated at water strike, under client instruction.	**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					0.00 (0.40)			Stiff yellowish brown silty very sandy CLAY. Sand is fine. (Reworked WEALD CLAY FORMATION)	
					0.40 (0.40)	88.24		Very stiff friable yellowish brown mottled orangish grey clayey sandy SILT with frequent dark orangish brown siltstone and sandstone lithorelics. Sand is fine. (WEALD CLAY FORMATION)	
					0.80 (0.40)	87.84		Stiff light grey mottled yellowish grey silty sandy CLAY. Sand is fine. (WEALD CLAY FORMATION)	
					1.20	87.44		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
								Continued on next Sheet	

Scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Backfill

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	10.50	Air/Mist	Brown / Grey	100%	1.20 3.00 10.50	300mm 146mm 120mm	3.00	146mm			28/06/2023 15:30	3.00	10.50		0.00	20mins	

Drill Bit Type	PCD/Drag Bit	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth

Exploratory Hole: BH22/04

Project	Capel		**Equipment**	Comacchio 305/Insulated hand tools	Sheet 2 of 3
Client	Suez		**Method**	RC/RO/IP	**Scale** 1:25
Project No	G22071	**Level** 88.64 mAOD	**Inclination**		**Drilled** TP
Easting	517891.30	**Northing** 138634.07	**SPT Hammer Serial Number**		**Logged** SC
Termination Reason	Terminated at water strike, under client instruction.		**SPT Hammer Energy Ratio**	%	**Checked** SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					(7.80)			NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 1.20 - 9.00						
					9.00	79.64		AZCL. Stiff grey clay (Driller's Description).	
					(0.44)				
			RC 9.00 - 10.50		9.44	79.20		Very stiff friable fissured bluish grey silty CLAY with angular pseudo-clasts of extremely weak bluish grey siltstone (<20x15x15mm). Fissures are 0-10° extremely closely spaced planar smooth, rarely planar stepped. (WEALD CLAY FORMATION)	
1 C	9.80 - 10.15				(1.06)				
								Continued on next Sheet	

Scale: 5.50, 6.00, 6.50, 7.00, 7.50, 8.00, 8.50, 9.00, 9.50, 10.00

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	10.50	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
10.50	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
28/06/2023 15:30	3.00	10.50		0.00	20mins	

Drill Bit Type	PCD/Drag Bit	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time			
Date and Time	Depth	Casing Depth	Water Depth

Exploratory Hole BH22/04

Project	Capel		**Equipment**	Comacchio 305/Insulated hand tools	
Client	Suez		**Method**	RC/RO/IP	
Project No	G22071	**Level** 88.64 mAOD	**Inclination**		
Easting	517891.30	**Northing** 138634.07	**SPT Hammer Serial Number**		
Termination Reason	Terminated at water strike, under client instruction.		**SPT Hammer Energy Ratio**	%	

Sheet 3 of 3 | **Scale** 1:25 | **Drilled** TP | **Logged** SC | **Checked** SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
2 U	10.15 - 10.40	Blows: 0 Rec: 100% Dia: 92mm Water:				78.14		Very stiff friable fissured bluish grey silty CLAY with angular pseudo-clasts of extremely weak bluish grey siltstone (<20x15x15mm). Fissures are 0-10° extremely closely spaced planar smooth, rarely planar stepped. (WEALD CLAY FORMATION)		10.50	
								End of Exploratory Hole at 10.50m			

11.00 11.50 12.00 12.50 13.00 13.50 14.00 14.50 15.00

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	10.50	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
10.50	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
28/06/2023 15:30	3.00	10.50		0.00	20mins	

Drill Bit Type	PCD/Drag Bit	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools
Client	Suez			**Method**	RO/RC/IP
Project No	G22071	**Level**	87.94 mAOD	**Inclination**	
Easting	517825.67	**Northing**	138579.88	**SPT Hammer Serial Number**	
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth
27/06/2023 08:00	0.00		
27/06/2023 17:00	15.00	3.00	Wet
28/06/2023 08:00	15.00	3.00	Wet
28/06/2023 10:00	18.00	3.00	Wet

Exploratory Hole

BH22/05

Sheet 1 of 4

Scale	1:25
Drilled	TP
Logged	SC
Checked	SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					0.00			Very stiff friable orangish brown silty sandy CLAY with occasional dark orangish brown subangular medium gravel size lithorelics of siltstone. Sand is fine. (WEALD CLAY FORMATION)	
					(0.80)				
					0.80	87.14		Firm orangish brown mottled grey slightly sandy silty CLAY. Sand is fine. (WEALD CLAY FORMATION)	
					(0.40)				
					1.20	86.74		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
								Continued on next Sheet	

Scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Backfill

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	18.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
18.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 15.00m depth. Rotary coring from 15.00m to 16.50m depth. Rotary open hole drilling from 16.50m to 18.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth

Exploratory Hole: BH22/05

Sheet 2 of 4

Project	Capel		**Equipment**	Comacchio 305/Insulated hand tools	
Client	Suez		**Method**	RO/RC/IP	
Project No	G22071	**Level** 87.94 mAOD	**Inclination**		
Easting	517825.67	**Northing** 138579.88	**SPT Hammer Serial Number**		
Termination Reason	Scheduled depth		**SPT Hammer Energy Ratio**	%	

Scale	1:25
Drilled	TP
Logged	SC
Checked	SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					(7.80)			NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 1.20 - 9.00						
1 C	9.05 - 9.35				9.00	78.94		Very stiff friable fissured bluish grey silty CLAY with occasional pseudo-clasts of angular extremely weak bluish grey siltstone (<15x20x20mm). Fissures are 0-10° extremely closely spaced planar smooth to planar stepped. (WELAD CLAY FORMATION)	
			RC 9.00 - 10.50						
3 U	9.70 - 9.94	Blows: 0 Rec: 100% Dia: 92mm Water:			(1.50)				
								Continued on next Sheet	

Scale: 5.50, 6.00, 6.50, 7.00, 7.50, 8.00, 8.50, 9.00, 9.50, 10.00

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	18.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
18.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 15.00m depth. Rotary coring from 15.00m to 16.50m depth. Rotary open hole drilling from 16.50m to 18.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/05
				Sheet 3 of 4

Project	Capel	**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez	**Method**	RO/RC/IP	**Drilled**	TP
Project No	G22071	**Level**	87.94 mAOD	**Logged**	SC
Easting	517825.67	**Northing**	138579.88	**Checked**	SSe
Inclination		**SPT Hammer Serial Number**			
Termination Reason	Scheduled depth	**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
					10.50	77.44		Very stiff friable fissured bluish grey silty CLAY with occasional pseudo-clasts of angular extremely weak bluish grey siltstone (<15x20x20mm). Fissures are 0-10° extremely closely spaced planar smooth to planar stepped. (WELAD CLAY FORMATION)		10.50	
			RO 10.50 - 15.00		(4.50)			NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		11.00 11.50 12.00 12.50 13.00 13.50 14.00 14.50	
					15.00	72.94		Continued on next Sheet		15.00	

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	18.00	Air/Mist	Brown / Grey	100%	1.20 3.00 18.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 15.00m depth. Rotary coring from 15.00m to 16.50m depth. Rotary open hole drilling from 16.50m to 18.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/05
				Sheet 4 of 4

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RO/RC/IP	**Drilled**	TP
Project No	G22071	**Level**	87.94 mAOD	**Inclination**		**Logged**	SC
Easting	517825.67	**Northing**	138579.88	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
2 C	15.90 - 16.25		RC 15.00 - 16.50		(1.50)			Very stiff friable bluish grey silty CLAY with occasional pseudo-clasts of angular extremely weak bluish grey siltstone (<20x20x15mm). Rare fissures, 0-10° planar smooth. (WEALD CLAY FORMATION)	
4 U	16.25 - 16.50	Blows: 0 Rec: 100% Dia: 92mm Water:							
					16.50	71.44		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 16.50 - 18.00		(1.50)				
						69.94		End of Exploratory Hole at 18.00m	

Scale: 15.50, 16.00, 16.50, 17.00, 17.50, 18.00, 18.50, 19.00, 19.50, 20.00

Backfill

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	18.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
18.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 15.00m depth. Rotary coring from 15.00m to 16.50m depth. Rotary open hole drilling from 16.50m to 18.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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CABLE PERCUSSIVE EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/06
08/12/2022 14:00	0.00			
08/12/2022 15:15	0.80	0.00	Dry	Sheet 1 of 2
12/12/2022 08:00	0.80	0.00	Dry	
12/12/2022 14:00	7.00	1.50	6.50	Scale 1:50
13/12/2022 08:00	7.00	1.50	5.20	
13/12/2022 16:00	13.80	1.50	8.00	Drilled SL
14/12/2022 08:00	13.80	1.50	8.00	Logged SC
14/12/2022 14:30	14.80	8.00	11.00	Checked SSe

Project	Capel			**Equipment**	Cut Cown Cable Rig /Insulated hand tools		
Client	Suez			**Method**	CP/IP		
Project No	G22071	**Level**	90.51 mAOD	**Inclination**		90 degrees	
Easting	517577.74	**Northing**	138490.40	**SPT Hammer Serial Number**			
Termination Reason	Termination due to excess water.			**SPT Hammer Energy Ratio**		%	

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Depth (Thickness)	Level (mAOD)	Description
			0.00		Firm brownish grey silty sandy CLAY with rootlets. Sand is medium. (MADE GROUND)
			(0.50)		
			0.50	90.01	Stiff dark grey silty CLAY with rare psudo-clasts of mudstone and siltstone of medium to coarse gravel size. (Weathered WEALD CLAY FORMATION)
			(0.90)		
			1.40	89.11	Stiff bluish grey occasionally mottled with brownish grey silty slightly sandy CLAY. Sand is fine. (Weathered WEALD CLAY FORMATION)
			(1.30)		
			2.70	87.81	Stiff friable bluish grey silty CLAY with occasional psudo-clasts of mudstone and siltstone of medium to coarse gravel size. Rare fine to medium gravel size white fossil fragments. (WEALD CLAY FORMATION)
			(1.30)		
1 UT	4.00 - 4.45	Blows: 100 Rec: 65% Dia: 100mm Water: Dry	4.00	86.51	Very stiff friable bluish grey silty CLAY with rare white fossils of fine to medium gravel size. (WEALD CLAY FORMATION) *4.00m - 4.45m Split and describe: Very stiff friable bluish grey silty CLAY with white fossil rich band.* *4.10m - 4.15m White fossil fragment rich band.*
			(4.50)		
			8.50	82.01	Very stiff friable bluish grey mottled with brownish grey silty CLAY with medium to coarse gravel size psudo-clasts of siltstone. (WEALD CLAY FORMATION)
2 UT	9.00 - 9.45	Blows: 100 Rec: 45% Dia: 100mm Water: 8.00			*9.00m - 9.45m Split and describe: Very stiff friable bluish grey mottled with brownish grey silty CLAY with medium to coarse gravel size psudo-clasts of siltstone.*

Continued on next Sheet

Chiseling				Hole Diameter		Casing Diameter		Water Added	
Depth Top	Depth Base	Duration (hh:mm)	Tool	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base
				14.80	150mm	8.00	150mm		

Water Strikes						
Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
12/12/2022 12:30	3.00	5.20		5.10	20mins	
13/12/2022 13:00	1.50	10.00		8.00	20mins	

Remarks
Hand excavated inspection pit from 0.00m to 0.80m. Cable percussive drilling from 0.80 to 14.80m.

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CABLE PERCUSSIVE EXPLORATORY HOLE LOG

Project	Capel	Equipment	Cut Cown Cable Rig /Insulated hand tools
Client	Suez	Method	CP/IP
Project No	G22071	Level	90.51 mAOD
Easting	517577.74	Northing	138490.40
Termination Reason	Termination due to excess water.	SPT Hammer Energy Ratio	%

Inclination	90 degrees
SPT Hammer Serial Number	

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth
08/12/2022 14:00	0.00		
08/12/2022 15:15	0.80	0.00	Dry
12/12/2022 08:00	0.80	0.00	Dry
12/12/2022 14:00	7.00	1.50	6.50
13/12/2022 08:00	7.00	1.50	5.20
13/12/2022 16:00	13.80	1.50	8.00
14/12/2022 08:00	13.80	1.50	8.00
14/12/2022 14:30	14.80	8.00	11.00

Exploratory Hole

BH22/06

Sheet 2 of 2

Scale	1:50
Drilled	SL
Logged	SC
Checked	SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Depth (Thickness)	Level (mAOD)	Legend	Description
			(6.30)	75.71		Very stiff friable bluish grey mottled with brownish grey silty CLAY with medium to coarse gravel size psudo-clasts of siltstone. (WEALD CLAY FORMATION)
						End of Exploratory Hole at 14.80m

Scale: 10.50, 11.00, 11.50, 12.00, 12.50, 13.00, 13.50, 14.00, 14.50, 15.00, 15.50, 16.00, 16.50, 17.00, 17.50, 18.00, 18.50, 19.00, 19.50, 20.00

Backfill

Chiseling

Depth Top	Depth Base	Duration (hh:mm)	Tool

Hole Diameter

Depth Base	Diameter
14.80	150mm

Casing Diameter

Depth Base	Diameter
8.00	150mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
12/12/2022 12:30	3.00	5.20		5.10	20mins	
13/12/2022 13:00	1.50	10.00		8.00	20mins	

Remarks
Hand excavated inspection pit from 0.00m to 0.80m. Cable percussive drilling from 0.80 to 14.80m.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Project	Capel		**Equipment**	Comacchio 305/Insulated hand tools	
Client	Suez		**Method**	RO/RC/IP	
Project No	G22071	**Level** 90.64 mAOD	**Inclination**	90 degrees	
Easting	517595.12	**Northing** 138570.50	**SPT Hammer Serial Number**		
Termination Reason	Scheduled depth		**SPT Hammer Energy Ratio**	%	

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth
20/06/2023 08:00	0.00		
20/06/2023 17:00	18.00	3.00	Wet
21/06/2023 08:00	18.00	3.00	Wet
21/06/2023 12:00	21.00	3.00	Wet

Exploratory Hole **BH22/08**

Sheet 1 of 5

Scale	1:25
Drilled	TP
Logged	TW
Checked	SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					0.00			Firm brownish grey sandy very gravelly CLAY with low cobble content. Sand is fine to medium. Gravel is angular to subangular fine to coarse of brick and mudstone. Cobbles are angular to subangular of brick. (MADE GROUND)	
					(0.30)				
					0.30	90.34		Firm yellowish grey mottled grey silty sandy CLAY. Sand is fine to medium. (Reworked WEALD CLAY FORMATION)	
					(0.50)				
					0.80	89.84		Firm yellowish orange sandy CLAY. Sand is fine to medium. (WEALD CLAY FORMATION)	
					(0.40)				
					1.20	89.44		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
								Continued on next Sheet	

Scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Backfill

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	21.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
21.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 21.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/08
				Sheet 2 of 5

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RO/RC/IP	**Drilled**	TP
Project No	G22071	**Level**	90.64 mAOD	**Inclination**	90 degrees	**Logged**	TW
Easting	517595.12	**Northing**	138570.50	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					(7.80)			NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 1.20 - 9.00						
					9.00	81.64		Stiff fissured grey silty CLAY with up to 10% angular lithorelics of extremely weak siltstone (<20mm). Fissures are randomly orientated very closely spaced planar smooth (locally polished). (WEALD CLAY FORMATION)	
					(0.55)				
			RC 9.00 - 10.50					Stiff fissured brown silty CLAY with up to 20% angular lithorelics of extremely weak siltstone (<30mm). Fissures are 0-20° and 80-90° very closely spaced planar smooth (locally polished). (WEALD CLAY FORMATION)	
3 U	9.60 - 9.90	Blows: 0 Rec: 100% Dia: 92mm Water:			9.55	81.09			
					(0.30)			Very stiff fissured grey silty CLAY with up to 10% angular to subangular lithorelics of extremely weak siltstone (<5mm). Fissures are 0-20° very closely spaced to closely spaced planar smooth. (WEALD CLAY FORMATION)	
1 C	9.90 - 10.20				9.85	80.79			

