

SSI 6878 Albion Park Rail Bypass

Construction and Pre-operation Compliance and Monitoring Report

Report 5
8 January – 7 July 2021

Contents

1 Introduction 7
1.1 Purpose of this report 8
1.2 Project Footprint 9
1.3 Key Project Personnel 10
2 Construction activities during reporting period 11
2.1 Demolition and property adjustment 11
2.2 Utilities adjustments and diversions 11
2.3 Fencing 11
2.4 Traffic 12
2.5 Earthworks 13
2.6 Roadworks 14
2.7 Drainage 15
2.8 Structures 16
2.9 Landscaping 18
2.10 Sedimentation and erosion control 20
2.11 Temporary works 22
3 Environmental management system overview 23
3.1 Environmental Management System certification 23
3.2 Environmental management framework 23
3.3 Construction Environmental Management Plan 23
3.4 Consistency assessments 25
3.5 Compliance auditing 25
3.6 Compliance Management 26
3.7 Previous Report actions 26
3.8 Incidents 26
3.9 Site Contamination 26
3.10 Environmental Performance 27
3.11 Effectiveness of environmental controls 27
3.12 Environmental initiatives 28
3.13 Internal and external environmental inspections 29
4 Environmental monitoring 31
4.1 Water quality 31
4.2 Flora and fauna 33
4.3 Heritage 34
4.4 Air quality 35
4.5 Noise and vibration 36
5 Community complaints 39
5.1 Number and types of complaints 40
5.2 Community engagement initiatives 40
6 Pre-Operational Requirements 44
6.1 Operational Environmental Management 44
6.1.1 Ancillary Site Remediation 44
6.1.2 Soil and Water management 45
7 Summary 48

Appendices

Appendix A Project Approval Compliance Table
Appendix B Construction Monitoring Report
Appendix C SAS and SAR

Details of Revision and Amendment:

Document Control

The most current version of this report will be available on the Fulton Hogan database for all project personnel. Distribution of this report will be made through the Albion Park Rail Bypass project document control system 'Qantrol'.

The environmental management team will maintain, review and update this report on a six monthly basis.

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3	Senior Environmental Engineer	25/08/2021	Jacob Cooper
4	NSW Environmental Manager	25/08/2021	Sam Leigh
5	TfNSW Environment Officer	25/08/2021	Peter Chudleigh
6	TfNSW Project Manager	25/08/2021	Warren Blacka
7	DPIE endorsed Environmental Representative (ER)	25/08/2021	Toby Hobbs
8	Department of Planning, Industry & Environment	25/08/2021	Georgia Dragicevic

Report Approved By:

[redacted]

Matthew Saviana

Project Director

[redacted]

Shannon Chisholm

Environment and Sustainability Manager

Compliance Report Declaration Form

Compliance Report Declaration Form	
Project	Albion Park Rail bypass
Project Application Number	SSI 6878
Description of Project	Extension of the M1 Princes Motorway between Yallah and Oak Flats to bypass Albion Park Rail
Project Address	1924 Illawarra Highway, Albion Park Rail, NSW, 2527
Proponent	Transport for NSW
Title of Compliance Report	Construction Compliance and Monitoring Report – Report 5
Date	8 January – 7 July 2021

I declare that I have reviewed relevant evidence and prepared the contents of the attached Compliance Report and to the best of my knowledge:

- the Compliance Report has been prepared in accordance with all relevant conditions of consent;
- the Compliance Report has been prepared in accordance with the Compliance Reporting Post Approval Requirements;
- the findings of the Compliance Report are reported truthfully, accurately and completely;
- due diligence and professional judgement have been exercised in preparing the Compliance Report; and
- the Compliance Report is an accurate summary of the compliance status of the development.

Notes:

- Under section 10.6 of the Environmental Planning and Assessment Act 1979 a person must not include false or misleading information (or provide information for inclusion in) a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is false or misleading in a material respect. The proponent of an approved project must not fail to include information in (or provide information for inclusion in) a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is materially relevant to the monitoring or audit. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000; and
- The Crimes Act 1900 contains other offences relating to false and misleading information: section 307B (giving false or misleading information – maximum penalty 2 years' imprisonment or 200 penalty units, or both).

Name of Authorised Reporting Officer:	Scott Fayers
Title:	Project Manager
Signature:	[redacted]
Qualification:	Engineer
Company:	Transport for NSW
Company Address:	90 Crown Street, Wollongong, NSW 2500

Amendment

Each new revision to the report will be distributed to all registered copyholders with an instruction that the superseded copy be destroyed or marked as superseded.

The revision number is included at the end of the document number, which is noted on each page. When amendments occur, the document or relevant section will be reissued with the revision number updated accordingly.

The Project Manager or Environmental Manager will approve amendments by initial in the Approval column below.

The following provides a record of amendments made to this document:

Revision	Date	Description	Page	Prepared by	Approved
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Abbreviations

CEMP	Construction Environmental Management Plan
CPESC	Certified professional in erosion and sediment control
CTP	Compliance Tracking Program
EMS	Environmental Management System
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPL	Environment Protection Licence
ER	Environmental Representative
DPIE	Department of Planning, Industry and Environment
NBN	National Broadband Network
NSW	New South Wales
POEO Act	Protection of the Environment Operations Act 1997
SEPP	State Environmental Planning Policy
TfNSW	Transport for New South Wales
TMP	Traffic Management Plan
RBL	Rating Background Level
ROL	Road Occupancy Licence
NCR	Non-conformance report

1 Introduction

Transport for NSW (TfNSW) is extending the M1 Princes Motorway between Yallah and Oak Flats to bypass Albion Park Rail. The motorway completes the 'missing link' for a high standard road between Sydney and Bomaderry.

The project has been assessed under Part 5.1 (State significant infrastructure - now Division 5.2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The NSW Department of Planning, Industry and Environment (DPIE) placed the '*Albion Park Rail bypass Environmental Impact Statement*' (Roads and Maritime, October 2015) (EIS) on public exhibition between 28 October and 27 November 2015. Submissions received during the exhibition were responded to in the *'Albion Park Rail Bypass Submissions and Preferred Infrastructure Report'* (Roads and Maritime, 2017) (SPIR). The report also assessed changes to the project from the EIS. Infrastructure Approval SSI-6678 was granted on the 30 January 2018 by the Minister for Planning.

Stage 2 of the Project is being delivered through a 'design and construct' contract. Fulton Hogan was appointed by TfNSW on 11 June 2018 to deliver the project. The main construction compound and formal site address for the project is located at 1914 Illawarra Highway, Albion Park Rail, NSW, 2527.

The Project consists of a new motorway bypassing the Albion Park Rail township from the Oak Flats Interchange to Yallah, connecting with the existing Princes Highway at the Duck Creek bridge. This project, as part of the Princes Highway upgrade, would improve traffic flow and maximise the benefits of upgrading the Princes Motorway and Princes Highway corridor between Sydney and south of Nowra.

The key features of Stage 2 of the Project include:

- two lanes in each direction divided by a median (with capacity to upgrade to three lanes in each direction in future)
- three interchanges provided at Yallah, Albion Park and Oak Flats connecting the local road network with the motorway
- bridges to carry the motorway over Duck Creek, Macquarie Rivulet and Frazers Creek
- a bridge to carry the motorway over the South Coast Rail Line
- bridges to carry the motorway over the Princes Highway and Tongarra Road
- bridges to carry local roads and ramps over the motorway
- bridges to provide improved floodwater conveyance and flood immunity
- local road changes or upgrades, including Yallah Road between Larkins Lane and Princes Highway at Yallah, the motorway replacing the existing East West Link and a new local service road which runs parallel to the motorway on the southern side, connecting the Oaks Flats interchange with Croome
- improved pedestrian and cycle connections

The replacement of directly impacted sporting facilities at the Croome Regional Sporting Complex, including sporting fields and associated amenities have been completed separately under Stage 1 of the Project and are not detailed within this report.
Further details on the project background can be sourced from the project website at (https://www.rms.nsw.gov.au/projects/albion-park-rail-bypass/index.html)

1.1 Purpose of this report

The purpose of this report is to provide a summary of the outcomes and actions obtained through the implementation of the project Compliance Tracking Program (CTP) required under the Minister's Condition of Approval (MCoA) A30.

