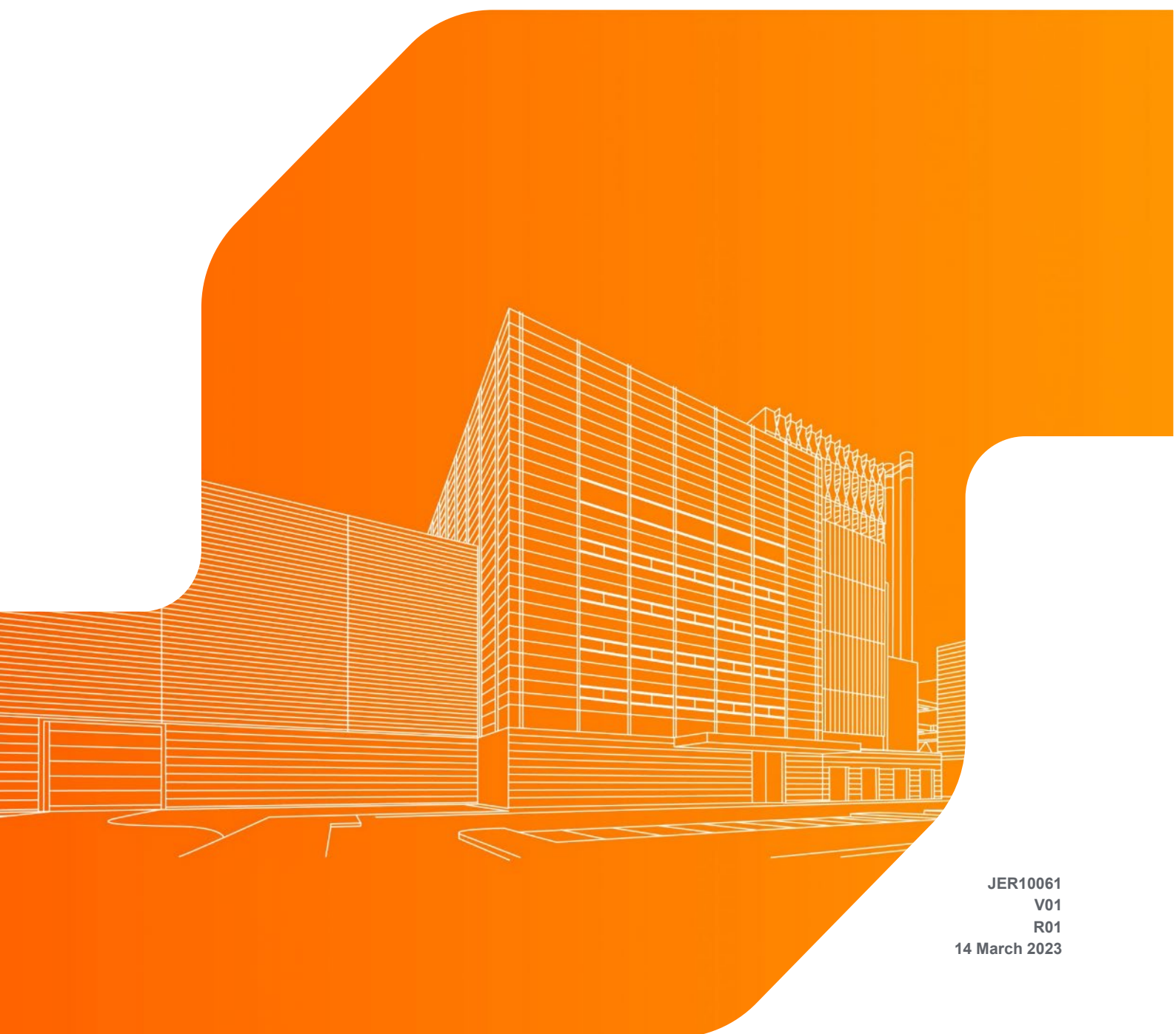


REDCAR ENERGY CENTRE

Contamination Discovery Strategy



JER10061
V01
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14 March 2023

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Approval for issue

Phil Thomas	BSc, MSc, SiLC, RoGEP	17 March 2023
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1 INTRODUCTION AND BACKGROUND

1.1 Introduction

RPS has been commissioned by Redcar Holdings Limited (herein referred to as the Client), to prepare a discovery strategy for the proposed Redcar Energy Centre (REC). The REC is to be constructed on a site located adjacent to the Teesmouth Estuary, at the northwestern extent of the Redcar Steelworks (centred on NGR 455820 E, 525980 N). The site is irregularly shaped, with an area of approximately 10.1 ha and currently comprises generally undeveloped land, with a pipeline gantry encroaching onto the site from the steelworks to the east.