Continued on next Sheet

Scale	Backfill
5.50	
6.00	
6.50	
7.00	
7.50	
8.00	
8.50	
9.00	
9.50	
10.00	

Drilling Flush					Hole Diameter		Casing Diameter		Water Added	
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base
1.20	21.00	Air/Mist	Brown / Grey	100%	1.20 3.00 21.00	300mm 146mm 120mm	3.00	146mm		

Water Strikes						
Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 21.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/08
				Sheet 3 of 5

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RO/RC/IP	**Drilled**	TP
Project No	G22071	**Level**	90.64 mAOD	**Inclination**	90 degrees	**Logged**	TW
Easting	517595.12	**Northing**	138570.50	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
					(0.65)			Very stiff fissured grey silty CLAY with up to 10% angular to subangular lithorelics of extremely weak siltstone (<5mm). Fissures are 0-20° very closely spaced to closely spaced planar smooth. (WEALD CLAY FORMATION)			
					10.50	80.14		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		10.50	
			RO 10.50 - 16.50		(6.00)					11.00	
										11.50	
										12.00	
										12.50	
										13.00	
										13.50	
										14.00	
										14.50	
								Continued on next Sheet		15.00	

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	21.00	Air/Mist	Brown / Grey	100%	1.20 3.00 21.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 21.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/08

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	Sheet 4 of 5	
Client	Suez			**Method**	RO/RC/IP	**Scale**	1:25
Project No	G22071	**Level**	90.64 mAOD	**Inclination**	90 degrees	**Drilled**	TP
Easting	517595.12	**Northing**	138570.50	**SPT Hammer Serial Number**		**Logged**	TW
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%	**Checked**	SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
					16.50	74.14			
					(0.10)				
					16.60	74.04		Non-intact (drilling induced). Recovered core comprises firm grey slightly gravelly silty CLAY. Gravel is subangular fine to coarse of extremely weak siltstone. (WEALD CLAY FORMATION)	
			RC 16.50 - 18.00		(0.80)			Very stiff fissured grey silty CLAY. Interlaminated with 0-10° very closely spaced thick laminations of extremely weak grey siltstone. Fissures are 0-10° extremely closely spaced planar smooth. (WEALD CLAY FORMATION)	
					17.40	73.24			
2 C	17.70 - 18.00				(0.60)			Very stiff fissured grey silty CLAY with up to 20% angular tabular lithorelics of extremely weak siltstone (<8mm). Fissures are 0-10° extremely closely spaced planar smooth. (WEALD CLAY FORMATION) *17.40m - 17.50m Angular lithorelics of very weak siltstone (<25mm).*	
					18.00	72.64			
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 18.00 - 21.00		(3.00)				
								Continued on next Sheet	

Scale: 15.50, 16.00, 16.50, 17.00, 17.50, 18.00, 18.50, 19.00, 19.50, 20.00

Backfill

Drilling Flush					Hole Diameter		Casing Diameter		Water Added	
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base
1.20	21.00	Air/Mist	Brown / Grey	100%	1.20 3.00 21.00	300mm 146mm 120mm	3.00	146mm		

Water Strikes						
Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 21.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/08
				Sheet 5 of 5

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RO/RC/IP	**Drilled**	TP
Project No	G22071	**Level**	90.64 mAOD	**Inclination**	90 degrees	**Logged**	TW
Easting	517595.12	**Northing**	138570.50	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		20.50	
						69.64		End of Exploratory Hole at 21.00m		21.00	
										21.50	
										22.00	
										22.50	
										23.00	
										23.50	
										24.00	
										24.50	
										25.00	

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	21.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
21.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 9.00m depth. Rotary coring from 9.00m to 10.50m depth. Rotary open hole drilled from 10.50m to 16.50m depth. Rotary coring from 16.50m to 18.00m depth. Rotary open hole drilling from 18.00m to 21.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth
14/06/2023 08:00	0.00		
14/06/2023 17:00	10.00	3.00	Wet
15/06/2023 08:00	10.00	3.00	Wet
15/06/2023 12:00	12.00	3.00	Wet

Exploratory Hole BH22/09

Sheet 1 of 3

Project	Capel	**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez	**Method**	RO/RC/IP	**Drilled**	TP
Project No	G22071	**Level** 81.88 mAOD	**Inclination** 90 degrees	**Logged**	TW
Easting	517782.09	**Northing** 138500.97	**SPT Hammer Serial Number**	**Checked**	SSe
Termination Reason	Scheduled depth		**SPT Hammer Energy Ratio** %		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					0.00			Stiff friable greyish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of limestone. Cobbles are subangular of limestone. (MADE GROUND)	
					(0.60)				
					0.60	81.28		Stiff bluish grey mottled greyish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular fine to coarse of mudstone and limestone. Cobbles are angular of limestone. (Reworked WEALD CLAY FORMATION)	
					(0.60)				
					1.20	80.68		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 1.20 - 6.00						
					(4.80)				
								Continued on next Sheet	

Scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Backfill

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	12.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
12.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time			
Date and Time	Depth	Casing Depth	Water Depth

Exploratory Hole BH22/09

Sheet 2 of 3

Project	Capel		**Equipment**	Comacchio 305/Insulated hand tools	
Client	Suez		**Method**	RO/RC/IP	
Project No	G22071	**Level** 81.88 mAOD	**Inclination**	90 degrees	
Easting	517782.09	**Northing** 138500.97	**SPT Hammer Serial Number**		
Termination Reason	Scheduled depth		**SPT Hammer Energy Ratio**	%	

Scale 1:25 **Drilled** TP **Logged** TW **Checked** SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
					6.00	75.88			
					(0.20)			AZCL. Stiff grey clay (Driller's Description).	
					6.20	75.68			
					(0.55)			Stiff fissured grey silty CLAY with up to 10% angular lithorelics of very weak grey siltstone (<12mm). Fissures are 0-10° extremely closely spaced planar smooth. (WEALD CLAY FORMATION)	
1 C	6.75 - 7.05		RC 6.00 - 7.50		6.75	75.12			
					(0.75)			Very stiff fissured grey silty CLAY with up to 10% angular lithorelics of very weak grey siltstone (<10mm). Fissures are 0-10° extremely closely spaced planar smooth. (WEALD CLAY FORMATION)	
					7.50	74.38			
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 7.50 - 10.50		(3.00)				
								Continued on next Sheet	

Scale: 5.50, 6.00, 6.50, 7.00, 7.50, 8.00, 8.50, 9.00, 9.50, 10.00

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	12.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
12.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/09
				Sheet 3 of 3

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RO/RC/IP	**Drilled**	TP
Project No	G22071	**Level**	81.88 mAOD	**Inclination**	90 degrees	**Logged**	TW
Easting	517782.09	**Northing**	138500.97	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
					10.50	71.38			
					(0.15)			AZCL. Stiff grey clay (Driller's Description).	
3 U	10.70 - 11.00	Blows: 0 Rec: 100% Dia: 92mm Water:			10.65	71.22		Very stiff fissured grey silty CLAY with up to 10% angular lithorelics of extremely weak grey siltstone and occasional interbeds of extremely weak grey siltstone. Fissures are 0-10° extremely closely spaced planar smooth. (WEALD CLAY FORMATION)	
2 C	11.10 - 11.35		RC 10.50 - 12.00		(1.35)			*10.65m - 10.80m Stiff* *11.10m - 11.30m Extremely weak grey siltstone.* *11.50m - 11.65m Weak grey siltstone with rare biotubation (1mm).*	
						69.88		End of Exploratory Hole at 12.00m	

Scale: 10.50, 11.00, 11.50, 12.00, 12.50, 13.00, 13.50, 14.00, 14.50, 15.00

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	12.00	Air/Mist	Brown / Grey	100%	1.20 3.00 12.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth
13/06/2023 08:00	0.00		
13/06/2023 17:00	10.00	3.00	Wet
14/06/2023 08:00	10.00	3.00	Wet
14/06/2023 13:00	15.00	3.00	Wet

Exploratory Hole BH22/10

Sheet 1 of 3

Project	Capel		**Equipment**	Insulated hand tools/Comacchio 305	
Client	Suez		**Method**	IP/RO/RC	
Project No	G22071	**Level** 84.85 mAOD	**Inclination**	90 degrees	
Easting	517817.15	**Northing** 138377.67	**SPT Hammer Serial Number**		
Termination Reason	Scheduled depth		**SPT Hammer Energy Ratio**	%	

Scale 1:25
Drilled TP/TP & JR
Logged DV/TW
Checked SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					0.00			Stiff brown slightly sandy CLAY. Sand is fine to medium. (MADE GROUND)	
					(0.30)				
					0.30	84.55		Stiff brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular fine to coarse of limestone. Cobbles are subangular of limestone. (MADE GROUND)	
					(0.20)				
					0.50	84.35		Stiff brown mottled light grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone and sandstone. (MADE GROUND)	
					(0.70)				
					1.20	83.65		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 1.20 - 6.00						
					(4.80)				
								Continued on next Sheet	

Scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Backfill

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	15.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
15.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth. Rotary open hole drilling from 12.00m to 15.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/10
				Sheet 2 of 3

Project	Capel			**Equipment**	Insulated hand tools/Comacchio 305	**Scale**	1:25
Client	Suez			**Method**	IP/RO/RC	**Drilled**	TP/TP & JR
Project No	G22071	**Level**	84.85 mAOD	**Inclination**	90 degrees	**Logged**	DV/TW
Easting	517817.15	**Northing**	138377.67	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		5.50	
					6.00	78.85				6.00	
								Soft to very soft brownish yellow mottled light grey slightly gravelly silty CLAY with occasional relic roots (<2mm). Gravel is subangular medium to coarse of sandstone. (WEALD CLAY FORMATION)		6.50	
2 U	6.70 - 7.00	Blows: 0 Rec: 100% Dia: 92mm Water:	RC 6.00 - 7.50		(1.50)					7.00	
					7.50	77.35		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		7.50	
			RO 7.50 - 10.50		(3.00)					8.00	
										8.50	
										9.00	
										9.50	
								Continued on next Sheet		10.00	

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	15.00	Air/Mist	Brown / Grey	100%	1.20 3.00 15.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth. Rotary open hole drilling from 12.00m to 15.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/10
				Sheet 3 of 3

Project	Capel			**Equipment**	Insulated hand tools/Comacchio 305	**Scale**	1:25
Client	Suez			**Method**	IP/RO/RC	**Drilled**	TP/TP & JR
Project No	G22071	**Level**	84.85 mAOD	**Inclination**	90 degrees	**Logged**	DV/TW
Easting	517817.15	**Northing**	138377.67	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
					10.50	74.35			
					(0.15)			AZCL. Stiff grey clay (Driller's Description).	
					10.65	74.20			
3 U	10.75 - 11.05	Blows: 0 Rec: 100% Dia: 92mm Water:			(0.37)			Stiff light greyish brown mottled light grey slightly gravelly silty CLAY. Gravel is angular fine to coarse of very weak siltstone. (WEALD CLAY FORMATION)	
					11.02	73.83		*11.00m - 11.02m Firm orangish brown silty gravelly CLAY. Gravel is angular to subangular fine to medium of very weak ferruginous siltstone.*	
1 C	11.10 - 11.40		RC 10.50 - 12.00		(0.38)			Very stiff grey silty CLAY with occasional irregular shaped pockets of orangish brown silt (<3mm). (WEALD CLAY FORMATION)	
					11.40	73.45		Very stiff fissured grey silty CLAY with very closely spaced (0-10°) thin beds of extremely weak grey siltstone. Fissures are 0-10° extremely closely spaced planar smooth. (WEALD CLAY FORMATION)	
					(0.60)			*11.50m - 11.55m Frequent white horizontally imbricated fossil shell fragments (<15mm in size). Fossils include gastropods (<5x10x15mm).*	
					12.00	72.85		*11.70m - 11.80m Firm grey silty CLAY with frequent irregular shaped pockets of orangish brown silt (<5mm).*	
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 12.00 - 15.00		(3.00)				
						69.85		End of Exploratory Hole at 15.00m	

Scale: 10.50, 11.00, 11.50, 12.00, 12.50, 13.00, 13.50, 14.00, 14.50, 15.00

Backfill

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	15.00	Air/Mist	Brown / Grey	100%	1.20 3.00 15.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth. Rotary open hole drilling from 12.00m to 15.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth
16/06/2023 11:00	0.00		
16/06/2023 17:00	10.50	3.00	Wet
17/06/2023 08:00	10.50	3.00	Wet
17/06/2023 10:00	12.00	3.00	Wet

Exploratory Hole BH22/11

Sheet 1 of 3

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools
Client	Suez			**Method**	RC/IP/RO
Project No	G22071	**Level**	81.67 mAOD	**Inclination**	90 degrees
Easting	517795.99	**Northing**	138288.42	**SPT Hammer Serial Number**	
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%

Scale	1:25
Drilled	TP
Logged	TW/DV
Checked	SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
					0.00			Stiff dark grey mottled brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular fine to coarse of brick. (MADE GROUND)			
					(1.10)					0.50	
					1.10	80.57				1.00	
					(0.10)			Stiff dark grey slightly sandy CLAY. Sand is fine to medium. (WEALD CLAY FORMATION)			
					1.20	80.47		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).		1.50	
										2.00	
										2.50	
			RO 1.20 - 6.00							3.00	
					(4.80)					3.50	
										4.00	
										4.50	
								Continued on next Sheet		5.00	

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	12.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
12.00	120mm

Casing Diameter

Depth Base	Diameter
6.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	PCD/Drag Bit	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/11
				Sheet 2 of 3

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RC/IP/RO	**Drilled**	TP
Project No	G22071	**Level**	81.67 mAOD	**Inclination**	90 degrees	**Logged**	TW/DV
Easting	517795.99	**Northing**	138288.42	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
					6.00	75.67			
					(0.15)			AZCL. Stiff grey clay (Driller's Description).	
					6.15	75.52			
					(0.20)			Stiff greyish brown silty CLAY with up to 5% angular lithorelics of extremely weak siltstone (<5mm). (WEALD CLAY FORMATION)	
					6.35	75.32			
1 C	6.70 - 7.00		RC 6.00 - 7.50		(0.55)			Very stiff fissured greyish brown silty CLAY with up to 5% angular lithorelics of extremely weak siltstone (<15mm) and rare subrounded pockets of orangish brown silt (<5mm). Fissures are 0-10° extremely closely spaced planar smooth with localised black staining. (WEALD CLAY FORMATION) *6.40m - 6.43m Frequent horizontally imbricated cream shells and shell fragments (3-8mm). Shells are gastropods. 6.47m - 6.53m Frequent horizontally imbricated well preserved cream shells (10x10x30mm). Shells are gastropods. Frequency increases with depth.*	
					6.90	74.77			
2 U	7.20 - 7.50	Blows: 0 Rec: 100% Dia: 92mm Water:			(0.60)			Very stiff fissured grey silty CLAY. Fissures are 0-15° extremely closely spaced planar smooth with frequent infill of orangish brown silt (<1mm thick) and occasional black staining. (WEALD CLAY FORMATION) *7.30m - 7.40m Firm greyish brown silty CLAY with up to 5% subrounded lithorelics of extremely weak siltstone (<5mm).*	
					7.50	74.17			
			RO 7.50 - 10.50		(3.00)			NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
								Continued on next Sheet	

Scale: 5.50, 6.00, 6.50, 7.00, 7.50, 8.00, 8.50, 9.00, 9.50, 10.00

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	12.00	Air/Mist	Brown / Grey	100%	1.20 3.00 12.00	300mm 146mm 120mm	6.00	146mm									

Drill Bit Type	PCD/Drag Bit	Drill Bit Condition	Good	Core Barrel Type	Conventional Triple Tube	Core Barrel Length	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth

Exploratory Hole BH22/11

Project	Capel		**Equipment**	Comacchio 305/Insulated hand tools	
Client	Suez		**Method**	RC/IP/RO	
Project No	G22071	**Level** 81.67 mAOD	**Inclination**	90 degrees	
Easting	517795.99	**Northing** 138288.42	**SPT Hammer Serial Number**		
Termination Reason	Scheduled depth		**SPT Hammer Energy Ratio**	%	

Sheet 3 of 3 | **Scale** 1:25 | **Drilled** TP | **Logged** TW/DV | **Checked** SSe

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)	Scale	Backfill
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).			
					10.50	71.17				10.50	
					(0.59)			AZCL. Stiff grey clay (Driller's Description).			
					11.09	70.58				11.00	
3 U	11.40 - 11.68	Blows: 0 Rec: 100% Dia: 92mm Water:	RC 10.50 - 12.00		(0.91)			Very stiff friable fissured grey silty CLAY with frequent pseudo-clasts of angular extremely weak siltstone of fine to medium gravel size. Fissures are 0-10° very closely spaced planar smooth. (WEALD CLAY FORMATION)		11.50	
						69.67		End of Exploratory Hole at 12.00m		12.00	
										12.50	
										13.00	
										13.50	
										14.00	
										14.50	
										15.00	

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	12.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
12.00	120mm

Casing Diameter

Depth Base	Diameter
6.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	PCD/Drag Bit	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 1.20m depth. Rotary open hole drilled from 1.20m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth.
Water added to BH through drilling process, unable to identify water strikes.