This Construction Compliance Report provides a review of compliance for the six month period between 8 January 2021 and 7 July 2021 and satisfies Condition A31 as a Pre-Operational Compliance report with operation tentatively scheduled for late October 2021 (weather permitting), noting that the previously advised date has changed due to the Premier's construction pause enacted under NSW Public Health (COVID-19 Temporary Movement and Gathering Restrictions) Amendment (No 9) Order 2021.

MCoA A30 states:

Construction Compliance Reports must be prepared and submitted to the Secretary for information every six (6) months from the date of the commencement of works or within another timeframe agreed with the Secretary, for the duration of works. The Construction Compliance Reports must include (as applicable):

(a) a results summary and analysis of environmental monitoring;

(b) the number of any complaints received, including a summary of main areas of complaint, action taken, response given and proposed strategies for reducing the recurrence of such complaints;

(c) details of any review of, and minor amendments made to, the CEMP as a result of construction carried out during the reporting period;

(d) a register of any consistency assessments undertaken and their status;

(e) results of any environmental audits and details of any actions taken in response to the recommendations of an audit;

(f) a summary of all incidents notified in accordance with Condition A38 and Condition A41 of this approval; and

(g) any other matter relating to compliance with the terms of this approval or as requested by the Secretary.

MCoA A31 states:

A Pre-Operation Compliance Report must be prepared and submitted to the Secretary for information no later than one month before the commencement of operation (or stage of operation) or within another timeframe agreed with the Secretary. The Pre-Operation Compliance Report must include:

(a) details of how the terms of this approval that must be addressed before the commencement of operation have been complied with; and

(b) the commencement date for operation.

This report also addresses MCoA C15, which states:

The results of the Construction Monitoring Programs must be submitted to the Secretary, and relevant regulatory agencies and Relevant Council(s), for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.

The Construction Monitoring Report required under MCoA C15 is appended to this report in Appendix B.

1.2 Project Footprint



Figure 1-1: Albion Park Rail Bypass footprint and boundary

1.3 Key Project Personnel

Name	Position	Contact Details
Matthew Saviana	Fulton Hogan Project Director	[redacted]
Shannon Chisholm	Fulton Hogan Environment and Sustainability Manager	[redacted]
Jacob Cooper	Fulton Hogan Senior Environmental Engineer	[redacted]
Sam Leigh	Fulton Hogan NSW Environmental Manager	[redacted]
Peter Chudleigh	TfNSW Environment Officer	[redacted]
Warren Blacka	TfNSW Manager	[redacted]
Toby Hobbs	DPIE endorsed Environmental Representative (ER)	[redacted]

2 Construction activities during reporting period

Project works are proceeding in accordance with the construction program. During the reporting period about 40% of the days were wet days with no works being undertaken. The total rainfall received on the project was over the long term average due to extreme rainfall events in March and May 2021. Three of the six months (February, April and June) were below the average rainfall recorded on the project.

During the reporting period construction activities were at full capacity with works progressing in all construction zones. The project transitioned into a finishing stage during the reporting period where close out activities including defects, ancillary site remediation and other completions tasks occurred.

The following works have been performed during the reporting period.

2.1 Demolition and property adjustment

Property demolition works have been completed with all properties specified within the technical scope of works deconstructed. Waste from this operation has been re-used or recycled where possible.

Property adjustment works have continued with new property accesses, services, at-house noise treatments and adjustments on-going. These works will continue and are anticipated to be completed prior to operation in late October 2021.

2.2 Utilities adjustments and diversions

Key utilities that have been adjusted via diversion, realignment, or replacement include the east Australian gas main, National Broadband Network (NBN), Optus, Telstra, power supply, Sydney Water potable water reticulation, and sewage infrastructure are now complete.

2.3 Fencing

New fencing on the boundary of the project is 80 percent complete with a focus on fencing commercially operating agricultural properties and property adjustments to reduce project disruptions. The majority of the permanent fencing is complete around environmentally sensitive areas and retained vegetation within the project boundary, where the permanent fencing has not been installed temporary fencing and/or delineation is erected in accordance with the Construction Environment Management Plan (CEMP).



Figure 2-1: Permanent boundary fencing along the northbound carriageway and Frazers Creek

2.4 Traffic

In order to safely carry out works traffic speeds have been reduced to eighty kilometres per hour on the Princes Motorway, sixty kilometres per hour on the Illawarra Highway, Tongarra Road and East West Link. Speeds are also modified on the adjacent roads as required during works to ensure public and construction staff safety is maintained under strict Road Occupancy Licence (ROL) conditions. Barriers, Variable Message Sign (VMS) boards and additional signage are being used throughout the project to manage traffic safely through the construction zone.

During the reporting period Croome Road was re-opened after repairs were completed and the main alignment was opened to Illawarra Highway traffic in a temporary configuration.

Commissioning of new Traffic lights on the Oak Flats Interchange in a temporary configuration was completed in the reporting period.



Figure 2-2: Traffic using the new section of the Princes Motorway

2.5 Earthworks

Bulk earthwork activities were reduced to the cut 5 area during the reporting period where placement of final fill layers behind the commercial estate and excavation underneath Bridge 13 were completed. At the end of the reporting period approximately 2,000,000m^3 has been placed and approximately 800,000m^3 excavated across the project.



Figure 2-3: Subgrade preparation on Fill 14

2.6 Roadworks

During the reporting period road pavement construction continued on the main alignment. The final wearing course layer on the main alignment was laid from fill 11 to the northern tie in. Road pavement construction includes the placement and compaction of Heavily Bound Base (HBB) material followed by Asphalt layers.

At the end of the reporting period the final HBB placement on the main alignment was completed with approximately 380,000m^3 in total placed at the end of the reporting period, 86,000 tonnes of Asphalt laid and 630,000m^2 of Spray Seal applied.

Finishing works including concrete kerb and footpath works has commenced with 35,000 lineal metres constructed to date.



Figure 2-4: Placement of concrete strip for wire rope barriers along Fill 6



Figure 2-5: Paving the final wearing course layer on Fill 9

2.7 Drainage

Drainage works have continued during the reporting period with the focus on completing pavement drainage to ensure management of runoff as designed from the main and local road alignment into longitudinal water quality basins and swales. At the end of reporting period approximately 15,000 lineal metres of pipeline had been laid across the project.



Figure 2-6: Installation of median drainage in Cut 5

2.8 Structures

The project includes the construction of 13 new bridges which cross creeks, floodplains, local roads and side roads.

Piling works and sub-structure are complete on all bridges with 12 bridges having asphalt laid on the decks and approaches. Permanent scour works are now complete across all waterway crossings.

Construction progress at Bridge 13 is approaching the final stages of deck furniture with asphalt scheduled in the early stage of the next reporting period. The final pour of B80 specified concrete has been completed during the reporting period which totals 14,500m^3 for the project.

Installation of structural signage has continued during the reporting period across the alignment and local roads.



Figure 2-7: Bridge 13 with deck and furniture completion



Figure 2-8: Bridges 3, 4 and 5 all in their finished state with live traffic over all decks



Figure 2-9: Bridge 9 spanning over Frazers Creek Crossing 2

2.9 Landscaping

The project continued landscaping works in the reporting period, with an ongoing focus placed on progressive rehabilitation of topsoiled batters, temporary stockpile and ancillary sites. Landscape planting is programmed to be completed early in the next reporting period, prior to operation. This is assisting in reducing the construction footprint, air quality impacts from dust and reducing erosion risks to water quality. During the reporting period approximately 110,000m^2 of topsoil was stabilised through hydromulch.