The proposed development and site boundary plans is set out in Drawing 1, 19216-RPS-SI-XX-DR-A-5002. This area is herein referred to as the 'Site'.

The remainder of this section sets out the report objectives, background, and report structure.

1.2 Objectives

The discovery strategy presented herein has been developed to support the initial phase of construction works required to lawfully implement the planning consent. It is designed, when taken together with the previous assessments, to demonstrate that any unforeseen contamination can be adequately managed during the delivery of the preliminary construction works.

The works that will be undertaken to lawfully implement the consent will comprise either setting out / marking out of, or construction of part of the external hardstanding areas or construction of fence lines or signage. These works are herein referred to as the 'Initial Works'.

1.3 Background

The planning consent for the scheme includes a pre-commencement planning condition with respects to ground contamination (planning Condition 3). Planning Condition 3 requires the following:

Unless otherwise agreed by the Local Planning Authority in writing, development other than that required to be carried out as part of an approved scheme of remediation must not commence until parts (a) to (c) have been complied with. This excludes any agreed remediation / mitigation measures provided by the development itself such as surface cover systems, gas protection systems, etc. If unexpected contamination is found after development has begun, development must be halted on that part of the site affected by the unexpected contamination to the extent specified by the Local Planning Authority in writing until condition (e) has been complied with in relation to that contamination.

a. Site Characterisation

An investigation and risk assessment, in addition to any assessment provided with the planning application, must be completed in accordance with a scheme to assess the nature and extent of any contamination on the site, whether or not it originates on the site. The contents of the scheme are subject to the approval in writing of the Local Planning Authority. The investigation and risk assessment must be undertaken by competent persons and a written report of the findings must be produced. The written report is

subject to the approval in writing of the Local Planning Authority. The report of the findings must include:

- *a survey of the extent, scale and nature of contamination;*
- *an assessment of the potential risks to:*
 - *human health,*

-
- *property (existing or proposed) including buildings, crops, livestock, pets, woodland and service lines and pipes,*
 - *adjoining land,*
 - *groundwaters and surface waters,*
 - *ecological systems,*
 - *archaeological sites and ancient monuments;*
 - *an appraisal of remedial options, and proposal of the preferred option(s). This must be conducted in accordance with Environment Agency's Land Contamination Risk Management Guidance*

b. Submission of Remediation Scheme

A detailed remediation scheme to bring the site to a condition suitable for the intended use by removing unacceptable risks to human health, buildings and other property and the natural and historical environment must be prepared, and is subject to the approval in writing of the Local Planning Authority. The scheme must include all works to be undertaken, proposed remediation objectives and remediation criteria, timetable of works and site management procedures. The scheme must ensure that the site will not qualify as contaminated land under Part 2A of the Environmental Protection Act 1990 in relation to the intended use of the land after remediation.

c. Implementation of Approved Remediation Scheme

The approved remediation scheme must be carried out in accordance with its terms prior to the commencement of development other than that required to carry out remediation, unless otherwise agreed in writing by the Local Planning Authority. This excludes any agreed remediation/mitigation measures provided by the development itself such as surface cover systems, gas protection systems, etc. The Local Planning Authority must be given two weeks written notification of commencement of the remediation scheme works.

Following completion of measures identified in the approved remediation scheme, a verification report that demonstrates the effectiveness of the remediation carried out must be produced, and is subject to the approval in writing of the Local Planning Authority prior to the operation of the development.

d. Reporting of Unexpected Contamination

In the event that contamination is found at any time when carrying out the approved development that was not previously identified it must be reported in writing immediately to the Local Planning Authority. An investigation and risk assessment must be undertaken in accordance with the requirements of part (a) and where remediation is necessary a remediation scheme must be prepared in accordance with the requirements of part (b), which is subject to the approval in writing of the Local Planning Authority. Following completion of measures identified in the approved remediation scheme a verification report must be prepared, which is subject to the approval in writing of the Local Planning Authority.