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O SERVICES

DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time

Date and Time	Depth	Casing Depth	Water Depth
15/06/2023 08:00	0.00		
15/06/2023 17:00	10.50	3.00	Wet
16/06/2023 08:00	10.50	3.00	Wet
16/06/2023 10:00	13.00	3.00	Wet

Exploratory Hole BH22/12

Sheet 1 of 3

Project	Capel	**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez	**Method**	RO/RC/IP	**Drilled**	TP
Project No	G22071	**Level** 82.90 mAOD	**Inclination** 90 degrees	**Logged**	TW/DV
Easting	517704.79	**Northing** 138240.76	**SPT Hammer Serial Number**	**Checked**	SSe
Termination Reason	Scheduled depth		**SPT Hammer Energy Ratio** %		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					0.00			Greyish brown slightly clayey sandy angular fine to coarse GRAVEL of limestone, concrete, brick and rare sandstone. Sand is fine to coarse. (MADE GROUND)	
					(0.50)				
					0.50	82.40		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 1.20 - 6.00		(5.50)				
								Continued on next Sheet	

Scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Backfill

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	13.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
13.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 0.50m depth. Rotary open hole drilled from 0.50m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth. Rotary open hole drilling from 12.00m to 13.00m depth.
Hand excavated inspection pit terminated upon brick obstruction. Hole progressed using rotary open hole under client instruction, following CAT scan at base of inspection pit.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/12
				Sheet 2 of 3

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RO/RC/IP	**Drilled**	TP
Project No	G22071	**Level**	82.90 mAOD	**Inclination**	90 degrees	**Logged**	TW/DV
Easting	517704.79	**Northing**	138240.76	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
					6.00	76.90		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
1 C	6.70 - 7.00		RC 6.00 - 7.50		(1.50)			Stiff to very stiff locally thinly laminated greyish brown CLAY with occasional dark grey staining. (WEALD CLAY FORMATION)	
3 U	7.00 - 7.30	Blows: 0 Rec: 100% Dia: 92mm Water:							
					7.50	75.40		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 7.50 - 10.50		(3.00)				
								Continued on next Sheet	

Scale: 5.50, 6.00, 6.50, 7.00, 7.50, 8.00, 8.50, 9.00, 9.50, 10.00

Backfill

Drilling Flush					Hole Diameter		Casing Diameter		Water Added		Water Strikes						
Depth Top	Depth Base	Type	Colour	Returns	Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks
1.20	13.00	Air/Mist	Brown / Grey	100%	1.20 3.00 13.00	300mm 146mm 120mm	3.00	146mm									

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 0.50m depth. Rotary open hole drilled from 0.50m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth. Rotary open hole drilling from 12.00m to 13.00m depth.
Hand excavated inspection pit terminated upon brick obstruction. Hole progressed using rotary open hole under client instruction, following CAT scan at base of inspection pit.
Water added to BH through drilling process, unable to identify water strikes.

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DYNAMIC SAMPLING AND ROTARY DRILLING EXPLORATORY HOLE LOG

Exploratory Hole Progress by Time				Exploratory Hole
Date and Time	Depth	Casing Depth	Water Depth	BH22/12
				Sheet 3 of 3

Project	Capel			**Equipment**	Comacchio 305/Insulated hand tools	**Scale**	1:25
Client	Suez			**Method**	RO/RC/IP	**Drilled**	TP
Project No	G22071	**Level**	82.90 mAOD	**Inclination**	90 degrees	**Logged**	TW/DV
Easting	517704.79	**Northing**	138240.76	**SPT Hammer Serial Number**		**Checked**	SSe
Termination Reason	Scheduled depth			**SPT Hammer Energy Ratio**	%		

Samples	Sampling and Testing Depths	Insitu Testing and Depth Related Remarks	Drill Runs	TCR SCR RQD	Depth (Thickness)	Level (mAOD)	Legend	Description	If (min ave max)
								NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
4 U	10.50 - 10.80	Blows: 0 Rec: 100% Dia: 92mm Water:			10.50	72.40			
					(0.50)			Stiff bluish grey CLAY with frequent creamish white shells and shell fragments of bivalves and gastropods (1-3mm). (WEALD CLAY FORMATION)	
2 C	11.10 - 11.50		RC 10.50 - 12.00		11.00	71.90		Stiff bluish grey slightly gravelly CLAY. Gravel is angular to subangular fine to medium of mudstone lithorelics. (WEALD CLAY FORMATION.)	
					(1.00)				
					12.00	70.90		NO RECOVERY. Open hole drilled. Stiff grey clay (Driller's Description).	
			RO 12.00 - 13.00		(1.00)				
						69.90		End of Exploratory Hole at 13.00m	

Scale	Backfill
10.50	
11.00	
11.50	
12.00	
12.50	
13.00	
13.50	
14.00	
14.50	
15.00	

Drilling Flush

Depth Top	Depth Base	Type	Colour	Returns
1.20	13.00	Air/Mist	Brown / Grey	100%

Hole Diameter

Depth Base	Diameter
1.20	300mm
3.00	146mm
13.00	120mm

Casing Diameter

Depth Base	Diameter
3.00	146mm

Water Added

Depth Top	Depth Base

Water Strikes

Date and Time	Casing	Strike	Sealed	Rising to	Time	Remarks

Drill Bit Type	Drag Bit/PCD	**Drill Bit Condition**	Good	**Core Barrel Type**	Conventional Triple Tube	**Core Barrel Length**	1.50

Remarks
Hand excavated inspection pit from GL to 0.50m depth. Rotary open hole drilled from 0.50m to 6.00m depth. Rotary coring from 6.00m to 7.50m depth. Rotary open hole drilled from 7.50m to 10.50m depth. Rotary coring from 10.50m to 12.00m depth. Rotary open hole drilling from 12.00m to 13.00m depth.
Hand excavated inspection pit terminated upon brick obstruction. Hole progressed using rotary open hole under client instruction, following CAT scan at base of inspection pit.
Water added to BH through drilling process, unable to identify water strikes.

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Appendix B Groundwater Hydrographs

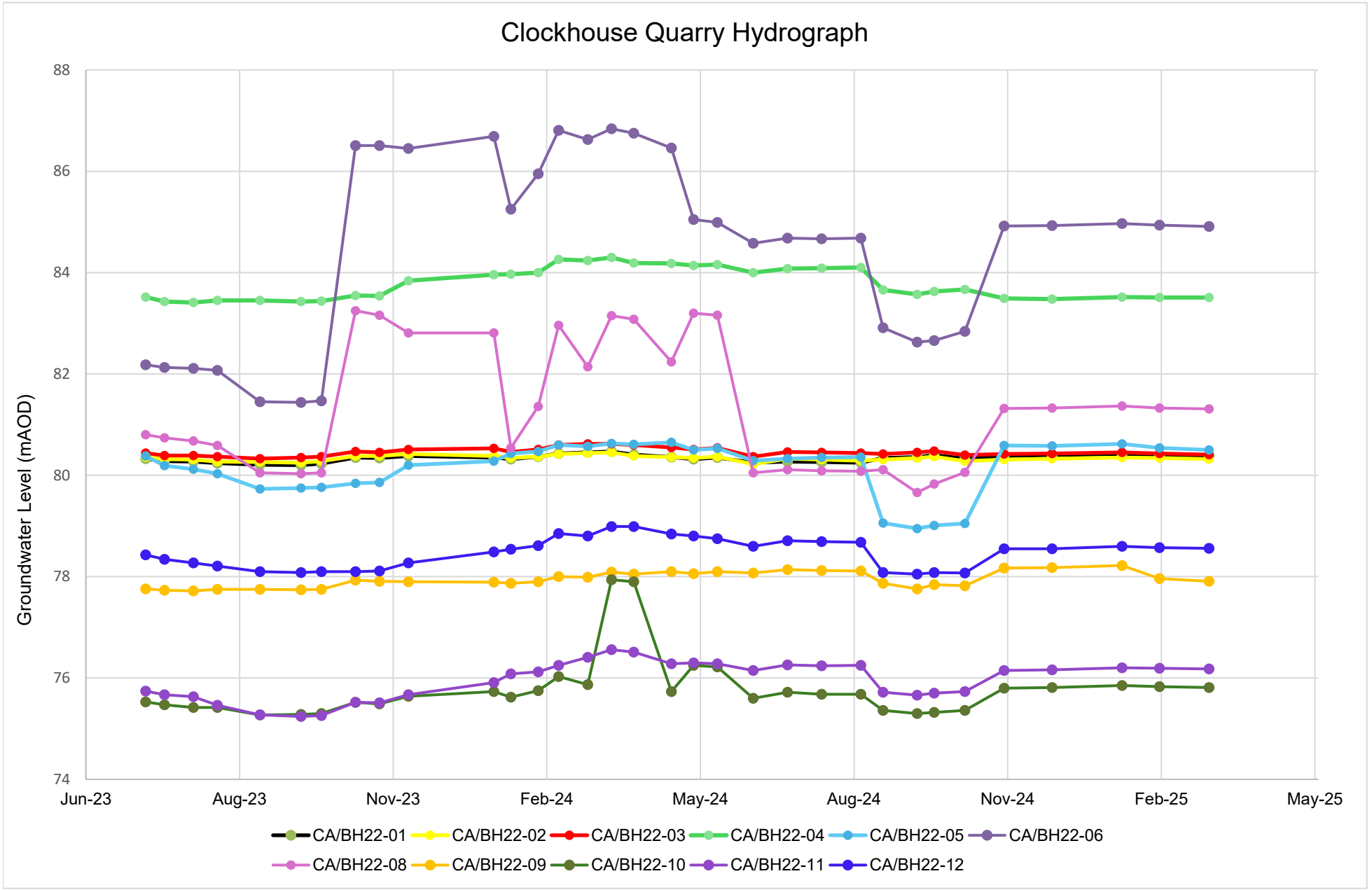
Clockhouse Quarry Restoration

Environmental Permit Application Hydrogeological Risk Assessment

Suez Recycling and Recovery UK Ltd

SLR Project No.: 402.065294.00001

11 November 2025


Clockhouse Quarry Hydrograph
Groundwater Level (mAOD)
88
86
84
82
80
78
76
74
Jun-23
Aug-23
Nov-23
Feb-24
May-24
Aug-24
Nov-24
Feb-25
May-25
CA/BH22-01
CA/BH22-02
CA/BH22-03
CA/BH22-04
CA/BH22-05
CA/BH22-06
CA/BH22-08
CA/BH22-09
CA/BH22-10
CA/BH22-11
CA/BH22-12

