

Acid Sulfate Soil Management Plan

Stage 2-4 Bulk Earth Works Development
Application

Former Corrimal Coke Works
27 Railway Street, Corrimal NSW 2518

Project No. 22158
Version 2

26 September 2025

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DOCUMENT CONTROL

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Executive Summary

This Acid Sulfate Soil Management Plan (ASSMP) has been prepared by Reditus Consulting Pty Ltd to accompany a State Significant Development Application (SSDA) which seeks development consent for the construction of four (4) residential flat buildings, providing a total of 206 x residential apartments (including 57 affordable housing apartments).

The SSDA is referred to as the Stage 2a Built Form SSDA (SSD-83789711).

The Stage 2a Built Form SSDA implements the second built form stage of the urban renewal of the former Corrimal Coke Works site. The project will deliver vibrant and contemporary residential-led urban renewal, which celebrates the site's industrial history and leverages its highly accessible and strategic location in proximity to Corrimal town centre and local amenities and services. The proposal will deliver high amenity residential dwellings of various sizes and typologies, including a dedicated affordable housing building.

The Stage 2a Built Form SSDA is submitted concurrently with a separate (but interrelated) Stage 2-4 civil works SSDA (SSD-86131212), which comprises the construction of the Central Park, the Southern Park, and roads, drainage and stormwater infrastructure, and paper subdivision.

This ASSMP has been prepared to address the requirements of *SEAR 12. Ground and Groundwater Conditions*.

This Stage 2a Built Form SSDA was declared as State Significant Development (SSD) in the State Significant Development Declaration Ministerial Order (No 10) 2025 (dated 30 June 2025) at Clause 5(1)(n) in Schedule 1 (Amendment SSD Declaration Order 2025 (No 5)).



1 Introduction

Reditus Consulting Pty Ltd (Reditus) was engaged by LegPro 70 Pty Ltd ATF LegPro 70 Unit Trust (the client, herein referred to as 'Legacy') to prepare an Acid Sulfate Soil Management Plan (ASSMP) for the former Illawarra Coke Company Coke Works site at 27 Railway Street, Corrimal NSW 2518 (herein referred to as 'the Site'). The site location is shown on **Figure 1, Appendix A** and the site layout is shown on **Figure 2, Appendix A**.

Reditus notes that this report, including its conclusions and recommendations, must be read in conjunction with the Statement of Limitations provided in **Section 7**.

Under State Environmental Planning Policy (Planning Systems) 2021, the site development constitutes state significant development (SSD). This report has been prepared to inform the SSD application by addressing the Planning Secretary's Environmental Assessment Requirements (SEAR) dated 12 May 2025 for ground and groundwater conditions.

1.1 Background

The Site was formerly a Metallurgical Coke Works with an operational lifespan of approximately 100 years and was decommissioned in 2014.

The site is proposed to be redeveloped into a mixed-use commercial/residential precinct inclusive of roadways, basement carparking (residential buildings), street scape heritage areas and open space zones. The construction phase of the redevelopment is proposed to occur in stages with multiple Development Applications planned to facilitate the process.

The Stage 2-4 development footprint is partially located within a Class 5 Acid Sulfate Soil Area. Acid sulfate soils are not typically found in Class 5 areas and are areas within 500 metres of adjacent class 1,2,3 or 4 land. An initial acid sulfate soil (ASS) assessment was prepared by Reditus in September 2020 (ASS Assessment, Reditus 2020) as part of a Data Gap Investigation prepared for the Site and included an investigation into the presence/absence of ASS and/or Potentially Acid Sulfate Soils (PASS). Based on the results of the investigation, some natural soils between a depth of 2 and 7 metre below ground level were flagged as possible PASS, there was doubt however over whether the minor quantum of net acid was from coastal quaternary aged ASS deposits or a low risk feature of the late Permian aged bedrock. Reditus subsequently recommended an ASSMP be prepared for the proposed development to manage the potential risk and outline further assessment of material suspected of being ASS or PASS. The previous version 1 of the ASSMP was prepared by Reditus in September 2023 (Reditus 2023) and was submitted as part of former development applications to Wollongong City Council (WCC).

In accordance with the previous ASSMP (Reditus 2023), further investigation was completed as part of an ASS assessment prepared by Reditus in September 2025 (Reditus 2025b) as part of further Data Gap Investigation works in Stage 2-4 Redevelopment Site. The ASS Assessment (Reditus 2025b) assessed the presence of PASS and AASS across the site including within and adjacent to the proposed new creek alignment at the site. The field and analytical results of the ASS assessment (Reditus 2025b) did not identify indicators of Actual ASS at the site, and the sulfur trail was not indicative of coast deposits containing reduced inorganic sulfur (RIS) and/or PASS requiring management. The report (Reditus 2025b) therefore concluded that the soils proposed for excavation as part of the proposed development were not considered to present an unacceptable ASS risk. Reditus recommended the existing ASSMP (Reditus 2023) be revised to provide contingency measures and unexpected finds protocols, should potential indicators of ASS be encountered during future BEW at the site.

Since the initial ASS assessment completed in 2020 (Reditus 2020) that provided doubt around the actual presence of any coastal ASS deposits, additional extensive soil and groundwater assessment has since been conducted at the site. These works are detailed in a Consolidated DSI report (Reditus 2022) and Stage 2-4 BEW Preliminary Data Gap Assessment and Site Validation Report (Reditus 2025), including analytical assessment, desktop assessment and field observations of the onsite geology, hydrogeology and geomorphic properties. The conclusions and recommendations of the additional and most up to date site information detailed in the 2025 ASS Assessment (Reditus 2025b) have been used to develop this ASSMP.



1.2 Addressing the SEAR

To proceed with the SSD submission, compliance with the Planning Secretary's Environmental Assessment Requirements (SEAR) is required. Specifically, *Section 12 – Ground and Groundwater Conditions* notes that an ASSMP must be provided. The SEARs were issued on 12 May 2025. These set out the environmental assessment requirements for the project. **Table 1** describes how the requirements under the SEAR has been adequately addressed through the publication of this report.

Table 1. SEAR Requirement Applicable to this Report.

ISSUE AND ASSESSMENT REQUIREMENTS	SUPPORTING DOCUMENTATION	REDITUS COMMENT
<p>13. Ground and Groundwater Conditions</p> <p>Where required provide a Groundwater Impact Assessment in accordance with relevant Groundwater Guidelines. If the proposed development is on land identified as having high salinity or acid sulfate soil potential in an EPI provide a Salinity Management Plan or Acid Sulfate Soil Management Plan that includes appropriate management measures and strategies.</p>	<p>Acid Sulfate Soils Management Plan</p>	<p>Historical investigations have identified that the site may have ASS or PASS potential. This document meets the requirements of an ASSMP in accordance with relevant guidelines and legislation (as listed in Section 8) for consultants reporting on contaminated land.</p>

Note: this report is to address the requirement of an Acid Sulfate Soil Management Plan (ASSMP).

The below signatories confirm this ASSMP addresses the requirement of the relevant SEAR for the site and relevant state and local legislation, policies, and guidelines including those listed in Section 8. I further confirm that to the extent of my knowledge and understanding none of the information contained in the ASSMP is false or misleading.

Brooke Kelly

Environmental Scientist

Mathew Burcher

Associate Environmental Scientist

CEnvP – General





1.3 Objective

The ASSMP is intended to document previous ASS results for the site and provide guidance in the event that ASS are identified during future BEW and development works at the site.

1.4 Scope of Works

To achieve the objectives outlined above, Reditus completed the following:

- Review of the subsurface conditions identified during the previous ASS assessments of the Site completed by Reditus as part of the additional works as part of a Data Gap Investigation.
- Preparation of this ASSMP in general accordance NSW Acid Sulfate Soil Management Advisory Committee (ASSMAC) Acid Sulfate Soil Manual 1998 and the Australian Governments Department of Agriculture and Water Resources National Acid Sulfate Soils Guidance 2018.

2 Site Identification

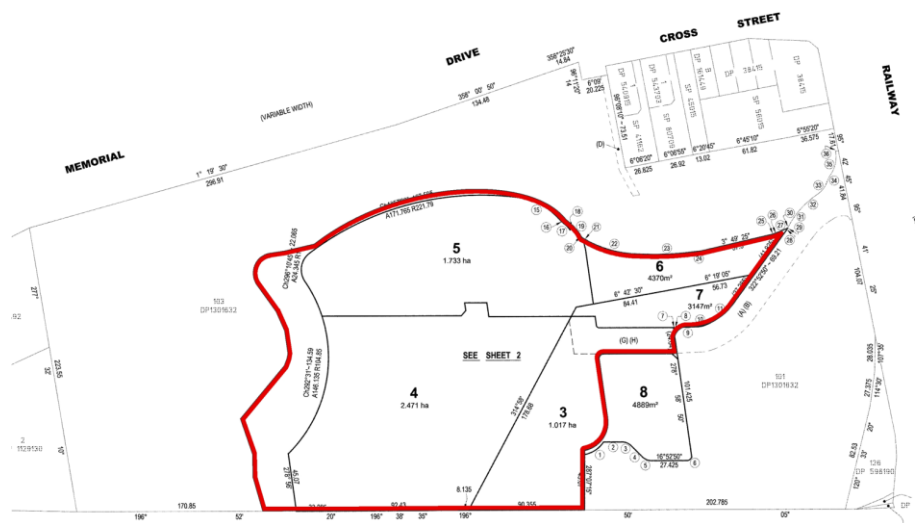
The site identification information has been summarised in **Table 2-1** below.

Table 2. Site Identification.