Figure 2-10: Permanent hydromulching of the centre median in Fill 2



Figure 2-11: Permanent garden bed planting along Fill 9



Figure 2-12: Permanent headlight screen between northbound lanes and Croome Road Sporting Complex



Figure 2-13: Progressive stabilisation of Dapto off-ramp

2.10 Sedimentation and erosion control

The project uses a multitude of erosion and sediment controls. These include:

- Off-site water diversions
- Sediment fence
- Mulch bunds checks and filtration

- Sediment traps/check dams
- Soil binders to stabilise exposed surfaces
- The use of recycled and powdered gypsum for pre-treatment of site run-off into sediment basins

The number of sediment basins on the project reflects construction progress. The risk footprint is continually decreasing as the works progress and areas are stabilised. The project has constructed six High Efficiency Sediment (HES) Basins across the project. HES Basins allow for treatment of site water runoff to occur during rainfall as opposed to treatment post rainfall. This system allows for a quicker turn-around in reinstating sediment basin capacities.

During the reporting period there were 12 sediment basins active onsite. All of these were designed by a Certified Practitioner of Erosion and Sediment Control (CPESC) and constructed in accordance with the Landcom Manual 'Soils & Construction' (blue book). Each sediment basin is designed specific for each catchment and runoff from earthworks is diverted into these basins to ensure that site sediments are controlled within the site.

Continued reduction in the construction footprint due to progressive stabilisation has allowed the project to decommissioned 15 sediment basins with a program to decommission all basins prior to operation.



Figure 2-14: HES basin in Fill 13



Figure 2-15: Water cart used to assist in dust suppression during pavement works

With regard to sediment basin management, the project continues to work diligently at treating and discharging captured site water back into the environment as efficiently as possible and in accordance with the conditions of the project EPL.

Regular consultation with EPA regarding soil and water management has continued through the reporting period. A presentation was made to EPA demonstrating total catchment management, construction footprint reduction and the transition from construction sediment basins to operational Longitudinal Water Quality Basins (LWQBs)

2.11 Temporary works

A range of temporary works activities have been required to allow for safe and efficient construction of the Albion Park Rail bypass. Temporary waterway crossings at Duck Creek and Frazers Creek #1 enabled safe and time efficient haul roads and safe light vehicle access tracks.

Duck Creek temporary crossing was removed followed by the permanent scour rock and channel lining of the waterway in the previous reporting period. Frazers Creek #1 temporary crossing is scheduled for removal prior to operation.

3 Environmental management system overview

3.1 Environmental Management System certification

The overall Environmental Management System (EMS) for the Project is described within the CEMP and relevant sub plans. The EMS for the Project has been prepared to comply with the requirements of AS/NZS ISO 14001 Environmental Management Systems.

The Fulton Hogan EMS is periodically audited by external auditors to ensure compliance with ISO 14001. The Fulton Hogan EMS was audited in October 2020 by an external auditor which resulted in the recertification of the system.

3.2 Environmental management framework

The framework of the environmental management documents has been prepared in accordance with the requirements of ISO 14001, the Guidelines for the Preparation of an EMP (DIPNR, 2004), Transport for NSW QA Specification D&C G36, G38 and G40 and the Project approval.

The CEMP comprises relevant sections from Fulton Hogan's Corporate Management System as well as a number of supporting documents (i.e. issue specific environmental sub plans) providing more detailed environmental management specifications.

3.3 Construction Environmental Management Plan

The CEMP is the key management tool in relation to environmental performance during the design and construction phases. The CEMP outlines Fulton Hogan's approach to minimising and managing environmental risks associated with the construction phase of the project. The CEMP is a dynamic document that is reviewed and amended to incorporate additional requirements as required, including changes to the project team, organisational structure and responsibilities or as improvements to procedures and methodologies develop.

The CEMP has been prepared in accordance with a number of guidelines including:

- Guideline for the Preparation of Environmental Management Plans (DIPNR, 2004);
- RMS Specification G36 – Environmental Protection (Management Systems);
- ISO 14001:2015 – Environmental Managements Systems;
- ISO 19011:2018 – Guidelines for Quality and/or Environmental Management Systems Auditing;
- NSW Minister for Planning Conditions of Approval (MCoA);
- EIS and SPIR; and
- Environment Protection License (EPL) requirements.

The CEMP was approved by the Department of Planning and Environment (now Department of Planning, Industry and Environment) in accordance with MCoA C3 on 7 December 2018.

Detailed environmental management sub plans have been prepared on key environmental elements identified for the Project through the environmental

assessment and approval process. They document the aspects, impacts, safeguards and monitoring requirements for each key environmental element, nominate who is responsible for implementing controls and note the frequency/timing of implementation.

The CEMP and sub-plans were reviewed and endorsed by the Project ER in 2018, dates of revision for the plans are detailed in Table 3-1.

Periodic annual review of relevant Sub-plans was completed during April 2021. Based on the review, no updates to the following Sub-plans were required:

- Heritage Management Sub-plan
- Flora and Fauna Management Sub-plan
- Contaminated Land Management Sub-plan
- Waste and Energy Management

Sub-plans that required amendments based on the review were:

- Air Quality Management Sub-plan
- Noise and Vibration Sub-plan
- Soil and Water Management Sub-plan

Amendments proposed to these plans were based on the reduction in monitoring requirements dictated in each Sub-plan's Monitoring Program. These are outlined below:

- Removal of DMG 1 from the Construction air quality monitoring program
- Removal of NML9, 10 and 11 from the Construction noise monitoring program
- Removal of surface water locations SW2 and SW2DS and groundwater locations GW5 and BH318 from the Construction water quality monitoring program

Proposed reduction in monitoring requirements is based on the construction stage of the northern section of the project. It is currently operating in a temporary configuration and therefore construction related impacts are no longer likely. These sites also oppose safety risks to project personnel with sampling sites in close proximity to pubic motorists.

During the reporting period, consultation with regulatory agencies regarding the proposed amendments was completed. A new revision of these Sub-plans will be issued for approval early in the next reporting period.

Table 3-1: CEMP and sub plans consistency with MCoA

Plan Name	DPIE Approval Date	Consistent with MCOA	Latest revision date
Construction Environmental Management Plan	07 December 2018	Yes	Rev 12 December 2020

Traffic and Transport Management Sub Plan	29 November 2018	Yes	Rev 13 March 2021
Flora and Fauna Management Sub Plan	07 December 2018	Yes	Rev 11 April 2021
Noise and Vibration Management Sub Plan	07 December 2018	Yes	Rev 9 September 2020
Soil and Water Quality Management Sub Plan	07 December 2018	Yes	Rev 9 April 2020
Heritage Management Sub Plan	29 November 2018	Yes	Rev 9 April 2021
Air Quality Management Sub Plan	07 December 2018	Yes	Rev 8 February 2020
Construction Waste and Energy Management Sub Plan	12 October 2018 Note: Provided to DPIE for information only	Yes	Rev 5 April 2021
Flooding and Hydrology Management Sub Plan	21 December 2018 Note: DPIE approved for first 6 months of construction. Plan updated and resubmitted to DPIE on 12 June 2019.	Yes	Rev 12 June 2019
Contaminated Land Management Sub Plan	12 October 2018 Note: Provided to DPIE for information only	Yes	Rev 5 April 2021

3.4 Consistency assessments

There were no Consistency Assessments required during the reporting period.

3.5 Compliance auditing

Regular auditing of the management system is completed during construction. Auditing includes:

- Internal compliance audits undertaken by Fulton Hogan;
- External compliance audits undertaken by an independent auditor or TfNSW appointed auditors.

The intent of these audits is to identify opportunities for improvement and any system non-conformances during the course of construction so appropriate corrective actions can be implemented in a timely manner.

During the reporting period an Independent External audit was conducted by independent qualified environmental auditors on behalf of TfNSW on 5th May 2021. The audit focused on implementation of the Environmental Management Plan and resulted in no non-compliances (NC).