Appendix C Groundwater Quality Time-Series Graphs

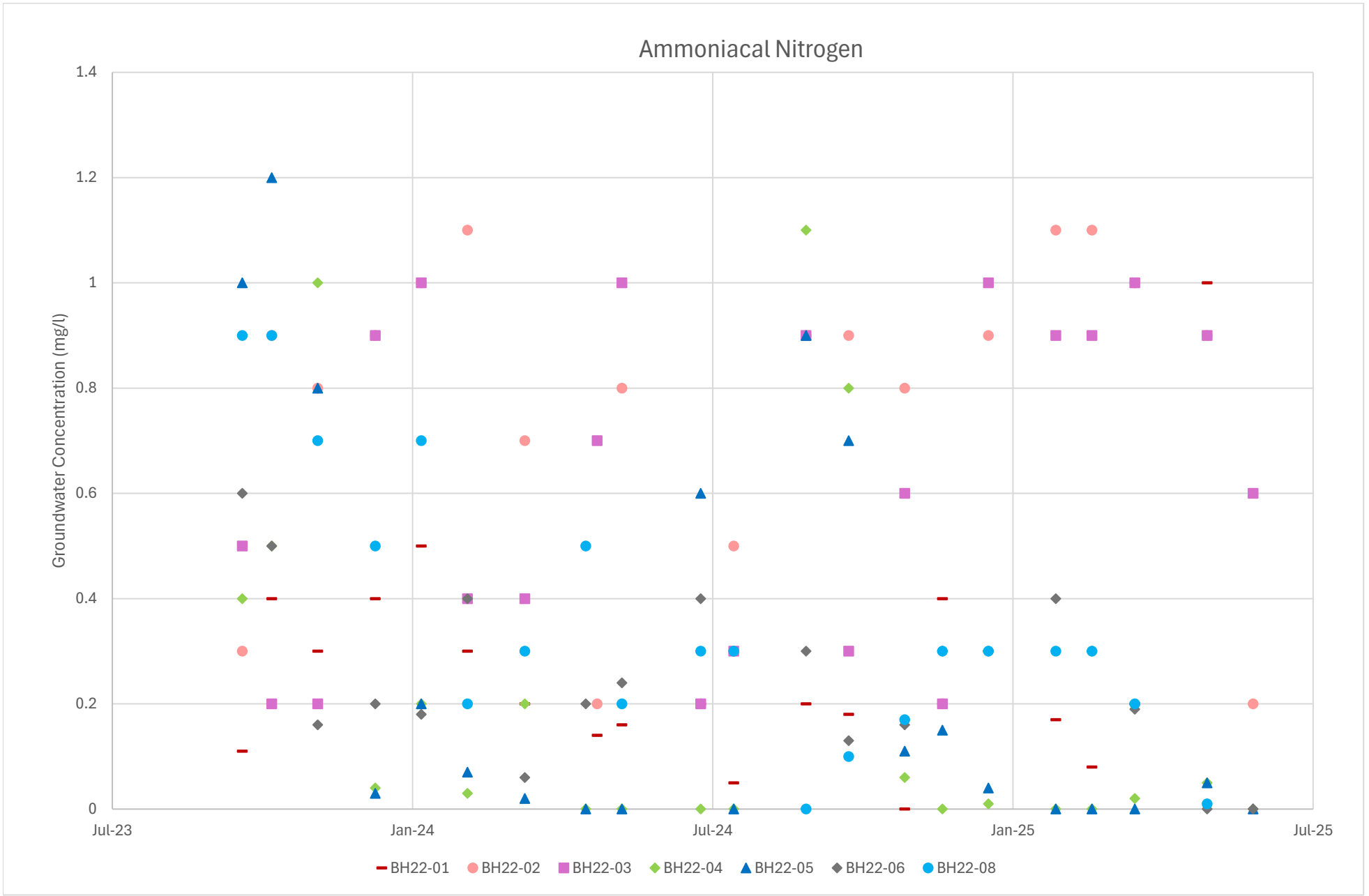
Clockhouse Quarry Restoration

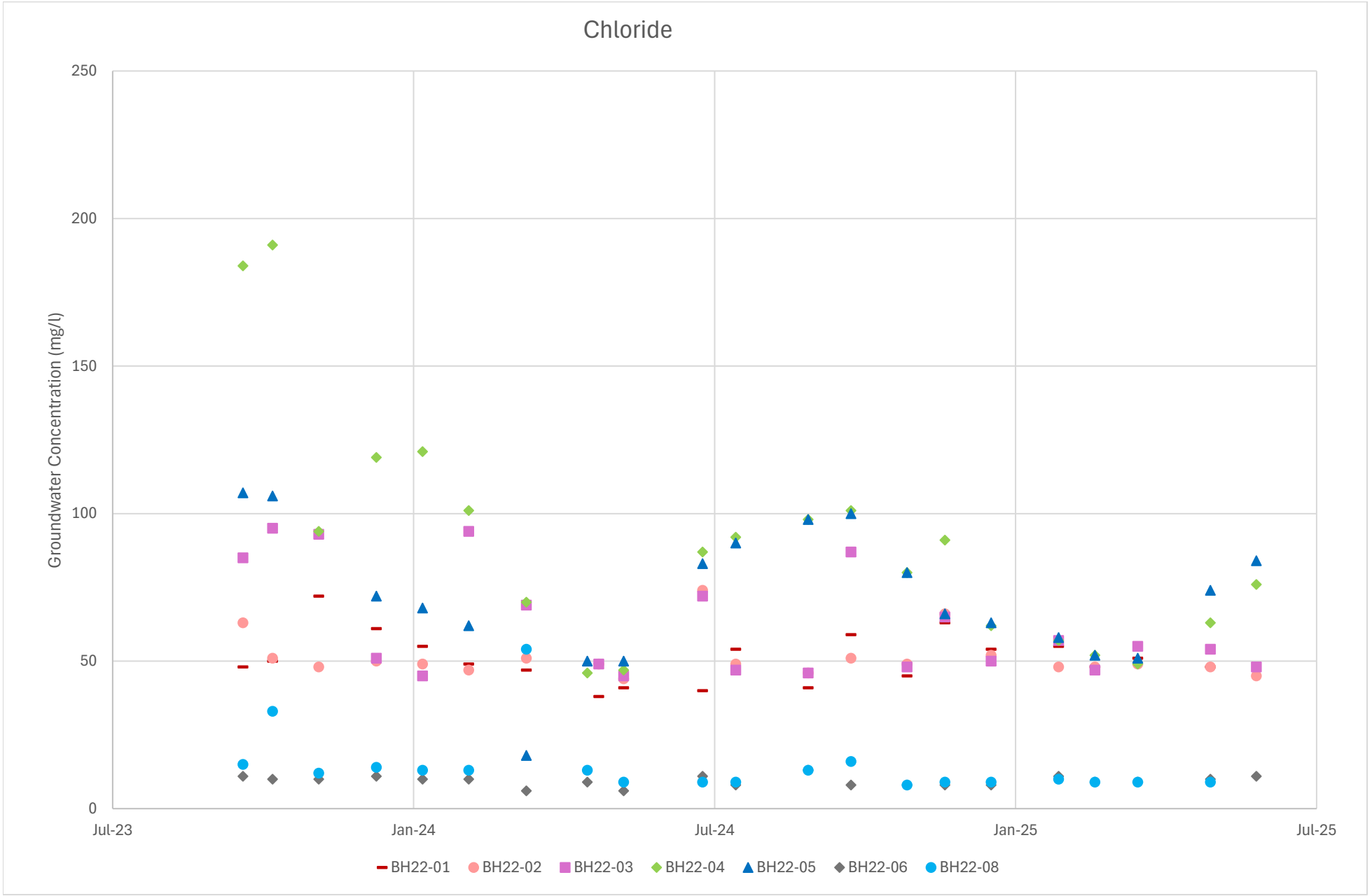
Environmental Permit Application Hydrogeological Risk Assessment

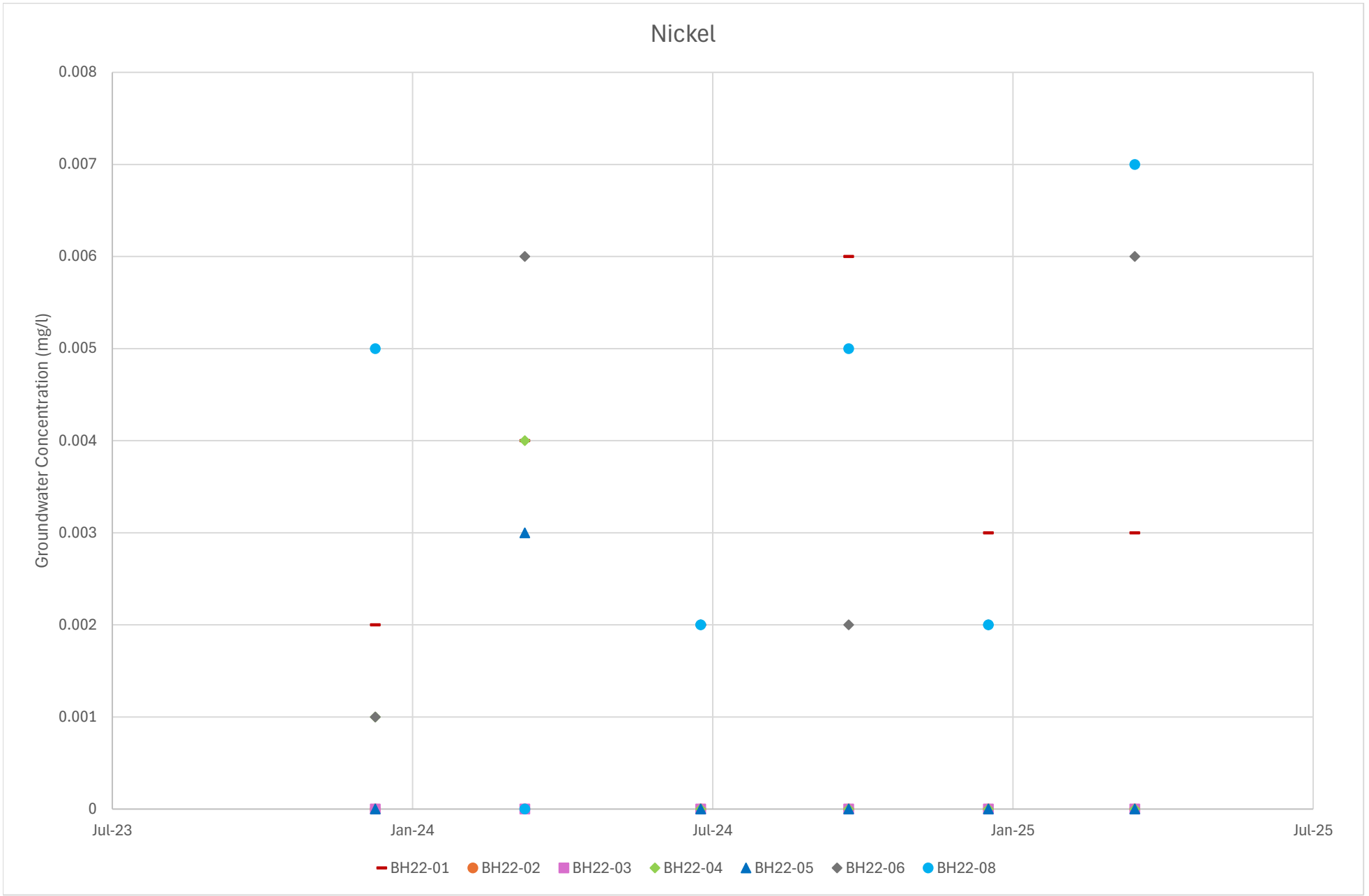
Suez Recycling and Recovery UK Ltd

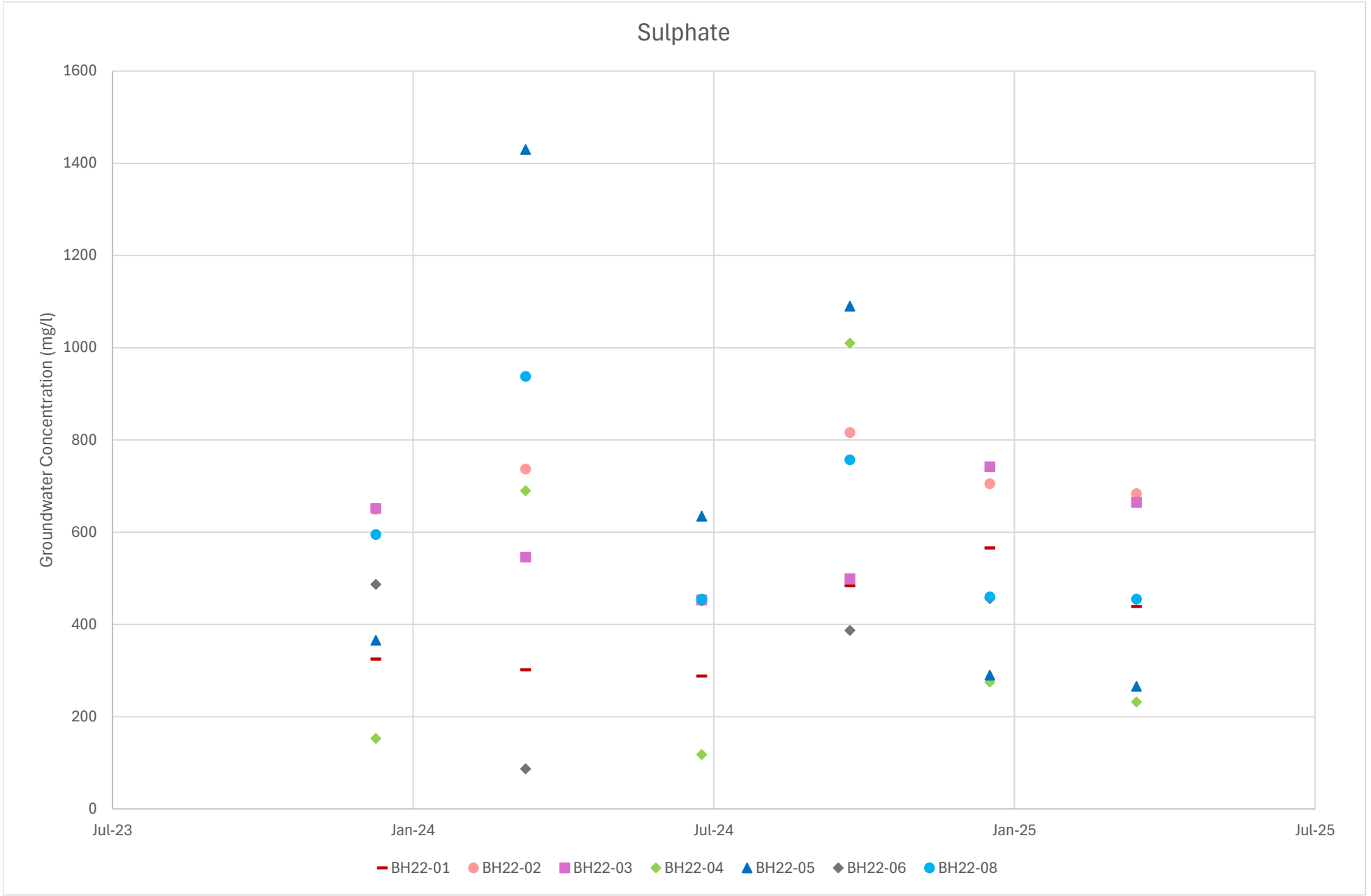
SLR Project No.: 402.065294.00001

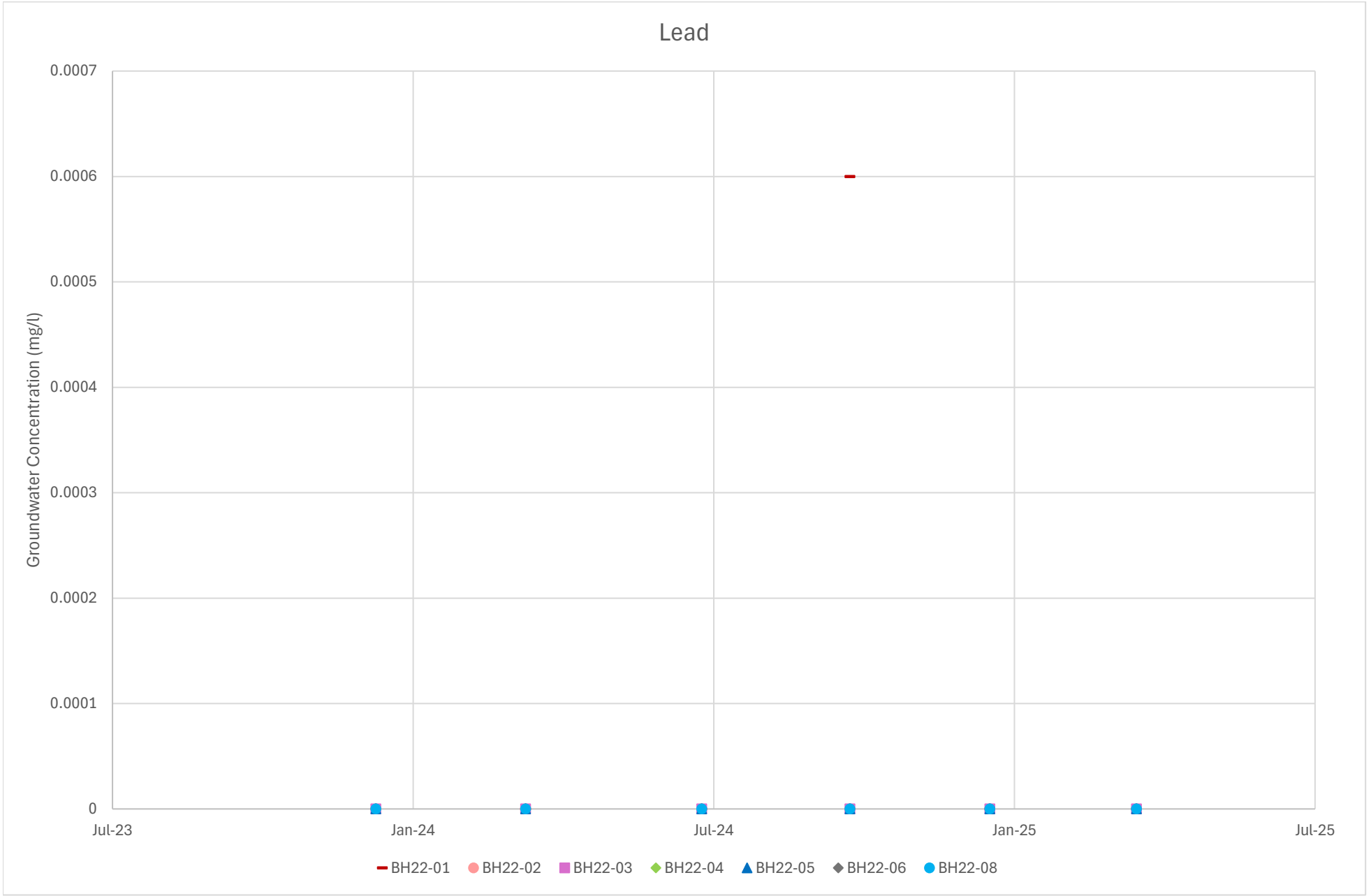
11 November 2025


Ammoniacal Nitrogen
Groundwater Concentration (mg/l)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Jul-23
Jan-24
Jul-24
Jan-25
Jul-25
BH22-01
BH22-02
BH22-03
BH22-04
BH22-05
BH22-06
BH22-08