RPS has previously produced a letter report¹ which sets out the available information pertaining to the ground conditions at the Site and considers if this information provides an acceptable level of confidence regarding the contamination status and the risk to receptors. The letter has concluded that, other in respects to the risk from ground gas, that there is sufficient information to confirm that the risks from contamination are sufficiently low and therefore development could proceed where it did not include enclosed structures.

In this context it is considered that the Initial Works can progress, and specifically with respects to the Initial Works, parts A and C of condition 3 can reasonable be discharged. This discovery strategy has been developed to address part D of condition 3.

¹RPS letter report titled: Redcar Energy Centre – Contaminated Land Planning Condition. Redcar and Cleveland Borough Council. (Ref: JER10061) dated 7th March 2023

1.4 Report Structure

The remainder of this report is set out as follows:

Section 2: Characterisation of Existing Contamination. This section details the existing contamination and associated visual and olfactory evidence of contamination at the site.

Section 3: Discovery Strategy. This section details the evidence that is considered to represent of discovery.

Section 4: Mitigation Measures. This section details the mitigation measures that will be implemented where contamination is discovered.

2 CHARACTERISATION OF KNOWN CONTAMINATION

A summary of the available data, potential sources, proven and nature of contamination from desk-based studies and intrusive works is summarised in the below sections.

2.1 Available Data

Historical contamination for the site has been established based upon the following data sources

- Phase 1 Preliminary Risk Assessment²
- Environmental Statement, Chapter 9³
- Phase 1: Desk Study⁴
- Contamination Assessment Report⁵

2.2 Potential Sources

2.2.1 On-Site Sources – Current

- Various sheds, cabins, containers, skip and vehicle storage presents a potential source of contamination.
- Relict infrastructure associated with the steel works such as pipelines and drainage infrastructure.
- Significant thicknesses of made ground from historical land use and earthworks/tipping of material.

2.2.2 On-Site Sources – Historical

- Tramway/railway infrastructure in the central and southern areas of the site.
- Tipping of materials during the 1950s and 1960s (recorded as a landfill for processed coke from the adjacent steelworks), likely to include process coke, ash, clinker and slag.
- Conveyors, buildings, and roadways associated with the wider steel works recorded across the Assessment Site.

2.2.3 Off-Site Sources – Current

- Adjacent steel works featuring tanks (10 m to the southeast), pipelines, conveyors etc (recently closed)

² RPS 2020: Phase 1 Preliminary Risk Assessment: Redcar Energy Centre, Redcar. Version 0, Draft. Issued 28th May 2020

³ RPS, Redcar Energy Centre Environmental Statement – Chapter 9: Geology, Hydrogeology and Contamination, July 2020

⁴ Soilmek 2021. Phase 1:Desk Study: Redcar Energy Centre – Redcar Holding Ltd. Ref: S210305, Final Dated September 2021

⁵ Soilmek 2022. Contamination Assessment Report: Redcar Energy Centre – Redcar Holding Ltd. Ref: S220335, Final Dated July 2022.

2.2.4 Off-Site Sources – Historical

- Long history of heavy industry including steel making on adjacent land.
- Large areas of tipping of waste material from the adjacent steel works site.
- Storage of process materials associated with the steelworks.
- Railways, roadways and other infrastructure associated with the steelworks.

The above sources are considered to represent potential sources of a wide range of contaminants including metals, inorganic compounds, acids, alkalis, organic solvents, PCBs, polycyclic aromatic hydrocarbons, petroleum hydrocarbons, and asbestos.

There is also potential for ground gas generating sources to be present associated with the onsite and offsite infilling of land and tipping of material from the adjacent steel works.

2.3 Visual and Olfactory Evidence of Contamination

During the Solmek ground investigation olfactory signs of contamination were noted within both the Made Ground and underlying superficial deposits, across the Site:

- A notably stronger sulphurous odour was recorded within Made Ground in TP07 @ 0 and 1.4 meters Below Ground Level (mBGL); and
- A chemical odour was recorded within superficial deposits within TP01 @ 4.9 – 5.7 mBGL and TP02 @ 5.0 – 5.4 mBGL in the south of the site.

The exploratory hole locations are presented on Drawing 2,. There was no recorded evidence of oil staining or significant visual evidence of contamination.