Table 3-3 summarise external audits conducted during the reporting period.

During the reporting period one internal audit was conducted by a Fulton Hogan Environmental representative, who was independent of the project. The audit was

conducted on 24th February 2021 and consisted of a review against the Project CEMP.

The audit found minor procedure changes in regards to the resubmissions of PESCP's.

Table 3-4 summarise internal audits conducted during the reporting period.

Table 3-3: Summary of Independent Verifier Audits

No.	Date	Auditor	Type	Outcomes	Status
1	May 2021	TfNSW	Independent Annually	N/A	Closed

Table 3-4: Summary of Internal Audits

No.	Date	Auditor	Type	Outcomes	Status
1	February 2021	Sam Leigh	Internal	Minor changes to procedure	Closed

3.6 Compliance Management

During the reporting period, Stage 2 works for the Albion Park Rail bypass, Fulton Hogan reported one non-compliance to the Secretary against CoA E36.

The non-compliance was for a breach in construction hours on 26 March 2021 where a small piece of equipment was left on inadvertently. The matter was rectified immediately and closed out with no further action from DPIE or EPA.

Appendix A of this report contains detailed information on the status and compliance of each specific condition for the Albion Park Rail bypass. This includes relevant information to satisfy Condition A31 regarding how the terms of approval have been addressed prior to commencement of operation.

3.7 Previous Report actions

No actions required closeout from the previous Construction Compliance Report.

3.8 Incidents

During the reporting period there was one reportable incident notified in accordance with Condition A38 and A41 of the Infrastructure approval. Refer to Section 3.6 for further information on the incident resulting in a non-compliance.

3.9 Site Contamination

In April 2019, the Department and NSW EPA were made aware of the discovery of historic illegal landfilling at Yallah during Stage 2 works and the proposed implementation of a Remedial Action Plan (RAP).

The subsequent contamination assessments are deemed to comply with the requirement for a Site Contamination Report under CoA E57. As a result of investigations, the following three reports have been produced and provided to NSW EPA:

- Stage 2 - Detailed Site Investigations (DSI) PAEC02 Cut No.1
- Stage 2 - Detailed Site Investigations (DSI) The Island Fill No.1
- Remedial Action Plan - Asbestos in Soil (ASBINS RAP), Albion Park Rail Bypass.

The ENRS Pty Ltd assessments and development of the Remedial Action Plan (RAP) referenced at CoA E57 have been overseen by an independent NSW EPA accredited Site Auditor from Cavvanba Pty Ltd.

The implementation of the RAP and statutory contaminated site audit was undertaken during a previous reporting period (08 July 2019 - 07 January 2020).

During this reporting period the Site Audit Statement (SAS) and Site Audit Report (SAR) have been completed by the independent NSW EPA accredited Site Auditor. Both the SAS and SAR was submitted to the Secretary and relevant councils on 26 February 2021.

The outcomes of the SAS and SAR have determined the site is suitable for commercial/industrial (road corridor) in compliance with the environmental management plan *"Environmental Management Plan – Asbestos in Soils Encapsulation Cell – M1 Princes Motorway Chainages 18250 to 18490"*

The SAS and SAR can be found in Appendix C.

3.10 Environmental Performance

The project implemented and maintained a high standard of environmental controls during the reporting period. Controls were planned and executed to industry best practice standards.

The project's environmental performance is reviewed and measured by Transport for NSW, the Project ER and NSW EPA.

The Project ER and TfNSW environment staff inspected the project 9 times in the reporting period due to limitations brought out by NSW Public Health Orders. Those inspections assessed the project with 9 'green' using the Transport for NSW traffic light environmental review system. According to the Transport for NSW assessment standards the green rating indicates the 'site demonstrates good environmental management with no action required to avoid environmental harm'. Fortnightly environmental site meetings including virtual onsite inspections enabled the ER to view site conditions around specific areas of potential risk.

EPA have visited site 2 times during the reporting period to review the progress of works and implementation of erosion and sediment controls. Minor issues were raised during the inspections and all stakeholders were satisfied with the way the site was progressing.

Due to COVID-19 restrictions the Environmental Review Group (ERG) meetings were held virtually on 23 March 2021 by Fulton Hogan. The project received positive feedback on the progression of the project and management of environmental compliance by all stakeholders.

3.11 Effectiveness of environmental controls

The effectiveness of environmental controls is evaluated by industry trained environmental engineers and scientists. Controls are planned prior to ground disturbance and installed before works start.

Environmental controls have been designed and installed in accordance with industry best environmental practice. External specialist consultants are engaged periodically to provide specialist reviews and provide advice if required. In addition

to this, all controls are inspected weekly as a minimum, during and after rainfall events.

Site controls are reviewed and reinforced as required in advance of predicted rainfall events. Prior to long weekends and shutdown periods extra controls are installed to make sure they are suitable for the time that workers are offsite.

Maintenance of controls occurs regularly during construction. Maintenance ensures controls are functioning properly and are fit for purpose.

In the reporting period, all erosion and sediment controls performed well during adverse weather. This minimised potential impacts on receiving catchments and adjacent sensitive receivers.

3.12 Environmental initiatives

The Albion Park Rail bypass construction team has adopted a 'Beyond Compliance' approach to the project. With the integration of Environment, Sustainability and Community Relations teams to identify both risk and opportunities to support positive environmental and community outcomes. This philosophy promotes a positive culture of excellence whereby the project aims to exceed the contract and legal requirements to create a legacy that all associated with the project will be proud of.

The 'Beyond Compliance' strategy has led to the development of goals for each construction zone to achieve during the project and helps build trust and establish relationships with the communities we work in.

During the reporting period, the 'Beyond Compliance' strategy achieved one significant result:

- Reuse of site won excess cured concrete for the shared path granular base has diverted approximately 2000 tonne of this resource from landfill



Figure 3-1: Waste concrete stockpiled ready for placement as foundation under the shared path



Figure 3-2: Processed waste concrete placed and compacted onsite

3.13 Internal and external environmental inspections

The project completes many inspections to assess environmental performance and identify improvements.

Those inspections have resulted in environmental management improvements across the project. The improvements included new erosion and sediment control installations, improved site mitigations and general site improvements.

Table 3-6 summarises the inspections completed on the project. The inspections completed are consistent with the requirements of the project documents.

Table 3-6: Inspections

Inspection type	Attendees	Number of inspections
Weekly	Fulton Hogan staff; engineers, environmental, foreman, leading hands, labourers, superintendents, management	27
Wet weather	Fulton Hogan staff; engineers, environmental, foreman, leading hands, labourers, superintendents, management	17
Environmental Representative	Toby Hobbs Fulton Hogan environmental manager	9
TfNSW	Peter Hawkins, Peter Chudleigh Fulton Hogan environmental staff	9

Inspection type	Attendees	Number of inspections
NSW EPA	Chris Kelly Fulton Hogan environmental staff	2

One environmental review group (ERG) presentation was undertaken during the reporting period via Microsoft Teams due to COVID-19. Table 3-7 lists recipients.

Table 3-7: Environmental Review Group Presentation recipients

Meeting Type	Recipients	Date
Environmental Review Group # 8 presentation	Graham Roche (TfNSW) Warren Blacka (TfNSW) Peter Hawkins (TfNSW) Peter Chudleigh (TfNSW) Jennifer Rowe (DPIE) Chris Kelly (EPA) Kym McNamara (OEH) Shannon Chisholm (Fulton Hogan) Karen Williams (Fulton Hogan) Erin Addison-Smith (Fulton Hogan) Tom Dewhurst (Fulton Hogan) Jacob Cooper (Fulton Hogan) Toby Hobbs (Vantage Environmental Management)	23 March 2021

4 Environmental monitoring

The Albion Park Rail bypass project is undertaking a range of environmental monitoring to review the environmental effects of the project. The results of these monitoring activities are used to establish trends and drive improvements where necessary.