Chloride
Groundwater Concentration (mg/l)
250
200
150
100
50
0
Jul-23
Jan-24
Jul-24
Jan-25
Jul-25
BH22-01
BH22-02
BH22-03
BH22-04
BH22-05
BH22-06
BH22-08


Nickel
Groundwater Concentration (mg/l)
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
Jul-23
Jan-24
Jul-24
Jan-25
Jul-25
BH22-01
BH22-02
BH22-03
BH22-04
BH22-05
BH22-06
BH22-08


Sulphate
Groundwater Concentration (mg/l)
1600
1400
1200
1000
800
600
400
200
0
Jul-23
Jan-24
Jul-24
Jan-25
Jul-25
BH22-01
BH22-02
BH22-03
BH22-04
BH22-05
BH22-06
BH22-08


Lead
Groundwater Concentration (mg/l)
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
Jul-23
Jan-24
Jul-24
Jan-25
Jul-25
BH22-01
BH22-02
BH22-03
BH22-04
BH22-05
BH22-06
BH22-08

Appendix D Surface Water Quality Chemographs

Clockhouse Quarry Restoration

Environmental Permit Application Hydrogeological Risk Assessment

Suez Recycling and Recovery UK Ltd

SLR Project No.: 402.065294.00001

11 November 2025

Appendix E LandSim Model Parameterisation Table

Clockhouse Quarry Restoration

Environmental Permit Application Hydrogeological Risk Assessment

Suez Recycling and Recovery UK Ltd

SLR Project No.: 402.065294.00001

11 November 2025

Appendix E: LandSim Model Parameterisation Table for Upper Infill

Table 1: Cell Geometry

Item	Value & Distribution	Justification
Infiltration to Open Waste (mm/year):	30 ± 3 *Normal Distribution*	Infiltration limited into clayey waste. Approx. 90% of the effective rainfall runs off or interflows towards the landfill restoration lakes.
Infiltration to Capped Areas (mm/year):	30 ± 3 *Normal Distribution*	
End of Filling (years from start of waste disposal):	14 *Single Fixed Value*	Expected filling time as in ESSD.
Duration of Mgmt Control (yrs from start of waste disposal):	20000 *Single Fixed Value*	Notional value as there is no leachate management for the whole landfill lifecycle.
Final Waste Thickness (m):	6 *Single Fixed Value*	According to cross section – waste at thickest point (worst case value)
Waste Porosity (fraction):	Minimum: 0.29 Maximum: 0.55 *Uniform Distribution*	Typical values for cohesive inert waste.
Waste Density (kg/l):	1.5 *Single Fixed Value*	Typical values for cohesive inert waste
Waste Field Capacity (%) (fraction):	Minimum: 0.34 Maximum: 0.6 *Uniform Distribution*	Typical values for cohesive inert waste
Head of Leachate when Surface Water Breakout Occurs (m):	6 *Single Fixed Value*	According to maximum thickness of upper layer.
Specified Leachate Head on EBS (m)	Minimum: 2 Maximum: 6 *Uniform Distribution*	According to cross section.
Cell Dimensions (m):	Length (unfolded): 456 *Single Fixed Value* Width: 80 *Single Fixed Value*	Given shape is a square frame, area = Length x Width of 4 sides: (300 x 40) + (300 x 40) + (250 x 40) + (250 x 10) = 36500 (top area) 36500 / 80 = 456 According to site plan – Length of infill at which the thickness of the

Item	Value & Distribution	Justification
		Upper Layer > Lower Layer.
Landfill Basal Area (Ha):	2.4 *Single Fixed Value*	According to site plan, length of cell x maximum width of cell round to 1 SF.
Landfill Cap Area (Ha):	3.65 *Single Value*	Derived as in cell dimensions above.

Table 2: Leachate Quality

Item	Value & Distribution	Source
Non-Hazardous		
Ammoniacal Nitrogen (mg/l):	Minimum: 0.3 Most Likely: 1 Maximum: 5 *Triangular Distribution*	According to HRA – rogue load for low-risk site based on EA requirements.
Chloride (mg/l) (if 3 x IWAC):	240 *Single Fixed Value*	3 x Site-specific Inert WAC limits, outlined within the Landfill Directive council decision annex 2003/33/EC.
Nickel (mg/l):	0.04 *Single Fixed Value*	Site-specific Inert WAC limits, outlined within the Landfill Directive council decision annex 2003/33/EC.
Hazardous Substances		
Anthracene	0.0339 *Single Fixed Value*	Assumes 20% of the total PAH WAC limit of 100mg/kg is Anthracene – converted to mg/l using P20 calculations based on Henry's Law and partition coefficients.
Benzo(a)pyrene (mg/l):	0.00776 *Single Fixed Value*	Assumes 20% of the total PAH WAC limit of 100mg/kg is Benzo(a)pyrene – converted to mg/l using P20 calculations based on Henry's Law and partition coefficients.
Lead (mg/l):	0.05 *Single Fixed Value*	Site-specific Inert WAC limits, outlined within the Landfill Directive council decision annex 2003/33/EC.

Table 3: Attenuation Parameters in Unsaturated Zone

Item	Value & Distribution	Source
Retardation (l/kg)		
Ammoniacal Nitrogen Kd	Minimum: 0.5 Maximum: 2 *Uniform Distribution*	LandSim default value.
Chloride Kd	0 *Single Value*	LandSim default value.
Nickel Kd	Minimum: 20 Maximum: 800 *Uniform Distribution*	LandSim default value.
Lead Kd	Minimum: 27 Maximum: 270000 *Uniform Distribution*	LandSim default value.
Anthracene Koc	Minimum: 5000 Maximum: 130000 *Uniform Distribution*	https://pubchem.ncbi.nlm.nih.gov/compound/anthracene
Benzo(a)pyrene Koc	128825 Single Value	Environment Agency (2009) Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values, Science Report SC050021/SR7
Fraction of Organic Carbon (fraction)	Minimum: 0.0006 Most Likely: 0.0074 Maximum: 0.062 *Log Triangular Distribution*	Value for silts and clays from EA Attenuation of Mecoprop in the Subsurface.
Half Life (years)		
Ammoniacal Nitrogen:	Min: 5 Max: 10 *Uniform Distribution*	EA (2003) R*eview of Ammonium in Groundwater*
Chloride:	Half-life: $1x10^9$ *Single Value*	No degradation assumed.
Nickel	Half-life: $1x10^9$ *Single Value*	No degradation assumed.
Lead	Half-life: $1x10^9$ *Single Value*	No degradation assumed.
Anthracene:	Minimum: 0.55 Maximum: 5.04 *Log uniform distribution*	Anaerobic range as worst case from Howard et al (1991) Handbook of Environmental Degradation Rates
Benzo(a)pyrene	Minimum: 0.62 Maximum: 5.8 *Log uniform distribution*	Anaerobic range as worst case from Howard et al (1991) Handbook of Environmental Degradation Rates

Vertical Pathway not modelled as a worst case.

Table 4: Aquifer Flow – Weald Clay Formation

Item	Value & Distribution	Source
Pathway Length (m)	Minimum: 32 Maximum: 488 *Uniform Distribution*	Given shape is a square frame, refer to sums in Cell Dimensions (Table 1). Compliance point set at 32m downstream of edge of void, effective void length for upper waste is 456m.
Pathway Width (m)	80 *Single Fixed Value*	According to site plan – Length of infill at which the thickness of the Upper Layer > Lower Layer.
Mixing Zone Thickness (m)	Minimum: 10 Maximum: 11 *Uniform Distribution*	Effective dilution thickness given permeability testing results.
Hydraulic Conductivity (m/sec)	Minimum: 4×10^{-6} Maximum: 9.6×10^{-6}	Based on permeability testing at BH22/8 and BH22/4.
Pathway Density (kg/l)	Minimum: 1.8 Maximum: 2.2 *Uniform Distribution*	Conservative value.
Pathway Porosity (fraction)	Minimum: 0.21 Maximum: 0.41 *Uniform Distribution*	Landsim default for siltstone.
Longitudinal Dispersivity (m)	Minimum: 3.2 Maximum: 45.6 *Uniform Distribution*	10% pathway length
Transverse Dispersivity (m)	Minimum: 1 Maximum: 15 *Uniform Distribution*	3% pathway length
Hydraulic Gradient	Minimum: 0.01 Maximum: 0.013	The post-rebound hydraulic gradient from north to south across the restored void is estimated at c. 3m or 4m across 300m i.e. 0.01 or 0.013
Attenuation Parameters		
All Parameters	Non-Hazardous Substances as Table 3, no attenuation assessed for Hazardous Substances	

No Background Groundwater Quality – modelling as worst-case scenario and to allow for comparison to RAM3 clean fill model.

Appendix F LandSim Model Results

Clockhouse Quarry Restoration

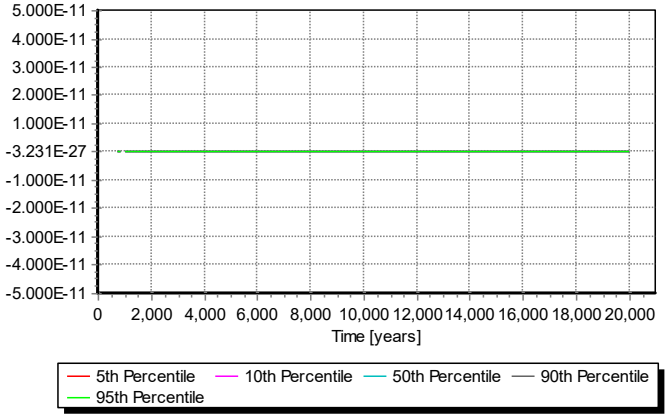
Environmental Permit Application Hydrogeological Risk Assessment

Suez Recycling and Recovery UK Ltd

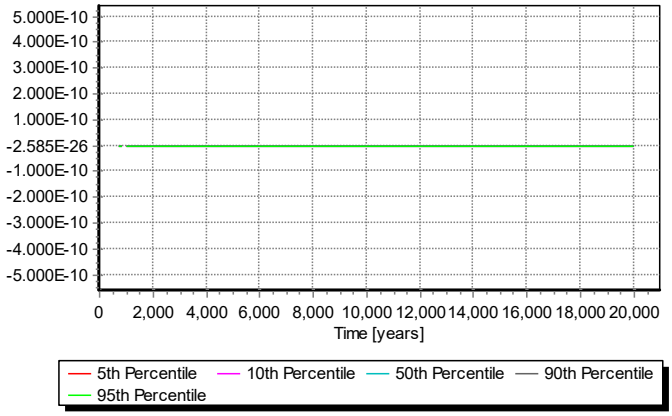
SLR Project No.: 402.065294.00001

11 November 2025

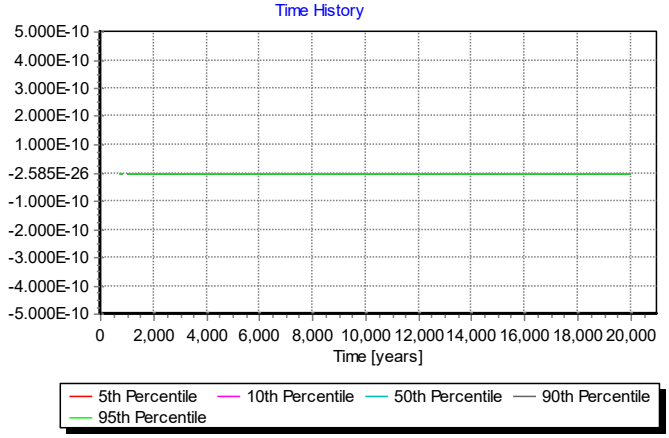
Results: Upper Landfill cell, Lead Concentration at base of Unsaturated Zone [mg/l]
Time History

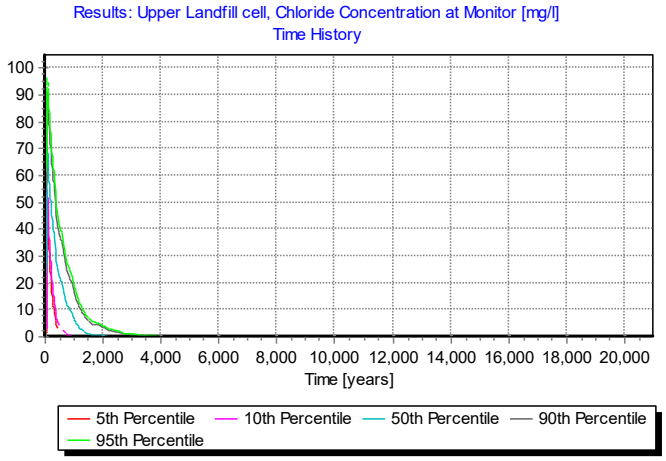


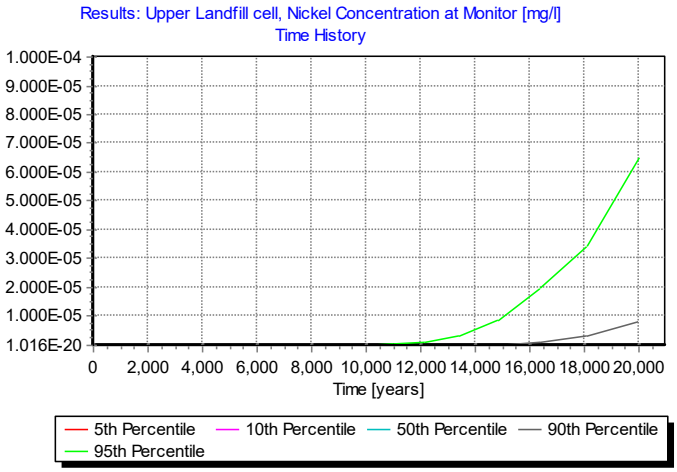
Results: Upper Landfill cell, Anthracene Concentration at base of Unsaturated Zone [mg/l]
Time History

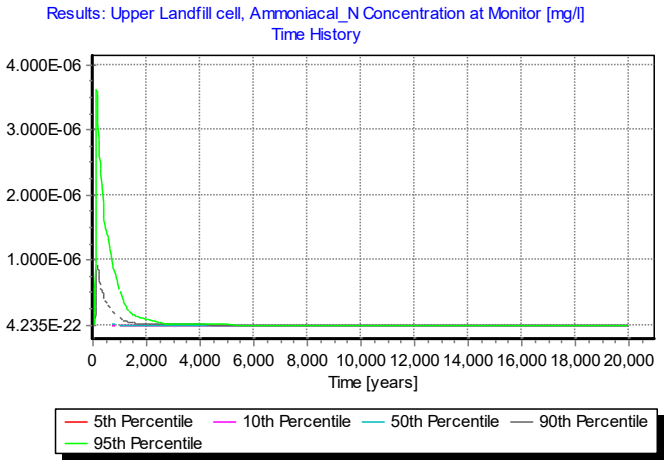


Results: Upper Landfill cell, Benzo(a)Pyrene Concentration at base of Unsaturated Zone [mg/l]
Time History




Results: Upper Landfill cell, Chloride Concentration at Monitor [mg/l]
Time History
100
90
80
70
60
50
40
30
20
10
0
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
Time [years]
5th Percentile
10th Percentile
50th Percentile
90th Percentile
95th Percentile


Results: Upper Landfill cell, Nickel Concentration at Monitor [mg/l]
Time History
1.000E-04
9.000E-05
8.000E-05
7.000E-05
6.000E-05
5.000E-05
4.000E-05
3.000E-05
2.000E-05
1.000E-05
1.016E-20
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
Time [years]
5th Percentile
10th Percentile
50th Percentile
90th Percentile
95th Percentile


Results: Upper Landfill cell, Ammoniacal_N Concentration at Monitor [mg/l]
Time History
4.000E-06
3.000E-06
2.000E-06
1.000E-06
4.235E-22
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
Time [years]
5th Percentile
10th Percentile
50th Percentile
90th Percentile
95th Percentile