DESCRIPTOR	SITE DETAILS
Proponent / Applicant	Legpro 70 Pty Ltd ATF Legpro 70 Unit Trust (Legacy)
Site Ownership	Illawarra Coke Company
SSD Reference	SSD-86131212 [SEARs issued 3 July 2025]
Project Name	Corrimal Coke Works - Stage 2-4 Early Stage (Civil) Works
Street Address	Corrimal Coke Works, 27 Railway Street, Corrimal
Country	Dharawal Country
Project Description	<p>The civil works SSDA seeks development consent for the following works:</p> <ul style="list-style-type: none"> • Torrens subdivision to create nine (9) new title lots (referred to as Lot 200, Lot 201, Lot 202, Lot 203, Lot 204, Lot 300, Lot 301, Lot 302, and Lot 303 in DP1313981). • Detailed civil works associated with the construction of local roads and drainage works relevant to future Stages 2-4. [Note. The detailed civil works will be enabled by the outcomes of the approved Stages 2 - 4 Bulk Earthworks DA (which includes vegetation management and creek alignment / embellishment works) (reference: DA-2023/823)]. • Construction of the Central Park (including embellishment works, lawn areas, landscaping, tree planting, equipment, and services). • Construction of the Southern Park (including embellishment works, lawn areas, landscaping, tree planting, equipment, and services). • Public domain works (landscaping, street tree planting, paving). • Reticulation of site services and infrastructure (electricity, telecommunication, water, and sewer).
Existing Legal Description	<p>The existing legal property description of the former Corrimal Coke Works site is Lot 101 DP1301632, Lot 201 DP1308649, Lot 202 DP1308649, and Lot 103 DP1301632 (registered titles). The former Corrimal Coke Works site boundary extent is identified in blue below.</p> <p>The proposed works associated with the civil works SSDA extend across Lot 201 DP1308649 (part), Lot 202 DP1308649, and Lot 103 DP1301632 (part).</p> <p>The land to which the civil works SSDA relates is identified in red below.</p>



Note. In September 2025, Wollongong City Council approved a development application for the paper subdivision of the former Corrimal Coke Works site to create eight (8) new Torrens Title lots (DA-2025/388). The new lots are described as Lot 1 – Lot 8 in DP1313981. The new lots have not yet been registered with the NSW Land Registry Services. However, it is anticipated that formal registration will occur prior to the determination of the subject civil works SSDA. **For information only**, the below identifies in **red** the land to which the civil works SSDA will relate at the point the newly created lots (approved by DA-2025/388) are formally registered.



Site Area

The area of the land to which the Stage 2-4 Civil Works SSDA relates is 66,226 sqm. This land is identified in the image above in **red**.

More broadly, the area of the Corrimal Coke Works site is 18.2 hectares.

Existing Development

Existing features across the Corrimal Coke Works site are as follow:

- Structures and infrastructure associated with the former coke work use have been removed and demolished under the Demolition DA (DA-2022/1249).
- Towradgi Creek forms the southern boundary of the site and drains in a west to east direction. A tributary of the Creek traverses the site. The western portion of the site is occupied by scattered bush and stockpiling areas.



Heritage

The site, in part, is subject to the following heritage listings:

- Local heritage listing in the Wollongong LEP 2009 (ID 6607); and
- State heritage listing on the State Heritage Register in the NSW Heritage Act 1977 ('Corrimal Coke Works Site', Item No. 02061).

Local Context

The site has an irregular rectangular configuration and is bounded by:

- East boundary: main southern railway line (Corrimal Train Station)
- West boundary: dual carriageway (Memorial Drive)
- North boundary: Railway Street
- South boundary: Towradgi Creek

Regional Context

The site is approximately 1km to the east of the Corrimal Town Centre.

Corrimal is approximately 6.5 kilometres north of Wollongong City Centre.

The site is located within close proximity to education and recreation facilities, including the Corrimal High School, Corrimal East Public School, Robert Ziems Park, Corrimal Memorial Park, Towradgi Beach Park, and Bowls and Recreation Club.



3 Previous Investigations

There have been numerous environmental investigations conducted by various consultants both during and following decommissioning. The most recent set of investigations have been completed by Arcadis Australia Pacific and Reditus. A summary of the investigation findings is provided in the Reditus Consolidated DSI (Reditus 2022). The Consolidated DSI (Reditus 2022) provided a single document of reference summarising numerous historical investigations completed over the years. The most relevant previous investigation to the characterisation of ASS at the site is the following:

- ASS Assessment prepared by Reditus dated 23 September 2025 (Reditus 2025b).

Further to the Reditus investigation (Reditus 2025b), assessment by the site's geotechnical engineer have also included information relating to ASS.

A summary of the Reditus and Other Consultants' reports are provided in the following sections.

3.1 Reditus (2020) Data Gap Investigation

An ASS assessment was completed by Reditus as part of the Data Gap Investigation (Reditus 2020) to determine whether PASS and/or ASS were present on the Site which may require management as part of the proposed development. The ASS assessment is summarised as follows:

- Based on field screening results, a total of 38 soil samples were selected for laboratory analysis of Chromium Reducible Sulfur to assess the presence/absence of ASS/PASS.
- Four (4) soil samples (ASS1-2.0m, ASS2-4.5m, ASS7-7.0m and ASS10-7.0m) reported reducible inorganic sulfur (RIS) content of $\geq 0.01\%S$ as well as a Net acidity (as equivalent Sulfur, SPOS, and equivalent acidity, TPA/TSA) at concentrations marginally exceeding the adopted action criteria.
- There were no indications of actual acid sulfate soils, and the exceedances of the action criteria are considered to be PASS only, however they were collected from materials that could be described as late Permian in origin and therefore not consistent with Coastal ASS deposits.
- The positive PASS results ranged between a depth of 2 and 7 metres below ground level and were identified within the areas of the Site proposed to be cut to form the new creek alignment.
- PASS appeared to be limited to the northern and southern extents of the creek realignment and were associated with a grey colourisation of the weathered silt/sandstone formation consistent with Permian aged bedrock. Vertical characterisation indicates the majority of the soils to be disturbed are not ASS or PASS. These results are consistent with the ASS mapping which place the site on the edge of a Class 3 ASS zone.
- Although the analytical results are only marginally greater than the action criteria and given the distinct lack of evidence of the presence of reduced inorganic sulfur (RIS), the net acid trail may not be caused through the oxidation of sulphides and therefore may not strictly be classified as PASS or ASS. Further detailed assessment would be required to confirm or otherwise the likely source of the acid trail and determine the requirements, if any, for management during redevelopment works
- Whilst the majority of excavation and soil disturbance depths are unlikely to disturb significant volumes of PASS, there is potential that localised portions of the deeper excavations may extend into or below the PASS layers, particularly within the areas of new creek alignment.
- The following approach to the management of PASS was recommended to be included as a condition of consent:
 - A detailed review of the civil earthworks design to confirm if the soils identified as PASS will be disturbed and therefore require further assessment and/ or management. Noting except for one location the PASS was identified at depths greater than 4.0m below ground level (mBGL) within siltstone materials.
 - If the proposed earthworks will disturb PASS soils, given the exceedances of the action criteria were only marginal and there were no obvious signs of reducible inorganic sulfur, further targeted soil characterisation should be considered. The purpose of the additional characterisation would be to better understand the origins of the potential acidity. This may include soil incubation tests to corroborate the Acid Neutralising



Capacity of the material and mineral characterisation to confirm or otherwise if the source of the acid trail is from oxidised sulphides.

- Preparation of an ASS Management Plan (ASSMP, this report). The ASSMP should include details of the additional soil assessment works and outline the management procedures required to be followed during earthworks that may disturb PASS or ASS materials, as well as address long term management plans for ongoing risks such as fluctuating water tables.
- The ASSMP and additional testing should also account for the proposed CWR blending process, noting that any PASS may be blended with CWR on a 50/50 weight for weight basis this may have the effect of buffering or diluting the PASS.

3.2 Other Consultants' Reporting (2023)

Recent geotechnical investigations completed by other consultants included sampling and analysis for ASS. The below summarises the scope of work and findings of the investigations relevant to this ASSMP. The results of the ASS testing completed by the other consultants is provided as **Appendix B** and sample locations are presented in **Figure 5, Appendix A**.

- A total of twenty-eight (28) test pits were advanced to depths of 0.7-3.5 mbgl using a mechanical excavator in March 2023.
- Thirty-one (31) samples were collected and measured for pH in water (pH_F) and pH after oxidation (pH_{FOX}) using a calibrated pH meter. Inconclusive results (e.g. $pH_F < 5$, lowering of pH by at least one pH unit after peroxide oxidation or $pH_{FOX} < 4$) were observed in ten (10) of the thirty-one (31) samples tested.
- Twelve (12) select soil samples were subsequently assessed for Net Acidity testing by a National Association of Testing Authorities (NATA) accredited laboratory. The results indicated Net Acidity (as % sulfur (S)) values in the range of 0.027 – 0.35 %S. Ten (10) samples reported %S above the adopted action criteria of 0.03 %S for "greater than 1,000 tonnes of soil disturbed" and seven (7) samples reported %S above the adopted action criteria of 0.1 %S for "1 to 1,000 tonnes of disturbed soil".
- Chromium reducible sulfur (CRS) results were reported in the range of <0.005 – 0.030 %S which is consistent with the Reditus investigation (Reditus 2020) that reported relatively low concentrations of RIS.
- The consultant concluded that based on the results of previous investigations and the current investigation, laboratory testing indicates the presence of PASS within the natural alluvial soils underlying the site, consistent with the broad-scale mapping. Further noting that residual soils (i.e. extremely weathered rock) derived from the weathering of the underlying bedrock and carbonaceous-rich fill is inconsistent with the formation of ASS and do not require lime neutralisation.
- Further to the above investigation, a supplementary investigation was completed concurrently and comprised drilling of geotechnical boreholes and soil sampling using a drilling rig to depths of between 6 to 13.5 mbgl. Samples of alluvial clays from a single borehole (bore 512) were assessed for ASS using pH_F and pH_{FOX} testing which did not report pH changes that would indicate the presence of potential ASS.