2.4 Elevated Contaminated Soil Concentrations

The laboratory testing undertaken generally identified low levels of contamination within Site soils, with six exceedances of the relevant GAC for a commercial end use recorded out of the 18 samples analysed. One sample recorded a sulphate concentration above the GAC for a commercial end use, with exceedances of the dibenz(a,h)anthracene GAC recorded at five locations. The recorded exceedances are listed in Table 2-1

In the absence of specific contaminative features onsite these exceedances are attributed to the infilling of land and tipping of material from the adjacent steel works shown to have occurred across the.

Table 2-1– Evidence of Contamination within Solmek Ground Investigation 2022

Exploratory Hole	Contamination of Concern	Depth (m bgl)	Stratum	Assessment Criteria – Commercial at 6% SOM (mg/kg unless otherwise stated)	Concentration (mg/kg unless otherwise stated)
TP03	Sulphate	1.80 – 1.90	Made Ground - Granular	2,000 (mg/l)	2,200 (mg/l)
TP01	Dibenzo(a,h) Anthracene	0.10 – 0.20		3.6	7.7
TP05		2.50 – 2.70		3.6	4.2
TP07		3.10 – 3.20		3.6	5.4
TP10		0.70 – 0.80		3.6	5.5
TP11		3.70 – 3.80		3.6	4.5

Two of the above exceedances (TP01 and TP07) are within the trial pits with identified olfactory evidence of contamination, albeit at different depths.

No further exceedances were identified and levels of other inorganic and organic contaminants were typically low, with the majority of contaminants having maximum concentrations at least an order of magnitude lower than the selected human health screening criteria. The exceptions to this were for arsenic, benzo(a)pyrene and benzo(b)fluoranthene, which whilst lower than the screening criteria, had maximum concentrations of the same order of magnitude as the screening criteria. Light end volatile Total Petroleum Hydrocarbons (TPH) were typically absent and on the limited number of occasions where they were identified were at least two orders of magnitude lower than the screening criteria.

3 DISCOVERY STRATEGY

On the basis of the completed ground investigation works it is considered that the following materials have been adequately assessed and characterised and do not represent discovery:

- Made Ground soils characterised as heterogenous soils of variable contents of sand, gravel and boulders composed of ash, brick, slag, concrete, with metal, glass, and plastic.
- Materials with occasional moderate odours (sulphurous).

The lines of evidence that will be considered representative of contamination to be reported under discovery are considered to be:

- Strong sulphurous odours.
- Chemical odours.
- Oil staining and / or hydrocarbon odours.
- Free oils.
- Unusual odours or colouration of materials.

Where the Primary Works include works within the areas of TP01, TP02 and TP07, then the materials previously identified as having chemical and strong sulphurous odours will be sampled and analysed.

All discovered contamination will be immediately reported to the clients retained environmental consultant and the local authority.

In the unlikely event that free product is identified during the Initial Works measures will be implemented to prevent the spread of this contamination as set out in the following section.

Where other types of contamination are identified, and they are localised, targeted source removal may be undertaken as detailed in the following section.

Where suspected Asbestos Containing Materials (ACM) are observed works will cease and a review will be undertaken to determine the licensing status of the works and establish safe working practices. .

4 MITIGATION MEASURES

4.1 Introduction

In the event that localised areas of contamination are discovered during the Initial Works, these will be reported to the local authority. These areas of contamination may be subject to further detailed assessment including risk assessment, and / or may be mitigated as set out in the following sections.

This section sets methodology for the removal of free product and the source removal and the associated verification requirements.

4.2 Removal of Free Product

In the unlikely event that free product is encountered during the Initial Works it will be remediated appropriately. Given the limited anticipated volume of contaminated groundwater the following approach is proposed:

- Creation of a sump within the effected excavation;
- Pumping of impacted groundwater from the sump to an IBC or groundwater treatment facility;
- All groundwater requiring discharge from site will be sampled and analysed to support waste sentencing. Once characterised the groundwater will be disposed of by a licensed liquid waste carrier or via discharge to foul sewer in accordance with a discharge licence obtained from the relevant water company; and
- Where volumes are very low the free product may be removed with the use of absorbent pads. Where absorbent pads are used these will be stored in appropriately sealed containers in a lockable skip. Following completion of the works the associated materials will be transported to a licensed waste management facility by a licensed haulier.