The results of environmental monitoring conducted during the reporting period are summarised in this section. In accordance with MCoA C12 and MCoA C15 a Construction Monitoring Report has been prepared at Appendix B.

Implementation of the standard mitigation measures listed the CEMP and sub plans ensure environmental impacts are minimised during construction. Based on the available data, no modification is required to the construction methods or environmental control measures being implemented onsite.

No additional or unscheduled monitoring outside that discussed in the Construction monitoring program is currently required to determine or verify a trend in impacts to surface water, groundwater, air quality and noise and vibration.

4.1 Water quality

Water quality monitoring during the reporting period has indicated overall improvements to the catchment. The main contributor being steady rainfall increasing catchment flow and moderating temperature to provide a healthy environment for both aquatic flora and fauna.

The results from the water quality monitoring program determined no negative impacts in relation to construction although exceedances were triggered. Exceedances identified during water quality monitoring events were investigated and determined not project related.

An overview of the monitoring conducted during the monitoring period can be found in Table 4-1 below.

Table 4-1: Water quality monitoring program summary

Date of monitoring	Type of monitoring	Rainfall received prior to monitoring	Exceedances	Comments
5/01/2021*	Surface water	58-71mm	Yes, SW7 pH>7.9	Exceedance is consistent previous records
22/02/2021	Surface water	11-29mm	No	Slight increase in TSS between sites SW3US & SW3. Turbidity results and onsite review determined impacts were not construction related
25/03/2021	Surface water	207-237mm	Yes, SW3 TSS>9.4	Comparable results between upstream and downstream sites determining no construction impacts at the time of onsite review
22/04/2021	Surface water	0-2mm	Yes, SW7 pH>7.9	Exceedance is consistent previous records
10/05/2021	Surface water	62-94mm	No	Comparable TSS and pH results were recorded for upstream and downstream locations and therefore no impacts from construction considered. No Oil and Grease was visible during the monitoring event.
17/06/2021	Surface water	8-11mm	No	Comparable TSS and pH results were recorded for upstream and downstream locations and therefore no impacts from

				construction considered. No Oil and Grease was visible during the monitoring event.
23/02/2021	Groundwater	0mm	Yes •pH in GW1,2,3,4 & BH318 •EC in GW1,3,4,5 & BH318 •Temperature in all wells •Level in GW2,5 & BH318 •Metals (copper) in GW2	The concentrations were generally only marginally greater than the nominated trigger levels and associated laboratory reporting limits and are considered representative of natural groundwater quality variations rather than related to potential impacts from project construction works.
11/06/2021	Groundwater	5mm	Yes •pH in GW1,2,3,4 & BH318 •EC in GW1,3,5 & BH318 •Temperature in GW3,4,5 & BH318 •Level in GW2,5 & BH318 •Metals (copper) in GW2	All parameters were consistent with previous events apart from a reduction in electrical conductivity for GW4 and increases in dissolved metals copper and zinc for GW2. Further trend analysis of GW2 dissolved metals copper and zinc indicates fluctuations in concentration levels being proportionate to large, seasonal rainfall events.

*Surface water event 25 has been included in this reporting period as results were not received for the previous reporting period



Figure 4-1: Duck Creek upstream monitoring location



Figure 4-2: Frazers Creek downstream monitoring location showing healthy environment and the establishment of Nardoo (indigenous water lily)

4.2 Flora and fauna

During the reporting period pre-clearing inspections were undertaken with no fauna rescues or relocations related to clearing activities.

The project witnessed an increase in fauna movements over the 6 month period due to an increase in rainfall, rehabilitation of habitat from construction works ancillary to the main alignment and re-establishment of connectivity through hard and soft landscaping. There were no mortalities caused by construction during the reporting period.

Advanced landscaped areas such as Frazers Creek diversion and fill 4 wetland have continued to provide habitat for native flora and fauna within the project footprint. In both areas additional planting and coarse woody debris were installed to facilitate connectivity along the road corridor and provide maturity in the landscape.



Figure 4-3: Aerial photo **Frazers Creek diversion with advanced landscape creating habitat for native fauna**



Figure 4-4: Aerial photo **Fill 4 wetland with matured planting and native wetland seed mix with new coarse woody debris scattered along the waterways edge**

4.3 Heritage

The Construction Heritage Management Plan Unexpected Finds Procedure was not implemented during the reporting period as there was no discovery of bone or other heritage items.

Consultation has been ongoing with the Aboriginal Focus Group regarding interpretive heritage signage and booklet as well as management of artefacts salvaged pre-construction.

A Heritage Report will be prepared in accordance with Condition E32.

4.4 Air quality

The purpose of air quality monitoring during the construction phase is to determine impacts resulting from construction of the project only (i.e. road construction) and not other adjacent but unrelated sources, such as quarry or agricultural operations. The key emissions from road construction are generally dust and Particulate Matter (PM). Air quality goals relate to the total dust burden in the air and not just the dust from the Project. Because of this, there needs to be some consideration of background levels, including the two major operational quarries adjacent to the project, when using these goals to assess impacts.

Industrial emissions are the dominant source of $PM_{2.5}$ emissions in Wollongong and Shellharbour LGAs, followed by domestic–commercial emissions (notably residential wood heating). Industrial and domestic–commercial sources contribute similar amounts of $PM_{2.5}$ emissions in the Kiama LGA.

Industrial emissions are the most significant source of PM_{10} emissions, accounting for 75% to 86% of total PM_{10} emissions in the three LGAs, followed by domestic–commercial emissions, accounting for 10% to 13% of total emissions.

Dust suppression via water cart/s usage and soil stabilising polymers were ongoing during the reporting period. Progressive stabilisation techniques are also being employed on the project to minimise impacts to air quality.

The monthly dust deposition results are consistent with the anticipated impacts described in the Construction air quality monitoring program. During the reporting period, the annual averaging period levels for DMG1 and DMG Control were 2.3 g/m²/month and 0.9 g/m²/month respectively. These values show the results are below the 4 g/m²/month (Annual) anticipated maximum total deposited dust level and are consistent with pre-construction levels.

$PM_{2.5}$ and PM_{10} 24 hour particulate matter levels were greater than the criteria identified in the AQMP at various times during the current reporting period. The rolling Annual Average for this reporting period $PM_{2.5}$ for RT1 and RT2 were 0.0095mg/m^3 and 0.0003mg/m^3 respectively and for PM_{10} for RT1 and RT2 were 0.0421mg/m^3 and 0.0003mg/m^3 respectively. The recorded rolling Annual Averages are less than the criteria identified in the AQMP. The rolling Annual Average for PM_{TSP} for RT1 and RT2 is 0.0105mg/m^3 and 0.0003mg/m^3 respectively which is also well below the criteria of 0.09 mg/m^3.

It is however noted that these monitoring results were less than or consistent with recorded ambient air quality levels across the Illawarra and the Greater Metropolitan Region and, as such, the results are considered to be reflective of regional background impacts, rather than a result of construction impacts.

The air quality monitoring program did not find any results related to construction impacts during this monitoring period. Implementation of the standard mitigation measures listed in AQMP have ensured air quality impacts are minimised during construction.



Figure 4-5: Local air quality and construction footprint in June looking north from Croome Rd

4.5 Noise and vibration

Attended noise monitoring was undertaken during normal construction hours on a monthly basis and during approved out of hours works. The recorded levels were generally consistent with the anticipated levels as described in Table 7-3 of the approved Noise and Vibration Management Plan.

There were no exceedances for 15 minute attended monitoring of Construction noise levels $L(A)_{eq}$ against the trigger level identified in the monitoring program. Ongoing monitoring found that the recorded Const $L(A)_{eq}$ levels reduced to near trigger levels due to a number of factors including: a) the permanent noise attenuation barriers were constructed, b) the effectiveness of temporary noise attenuation barriers installed around work areas and c) the relocation of haul routes to relocate plant and machinery further away from sensitive receivers.