Appendix G RAM3 Model Parameterisation Table

Clockhouse Quarry Restoration

Environmental Permit Application Hydrogeological Risk Assessment

Suez Recycling and Recovery UK Ltd

SLR Project No.: 402.065294.00001

11 November 2025

Appendix G: RAM3 Model Parameterisation Table

Item		Value and Distribution	Justification
Infiltration to restored Site (mm/year)		100	40% of effective rainfall. Conservative value to reflect the fact that there will be leachate ponded in the very centre of the infill.
Waste, Area (m^2)		44750	Calculated based upon extractive area Length: 250m Width: 179m (width where thickness of lower infill > upper infill)
Waste, Thickness (m)		19.5	Maximum thickness of both upper and lower infill according to cross section.
Waste porosity		Minimum: 0.34 Maximum: 0.57 *Uniform Distribution*	Aqtesolv range for clay material
Source Contamination	Amm. Nitrogen (mg/l)	Minimum: 0.3 Most Likely: 1 Maximum: 5 *Triangular Distribution*	According to HRA – rogue load for low-risk site based on EA requirements.
	Chloride (mg/l) (if 3 x IWAC)	240	Site-specific Inert WAC limits, outlined within the Landfill Directive council decision annex 2003/33/EC.
	Nickel (mg/l)	0.04	
Free Water Diffusion Coefficients (m^2/s)	Ammoniacal Nitrogen	1.96×10^{-9}	Contaminant Fluxes from Hydraulic Containment Landfills - A review, Report SC0310/SR
	Chloride	2.03×10^{-09}	RBCA Handbook
	Nickel	1.07×10^{-9}	RBCA Handbook

Item		Value	Source of Data
Clean Inert Fill	Unit Thickness (m)	0.01	Nominal value to exclude attenuation in infill layer when modelling.
	Hydraulic Conductivity (m/s)	1×10^{-7}	Minimum hydraulic conductivity of sidewall attenuation layer based on minimum value of clay from

			Attenuation Parameters file.
	Hydraulic Gradient (m/m)	0.0203	Estimated using darcy's law, i.e.: $i = \frac{Q}{KA}$ Where: I = Hydraulic Gradient Q = Flow (calculated based on infiltration rate 100mm/year) X waste area (44750m^3)) (m^3/s) K = Hydraulic Conductivity (1x10^{-7} m/s) A = Sidewall and basal cross-sectional area (circa 7Ha) (m^2)
	Porosity	Minimum: 0.34 Maximum: 0.60 *Uniform Distribution*	Based on range for silt & clay, ConSIM helpfile
	Dry Bulk Density (kg/m^3)	1500 *Single Fixed Value*	Typical values for cohesive inert waste
	Dispersivity (m)	0.001	10% of unit thickness
Stiff Weald Clay	Unit Thickness (m)	Minimum: 10 Maximum: 11m *Uniform Distribution*	Effective dilution thickness given permeability testing results.
	Hydraulic Conductivity (m/s)	Minimum: 4 x 10^{-6} Maximum: 9.6 x 10^{-6} *Uniform Distribution*	Based on permeability testing at BH22/8 and BH22/4.
	Hydraulic Gradient (m/m)	Minimum: 0.01 Maximum: 0.013 *Uniform Distribution*	The post-rebound hydraulic gradient from north to south across the restored void is estimated at c. 3m or 4m across 300m i.e. 0.01 or 0.013
	Porosity	Minimum: 0.21 Maximum: 0.41 *Uniform Distribution*	Landsim default for siltstone.
	Dry Bulk Density (kg/m^3)	Minimum: 1800 Maximum: 2200 *Uniform Distribution*	Conservative value.
	Fraction of Organic Carbon (fraction)	Minimum: 0.0006 Most Likely: 0.0074 Maximum: 0.062 *Triangular Distribution*	Value for silts and clays from EA Attenuation of Mecoprop in the Subsurface.

	Travel Distance (m)	32	Compliance point (BH5) set at 32m downstream of edge of void,
	Dispersivity (m)	3.2	10% of pathway length
	Mixing depth / Width (m)	Depth: Maximum: 10m Minimum: 11m *Uniform Distribution* Width: 179m	Effective dilution thickness given permeability testing results. Width = width of waste mass where thickness of lower infill > upper infill, based off cross section.

Item		**Value**	Source of Data
Partition Coefficient			
Ammoniacal Nitrogen (l/kg)	Clean Inert Fill	Minimum: 0.5 Maximum: 2 *Uniform Distribution*	LandSim default
	Stiff Weald Clay	Minimum: 0.5 Maximum: 2 *Uniform Distribution*	LandSim default
Chloride (l/kg)	Clean Inert Fill	0.0	LandSim default
	Stiff Weald Clay	0.0	LandSim default
Nickel (l/kg)	Clean Inert Fill	Minimum: 20 Maximum: 800 *Uniform Distribution*	LandSim default
	Stiff Weald Clay	Minimum: 20 Maximum: 800 *Uniform Distribution*	LandSim default
Half lives			
Ammoniacal Nitrogen	Clean Inert Fill Stiff Weald Clay	Minimum: 5 Maximum: 10 *Uniform Distribution*	EA (2003) Review of Ammonium in Groundwater
Chloride:	Clean Inert Fill Stiff Weald Clay	Half-life: $1x10^9$ *Single Fixed Value*	No degradation assumed.
Nickel	Clean Inert Fill Stiff Weald Clay	Half-life: $1x10^9$ *Single Fixed Value*	No degradation assumed.

Appendix H RAM3 Model Parameters

Clockhouse Quarry Restoration

Environmental Permit Application Hydrogeological Risk Assessment

Suez Recycling and Recovery UK Ltd

SLR Project No.: 402.065294.00001

11 November 2025

Source Type

☑ Soil Source ☐ Groundwater Source

Level Number

○ Level One
○ Level Two
◉ Level Three
○ Level Four
○ Advanced

Parameter Values

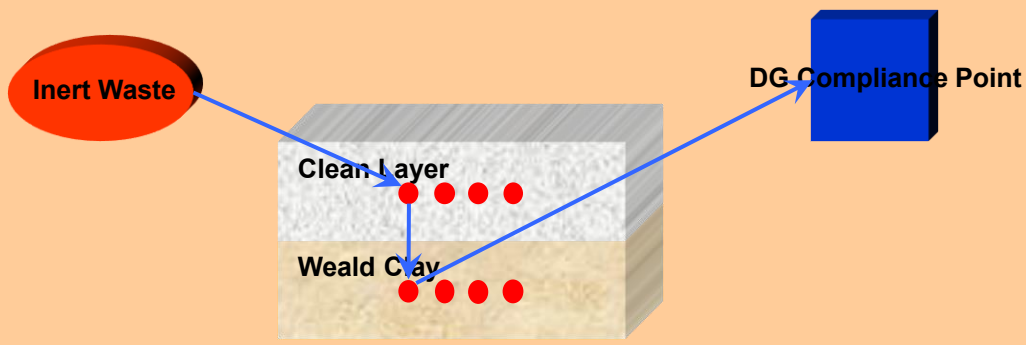
○ Deterministic ◉ Probabilistic

Created: 05/09/2025 09:08:24

by: Silas Rowe

Version: 3.34.00x Bmb

Site: Clockhouse_Lower_Infill



Numerical value
Suggested formula
Probabilistic parameters
Data specified elsewhere
Suggested formula edited

SOURCE CONCENTRATIONS: Inert Waste

SOIL SOURCE

Source Data Options

- ○ Pore water concentrations
- ◉ Leaching test
- ○ Soil contaminant concentrations

Source Type

- ○ Constant source
- ◉ Declining source

Source Geometry

Inert_Waste_Source_length	250	**m**
Inert_Waste_Source_width	179	**m**
Inert_Waste_Source_area	44750	**m2**
Inert_Waste_Source_thickness	19.5	**m**
Inert_Waste_Source_volume	872625	**m3**

General Source Properties

Inert_Waste_Source_field_capacity	**[-]**	0.34
Distribution		uniform
Inert_Waste_Source_field_capacity_param1		0.34
Inert_Waste_Source_field_capacity_param2		0.6
Inert_Waste_Source_field_capacity_param3		

Source Contaminant Information

Source determinand names		Amm. Nitr	Chloride	Nickel
Inert_Waste_Leaching_test_concentration	**mg/L**	0.3	240	0.04
Distribution		triangular	constant	constant
Inert_Waste_Leaching_test_concentration_param1		0.3		
Inert_Waste_Leaching_test_concentration_param2		1		
Inert_Waste_Leaching_test_concentration_param3		5		

Inert_Waste_Initial_inventory	**kg**	89.00775	71206.2	11.8677
Distribution		constant	constant	constant
Inert_Waste_Initial_inventory_param1				
Inert_Waste_Initial_inventory_param2				
Inert_Waste_Initial_inventory_param3				

Inert_Waste_Input_concentration	**mg/L**	0.3	240	0.04

CONTAMINANT INFORMATION

		Species1	Species2	Species3
Source determinand names	3	Amm. Nitr	Chloride	Nickel

Receptor Target Concentrations

	Name	Values in mg/L		
Quality Standard 1	EAL	0.39	150	0.012
Quality Standard 2				
Quality Standard 3				
Quality Standard 4				

Generic Contaminant Properties

Contaminants_Solubility	**mg/L**			
Distribution		constant	constant	constant
Contaminants_Solubility_param1				
Contaminants_Solubility_param2				
Contaminants_Solubility_param3				

Contaminants_Henrys_Law_Constant	**[-]**			
Distribution		constant	constant	constant
Contaminants_Henrys_Law_Constant_param1				
Contaminants_Henrys_Law_Constant_param2				
Contaminants_Henrys_Law_Constant_param3				

Contaminants_Organic_Carbon_Water_Partition_Coefficient_Koc	**L/kg**			
Distribution		constant	constant	constant
Contaminants_Organic_Carbon_Water_Partition_Coefficient_Koc_param1				
Contaminants_Organic_Carbon_Water_Partition_Coefficient_Koc_param2				
Contaminants_Organic_Carbon_Water_Partition_Coefficient_Koc_param3				

Contaminants_Free_Water_Diffusion_Coefficient	**m2/s**	1.96E-09	2.03E-09	1.07E-09
Distribution		constant	constant	constant
Contaminants_Free_Water_Diffusion_Coefficient_param1				
Contaminants_Free_Water_Diffusion_Coefficient_param2				
Contaminants_Free_Water_Diffusion_Coefficient_param3				

HYDROGEOLOGICAL UNITS

Hydrogeological Units		Clean Laye	Weald Clay
Hydrogeology_Unit_Thickness	**m**	0.01	10
Distribution		constant	uniform
Hydrogeology_Unit_Thickness_param1			10
Hydrogeology_Unit_Thickness_param2			11
Hydrogeology_Unit_Thickness_param3			
Hydrogeology_Log_Hydraulic_Conductivity	**log(m/s)**	-7	-5.398
Distribution		constant	uniform
Hydrogeology_Log_Hydraulic_Conductivity_param1			-5.4
Hydrogeology_Log_Hydraulic_Conductivity_param2			-5.02
Hydrogeology_Log_Hydraulic_Conductivity_param3			
Hydrogeology_Hydraulic_Conductivity	**m/s**	1E-07	4.00E-06
Distribution		constant	uniform
Hydrogeology_Hydraulic_Conductivity_param1			4.00E-06
Hydrogeology_Hydraulic_Conductivity_param2			9.60E-06
Hydrogeology_Hydraulic_Conductivity_param3			
Hydrogeology_Hydraulic_Gradient	**[-]**	0.0203	0.01
Distribution		constant	uniform
Hydrogeology_Hydraulic_Gradient_param1			0.01
Hydrogeology_Hydraulic_Gradient_param2			0.013
Hydrogeology_Hydraulic_Gradient_param3			
Hydrogeology_Porosity	**[-]**	0.34	0.21
Distribution		uniform	uniform
Hydrogeology_Porosity_param1		0.34	0.21
Hydrogeology_Porosity_param2		0.6	0.41
Hydrogeology_Porosity_param3			
Hydrogeology_Velocity	**m/s**	5.97E-09	1.90476E-07
Distribution		constant	constant
Hydrogeology_Velocity_param1			
Hydrogeology_Velocity_param2			
Hydrogeology_Velocity_param3			
Hydrogeology_Tortuosity	**[-]**	10	10
Distribution		constant	constant
Hydrogeology_Tortuosity_param1			
Hydrogeology_Tortuosity_param2			
Hydrogeology_Tortuosity_param3			

ATTENUATION PARAMETERS

Hydrogeological Units		Clean Laye	Weald Clay

General properties

Attenuation_Dry_bulk_density	kg/m3	1500	1800
Distribution		constant	uniform
Attenuation_Dry_bulk_density_param1			1800
Attenuation_Dry_bulk_density_param2			2200
Attenuation_Dry_bulk_density_param3			

Attenuation_Fraction_organic_carbon	[-]	0.01	0.0006
Distribution		uniform	triangular
Attenuation_Fraction_organic_carbon_param1		0.01	0.0006
Attenuation_Fraction_organic_carbon_param2		0.1	0.0074
Attenuation_Fraction_organic_carbon_param3			0.062

Contaminant specific parameters

Amm. Nitrogen

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	0.5	0.5
Distribution		uniform	uniform
Attenuation_Partition_Coefficient_Kd_Species_1_param1		0.5	0.5
Attenuation_Partition_Coefficient_Kd_Species_1_param2		2	2
Attenuation_Partition_Coefficient_Kd_Species_1_param3			

Attenuation_Retardation_Species_1	[-]	3.205882	5.285714286
Distribution		constant	constant
Attenuation_Retardation_Species_1_param1			
Attenuation_Retardation_Species_1_param2			
Attenuation_Retardation_Species_1_param3			

Attenuation_Half_Life_Species_1	days	5	5
Distribution		uniform	uniform
Attenuation_Half_Life_Species_1_param1		5	5
Attenuation_Half_Life_Species_1_param2		10	10
Attenuation_Half_Life_Species_1_param3			

Attenuation_Decay_Coefficient_Species_1	1/s	1.6E-06	1.60451E-06
Distribution		constant	constant
Attenuation_Decay_Coefficient_Species_1_param1			
Attenuation_Decay_Coefficient_Species_1_param2			
Attenuation_Decay_Coefficient_Species_1_param3			

Chloride

Attenuation_Partition_Coefficient_Kd_Species_2	**L/kg**	0	0
Distribution		constant	constant
Attenuation_Partition_Coefficient_Kd_Species_2_param1			
Attenuation_Partition_Coefficient_Kd_Species_2_param2			
Attenuation_Partition_Coefficient_Kd_Species_2_param3			

Attenuation_Retardation_Species_2	**[-]**	1	1
Distribution		constant	constant
Attenuation_Retardation_Species_2_param1			
Attenuation_Retardation_Species_2_param2			
Attenuation_Retardation_Species_2_param3			

Attenuation_Half_Life_Species_2	**days**	No Decay	No Decay
Distribution		constant	constant
Attenuation_Half_Life_Species_2_param1			
Attenuation_Half_Life_Species_2_param2			
Attenuation_Half_Life_Species_2_param3			

Attenuation_Decay_Coefficient_Species_2	**1/s**	0	0
Distribution		constant	constant
Attenuation_Decay_Coefficient_Species_2_param1			
Attenuation_Decay_Coefficient_Species_2_param2			
Attenuation_Decay_Coefficient_Species_2_param3			

Nickel

Attenuation_Partition_Coefficient_Kd_Species_3	**L/kg**	20	20
Distribution		uniform	uniform
Attenuation_Partition_Coefficient_Kd_Species_3_param1		20	20
Attenuation_Partition_Coefficient_Kd_Species_3_param2		800	800
Attenuation_Partition_Coefficient_Kd_Species_3_param3			

Attenuation_Retardation_Species_3	**[-]**	89.23529	172.4285714
Distribution		constant	constant
Attenuation_Retardation_Species_3_param1			
Attenuation_Retardation_Species_3_param2			
Attenuation_Retardation_Species_3_param3			