4.3 Source Removal

In the event that soil contamination exceeding the remedial criteria (See section 4.4) is identified during the Initial Works it will be remediated following the steps outlined below:

- Excavation of the contaminated areas will be undertaken in a controlled manner and supervised by an independent suitably experienced Environmental Consultant;
- Excavation will be undertaken with equipment of an appropriate scale to allow segregation of materials as they are excavated, based on visual and olfactory evidence of contamination;
- Where groundwater is identified within excavations, that is contaminated or may become contaminated through exposure to the materials being excavated, it will be controlled through the following steps:
 - Excavation will be stopped to allow the pumping of waters, and where required a sump constructed at the base of the excavation.
 - The groundwater will be pumped from the sump until all visually and olfactory contaminated groundwater is removed.
 - The groundwater will be pumped to an IBC or groundwater treatment facility;
 - All groundwater requiring discharge from Site will be sampled and analysed to support waste sentencing. Once characterised the groundwater will be disposed of by a licensed liquid waste carrier or via discharge to foul sewer in accordance with a discharge licence obtained from the relevant water company.

- Should temporarily stockpiling of contaminated materials be necessary, stockpiles will be designated via markers to show whether they are clean or dirty;
- Stockpiles of contaminated material will be stored such that cross-contamination from dust dispersal, run-off from rainfall and contamination of underlying clean soils is prevented. As a minimum material will be stockpiled in a bunded hardstanding or plastic sheeted area and be covered by plastic sheeting;
- A schedule of stockpiles and material movements will be maintained;
- Once all unacceptable contaminated material is considered to have been removed, the excavation will be halted and made safe for validation;
- Inspection will be made by the appointed Environmental Consultant to check that visual / olfactory evidence of contamination has been removed;
- Validation samples will be taken from the base and faces of the excavation in accordance with the frequencies set out in Table 4-2. The validation samples will be analysed for criteria range of contaminant consistent with the observed visual and olfactory evidence of contamination (the 'Contaminant of Concern') at an MCERTS accredited laboratory. All excavations will be made safe if required to remain open for extended periods of time;
- Where validation sampling confirms that the remaining material does not contain contaminant concentrations above the remediation criteria for the Contaminant of Concern (CoC), excavation will cease. If following validation sampling contaminant concentrations within the remaining material exceed the remediation criteria for the CoC, excavation will continue in accordance with the procedures outlined above;
- The use of any backfill materials will be agreed with the attending Environmental Consultant prior to use;
- Where materials are disposed of off-site to a licensed waste management facility, a schedule of information will be provided by the Contractor, which will include waste transfer ticket number, vehicle registration, landfill and weight recorded by the weighbridge at the landfill; and
- All materials will be appropriately characterised prior to disposal.

4.4 Human Health Remedial Criteria

The quantitative remedial criteria have been selected to be protective of human health in the context of the proposed Initial Works. The appropriate remedial criteria are set out in Table 4-1.

Table 4-1: Remedial Criteria for Areas Beneath Hardstanding

Contaminant	Remedial Criteria (mg/kg)
Benzene	27
Toluene	56,000
Ethylbenzene	5,700
Total Xylenes	5,900
Aromatic >EC8-EC10	3,500
Aromatic >EC10-EC12	16,000
Aromatic >EC12-EC16	36,000
Aliphatics >C8-C10	2,000
Aliphatics >C10-C12	9,700
Aliphatics >C12-C16	59,000
Naphthalene	190

4.5 Controlled Water Remedial Criteria

With respects to protection of controlled waters it is considered that the removal of any observable free phase oils (free product) will be sufficient mitigation.

4.6 Validation Requirements

Where remedial works are undertaken, they will be validated as set out within Table 4-2.

Table 4-2: Verification Testing Regime

Remediation Option	Validation Testing Regime	Frequency
Source Removal	The samples will be analysed for the Contaminant of Concern (verification samples shall not have contaminant concentrations exceeding the remedial criteria shown in Table 4-1)	One sample per 10 m linear intervals from each excavation side and base (minimum of 5 no. per excavation pit);
Site Won Backfill to Source removal Voids	Chemical characterisation of imported material. Contaminant concentrations will not exceed the remedial criteria shown in Table 4-1	One sample per 50 m ³ of site won material.
Pump & Dispose (if required)– organically contaminated groundwater	Suite of analyses required by party accepting waste.	One sample per area dewatered

4.7 Verification Documentation

Introduction

A Remediation Verification Plan is set out in this section to demonstrate (verify) that any discovered contamination has been appropriately remediated. This document is only required where contamination is discovered during the Initial Works.