Figure 4-6: Attended noise monitoring

Attended vibration monitoring has been conducted multiple times to confirm vibration levels and on all occasions, results were within acceptable parameters established in International Standards and adopted in the approved management plan.



Figure 4-7: Attended vibration monitoring

5 Community complaints

In accordance with MCoA B6, a complaints management system has been established on the project to address any community concerns, complaints and enquiries during the course of construction.

The complaints management system details the process for receiving, managing, responding and closing out enquiries and complaints about the project.

The following facilities are available for members of the public to make a complaint or enquiry:

- A 24 hour telephone number for the registration of complaints and enquiries about the project;
- A postal address to which written complaints and enquiries may be sent;
- An email address to which electronic complaints and enquiries may be transmitted.

The staffed community display centre was open for most of the reporting period. During this time we followed social distancing, cleaning, hygiene and record keeping practices. The display centre was temporarily closed from Monday 28 June 2021, in response to COVID-19. Between January and June 2021, 22 visitors attended the display centre.


NSW GOVERNMENT

Roads and Maritime Services

Albion Park Rail Bypass

Roads and Maritime Services is planning an extension of the M1 Princes Motorway between Yallah and Oak Flats to bypass Albion Park Rail.

The NSW Government is funding the $630 million project; the bypass would complete the 'missing link' for a high standard road between Sydney and Bomaderry.

The project will provide improved road safety, ensure better traffic flow and more reliable journeys.

Survey and geotechnical investigations has commenced with major construction work expected to begin in early 2019.

Roads and Maritime has engaged Fulton Hogan to build the bypass.

For further information about the project please contact the community relations team on the details below.

BLZ152315

Visit: rms.nsw.gov.au/aprb
Email: APRbypass@fultonhogan.com.au
Call: 1800 708 727 (press 2)
Post: Albion Park Rail bypass
PO Box 1014 Albion Park Rail NSW 2527

Figure 5.1 - Advert printed in local newspapers

The project will continue to respond to and manage complaints made by stakeholders in accordance with AS-ISO 10002-2006 Complaints Handling. This system will be in place until eight weeks after the date of construction completion.

5.1 Number and types of complaints

During the reporting period 730 events were recorded in Consultation Manager including telephone calls, meetings, emails, letters, doorknocks, staffed displays and visits to the community display centre.

During the reporting period, we recorded 7 complaints. These included:

- Noise – 4 complaints
- Dust – 2 complaints
- Light spill – 1 complaints

Refer to Table 5-1 for the details of these complaints. The majority of the complaints received by the project were related to noise and dust. Mitigation measures were implemented by the project including the installation of permanent and temporary noise attenuation barriers to ensure compliance with noise levels. These noise attenuation barriers have reduced the recurrence of such complaints. The ongoing progressive stabilisation of the project and use of water carts has reduced the recurrence of such complaints.

All complaints were closed out with the complainant within the specified timeframe. No emerging trends from received complaints have been identified and no additional action is required. The community relations team will continue to respond to enquiries and complaints about the project in timely manner.

5.2 Community engagement initiatives

During the reporting period engagement continued with the wider community, road users and nearby residents continued. Some of the key engagement activities during the reporting period included:

- Community update in April 2021 was delivered to over 4,000 nearby properties
- Twenty notification letters were delivered, including the monthly OOHW notification, good neighbour notifications and general notifications were delivered to the community about work
- Eighteen emails updates to registered stakeholders were sent
- Community display centre staffed Monday to Fridays 9am – 5pm (from 8 July), with 22 visitors recorded
- Community information session was held 6 May at the Albion Park Rail bypass Training Hub, with 67 people attending
- We received 18 feedback forms from the attendees of the information session
- On Saturday 19 June TfNSW welcomed the community walk along a section of the newly completed motorway
- Presentations to Jamberoo Probus Club, Albion Park Evening VIEW Club, Blackbutt Flinders Probus Club
- Traffic Steering Committee meeting was held 5 March
- Around 68 media articles were published about the project in print and online

- Social media engagement on NSW Roads Facebook with some posts reaching over 94,000 people and a click rate of over 20 times more than the industry benchmark
- Two media events were held on 10 February and 12 April 2021
- Over 730 community interactions were recorded during the reporting period.

Table 5-1 – Complaints register

Date	Location	Type	Summary	Details	Resolution
28-Jan	[redacted]	Dust complaint	North zone. Water trucks on site frequently watering truck haul route.	Complaint received via email to TfNSW and response to be provided via email from TfNSW. No specific date or time mentioned to investigate and respond.	Project team to respond to perceived dust generation comments via TfNSW email. Water trucks used regularly in this area. All reasonable dust mitigation measures in place. Team will monitor and deploy additional control measures where applicable.
21-Feb	[redacted]	Noise complaint	North zone. Trucks loading and transporting rocks as part of notified night works in the area.	Complaint received via text message and email. Noisy works complete by 9pm. Resident advised. Follow-up phone conversation and email.	Project team completed noisy activities by 9pm. Resident satisfied that noise event was a one off
3-Mar	[redacted]	Dust complaint	South zone. General construction activities. Water trucks on site.	Complaint received via email from EPA regarding dust fallout in residential pool area. Response provided by phone call to complainant and email to EPA.	Project team investigated complaint and based on evidence gathered, there is no link between pool dust fall out and the project activities.
21-Mar	[redacted]	Light complaint	Tongarra Road. No work on site due to rain event. Time-lapse camera set up by TfNSW with lighting towers to capture footage of rain event in area.	Complaint received via phone call regarding light spill from temporary lighting tower set up and follow up phone call provided.	Lighting tower was adjusted and resident was satisfied with outcome.
26-Mar	[redacted]	Noise enquiry	South zone - near basin construction site at Grevillea. Dewatering of basin post rain event.	Enquiry received via phone call regarding whether water pump should still be running. Pump switched off before 9pm. Resident advised. Follow-up phone conversation with resident provided.	Resident satisfied with outcome.
26-Mar	[redacted]	Noise complaint	South zone - near basin construction site at Grevillea. Dewatering of basin post rain event.	Complaint received via phone call regarding noise from the pump dewatering the construction basin. Pump switched off before 9pm. Resident advised. Follow-up phone call provided.	Pump switched off before 9pm. Resident notified.

20-May	[redacted]	Noise complaint	South zone - night works at Oak Flats interchange	Complaint received via phone call regarding noise from hammering on southeast section of Oak Flats interchange. Resident's call returned and the team explained planned work in the area including weekend closure. Resident advised that some hammering was still required ahead of the June weekend shutdown and the team would carry out additional monitoring in the area.	Resident satisfied with outcome.

All complaints were closed out with the complainant within the specified timeframe. No emerging trends from received complaints have been identified and no additional action is required. The community relations team will continue to respond to enquiries and complaints about the project in timely manner.

6 Pre-Operational Requirements

As the project moves into the final stages of construction, a number of planning activities have commenced in preparation for operation as required by TfNSW and the Project Conditions of Approval. As typical of this stage of a project, the decommissioning and/or hand over of construction related infrastructure including ancillary sites, sediment basins and local accesses become a focal point of completion for the project.

Details of operational compliance tracking for all pre-operational compliance conditions specified under Condition of Approval A31 can be found in Appendix A.

6.1 Operational Environmental Management

This section addresses the progression of MCoA's D1 to D10 under Operational Environmental Management. Examples of how the project has identified certain construction activities that influences aspects of these conditions are included in this section.

An Environmental Management System (EMS) has been developed to address Condition D2 (a), (b) and (c) that is:

a) the performance outcomes, commitments and mitigation measures, made and identified in the EIS as amended by the SPIR, and these conditions of approval can be achieved

b) issues identified through ongoing risk analysis can be managed

c) procedures are in place for rectifying any non-compliance with this approval identified during compliance auditing, incident management or any other time during operation.