Reditus note that results of the March 2023 investigation reported CRS results to be below the *Water Quality Australia – National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual (June 2018)* (NASS 2018) action criteria of ≥ 0.01 %CRS (i.e. RIS content) in majority of samples analysed with exception to the following:

- Bore 304 at 2.5 m depth – 0.01 %CRS.
- Bore 413 at 1.0-1.1 m depth - 0.03 %CRS.
- Bore 415 at 2.0-2.1 m depth – 0.01 %CRS.
- Bore 416 at 1.0-1.1 m depth – 0.01 %CRS.
- Bore 421 at 1.0-1.1 m depth – 0.02 %CRS.

CRS analysis is an indicator of potential for oxidation of RIS or RIS constituents in soil. ASS are distinguished from other soil or sediment materials by having properties or behaviour that have been affected considerably by the oxidation of RIS or have the capacity to be affected by the oxidation of their RIS constituents.



The results of the March 2023 ASS investigation identified net acidity (as %S) exceeding the ASSMAC (1998) action criteria for >1,000 tonnes disturbed in seven (7) samples analysed, thus triggering the need to prepare this ASSMP. However, as outlined in the NASS (2018) guidance, it is important to note the acidity hazard of soil materials that are strongly acidic due to processes other than RIS oxidation, are not considered an ASS acidity hazard. Actual ASS are acid soil materials, but not all acid soil materials are Actual ASS. Naturally occurring acidic soils are not uncommon and are not considered an environmental hazard that require management to change their acidity.

Therefore, based on the NASS (2018) guidance, PASS material requiring management and treatment, should they be disturbed, were identified in samples from Bore 304 (2.5m), Bore 413 (1-1.1m), Bore 415 (2-2.1m), Bore 416 (1-1.1m) and Bore 421 (1-1.1) only during the March 2013 investigation.

Sample locations from the Reditus (2020) and other consultants (2023) investigation in which net acidity (as %S) and/or CRS was reported exceeding the ASSMAC (1998) action criteria (requiring management) or the NASS (2018) action criteria (requiring management and treatment) are presented on **Figure 5, Appendix A**.

While the initial ASS assessment completed in 2020 (Reditus 2020) identified PASS onsite at four samples, extensive soil and groundwater assessment has since been conducted at the site, as detailed in the Consolidated DSI (Reditus 2022) and Stage 2-4 BEW Preliminary Data Gap Assessment and Site Validation Report (Reditus 2025a), including analytical assessment, desktop assessment and field observations of the onsite geology, hydrogeology and geomorphic properties. Therefore, the conclusions and recommendations of the 2025 ASS Assessment (Reditus 2025b) have been applied to the site and this ASSMP.

3.3 Reditus (2025b) ASS Assessment

An ASS assessment was completed by Reditus as part of the Data Gap Investigation (September 2025) to determine whether PASS and/or ASS were present at the Stage 2-4 Redevelopment Site which may require management as part of the proposed development. The ASS assessment is summarised as follows:

- Eleven test pits were advanced within the proposed new creek alignment. Test pits were advanced to the depth in which bedrock was encountered or prior refusal. Samples were collected from each of the test pits at every 0.5 m and/or based on visual indicators of potential ASS and submitted to a NATA accredited laboratory. All samples were analysed for p_HF and p_HFOX. Selected samples were analysed for Chromium Reducible Sulfur suite.
- The field and analytical results of the ASS assessment did not identify indicators of AASS at the site for the soil sampling locations assessed to date.
- The sulfur trail was not indicative of RIS and PASS requiring management. Therefore, **the soils proposed for excavation as part of the proposed development were not considered to present an unacceptable ASS risk that required management or treatment.**
- As a precaution due to the extensive earthworks proposed at the site Reditus recommended the existing ASSMP should be revised to provide contingency measures and unexpected finds protocols should potential indicators of ASS be encountered during future BEW at the site.

4 Site Condition and Surrounding Environment

The site condition and surrounding environment detailed in this Section has been updated based on recent environmental investigations conducted at the Site.

4.1 Regional Geology and Acid Sulfate Soil Risk Mapping

According to the Wollongong-Port Hacking Geological Series Sheet 9029-9129 (Edition 1, 1985), the Site is underlain by quartz and lithic “fluvial” sand, silt and clay.

The NSW Department of Planning, Industry & Environment ‘eSPADE’ NSW Soil and Land Information portal maps the Site as within the Gwynneville (9029gw) soil landscape, which is characterised by undulating to steep hills underlain by Illawarra Coal Measures, resistant interbedded quartz lithic sandstone, grey siltstone and claystone, carbonaceous claystone, clay and laminite.

A review of the NSW Government Department of Planning, Industry and Environment Acid Sulfate Soils Risk mapping tool indicates that the Site is located within a terrestrial deposit area of ‘LAp2 – Alluvial process, elevation 2-4 mAHD’ with a ‘Low probability of occurrence’ for ASS.

A review of the Wollongong City Council LEP 2009 Acid Sulfate Soil maps indicates that the Site is situated primarily (approximately 97% of total area) within a Class 5 acid sulfate category. Approximately 3% of the Site is situated within an area of Class 3 acid sulfate soils, corresponding to a sliver of land centred on a non-perennial watercourse close to the southern site boundary.

The Wollongong Local Environmental Plan (2009) defines Class 3 and Class 5 ASS as follows:

- Class 3 ASS:
 - Development consent is required for the carrying out of works more than 1 metre below the natural ground surface and works by which the water table is likely to be lowered more than 1 metre below the natural ground surface.
- Class 5 ASS:
 - Development consent is required for the carrying out of works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.

ASS mapping is shown on **Figure 4, Appendix A**.

4.2 Environmental Setting

The environmental setting of the site is described as follows:

- North Corrimal Creek flows generally north to south through the middle of the site which collects in two dams created on-site to capture the water for quenching the coke during production and dust suppression.
- The site is generally flat to gently undulating. There is a general incline south towards Towradgi Creek which occurs at the southern boundary. Filling and levelling have occurred in the past. A Temporary Stockpile Staging Area is present in the western area of the site and is mostly flat, though there is local incline towards the creek (North Corrimal Creek) which flows north to south through the site. The majority of the site is between 9 to 15 m AHD.
- The standing water level within the existing wells onsite ranged between 3.03 m to 4.69 m btoc. The inferred local groundwater flow direction on the site is to the south to southeast.
- The nearest sensitive environments are North Corrimal Creek, Towradgi Creek, surrounding residential properties and Corrimal East Public School.



4.3 Site Condition

The current site condition is as follows:

- Surplus material, including fill, crushed aggregate, contaminated materials arising from known hotspot excavations and unexpected finds and natural soils, are currently stockpiled within the Stage 2-4 BEW Redevelopment Site.
- Carbonaceous fill material had been excavated from Stage 1 BEW Redevelopment Site and temporarily stockpiled within Stage 2-4 prior to validation for potential re-use on site.
- Crushed recycled aggregate associated with demolition works is stockpiled within the north-eastern portion of the Stage 2-4 site.
- Above and below ground structures have been demolished with only small ancillary structures and fixtures associated with the on-site dams and heritage protected items remaining.
- Initial stages of cut-to-fill earthworks and leveling have commenced in the north-eastern portion of Stage 2-4 in preparation for construction of a temporary builder's compound associated with the Stage 1 construction works and road construction.



5 Potential to Oxidise Acid Sulfate Soil

The relatively specific conditions under which ASS are formed usually limit their occurrence to low lying parts of coastal floodplains, rivers and creeks. This includes areas with saline or brackish water such as deltas coastal flats, backswamps and seasonal or permanent freshwater swamps that were formerly brackish. Due to flooding and stormwater erosion, these sulfidic sediments may continue to be re-distributed through the sands and sediments of the estuarine floodplain region. Sulfidic sediment may be found at any depth in suitable coastal sediments – usually beneath the water table.

Any lowering in the water table that covers and protects PASS or excavation of PASS from below the water table, will result in the aeration and the exposure of iron sulphide sediments to oxygen. The lowering in the water table can occur naturally due to the seasonal fluctuations and drought or by human intervention, in particular agricultural drainage and excavation for development. PASS can also be exposed to air during physical disturbance with the material at the disturbance face, as well as the extracted material, both potentially being oxidised. The oxidation of iron sulphide sediments in PASS may result in net generation of acid and result in actual ASS.

The following activities may expose PASS to oxidising conditions during construction:

- Excavations for construction including basement excavations, service trenches, lift pits/wells, which extend into natural soils.
- Installation of piles and subsequent generation of spoil at the surface.
- Dewatering of excavations (if required) during construction works.
- Dredging of sediment from on-site surface water bodies and watercourses.

Previous investigations completed at the site did not identify coastal floodplain, river or creek deposits that contained reduced inorganic sulphur at concentrations that require specific management. As such the site presents a low risk of oxidising PASS during the proposed construction works.



6 Unexpected Finds Protocol

6.1 Ongoing Monitoring for PASS

The following environmental media should be monitored during BEW and redevelopment works at the site if unexpected PASS or ASS materials are identified:

- Surface water, groundwater, and leachate water associated with any disturbance of PASS for parameters including pH and electrical conductivity (EC) or dissolved solids.
- Hydrological observations to ensure the development is not affecting the natural water cover within PASS soil horizons.
- Any soils stockpiled on site should be the subject of an ongoing assessment of the status of any oxidation occurring within the soils, noting that PASS soils are to be treated within 24 hours of disturbance.
- Regular testing of the soils and water should be done using approved laboratory methods, as detailed below.

All monitoring data should be compiled and reviewed regularly against baseline data, appropriate standards and agreed performance targets. Monitoring should ensure that all water discharged from a site complies with the requirements of the relevant water quality legislation, the ANZG Australian Water Quality Guidelines (2018) and any specific water quality objectives set for receiving waters. Performance outside these standards or targets will require corrective action.

6.2 Trigger Values

In the event of the water quality parameters varying greater than these criteria, further assessment and advice from a suitably qualified professional should be sought as corrective actions may need to be implemented.

6.2.1 SOIL

Soils encountered during site works should meet a target pH result within the following ranges:

- pH_{field} 6.0 and 9.5 pH units.
- pH_{KCl} 6.0 and 10.5 pH units.