Remediation Contractor Documentation

All remedial works will be carefully documented by the Contractor to enable a Remediation Verification Report to be produced by the appointed Environmental Consultant. The documentation to be provided by the Contractor will include, but will not be limited to, the following:

- Plans and records detailing the extent (depth and lateral extent) of excavations undertaken;
- Records of volumes of materials excavated;
- Inspection records confirming that all visual evidence of contamination has been removed;
- Records of volumes of contaminated groundwater removed (where applicable) for treatment / disposal;
- Plans detailing the destination of the excavated soil within the treatment stockpiles and plans detailing the dimensions and nature of the treatment stockpiles;
- Sample records detailing the location and composition of every sample collected by the Contractor with the results of site inspections and verification testing;
- Sample chemical analysis results from remedial excavations; and

-
- Records of any soil / groundwater disposed of off-site, detailing waste transfer ticket number, vehicle registration, waste disposal address and volume and weight of material disposed of.

4.8 Remedial Verification Report

Following completion of the remedial works, a verification report will be prepared to provide details of the remedial works that have been undertaken. In particular the report will include the following details to provide lines of evidence that the remedial measures outlined within this document and agreed with the Council have been successfully implemented:

- Plans detailing the extent of remedial source removal works;
- Laboratory records demonstrating the soil quality of any residual materials;
- Waste disposal records (both soil and groundwater) including the provision of waste transfer notes;
- Plans / laboratory analysis / photographs of areas of source removal and free product removal
- Records of the removal and disposal of soils or free product e.g. waste transfer notes / hazardous waste consignment notes; and
- Records of any backfill materials used.

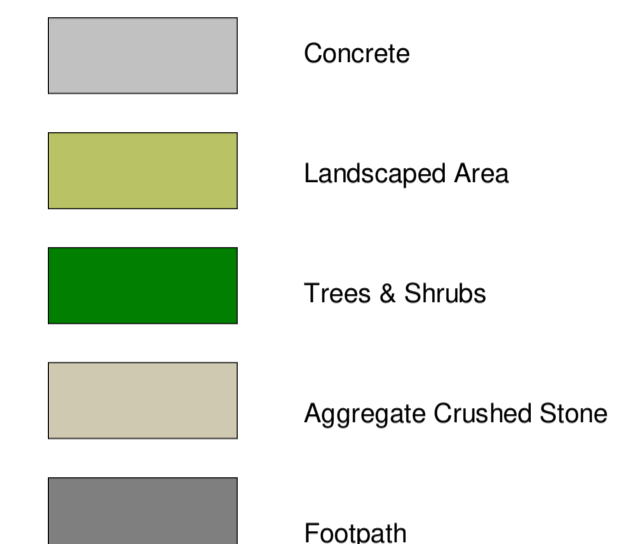


DRAWINGS

Drawing 1 19216-RPS-SI-XX-DR-A-5002

Drawing 2 Exploratory Hole Location Plan

- Key



P05	Landscape amended to north boundary, additional notes added	ET	ET	21/07/2020
P04	IBA Layout amended	ET	TFH	12/06/2020
P03	REC & MRF positions amended, attenuation added	ET	TFH	14/02/2020
P02	66 kV Substation added, site area amended	ET	TFH	19/06/19
P01	Initial Issue	ET	TFH	26/04/19
Rev	Description	By	Ckd	Date



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Project Redcar Energy Centre

Title **Proposed Site Plan**

Status	Scale @ A1	Date Created
Preliminary	1 : 1000	18/04/19

Task Team Manager	Information Author	Task Information Manager
TFH	ET	TFH

Document Number
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rpsgroup.com		

Proposed Site Plan

1 : 1000





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Figure Title

Exploratory Hole Location Plan

Project Number

S220535

Project Name

Redcar Bulk Terminal

Client

Redcar Bulk Terminal

Date

July 2022



DRG Number

Figure 2

Scale

1:3000 @ A4 [DO NOT SCALE]

Legend Key

-  Locations By Type - TP
-  Project Bounds - Project Bounds

REDCAR ENERGY CENTRE

Contamination Discovery Strategy

2023-03-14

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V01

R01

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