The EMS was submitted to the Secretary on 13 May 2021 and approved on 6 July 2021. With operation date scheduled for late October 2021 (weather permitting) the EMS submission and approval satisfies conditions D2, D3 and D8.

Due to the approval of the EMS, the operational conditions D1, D4 – D7 are not applicable to the Project.

Operational conditions D9 and D10 relate to Transport and Access and Operational Noise respectively. Although these conditions are not triggered in this period and during construction, they are based on the scope of work during the construction phase to be satisfied as compliant.

Early completions in utility relocations, property accesses and acoustic treatments and landscaping enables a fluid move into operational condition's D2, D9 and D10 compliance. Examples of the type of work that enables this are highlighted below.

6.1.1 Ancillary Site Remediation

During the reporting period the project has continued to downsize allowing for demobilisation of ancillary facilities and completion of permanent fencing and landscaping in these areas ready to be handed back to TfNSW.



Figure 6.1 – Remediated Croome Rd Minor ancillary site and AS11 during decommissioning

Decommissioning ancillary sites will continue into the next reporting period to ensure risks are aligned with the TfNSW Operational Environmental Management System when the project becomes operational.

6.1.2 Soil and Water management

Through this reporting period the construction footprint has diminished due to the continued progressive stabilisation and transition into finishing works.

Temporary construction basins have been remediated and landscaped or reconfigured into permanent and longitudinal water quality basins to support the treatment of runoff from the operational motorway and enhancement of the local receiving water bodies.



Figure 6.2– Temporary construction sediment basin being filled in with Excavated Natural Material



Figure 6.3 – Longitudinal water quality basins used as construction basins with vigorous vegetation growth prior to operation

To align water quality impacts from construction to operation a staged development of the longitudinal water quality basins has been adopted. During construction designed LWQBs were built into a temporary arrangement to fit the needs of construction and then re-constructed by removing silt and replacing with bio-filtration media and vegetation once the catchment reached a suitable stabilised area.

By working with the final design in the construction stage it has reduced the time it takes for these basins to reach a functional stage that will treat runoff from the project prior to operation.

7 Summary

This report has captured the compliance of the Albion Park Rail bypass project during the 8 January to 7 July 2021 period. It also satisfies the pre-operational requirements of CoA A31.

The project continued to demonstrate a high level of environmental management throughout the six month reporting period. The reporting period reflected a transitional change from bulk earthworks to finishing and pavement works enabling substantial reductions in construction footprint as the project moves closer to operation.

The next reporting period will capture compliance on the Albion Park Rail bypass project from 8 July to 7 January 2022 with construction completion and commencement of operation set for late October 2021 (weather permitting).

Appendix A Project Compliance Reporting Table

Appendix A - Stage 2 Conditions of Approval Compliance Table

CoA	Condition of Approval (CoA)	Applicable to Stage 2?	Project Phase applicable to Condition	Stage 2 Compliance	Evidence of Stage 2 Pre-Construction Compliance/ Notes
PART A: ADMINISTRATIVE CONDITIONS					
GENERAL					
A1	The SSI must be carried out in accordance with: (a) the description of the SSI in the EIS as amended by the SPIR; and (b) the terms of this approval.	Yes	Construction and Operation	Compliant	The terms of the project approval and environmental mitigation measures described within the EIS as amended by the SPIR are addressed within the approved CEMP and sub plans for Stage 2 construction work. Works are being implemented in accordance with the CEMP (Rev 9) approved prior to construction by the Department, 7 December 2018.
A2	The SSI must be carried out in accordance with all procedures, commitments, preventative actions, performance criteria and mitigation measures set out in the EIS as amended by the SPIR unless otherwise specified in, or required under, this approval.	Yes	Construction and Operation	Compliant	The procedures, commitments, preventative actions, performance criteria and mitigation measures set out in the EIS as amended by the SPIR have been are addressed within the approved CEMP and sub plans for Stage 2 construction work. Works are being implemented in accordance with the CEMP approved prior to construction by the Department, 7 December 2018.
A3	In the event of an inconsistency between the EIS as amended by the SPIR or any other document required under this approval, and a term of this approval, the term of this approval prevails to the extent of the inconsistency. For the purpose of this condition, there will be an inconsistency between a term of this approval and any document if it is not possible to comply with both the term and the document.	Yes	Construction and Operation	Compliant	No inconsistency identified during the reporting period.
A4	The Proponent must comply with all requirements of the Secretary in relation to: (a) the environmental performance of the SSI; (b) any document or correspondence; (c) any notification given to the Secretary under the terms of this approval; (d) any audit of the construction or operation of the SSI; (e) compliance with the terms of this approval (including anything required to be done under this approval); and (f) the carrying out of any additional monitoring or mitigation measures.	Yes	Construction and Operation	Compliant	Stage 2 works are proceeding in accordance with the management plans approved by the Department prior to construction and all requirements of the Secretary are being complied with. Approval of the noted plans was provided by DPIE as follows: - Waste and Energy Management Sub-Plan - Rev 4 submitted for information 12 October 2018 - Contaminated Land Management Sub-Plan - Rev 4 submitted for information 12 October 2018 - Heritage Management Sub-Plan - Rev 8 approved 29 November 2018 - Traffic and Transport Management Sub-Plan - Rev 11 approved 29 November 2018 - Construction Environmental Management Plan (CEMP) - Rev 9 approved 7 December 2018 - Noise and Vibration Management Sub-Plan - Rev 6 approved 7 December 2018 - Flora and Fauna Management Sub-Plan - Rev 9 approved 7 December 2018 - Soil and Water Management Sub-Plan - Rev 8 approved 7 December 2018 - Air Quality Management Sub-Plan - Rev 7 approved 7 December 2018 - Flooding and Hydrology Management Sub-Plan - Rev 11 approved 21 December 2018.
A5	In the event that there are differing interpretations of the terms of this approval, including in relation to a condition of this approval, the Secretary's interpretation is final.	Yes	Construction and Operation	Compliant	No differing interpretations identified during the reporting period.
A6	Where the terms of approval provide the Secretary the discretion to alter the requirements of the approval, the Proponent must provide supporting evidence so that the Secretary can consider the need, environmental impacts and consistency of the alteration. *Note: Inaction and/or expedience will not be supported as justifications for need unless it can be demonstrated that there will beneficial environmental outcomes.*	Yes	Construction and Operation	Compliant	The terms of the approval were altered by the Secretary as detailed in Modification of Infrastructure Approval 1, Schedule 1, 25 October 2018. The Consolidated Instrument SSI 6878 Mod 1 has been made available to the public via the project information on both the TfNSW & DPIE websites. This relates to a request for clarification of conditions E51 and E75 in relation to building and structure condition surveys and road dilapidation surveys by TfNSW, 21 August 2018. The modification included definitions in relation to the expected timing required for compliance of these conditions.
A7	Without limitation, all strategies, plans, programs, reviews, audits, report recommendations, protocols and the like required by the terms of this approval must be implemented by the Proponent in accordance with all requirements issued by the Secretary from time to time in respect of them.	Yes	Construction and Operation	Compliant	Stage 2 construction works are being managed in accordance with the terms of approval and all management plans inclusive of programs, reviews, audits and the like are proceeding in accordance with the documentation approved by the Department prior to construction. Approval of the CEMP and sub-plans are noted in CoC A1 & A4 however current revisions of the plans as approved by the Department or project ER as minor updates are as follows: - Construction Environmental Management Plan (CEMP) - Rev 12 approved 16 December 2020 by the ER - Heritage Management Sub-Plan - Rev 9 approved 16 March 2020 by the ER - Traffic and Transport Management Sub-Plan - Rev 13 approved 23 January 2020 the ER - Noise and Vibration Management Sub-Plan - Rev 9 approved 30 September 2020 by the ER - Flora and Fauna Management Sub-Plan - Rev 11 approved 20 March 2020 by the ER - Soil and Water Management Sub-Plan - Rev 9 approved 9 June 2020 by the Department - Air Quality Management Sub-Plan - Rev 8 approved 23 March 2020 by the Department - Flooding and Hydrology Management Sub-Plan - Rev 12 approved 21 June 2020 by the Department CEMP implementation is ongoing and is evidenced by annual reviews, independent audit reports and ongoing liaison with the ER regarding matters of environmental management and compliance with the approved plans.