6.2.2 WATER

Water quality parameters should not vary from the baseline conditions as indicated as below:

- pH should not vary by more than 1.0 pH units from the baseline range.
- TDS should not vary by more than 1,500 mg/L from the baseline range.
- Total alkalinity within groundwater should remain on a stable trend line and not trend down.
- Meet the relevant guideline criteria noted in Table 2 below and any other relevant planning consent conditions or licences.

6.3 Soil Treatment

If unexpected ASS or PASS is identified at the site it will require appropriate treatment prior to re-use. The application of the treatment will depend upon the nature and extent of the identified PASS/ASS and how that material is proposed to be re-used. If unexpected ASS/PASS is identified works within those areas should cease and a suitably qualified professional engaged to provide a treatment plan in accordance with the principals of the

The Acid Sulfate Soil Management Advisory Committee (ASSMAC) Acid Sulfate Soils Assessment Guidelines 1998 (Also referred to as the "Acid Sulfate Soils Manual").

Shand, P, Appleyard, S, Simpson, SL, Degens, B, Mosley, LM 2018, National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments, Department of Agriculture and Water Resources, Canberra, ACT. CC BY 4.0.

6.4 Temporary Dewatering

Water is the main mechanism by which acid and metals from oxidised ASS are mobilised and transported. Careful management of water is therefore paramount to effective management of potential adverse impacts from PASS.

The below sections provide strategies for assessment and disposal of groundwater or surface water accumulating in excavations. The proposed works are not expected to require significant groundwater dewatering.

Appropriate management of water at the subject site is important given the relatively shallow water table, and the proximity to Towradgi Creek in the southern section of the site.

6.4.1 DEWATERING MANAGEMENT

Localised and temporary dewatering (i.e. 6 to 12 months) may be required in sections of the site that have basements. The methods used should be chosen to minimise lowering of the water table beyond the excavation footprint/s both spatially and temporally. The dewatering management plan that will be required to be prepared for basements that intersect the underlying groundwater will need to refer to this ASSMP and comply with the monitoring frequencies and target discharge criteria noted in **Table 2**.

6.4.2 WATER ASSESSMENT

When extracted water requires assessment prior to disposal to stormwater or Towradgi Creek, the sampling plan listed in **Table 2** should be met. This table also details the recommended monitoring frequencies and target thresholds. Water samples are to be collected by a suitably qualified and experienced environmental consultant.

Table 2: Suggested Water Monitoring Frequencies and Target Levels for Disposal to Stormwater

PARAMETER	FREQUENCY	TARGET LEVEL FOR DISPOSAL TO STORMWATER
pH	<p><u>Field measurement:</u></p> <ul style="list-style-type: none"> • During storage as required to allow timely treatment; • Immediately prior to disposal; and • Daily checks during discharge period. 	<ul style="list-style-type: none"> • pH 6.5 – 8.5
Total suspended solids (TSS)	<p><u>Field measurement:</u></p> <ul style="list-style-type: none"> • Immediately prior to disposal; and • As required based on visual observations; and <p><u>Visual assessment:</u></p> <ul style="list-style-type: none"> • Daily during discharge period. 	<ul style="list-style-type: none"> • water observed to be clear; • turbidity <50 NTU
Oil and grease	<p><u>Visual assessment:</u></p> <ul style="list-style-type: none"> • Immediately prior to disposal; and • Daily checks during discharge period; and <p><u>Laboratory analysis:</u></p> <ul style="list-style-type: none"> • required if visual observations confirm presence of sheens 	<ul style="list-style-type: none"> • none observable • <10 mg/l
Iron (total and soluble)	<p><u>Laboratory analysis:</u></p> <ul style="list-style-type: none"> • Immediately prior to disposal; and • Weekly checks during discharge period; and • As required based on visual observations; and <p><u>Visual assessment:</u></p> <ul style="list-style-type: none"> • Daily during discharge. 	<ul style="list-style-type: none"> • ≤ 0.3 mg/L filterable iron • no obvious sign of iron staining/ settlement



PARAMETER	FREQUENCY	TARGET LEVEL FOR DISPOSAL TO STORMWATER
Metals (aluminium, arsenic, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, zinc). ph, titratable acidity/alkalinity, major elements (Na, K, Ca, Mg, HCO ₃ , SO ₄ , Cl),	<u>Laboratory analysis:</u> <ul style="list-style-type: none"> one round of testing before first disposal; if first round of testing exceeds target levels then additional treatment and further testing prior to disposal is required. 	<ul style="list-style-type: none"> ANZG (2018) trigger levels for 95% level of protection for marine water ecosystems.
pH, titratable acidity/alkalinity, major elements (Na, K, Ca, Mg, HCO ₃ , SO ₄ , Cl),	<u>Laboratory analysis:</u> <ul style="list-style-type: none"> Each disposal event or weekly 	<ul style="list-style-type: none"> ANZG (2018) trigger levels for 95% level of protection for marine water ecosystems. ANZEC (2000) chemical and physical stressors for lowland rivers. Relevant NSW EPA Water Quality Objectives.

6.4.3 WATER DISPOSAL

Water requiring off-site discharge should be disposed of in accordance with the POEO Act 1997, relevant guidelines, consents and licences.

Should discharge into local stormwater be the proposed management strategy, an approval may be required from Wollongong City Council. An assessment of discharge water should be completed. Where the extracted water is not suitable for discharge, or immediate disposal is required, collection by a suitably licensed water transport company for disposal to a suitably licenced disposal facility will be required or treated to acceptable levels prior to discharge. Records of water quality monitoring, volume generated, volume removed, waste disposal records, waste tracking records, water quality reports and waste disposal receipts are required.

6.5 Contingency Plan

In the case where monitored results indicate the agreed standards or performance indicator levels are not being achieved, then immediate corrective action will be required. These corrective actions may apply to individual components of the construction or operation stage of the project that are responsible for the breach of agreed standards.

Where overland discharge or sewer discharge of extracted groundwater is proposed, a contingency plan should be in place to allow neutralisation and confirmation monitoring prior to discharge if pH levels are low or fall below natural background levels. During periods of heavy or prolonged rainfall, stockpiling of ASS should be appropriately contained/bunded to collect leachate for testing and neutralisation (if required) prior to disposal. Alternatively, temporary backfilling of PASS could be undertaken to prevent the migration of leachate.

The development should be conducted with due regard to erosion and sediment controls to minimise potential impacts to nearby sensitive receptors.

When corrective action fails or monitoring results identify severe failures of the management strategy to meet agreed standards, the project should cease to operate, and action should be taken to restore the Site to a condition equivalent to that prior to the commencement of the project.

6.6 Compliance Reporting

If unexpected ASS or PASS is identified during the works, then a final post-monitoring closure report should be issued upon completion of the works presenting the monitoring regime and results to confirm that no adverse



environmental impact has occurred during the works. The report should be prepared in accordance with the checklist provided in Appendix F of the NASS (2018) *Guidance for the dewatering of acid sulfate soils in shallow groundwater environments*.



7 Limitations

This report has been prepared in accordance with the scope of services described in the **Section 1.4**. The letter has been prepared for the sole use of the client and has been prepared in accordance with a scope of work agreed by the client.

The report or document does not purport to provide legal advice and any conclusions or recommendations made should not be relied upon as a substitute for such advice.

The report does not constitute a recommendation by Reditus for the client or any other party to engage in any commercial or financial transaction and any decision by the client or other party to engage in such activities is strictly a matter for the client.

The report relies upon data, surveys, measurements and results taken at or under the site at particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances, and no greater reliance should be assumed or drawn by the client. Furthermore, the report has been prepared solely for use by the client and Reditus accepts no responsibility for its use by other parties. The client agrees that Reditus' report or associated correspondence will not be used or reproduced in full or in part for promotional purposes and cannot be used or relied upon by any other individual, party, group or company in any prospectus or offering. Any individual, party, group or company seeking to rely on this report cannot do so and should seek their own independent advice.

No warranties, express or implied, are made. Subject to the scope of work undertaken, Reditus assessment is limited strictly to identifying typical environmental conditions associated with the subject property based on the scope of work and testing undertaken and does not include and evaluation of the structural conditions of any buildings on the subject property or any other issues that relate to the operation of the site and operational compliance of the site with state or federal laws, guidelines, standards or other industry recommendations or best practice. Scope of work undertaken for assessments are agreed in advance with the client and may not necessarily comply with state or federal laws or industry guidelines for the type of assessment conducted.

Additionally, unless otherwise stated Reditus did not conduct soil, air or wastewater analyses including asbestos or perform contaminated sampling of any kind. Nor did Reditus investigate any waste material from the property that may have been disposed off-site or undertake and assessment or review of related site waste management practices.

The results of this assessment are based upon (if undertaken as part of the scope work) a site inspection conducted by Reditus personnel and/or information from interviews with people who have knowledge of site conditions and/or information provided by regulatory agencies. All conclusions and recommendations regarding the property are the professional opinions of the Reditus personnel involved with the project, subject to the qualifications made above.

While normal assessments of data reliability have been made, Reditus assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Reditus, or developments resulting from situations outside the scope of this project/assessment.

Reditus is not engaged in environmental auditing and/or reporting of any kind for the purpose of advertising sales promoting, or endorsement of any client's interests, including raising investment capital, recommending investment decisions, or other publicity purposes. Reditus assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Reditus, or developments resulting from situations outside the scope of this project.

Reditus' professional opinions are based upon its professional judgment, experience, and training. These opinions are also based upon data derived from the limited testing and analysis described in this report or reports reviewed. It is possible that additional testing and analysis might produce different results and/or different opinions or other opinions. Reditus has limited its investigation(s) to the scope agreed upon with its client. Reditus believes that its opinions are reasonably supported by the testing and analysis that has been undertaken (if any), and that those opinions have been developed according to the professional standard of care for the environmental consulting profession in this area at this time. Other opinions and interpretations may be possible. That standard of care may change and new methods and practices of exploration, testing and analysis may develop in the future, which might produce different results.



8 References

Site Specific

Reditus (2020) *Data Gap Investigation, 27 Railway Street, Corrimal NSW*. 4 September 2020. Ref: 19149RP01v4.