Attenuation_Half_Life_Species_3	**days**	No Decay	No Decay
Distribution		constant	constant
Attenuation_Half_Life_Species_3_param1			
Attenuation_Half_Life_Species_3_param2			
Attenuation_Half_Life_Species_3_param3			

Attenuation_Decay_Coefficient_Species_3	**1/s**	0	0
Distribution		constant	constant
Attenuation_Decay_Coefficient_Species_3_param1			
Attenuation_Decay_Coefficient_Species_3_param2			
Attenuation_Decay_Coefficient_Species_3_param3			

WATER BALANCE

Infiltration through the soil zone source

Source Name: Inert Waste

Effective_Rainfall	100	**mm/year**
Infiltration_Factor	1	**[-]**
Infiltration_Rate	100	**mm/year**
Infiltration_Area	44750	**m2**
Q_Infiltration	0.000141804	**m3/s**

PATHWAY SUMMARY

Path 1	Section 1		Section 2		Section 3		Section 4	
Path 1 Type	Source		Unit		Unit		Receptor	
Path 1 Name	**Inert Waste**		**Clean Layer: Node 1**		**Weald Clay: Node 1**		**DG Compliance Point**	
Path 1 Process	Declining source		ADRD (1D)		ADRD (1D) + Dilution		Monitoring Borehole	
Path 1 Standards							Target Standard	EAL
Path 1 Parameter1	**Q_managed [m3/s]**	0.000E+00	**Velocity [m/s]**	5.971E-09	**Velocity [m/s]**	1.905E-07		
Path 1 Parameter2	**Managed time [years]**	0.000E+00	**Dispersivity [m]**	0.0	**Dispersivity [m]**	3.2		
Path 1 Parameter3	**Q_path [m3/s]**	1.418E-04	**Travel Distance [m]**	0.0	**Travel Distance [m]**	32.0		
Path 1 Parameter4	**Q_decline [m3/s]**	1.418E-04			**Mixing Depth [m]**	10.5		
Path 1 Parameter5					**Mixing Width [m]**	179.0		
Path 1 Parameter6			**Q_Dilute [m3/s]**	0	**Q_Dilute [m3/s]**	7.518E-05	**Q_dilute [m3/s]**	0.000E+00

SIMULATION PARAMETERS

Monte Carlo Analysis with Crystal Ball

Reported Percentile	95
Number of simulations	1000

☐ Stop on calculation error

☐ Use same sequence of random numbers

Minimise while running:

◉ Nothing

○ All Spreadsheets (faster)

○ Microsoft Excel (fastest)

Named Constants

s_per_year	31557600
s_per_day	86400

Laplace Transform Solution Parameters

sigma	0
nu	1
nsum	16
omega	11

Reporting Options

☐ Include Remedial Targets and Attenuation Factors on the results sheets in Advanced level

☐ Use the array form of the RAM function

☐ Include a set of timeslices for each contaminant in each pathway

Number of timeslices for breakthrough curves: 42

The timeslices specified on the results sheets are saved below.

Path1 timeslices in years

TS_Path1
10
20
30
40
50
60
70
80
90
100
200
300
400
500
600
700
800
900
1000
1250
1500
1750
2000
2500
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
13000
14000
15000
16000
17000
18000
19000
20000

Appendix I RAM3 Model Results

Clockhouse Quarry Restoration

Environmental Permit Application Hydrogeological Risk Assessment

Suez Recycling and Recovery UK Ltd

SLR Project No.: 402.065294.00001

11 November 2025

BREAKTHROUGH Probabilistic Results

1000 Monte Carlo iterations

Site Name: "Clockhouse_Lower_Infill"

Level3

Pollutant Linkage: Inert Waste, Clean Layer, Weald Clay, DG Compliance Point

95 th Percentile Concentrations in mg/L in DG Compliance Point

Compared with EAL target concentration in mg/L

	3.900E-01	1.500E+02	1.200E-02
Time(years)	Species1	Species2	Species3
	Amm. Nitrogen	**Chloride**	**Nickel**
10	3.784E-32	1.275E+02	0.000E+00
20	3.442E-32	1.263E+02	0.000E+00
30	3.131E-32	1.147E+02	8.080E-37
40	2.848E-32	1.036E+02	2.169E-32
50	2.591E-32	9.424E+01	4.129E-28
60	2.357E-32	8.545E+01	1.038E-23
70	2.123E-32	7.797E+01	1.402E-23
80	1.883E-32	7.130E+01	2.739E-20
90	1.670E-32	6.492E+01	7.026E-20
100	1.480E-32	5.943E+01	3.594E-18
200	5.372E-33	2.408E+01	1.241E-09
300	2.080E-33	9.851E+00	7.730E-07
400	8.221E-34	4.065E+00	1.567E-05
500	3.236E-34	1.674E+00	8.459E-05
600	9.435E-35	6.976E-01	2.484E-04
700	2.450E-35	2.904E-01	4.896E-04
800	1.038E-35	1.202E-01	7.831E-04
900	3.263E-36	4.960E-02	9.742E-04
1000	1.292E-36	2.061E-02	1.073E-03
1250	9.002E-38	2.292E-03	9.599E-04
1500	1.752E-39	2.600E-04	8.666E-04
1750	0.000E+00	2.900E-05	7.603E-04
2000	0.000E+00	2.965E-06	7.200E-04
2500	0.000E+00	0.000E+00	5.817E-04
3000	0.000E+00	0.000E+00	5.354E-04
4000	0.000E+00	0.000E+00	4.222E-04
5000	0.000E+00	0.000E+00	3.449E-04
6000	0.000E+00	0.000E+00	2.908E-04
7000	0.000E+00	0.000E+00	2.504E-04
8000	0.000E+00	0.000E+00	2.249E-04
9000	0.000E+00	0.000E+00	2.041E-04
10000	0.000E+00	0.000E+00	1.846E-04
11000	0.000E+00	0.000E+00	1.698E-04
12000	0.000E+00	0.000E+00	1.573E-04
13000	0.000E+00	0.000E+00	1.496E-04
14000	0.000E+00	0.000E+00	1.411E-04
15000	0.000E+00	0.000E+00	1.324E-04
16000	0.000E+00	0.000E+00	1.260E-04
17000	0.000E+00	0.000E+00	1.186E-04
18000	0.000E+00	6.946E-10	1.123E-04
19000	0.000E+00	1.632E-09	1.064E-04
20000	0.000E+00	2.417E-09	1.024E-04

Pollutant Linkage: Inert Waste, Clean Layer, Weald Clay, DG Compliance Point

5 th Percentile Remedial Target Concentrations in mg/L in Inert Waste

Time(years)	Species1	Species2	Species3
	Amm. Nitrogen	**Chloride**	**Nickel**
10	1.452E+31	2.821E+02	1.000E+40
20	1.595E+31	2.849E+02	1.000E+40
30	1.755E+31	3.139E+02	1.552E+32
40	1.936E+31	3.469E+02	1.741E+28
50	2.128E+31	3.818E+02	4.010E+23
60	2.339E+31	4.206E+02	3.860E+19
70	2.571E+31	4.592E+02	2.741E+19
80	2.826E+31	5.049E+02	1.739E+16
90	3.106E+31	5.541E+02	6.403E+15
100	3.415E+31	6.044E+02	9.363E+13
200	9.166E+31	1.495E+03	3.727E+05
300	2.541E+32	3.648E+03	5.985E+02
400	7.412E+32	8.835E+03	2.699E+01
500	2.108E+33	2.137E+04	4.812E+00
600	5.404E+33	5.153E+04	1.848E+00
700	1.480E+34	1.236E+05	9.650E-01
800	4.961E+34	2.985E+05	5.860E-01
900	1.408E+35	7.253E+05	4.877E-01
1000	4.994E+35	1.742E+06	4.318E-01
1250	6.721E+36	1.565E+07	4.997E-01
1500	2.738E+38	1.376E+08	5.505E-01
1750	1.000E+40	1.237E+09	6.298E-01
2000	1.000E+40	1.204E+10	6.650E-01
2500	1.000E+40	1.000E+40	8.153E-01
3000	1.000E+40	1.000E+40	8.956E-01
4000	1.000E+40	1.000E+40	1.129E+00
5000	1.000E+40	1.000E+40	1.387E+00
6000	1.000E+40	1.000E+40	1.640E+00
7000	1.000E+40	1.000E+40	1.917E+00
8000	1.000E+40	1.000E+40	2.132E+00
9000	1.000E+40	1.000E+40	2.351E+00
10000	1.000E+40	1.000E+40	2.599E+00
11000	1.000E+40	1.000E+40	2.820E+00
12000	1.000E+40	1.000E+40	3.044E+00
13000	1.000E+40	1.000E+40	3.203E+00
14000	1.000E+40	1.000E+40	3.394E+00
15000	1.000E+40	1.000E+40	3.619E+00
16000	1.000E+40	1.000E+40	3.808E+00
17000	1.000E+40	1.000E+40	4.017E+00
18000	1.000E+40	5.123E+13	4.271E+00
19000	1.000E+40	2.199E+13	4.496E+00
20000	1.000E+40	1.490E+13	4.676E+00

Compared with source concentrations in mg/L

3.000E-01	2.400E+02	4.000E-02

Pollutant Linkage: Inert Waste, Clean Layer, Weald Clay, DG Compliance Point

5 th Percentile Dilution Factor

1.639E+00

Pollutant Linkage: Inert Waste, Clean Layer, Weald Clay, DG Compliance Point

5 th Percentile Attenuation Factor

Time(years)	Species1	Species2	Species3
	Amm. Nitrogen	**Chloride**	**Nickel**
10	1.730E+31	1.065E+00	1.000E+40
20	1.902E+31	1.137E+00	1.000E+40
30	2.090E+31	1.242E+00	6.189E+33
40	2.298E+31	1.356E+00	7.071E+29
50	2.530E+31	1.482E+00	1.600E+25
60	2.853E+31	1.619E+00	1.572E+21
70	3.218E+31	1.767E+00	1.359E+21
80	3.629E+31	1.929E+00	6.154E+17
90	4.092E+31	2.104E+00	2.807E+17
100	4.580E+31	2.296E+00	3.338E+15
200	1.171E+32	5.501E+00	1.379E+07
300	3.071E+32	1.318E+01	2.470E+04
400	9.472E+32	3.146E+01	1.156E+03
500	2.521E+33	7.527E+01	2.063E+02
600	6.329E+33	1.801E+02	7.509E+01
700	1.919E+34	4.310E+02	3.829E+01
800	6.415E+34	1.031E+03	2.404E+01
900	1.828E+35	2.465E+03	1.954E+01
1000	5.467E+35	5.896E+03	1.755E+01
1250	7.609E+36	5.241E+04	1.894E+01
1500	3.111E+38	4.653E+05	2.256E+01
1750	1.000E+40	4.171E+06	2.414E+01
2000	1.000E+40	4.084E+07	2.652E+01
2500	1.000E+40	1.000E+40	3.258E+01
3000	1.000E+40	1.000E+40	3.825E+01
4000	1.000E+40	1.000E+40	4.581E+01
5000	1.000E+40	1.000E+40	5.628E+01
6000	1.000E+40	1.000E+40	6.678E+01
7000	1.000E+40	1.000E+40	7.751E+01
8000	1.000E+40	1.000E+40	8.825E+01
9000	1.000E+40	1.000E+40	9.655E+01
10000	1.000E+40	1.000E+40	1.063E+02
11000	1.000E+40	1.000E+40	1.152E+02
12000	1.000E+40	1.000E+40	1.246E+02
13000	1.000E+40	1.000E+40	1.349E+02
14000	1.000E+40	1.000E+40	1.448E+02
15000	1.000E+40	1.000E+40	1.548E+02
16000	1.000E+40	1.000E+40	1.657E+02
17000	1.000E+40	1.000E+40	1.781E+02
18000	1.000E+40	1.581E+11	1.873E+02
19000	1.000E+40	6.944E+10	1.997E+02
20000	1.000E+40	4.749E+10	2.103E+02

Drawings

Drawing 001: Site Location

Drawing 002: Plan view of Current Site

Drawing Clh-INF-1223-01a: Proposed Infill Contours

Drawing 003: Cross Sections of Restored Site

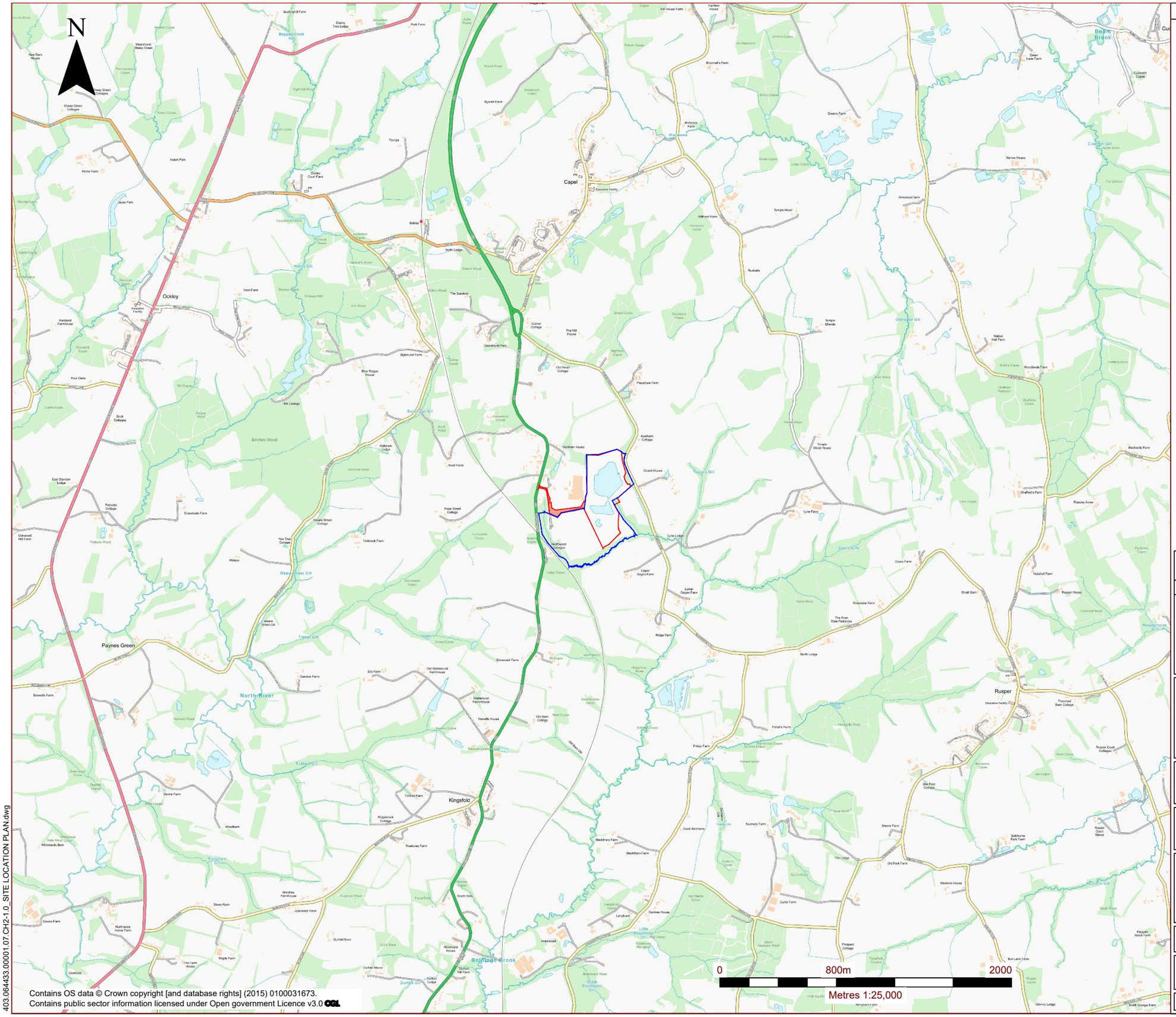
Clockhouse Quarry Restoration

Environmental Permit Application Hydrogeological Risk Assessment

Suez Recycling and Recovery UK Ltd

SLR Project No.: 402.065294.00001

11 November 2025



LEGEND

SUEZ OWNERSHIP BOUNDARY

APPLICATION SITE

Revision	By	Chk'd By	Date	Comments
0	TR	IG	11/22	

suez

Amenity Way, Morden, Surrey, SM4 4AX
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Site
CLOCKHOUSE QUARRY, CAPEL,
SURREY, RH5 5JL