Reditus (2022) *Consolidated Detailed Site Investigation*. 22 November 2022. Ref: 22158RP04.

Reditus (2023) *Acid Sulfate Soil Management Plan – Stage 2-4 Bulk Earth Works Development Application – Former Corrimal Coke Works – 27 Railway Street, Corrimal NSW 2518*. 1 September 2023. Ref: 22158RP06.

Reditus (2025a) *Stage 2-4 BEW – Preliminary Data Gap Assessment and Site Validation Report -Stage 2-4 Redevelopment – Former Corrimal Coke Works, Railway Street, Corrimal, NSW*. 12 September 2025. Ref: 24326RP06.

Reditus (2025b) *Acid Sulfate Soil Assessment – Proposed New Creek Alignment, Stage 2-4 Bulk Earth Works Redevelopment Site – Former Corrimal Coke Works, Railway Street, Corrimal NSW*. 23 September 2025. Ref: 24326LTR20_v1.

Environmental Planning

NSW Environmental Planning and Assessment Act (the EP&A Act 1979).

NSW State Environmental Planning Policy Number (SEPP) Resilience and Hazards 2021. Superseding SEPP55 – Remediation of Land, 1998.

Site Contamination

NSW Contaminated Land Management Act (the CLM Act 1997).

NSW EPA statutory guidelines made or approved under section 105 of the CLM Act, including:

- *NSW EPA Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017.*
- *NSW EPA Guidelines for Consultants Reporting on Contaminated Land, 2020.*
- *NSW EPA Sampling Design Guidelines, August 2022.*
- *NSW EPA Guidelines for the Assessment and Management of Groundwater Contamination, 2007.*
- *NSW EPA Guidelines for Assessment and Management of Hazardous Ground Gases, 2020.*

National Environment Protection Council (1999, Revised 2013) National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 – Schedule B1 Guideline on Investigation levels for Soil and Groundwater (NEPC, 2013).

Australian and New Zealand Governments Guidelines for Fresh and Marine Water Quality 2018.

Australian Standard AS4482.1-2005. Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil. Part 1: Non-volatile and Semi-volatile Compounds, 2005.

Australian Standard AS4482.2-1999. Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil. Part 2: Volatile Substances, 1999.

PFAS National Environmental Management Plan version 2.0 (the PFAS NEMP 2.0), 2020.

Acid Sulfate Soils

The Acid Sulfate Soil Management Advisory Committee (ASSMAC) Acid Sulfate Soils Assessment Guidelines 1998 (Also referred to as the “Acid Sulfate Soils Manual”).

Water Quality Australia – National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual (June 2018) (NASS 2018).

Waste

NSW Protection of the Environment Operations Act (POEO Act) 1997.

NSW Protection of the Environment Operations (Waste) Regulations 2014.

NSW EPA Waste Classification Guidelines, Part 1 Classifying Waste, 2014.

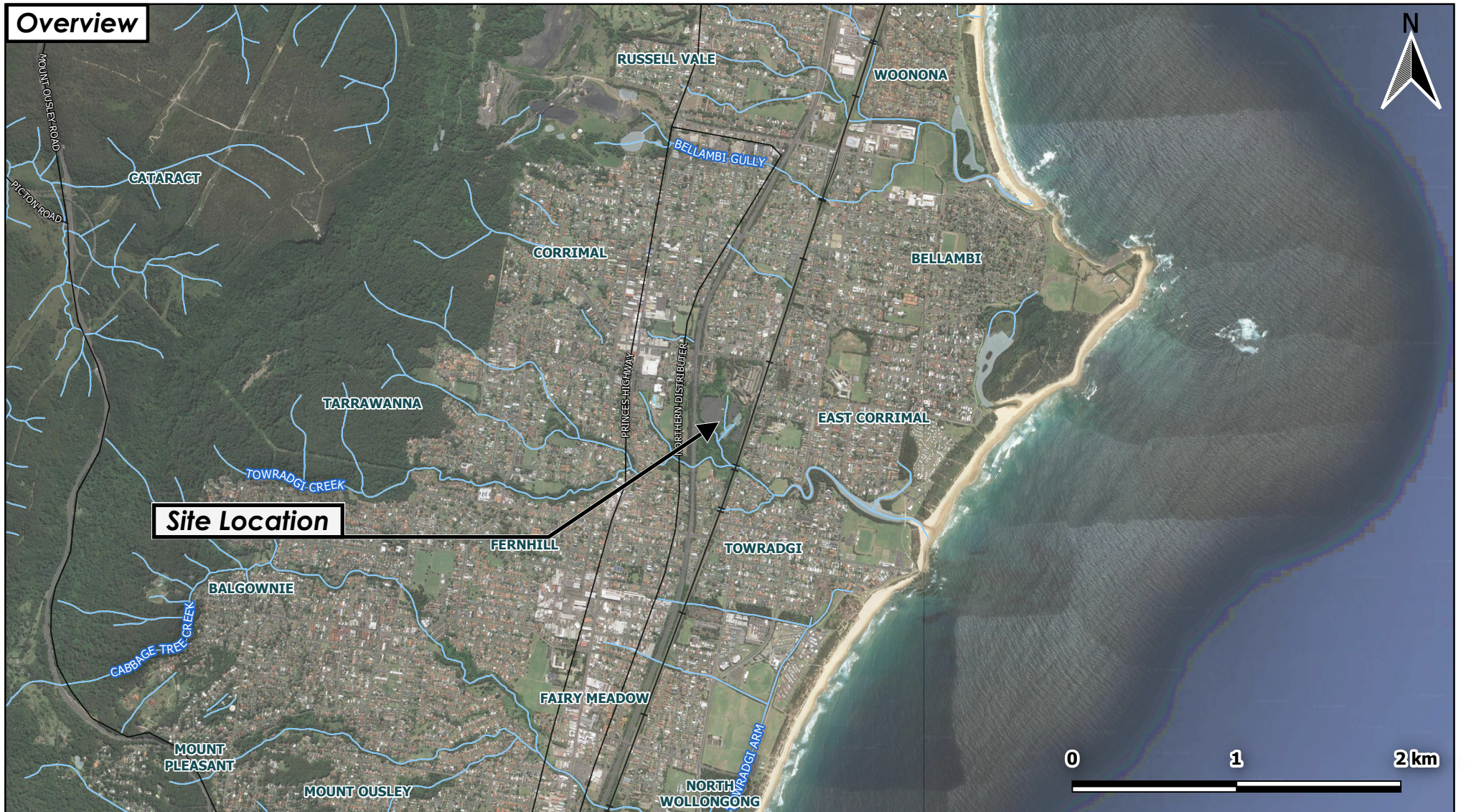


NSW EPA Resource Recovery Order, Excavated Natural Material Order under Part 9, Clause 93 of POEO Waste Regulation 2014 (the ENM Order 2014).

A

Figures

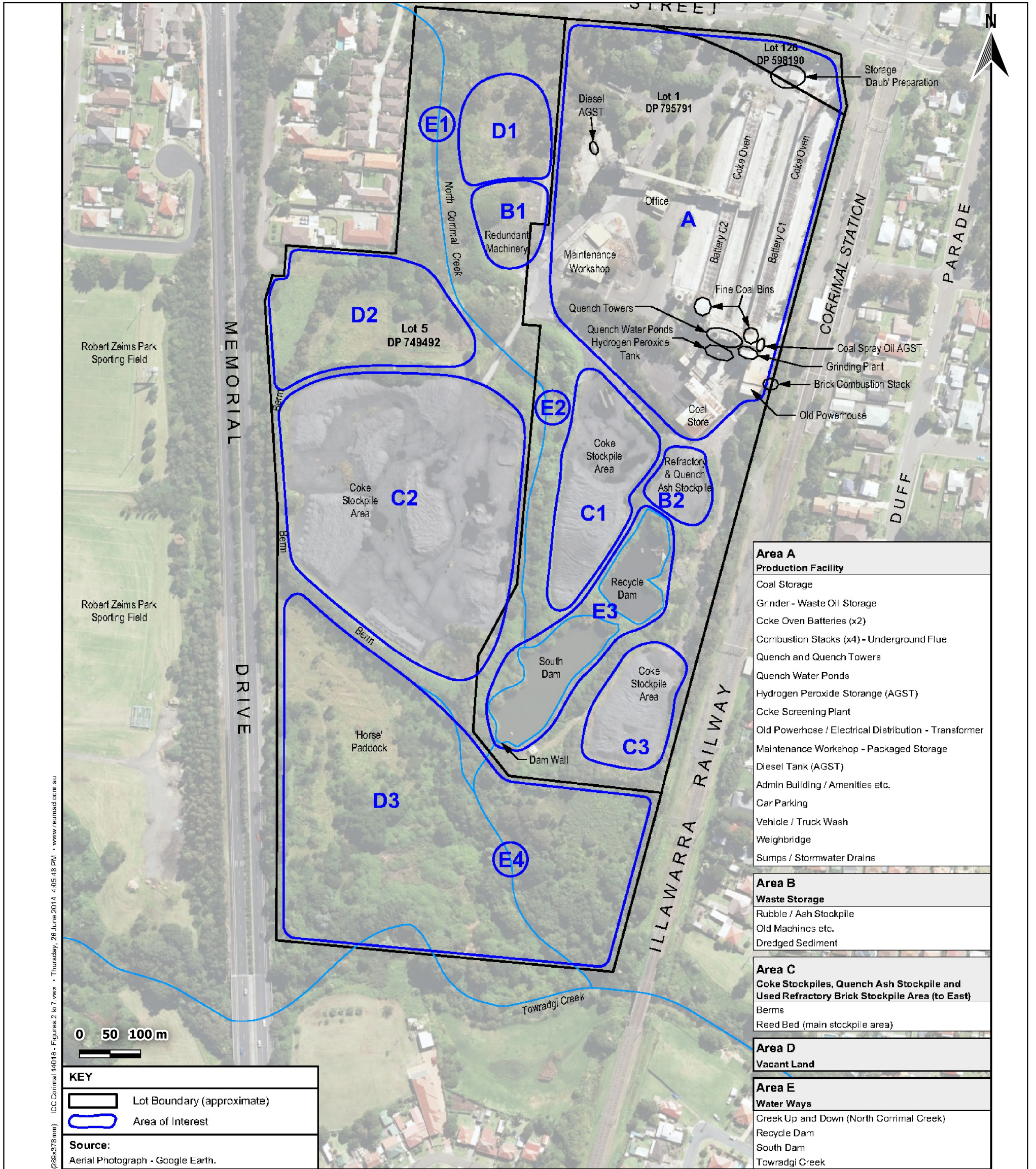




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Date of Export	
31/08/2023	
Author	Approver
MB	DJ
Data Source	
Metromap, Google Maps, Open Street Map, NSW Government	

Legend	
Site Boundary	Railways
Surface Water	Rivers
Major Roads	Streams
	Minor Channels

Figure 1 - Site Location
 Former Corrimal Coke Works, Railway Street, Corrimal NSW
 22158 - Acid Sulfate Soil Management Plan
 LegPro 70 Pty Ltd ATF LegPro 70 Unit Trust c/- Legacy Property Pty Ltd



Map	
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Author	Approver
MB	DJ
Data Source	
Metromap, Google Maps, Open Street Map, Geoscience Australia	

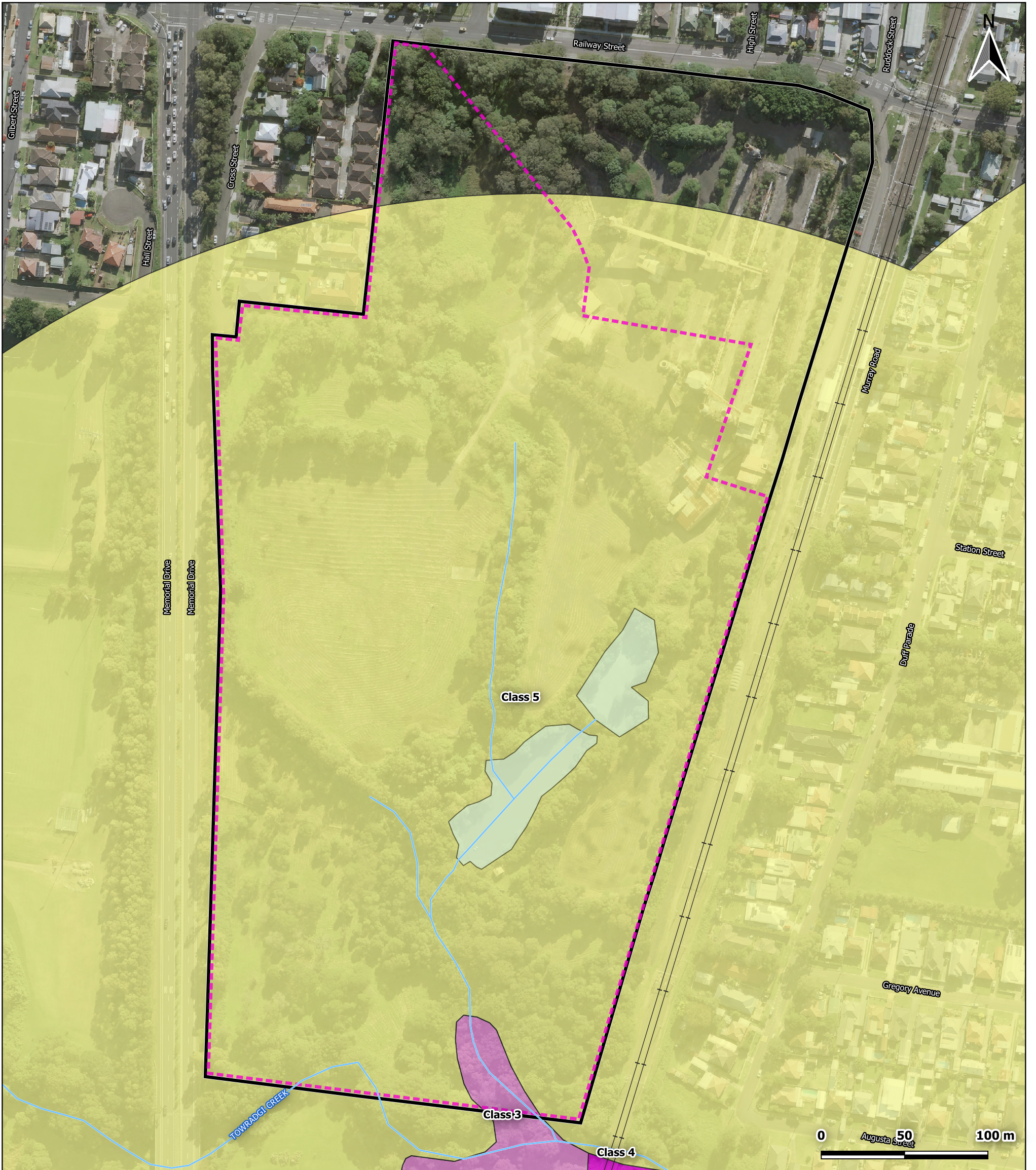
Figure 2 - Site Layout & Features
 Former Corrimal Coke Works, Railway Street, Corrimal, NSW
 22158 - Acid Sulfate Soil Management Plan
 LegPro 70 Pty Ltd ATF LegPro 70 Unit Trust c/- Legacy Property Pty Ltd



Map	
22158_rp06_f03_landuse_v01	
Date of Export	Map Scale (approx. at A3)
31/08/2023	1:2,300
Author	Approver
MB	DJ
Data Source	
Metromap, Google Maps, Open Street Map, Geoscience Australia	

Legend	
	Site Boundary
	Stage 2 Boundary
	High-Density Residential Land Use Area
	Low-Density Residential Land Use Area
*Unshaded areas outside low- and high-density residential land use classified as "Recreational and Public Open Space" land	

Figure 3 - Land Uses & Redevelopment Staging
 Former Corrimal Coke Works, Railway Street, Corrimal, NSW
 22158 - Acid Sulfate Soil Management Plan
 LegPro 70 Pty Ltd ATF LegPro 70 Unit Trust c/- Legacy Property Pty Ltd



Map	
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Date of Export	Map Scale (approx. at A3)
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Author	Approver
MB	DJ
Data Source	
Metromap, Google Maps, Open Street Map, Geoscience Australia	





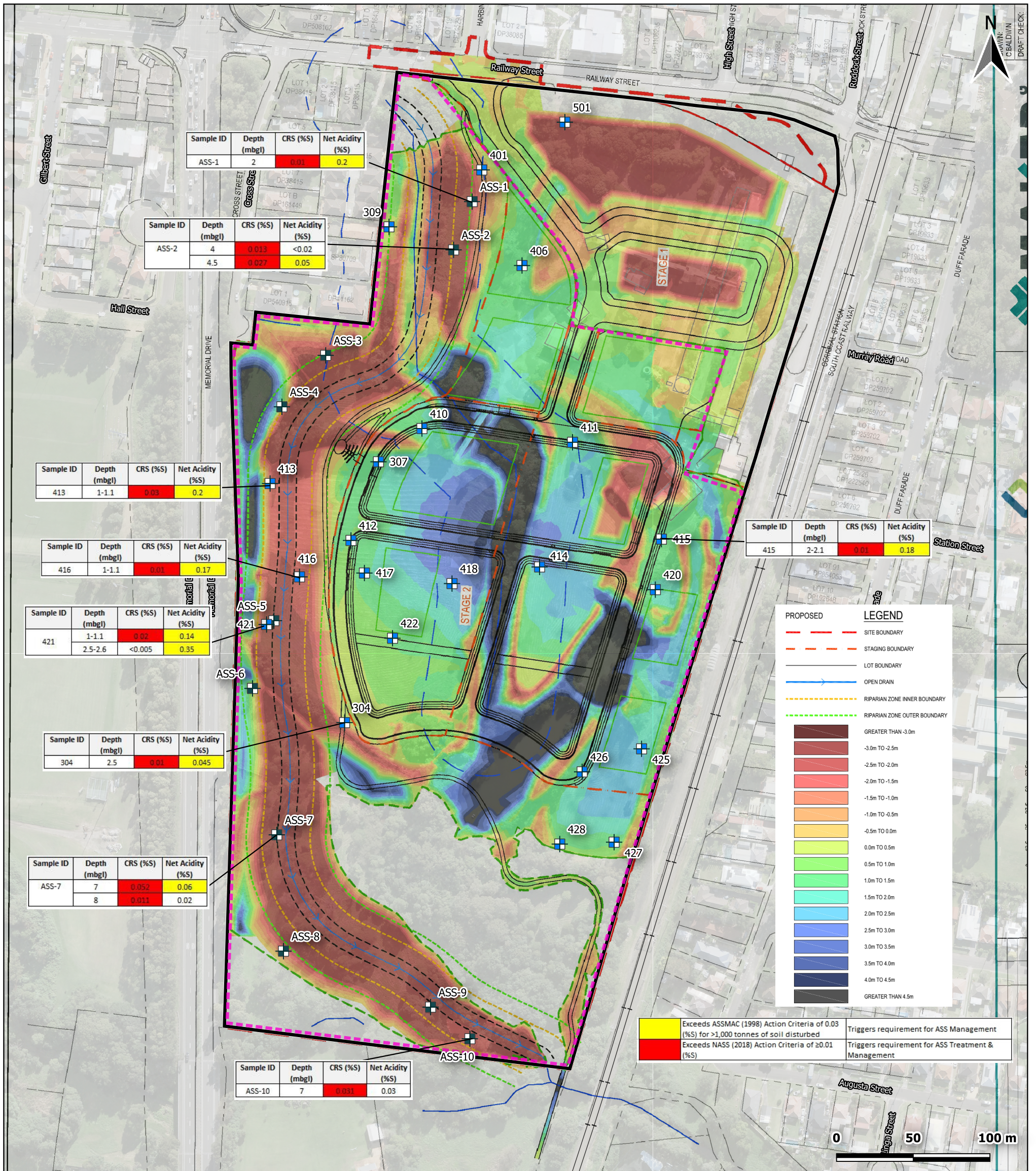
Legend	
	Site Boundary
	Stage 2 Boundary
NSW EPI Acid Sulfate Soils	
	Class 3
	Class 5