Project
CLOCKHOUSE QUARRY RESTORATION

Drawing Title
SITE LOCATION PLAN

Scale	Date
1:25000 @ A3	NOVEMBER 2022

Drawing Number	Revision
CH 2/1	0

403.064433.00001.07.CH2-1.0_SITE LOCATION PLAN.dwg

N

Ditch

Ditch

Water level
76.58m
06-10-2014

Clay Stockpile

Stockpile

Stockpile

Clay Stockpile
Volume 498m3

Stockpile

Pump House

Water level
76.30m
06-10-2014

Water level
76.80m
06-10-2014

Pond Arisings (Silt)

0 50 100 150 200 250m

Scale 1:2,500

Legend:

Environmental Permit Boundary

Rev	Amendments	Date	By	Chk	Auth

SLR

www.slrconsulting.com

Client
Suez Recycling and Recovery UK Limited

Project
Clockhouse Quarry

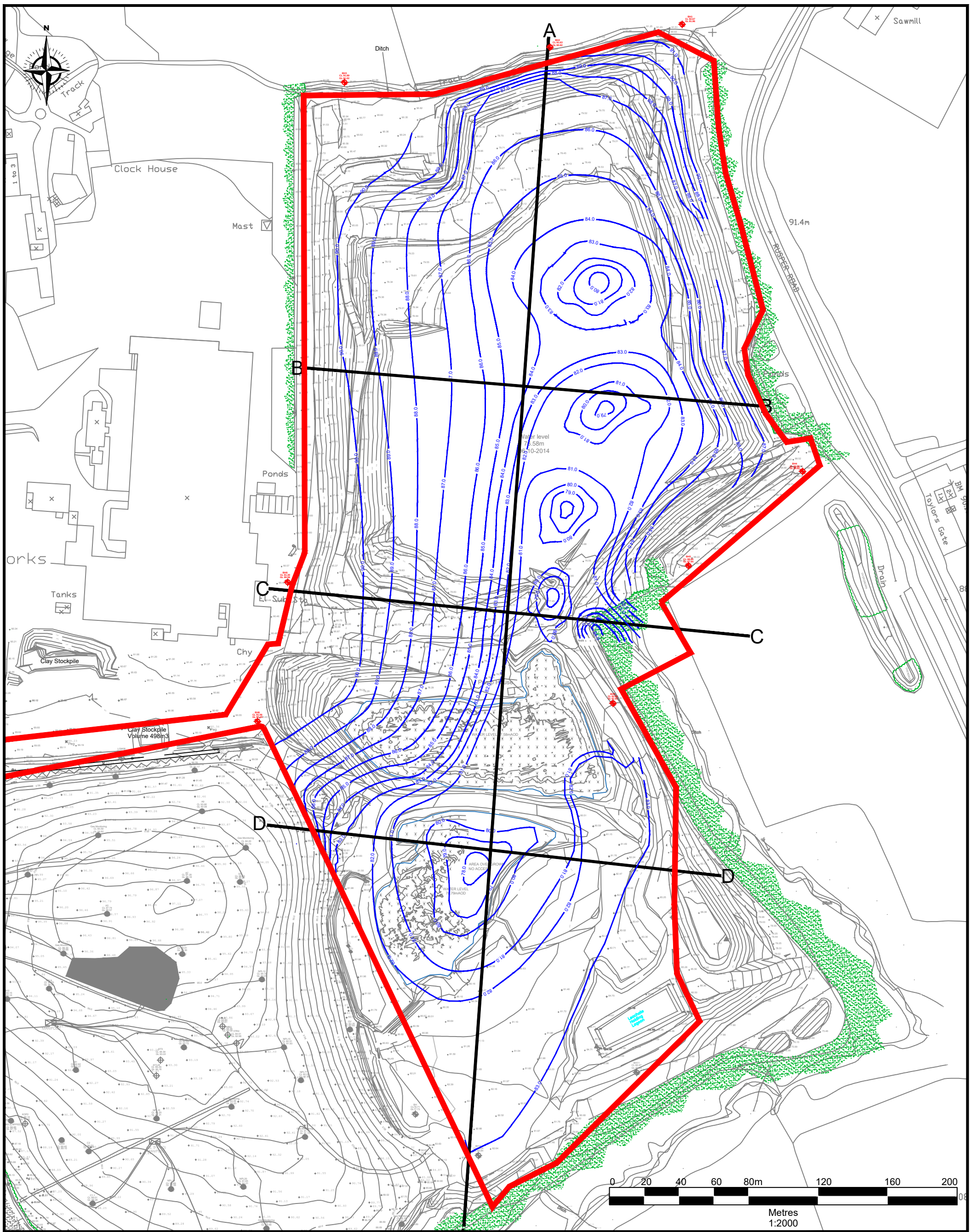
Figure Title
Environmental Permit Boundary and Site Layout Plan

Scale	SLR Project No.
1:2,500 @ A3	402.065294.00001

Designed	Drawn	Checked	Authorised
	TS	GS	MD
Date	Date	Date	Date
	Sept 2024	Sept 2024	Sept 2024

Figure Number
002

Rev.
0



Notes

1. Reproduced from the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationary Office, Crown Copyright, Licence Number 100004910.

Key:

- Application Boundary
- Proposed Infill Contours

suez

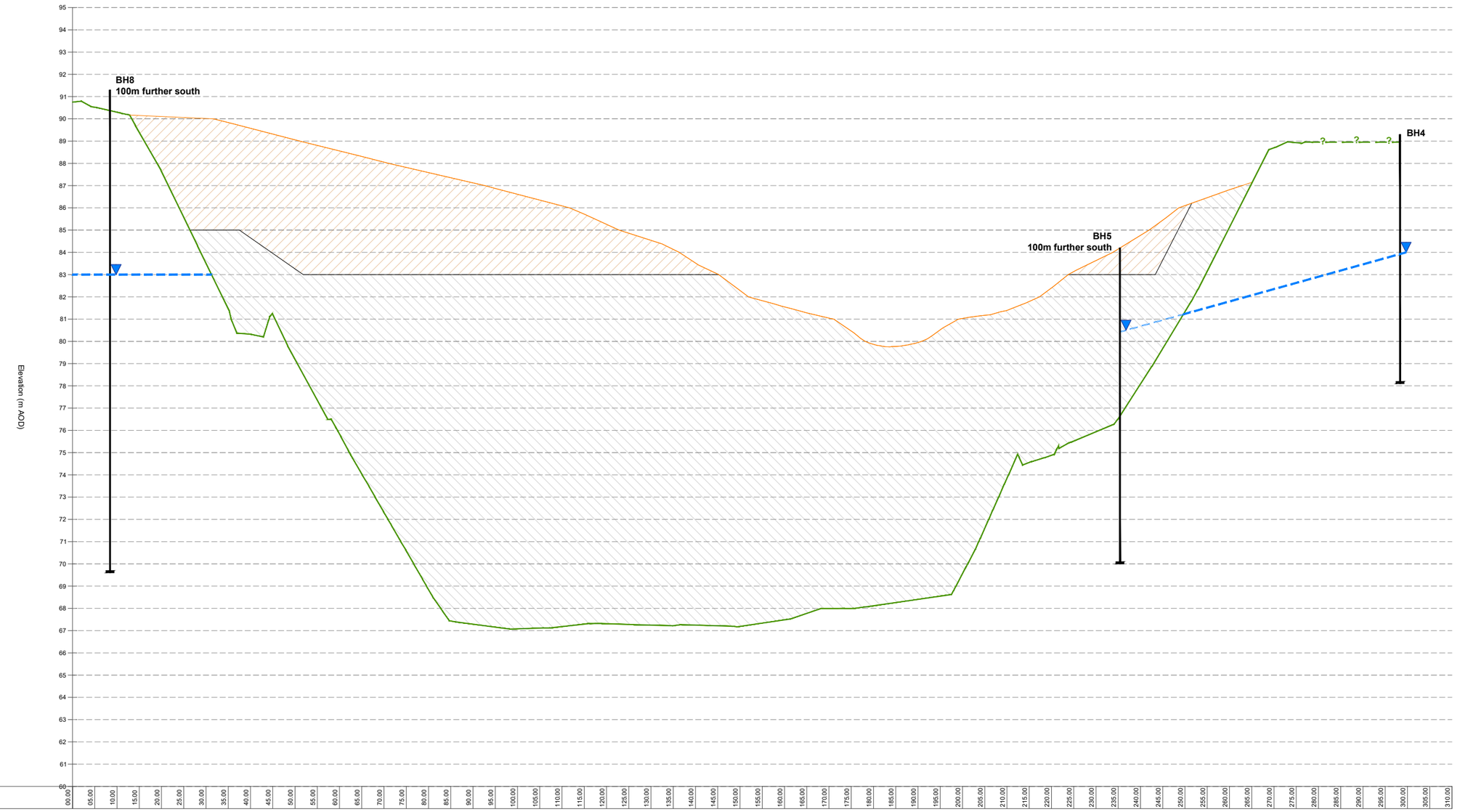
Darwen Resource Recovey Park, Lower Eccleshill Road, Darwen, BB3 0RP
Tel:(01254)819700, Fax:(01254)819749, Email: richard.bisset@suez.com

Site	Clockhouse Quarry, Capel
Title	Proposed Infill Contours
Scale	1:2000 @ A3
Date	December 2023
Drawing Ref	Clh-INF-1223-01a
Drawn by	RB
Checked by	KJ

Rev	subject	date
A	Red line added	July 2024

West

East



Section B - B'
Scale: H 1:500,V 1:100. Datum: 60.000

Notes:

1.

Legend:

- Existing Ground Levels (m AOD)
- Proposed Infill (m AOD)
- Selected Inert Waste
- Clean Inert Fill
- Estimated Rebounded Groundwater Level

Rev	Amendments	Date	By	Chk	Auth

SLR

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Drawing Purpose

Suitability Code

Client: SUEZ Recycling and Recovery UK Ltd

Project: Clockhouse Quarry Restoration HRA

Drawing Title: Hydrogeological Conceptual Model

Scale	SLR Project No.
1:500 @ A1	402.065294.00001

Designed	Drawn	Checked	Authorised
PS	TS	PS	
Date: Aug 2025	Date: Aug 2025	Date: Aug 2025	Date

Drawing Number: 003 Rev. 0

N

Permanent Water Level 82.50

Weir Crest Level 82.50

Permanent Water Level 81.50

Weir Crest Level 81.50

Permanent Water Level 80.50

Weir Crest Level 80.50

Weir Crest Level 80.25

Permanent Water Level 80.25

Weir Crest Level 80.50

Permanent Water Level 80.50

Ephemeral Pond

0 50 100 150 200 250m

Scale 1:2,500

Legend:

- Site Boundary
- Groundwater M onitoring Point
- Proposed Damp Grassland
- Proposed Pond
- Existing Contour (1m)
- Proposed Contour (1m)
- Proposed Swale - Top of Bank
- Proposed Swale - Bottom of Bank
- Weir

Rev	Amendments	Date	By	Chk	Auth

SLR

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Client: Suez

Project: Clock House Quarry Restoration 2025 Hydrogeological Risk Assessment

Figure Title: Restoration Scheme

Scale	SLR Project No.
1:2500 @ A3	402.064433.00001

Designed	Drawn	Checked	Authorised
EO	TS	EO	
Date	Date	Date	Date
Nov 2023	Nov 2023	Nov 2023	

Figure Number: **002** Rev.: **0**

14/11/2023

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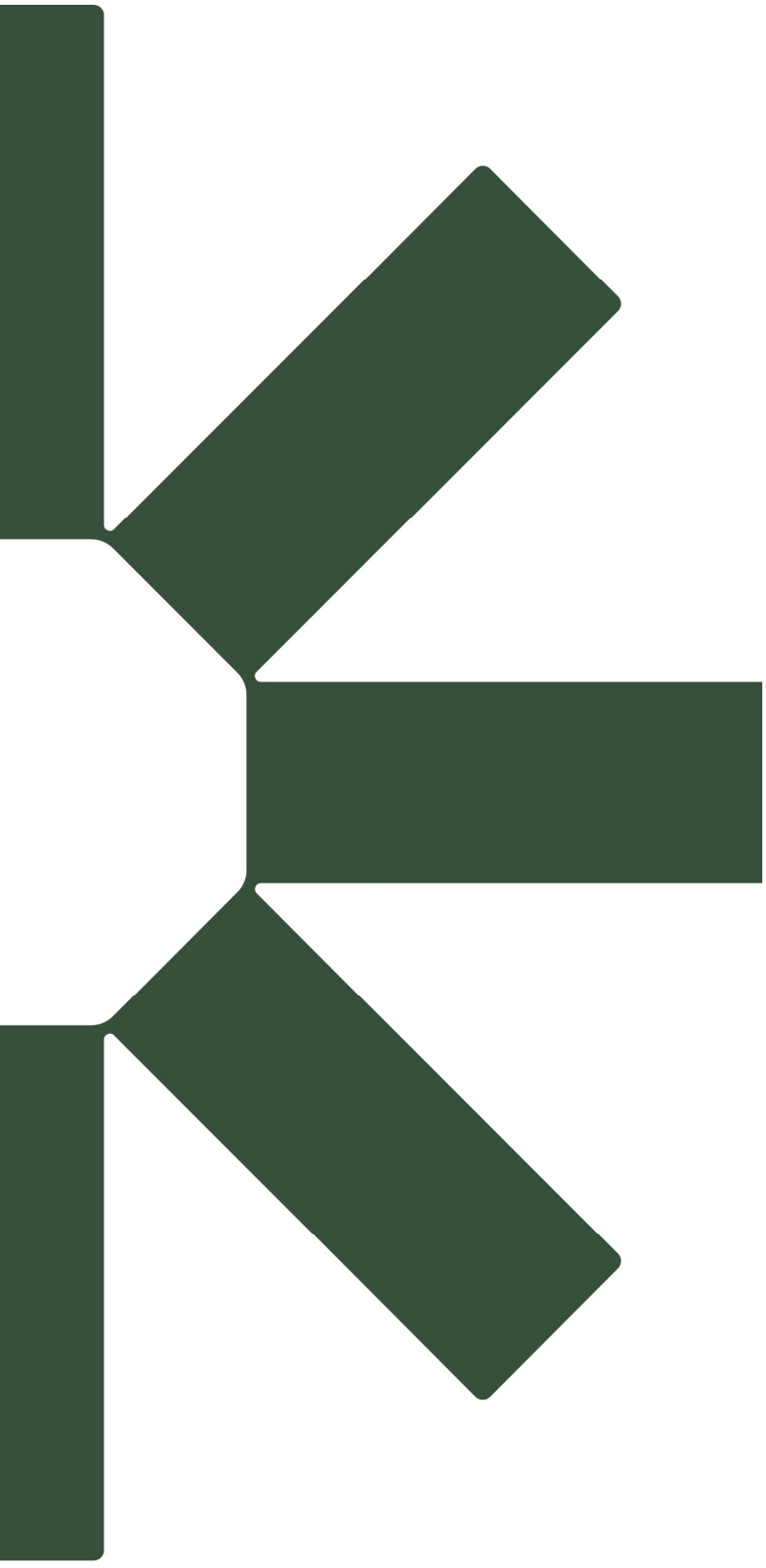

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