Figure 4 - Acid Sulfate Soils Class Zones

Former Corrimal Coke Works, Railway Street, Corrimal, NSW

22158 - Acid Sulfate Soil Management Plan

LegPro 70 Pty Ltd ATF LegPro 70 Unit Trust c/- Legacy Property Pty Ltd



Map	
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Author	Approver
MB	DJ
Data Source	
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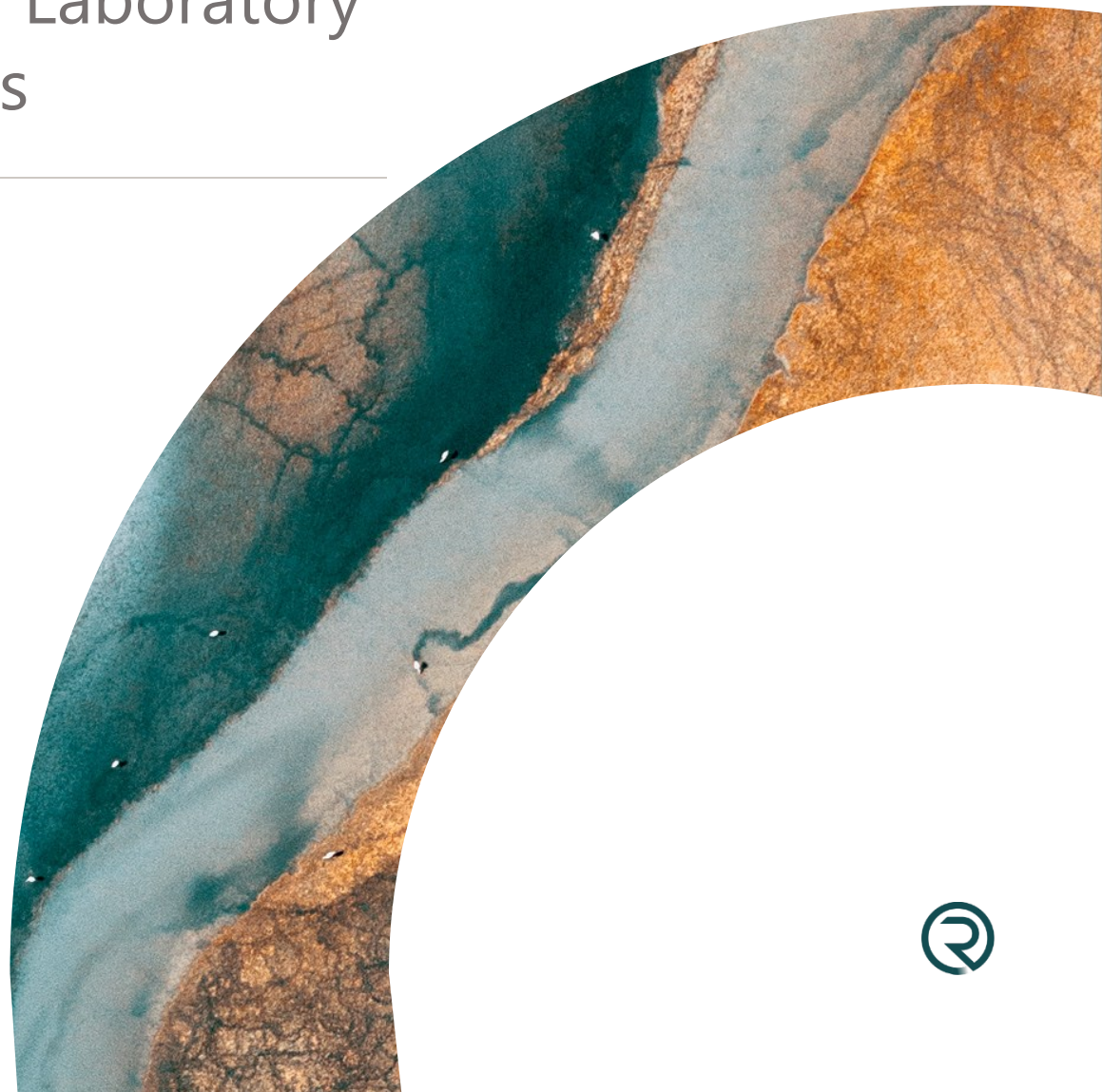
Legend	
	Site Boundary
	Stage 2-4 BEW Boundary
	Reditus 2020 ASS Sample Locations
	'Other Consultants' 2023 Sample Locations

Figure 5 - Acid Sulfate Soil Action Criteria Exceedances
 Former Corrimal Coke Works, Railway Street, Corrimal, NSW

22158 - Acid Sulfate Soil Management Plan
 LegPro 70 Pty Ltd ATF LegPro 70 Unit Trust c/- Legacy Property Pty Ltd

B

Other Consultants' (2023) Laboratory Results



Client: Legacy Property
 Project: Corrimal Cokeworks Re-development

Project No: 78653.13
 pH Meter: TPS with Ionode IJ46/WP80 pH/Temp. Electrode
 PH Scan 2
 Calibration Buffer: pH4
 pH7
 pH10

Project Location: 27 Railway Street, Corrimal

Sample Location	Depth (m)	pH _F (in distilled water)	pH _{Fox} (oxidised in H ₂ O ₂)				Strength of Reaction	Soil Description
		Date: 28/03/2023	Date: 28/03/2023	Date:	Date:	(1,2,3,4)*		
		Time: 10:00 AM	Time: 12:00 PM	Time:	Time:	F **		
401	2.0 – 2.1	5.70	4.48			1		
406	2.0 – 2.1	6.05	2.98			3		
410	1.5 – 1.6	5.25	3.44			1 – 2		
411	2.0 – 2.1	5.39	4.64			1		
412	1.5 – 1.6	5.36	3.30			1F		
413	0.3 – 0.5	5.06	4.09			2F		
413	0.5 – 0.6	4.90	3.91			1		
413	1.0 – 1.1	5.73	4.28			1		
414	3.4 – 3.5	5.88	5.30			1		
415	2.0 – 2.1	5.40	4.64			2F		
416	0.6 – 0.7	5.72	5.78			2F		
416	1.0 – 1.1	4.95	4.09			1		
416	1.5 – 1.6	4.52	5.16			1		
417	0.6 – 0.7	5.93	5.38			2F		
417	1.0 – 1.1	5.55	4.90			1		

Legend: * 1 denotes no or slight effervescence
 2 denotes moderate effervescence
 3 denotes vigorous effervescence
 4 denotes "volcano" ie. very vigorous effervescence, gas evolution and heat
 ** F after reaction number indicates a bubbling/frothy reaction (organics)

Operator: EB

Date: 28/03/2023

Sample Location	Depth (m)	pH _F (in distilled water)	pH _{FOX} (oxidised in H ₂ O ₂)				Strength of Reaction (1,2,3,4)* F **	Soil Description
		Date: 28/03/2023	Date: 28/03/2023	Date:	Date:			
		Time: 10:00 AM	Time: 12:00 PM	Time:	Time:			
417	1.3-1.4	4.97	5.15			1		
418	1.5 – 1.6	5.93	4.61			1F		
418	1.9 – 2.0	4.65	6.10			1		
420	2.5 – 2.6	5.75	3.44			1		
421	1.0 – 1.1	5.99	3.20			1		
421	1.5 – 1.6	5.69	4.60			1		
421	2.0 – 2.1	5.04	3.30			1		
421	2.5 – 2.6	4.96	3.60			1		
422	1.0 – 1.1	5.87	3.11			2F		
422	1.5 – 1.6	4.71	2.94			2		
425	1.5 – 1.6	6.43	5.38			1F		
425	2.0 – 2.1	6.49	7.22			1		
426	1.5 – 1.6	7.35	8.02			1		
426	2.0 – 2.1	6.65	6.84			2F		
427	1.9 – 2.0	6.93	7.89			2F		
428	2.0 – 2.1	6.49	6.70			2F		

Legend: * 1 denotes no or slight effervescence
 2 denotes moderate effervescence
 3 denotes vigorous effervescence
 4 denotes "volcano" ie. very vigorous effervescence, gas evolution and heat
 ** F after reaction number indicates a bubbling/frothy reaction (organics)

Operator: EB

Date: 28/03/2023

CERTIFICATE OF ANALYSIS 319782

Client Details

Client	Douglas Partners Unanderra
Attention	Arthur Castrissios
Address	Unit 1, 1 Luso Drive, Unanderra, NSW, 2526

Sample Details

Your Reference	<u>78653.13 Corrimal</u>
Number of Samples	12 Soil
Date samples received	29/03/2023
Date completed instructions received	29/03/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	05/04/2023
Date of Issue	05/04/2023
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By
 Jenny He, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Client Reference: 78653.13 Corrimal

Chromium Suite						
Our Reference		319782-1	319782-2	319782-3	319782-4	319782-5
Your Reference	UNITS	406	410	412	413	415
Depth		2-2.1	1.5-1.6	1.5-1.6	1-1.1	2-2.1
Date Sampled		17/03/2023	15/03/2023	15/03/2023	15/03/2023	16/03/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/04/2023	05/04/2023	05/04/2023	05/04/2023	05/04/2023
Date analysed	-	05/04/2023	05/04/2023	05/04/2023	05/04/2023	05/04/2023
pH _{kcl}	pH units	4.9	4.0	4.0	3.6	3.8
s-TAA pH 6.5	%w/w S	0.03	0.09	0.08	0.16	0.17
TAA pH 6.5	moles H ⁺ /t	17	59	49	100	100
Chromium Reducible Sulfur	%w/w	<0.005	<0.005	<0.005	0.03	0.01
a-Chromium Reducible Sulfur	moles H ⁺ /t	<3	<3	<3	18	6
S _{HCl}	%w/w S	[NT]	0.009	0.011	0.008	0.010
S _{KCl}	%w/w S	[NT]	0.009	<0.005	0.006	0.005
S _{NAS}	%w/w S	[NT]	<0.005	0.007	<0.005	<0.005
ANC _{BT}	% CaCO ₃	[NT]	[NT]	[NT]	[NT]	[NT]
s-ANC _{BT}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity	%w/w S	0.027	0.094	0.088	0.20	0.18
a-Net Acidity	moles H ⁺ /t	17	59	55	120	110
Liming rate	kg CaCO ₃ /t	1	4	4	9.2	8.6
a-Net Acidity without ANCE	moles H ⁺ /t	17	59	55	120	110
Liming rate without ANCE	kg CaCO ₃ /t	1.3	4.4	4.1	9.2	8.6
s-Net Acidity without ANCE	%w/w S	0.027	0.094	0.088	0.20	0.18

Client Reference: 78653.13 Corrimal

Chromium Suite						
Our Reference		319782-6	319782-7	319782-8	319782-9	319782-10
Your Reference	UNITS	416	417	418	421	421
Depth		1-1.1	1-1.1	1.5-1.6	1-1.1	2.5-2.6
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/04/2023	05/04/2023	05/04/2023	05/04/2023	05/04/2023
Date analysed	-	05/04/2023	05/04/2023	05/04/2023	05/04/2023	05/04/2023
pH _{kcl}	pH units	3.6	3.7	4.5	4.0	3.6
s-TAA pH 6.5	%w/w S	0.16	0.13	0.07	0.11	0.34
TAA pH 6.5	moles H ⁺ /t	99	81	46	69	210
Chromium Reducible Sulfur	%w/w	0.01	<0.005	0.005	0.02	<0.005
a-Chromium Reducible Sulfur	moles H ⁺ /t	6	<3	3	12	<3
S _{HCl}	%w/w S	0.007	0.005	0.008	0.017	0.029
S _{KCl}	%w/w S	<0.005	<0.005	0.008	0.008	0.017
S _{NAS}	%w/w S	<0.005	<0.005	<0.005	0.009	0.012
ANC _{BT}	% CaCO ₃	[NT]	[NT]	[NT]	[NT]	[NT]
s-ANC _{BT}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity	%w/w S	0.17	0.13	0.079	0.14	0.35
a-Net Acidity	moles H ⁺ /t	110	84	49	87	220
Liming rate	kg CaCO ₃ /t	8.1	6	4	7	16
a-Net Acidity without ANCE	moles H ⁺ /t	110	84	49	87	220
Liming rate without ANCE	kg CaCO ₃ /t	8.1	6.3	3.7	6.5	16
s-Net Acidity without ANCE	%w/w S	0.17	0.13	0.079	0.14	0.35

Chromium Suite			
Our Reference		319782-11	319782-12
Your Reference	UNITS	422	425
Depth		1.5-1.6	1.5-1.6
Date Sampled		15/03/2023	16/03/2023
Type of sample		Soil	Soil
Date prepared	-	05/04/2023	05/04/2023
Date analysed	-	05/04/2023	05/04/2023
pH _{KCl}	pH units	3.7	5.4
s-TAA pH 6.5	%w/w S	0.16	0.02
TAA pH 6.5	moles H ⁺ /t	100	15
Chromium Reducible Sulfur	%w/w	<0.005	<0.005
a-Chromium Reducible Sulfur	moles H ⁺ /t	<3	<3
S _{HCl}	%w/w S	0.009	[NT]
S _{KCl}	%w/w S	0.005	[NT]
S _{NAS}	%w/w S	<0.005	[NT]
ANC _{BT}	% CaCO ₃	[NT]	[NT]
s-ANC _{BT}	%w/w S	[NT]	[NT]
s-Net Acidity	%w/w S	0.17	0.024
a-Net Acidity	moles H ⁺ /t	110	15
Liming rate	kg CaCO ₃ /t	7.9	1
a-Net Acidity without ANCE	moles H ⁺ /t	110	15
Liming rate without ANCE	kg CaCO ₃ /t	7.9	1.1
s-Net Acidity without ANCE	%w/w S	0.17	0.024

Method ID	Methodology Summary
Inorg-068	<p>Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity. Net acidity including ANC has a safety factor of 1.5 applied.</p> <p>Neutralising value (NV) of 100% is assumed for liming rate.</p> <p>Based on National acid sulfate soils identification and laboratory methods manual June 2018.</p> <p>The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL results reported.</p>

Client Reference: 78653.13 Corrimal

QUALITY CONTROL: Chromium Suite				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			05/04/2023	1	05/04/2023	05/04/2023		05/04/2023	[NT]
Date analysed	-			05/04/2023	1	05/04/2023	05/04/2023		05/04/2023	[NT]
pH _{kcl}	pH units		Inorg-068	[NT]	1	4.9	5.0	2	97	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	<0.01	1	0.03	0.02	40	[NT]	[NT]
TAA pH 6.5	moles H ⁺ /t	5	Inorg-068	<5	1	17	16	6	112	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	1	<0.005	<0.005	0	93	[NT]
a-Chromium Reducible Sulfur	moles H ⁺ /t	3	Inorg-068	<3	1	<3	<3	0	[NT]	[NT]
S _{HCl}	%w/w S	0.005	Inorg-068	<0.005	1	[NT]	[NT]		[NT]	[NT]
S _{KCl}	%w/w S	0.005	Inorg-068	<0.005	1	[NT]	[NT]		[NT]	[NT]
S _{NAS}	%w/w S	0.005	Inorg-068	<0.005	1	[NT]	[NT]		[NT]	[NT]
ANC _{BT}	% CaCO ₃	0.05	Inorg-068	<0.05	1	[NT]	[NT]		101	[NT]
s-ANC _{BT}	%w/w S	0.05	Inorg-068	<0.05	1	[NT]	[NT]		[NT]	[NT]
s-Net Acidity	%w/w S	0.005	Inorg-068	<0.005	1	0.027	0.026	4	[NT]	[NT]
a-Net Acidity	moles H ⁺ /t	5	Inorg-068	<5	1	17	16	6	[NT]	[NT]
Liming rate	kg CaCO ₃ /t	0.75	Inorg-068	<0.75	1	1	1	0	[NT]	[NT]
a-Net Acidity without ANCE	moles H ⁺ /t	5	Inorg-068	<5	1	17	16	6	[NT]	[NT]
Liming rate without ANCE	kg CaCO ₃ /t	0.75	Inorg-068	<0.75	1	1.3	1.2	8	[NT]	[NT]
s-Net Acidity without ANCE	%w/w S	0.005	Inorg-068	<0.005	1	0.027	0.026	4	[NT]	[NT]

Client Reference: 78653.13 Corrimal

QUALITY CONTROL: Chromium Suite					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	05/04/2023	05/04/2023		[NT]	[NT]
Date analysed	-			[NT]	11	05/04/2023	05/04/2023		[NT]	[NT]
pH _{kcl}	pH units		Inorg-068	[NT]	11	3.7	3.7	0	[NT]	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	[NT]	11	0.16	0.15	6	[NT]	[NT]
TAA pH 6.5	moles H ⁺ /t	5	Inorg-068	[NT]	11	100	96	4	[NT]	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	[NT]	11	<0.005	0.01	67	[NT]	[NT]
a-Chromium Reducible Sulfur	moles H ⁺ /t	3	Inorg-068	[NT]	11	<3	7	80	[NT]	[NT]
S _{HCl}	%w/w S	0.005	Inorg-068	[NT]	11	0.009	0.009	0	[NT]	[NT]
S _{KCl}	%w/w S	0.005	Inorg-068	[NT]	11	0.005	0.005	0	[NT]	[NT]
S _{NAS}	%w/w S	0.005	Inorg-068	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
s-Net Acidity	%w/w S	0.005	Inorg-068	[NT]	11	0.17	0.17	0	[NT]	[NT]
a-Net Acidity	moles H ⁺ /t	5	Inorg-068	[NT]	11	110	110	0	[NT]	[NT]
Liming rate	kg CaCO ₃ /t	0.75	Inorg-068	[NT]	11	7.9	7.9	0	[NT]	[NT]
a-Net Acidity without ANCE	moles H ⁺ /t	5	Inorg-068	[NT]	11	110	110	0	[NT]	[NT]
Liming rate without ANCE	kg CaCO ₃ /t	0.75	Inorg-068	[NT]	11	7.9	7.9	0	[NT]	[NT]
s-Net Acidity without ANCE	%w/w S	0.005	Inorg-068	[NT]	11	0.17	0.17	0	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

CHROMIUM_SUITE:Sample 319782-11 RPD is accepted as <5*PQL

Client: Legacy Property
 Project: Corrimal Cokeworks Re-development

Project No: 78653.15
 pH Meter: TPS with Ionode IJ46/WP80 pH/Temp. Electrode
 PH Scan 2
 Calibration Buffer: pH4
 pH7
 pH10

Project Location: 27 Railway Street, Corrimal

Sample Location	Depth (m)	pH _F (in distilled water)	pH _{Fox} (oxidised in H ₂ O ₂)				Strength of Reaction (1,2,3,4)* F **	Soil Description
			Date: 28/03/2023	Date: 28/03/2023	Date:	Date:		
		Time: 10:00 AM	Time: 12:00 PM	Time:	Time:			
512	2.5 – 2.95	5.80	7.49			2F	Silty clay	
512	4.0 – 4.45	5.90	12.30			2F	Silty clay	

Legend: * 1 denotes no or slight effervescence
 2 denotes moderate effervescence
 3 denotes vigorous effervescence
 4 denotes "volcano" ie. very vigorous effervescence, gas evolution and heat
 ** F after reaction number indicates a bubbling/frothy reaction (organics)

Operator: EB
 Date: 28/03/2023



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