A8	Where the terms of this approval require consultation with identified parties, details of the consultation undertaken, matters raised by the parties, and how the matters were considered, must accompany the strategies, plans, programs, reviews, audits, protocols and the like submitted to the Secretary.	Yes	Construction and Operation	Compliant	Fulton Hogan manages a database of consultation with all identified parties, including details of consultation, matters raised and how the matters were considered.
A9	This approval lapses five (5) years after the date on which it is granted, unless works for the purpose of the SSI are commenced on or before that date.	Yes	Construction and Operation	Compliant	The State Significant Infrastructure Approval SSI6878 was granted 30 January 2018, marking the commencement of the five year approval duration under Condition A9. The Secretary's approval was received for the CEMP (Rev 9) and associated documents in December 2018 and detailed in evidence supplied under CoA A4 and A7. Construction of SSI 6878 commenced 7 January 2019 as advised to the Secretary by TfNSW, 8 January 2019.
A10	The Proponent is responsible for any breaches of the conditions of this approval resulting from the actions of all persons that it invites onto any site, including contractors, sub-contractors and visitors.	Yes	Construction and Operation	Compliant	Transport for NSW (TfNSW) are responsible for compliance with all conditions of approval. TfNSW has contracted Fulton Hogan Construction (FHC) Pty Ltd to deliver Stage 2 of the Albion Park Rail bypass via a Design and Construct Project Deed. The TfNSW Deed & associated contractual specifications requires FHC to comply with, carry out and fulfil the conditions and requirements of all Approvals (whether obtained by the Contractor or TfNSW) including those conditions and requirements which TfNSW is expressly or impliedly required under the terms of the Approvals to comply with, carry out and fulfil. FHC assist TfNSW in the management of all persons on site including sub-contractors and visitors.
CROOM REGIONAL SPORTING COMPLEX					
A11	The relocation of sporting facilities and associated components of the Croom Regional Sporting Complex are not subject to Part C and Part D of this approval, subject to: (a) no works be undertaken in Precinct 7 as identified in the EIS; (b) the preparation of a Construction Environmental Management Process (Plan), in consultation with relevant government agencies and Shellharbour City Council, and endorsed by the ER under Condition A24(d). The Plan must detail how the performance outcomes, commitments, mitigation and monitoring measures specified in the EIS as amended by the SPIR will be implemented and achieved during construction; and (c) the implementation of the approved Construction Environmental Management Process (Plan).	No	Construction	Not Triggered	Not applicable to Stage 2. Refer to Stage 1 Construction Compliance and Pre-Operational Compliance Report submitted 31 May 2019.
STAGING					
A12	The SSI may be delivered and operated in stages (including in relation to works undertaken in Croom Regional Sporting Complex). Where staged delivery or operation is proposed, a **Staging Report** (for either or both delivery and operation as the case requires) must be prepared and submitted to the Secretary for information. The **Staging Report** must be submitted to the Secretary no later than one month prior to the commencement of construction of the first of the proposed stages of construction (or if only staged operation is proposed, one month prior to the commencement of operation of the first of the proposed stages of operation), or within another timeframe agreed with the Secretary.	Yes	Construction and Operation	Compliant	A Staging Report has been prepared that details how the SSI will be staged. In accordance with CoA A24d, the Staging Report was endorsed by the ER, 16 February 2018. The Staging Plan was submitted to the Secretary for information, 19 February 2018.
A13	The **Staging Report** must: (a) if staged delivery is proposed, set out how the whole of the SSI will be staged, including general details of work and other activities to be carried out in each stage and the general timing of when the delivery of each stage will commence; (b) if staged operation is proposed, set out how the operation of the whole of the SSI will be staged, including general details of work and other activities to be carried out in each stage and the general timing of when operation of each stage will commence; (c) specify the relevant conditions of approval that apply to each stage and how compliance with those conditions will be achieved across and between each of the stages of the SSI; and (d) set out mechanisms for managing any cumulative impacts arising from the proposed staging.	Yes	Construction and Operation	Compliant	In accordance with CoA A24d, the Staging Report was endorsed by the ER, 16 February 2018. The Staging Plan was submitted to the Secretary for information, 19 February 2018. The Staging Report details how the SSI will be staged, detailing relevant conditions that apply to each stage, how compliance will be achieved and how cumulative impacts will be managed.
A14	The SSI must be staged in accordance with the **Staging Report,** as submitted to the Secretary.	Yes	Construction and Operation	Compliant	Stage 2 construction work is being implemented in accordance with the Staging Report as submitted to the Secretary for information, 19 February 2018.
A15	Where staging is proposed, the terms of this approval that apply or are relevant to the works or activities to be carried out in a specific stage must be complied with at the relevant time for that stage.	Yes	Construction and Operation	Compliant	Stage 2 construction work is being implemented in accordance with the Staging Report as submitted to the Secretary for information, 19 February 2018. All terms of SSI 6878 Mod 1 approval relevant to Stage 2 works are being complied with. A general exception applies to Conditions A11, E54 and E55 which relate to Stage 1 works for "Croom Regional Sporting Complex" and Part D "Operational Environmental Management".

ANCILLARY FACILITIES					
CoA	**Condition of Approval (CoA)**	**Applicable to Stage 2?**	**Project Phase applicable to Condition**	**Stage 2 Compliance**	**Evidence of Stage 2 Pre-Construction Compliance/ Notes**
A16	Ancillary facilities that are not identified by description and location in the EIS as amended by the SPIR must meet the following criteria, unless otherwise approved by the Secretary: (a) the facility is development of a type that would, if it were not for the purpose of the SSI, otherwise be exempt or complying development; or (b) the facility is located as follows: i. at least 50 metres from any waterway unless an erosion and sediment control plan is prepared and implemented so as not to adversely affect water quality in the waterway in accordance with Managing Urban Stormwater series; ii. within or adjacent to land upon which the SSI is being carried out unless it can be demonstrated that performance criteria established in this approval can be met and that there will be a reduction in impact at other sites and a reduction in the construction program; iii. with ready access to a road network; iv. to prevent heavy vehicles travelling on local streets or through residential areas in order to access the facility, except as identified in the EIS as amended by the SPIR; v. so as to be in accordance with the Interim Construction Noise Guideline (DECC 2009) or as otherwise agreed in writing with affected landowners and occupiers; vi. so as not to require vegetation clearing beyond the extent of clearing approved under other terms of this approval except as approved by the ER as minor clearing; vii. so as not to have any impact on heritage items (including areas of archaeological sensitivity) beyond the impacts identified, assessed and approved under other terms of this approval; viii. so as not to unreasonably interfere with lawful uses of adjacent properties that are being carried out at the date upon which establishment of the facility is to commence; ix. to enable operation of the ancillary facility during flood events and to avoid or minimise, to the greatest extent practicable, adverse flood impacts on the surrounding environment and other properties and infrastructure; and x. so as to have sufficient area for the storage of raw materials to minimise, to the greatest extent practicable, the number of deliveries required outside standard construction hours.	Yes	Construction	Compliant	The Project Ancillary Facilities Management Plan (Rev 9) approved by the ER, 30 September 2020. All ancillary sites have been established in accordance with the approved AFMP which maintains compliance with CoA A16. All facilities have been assessed for compliance using the approved documentation under AFMP Appendix G and records maintained on file as evidence. During the reporting period, Fulton Hogan maintained all ancillary facilities in accordance with the AFMP. Ancillary sites are reviewed by TfNSW and the ER and are managed by Fulton Hogan in accordance with the provisions set out in the approved AFMP, CEMP and sub-plans.
A17	Before establishment of any ancillary facility, except in relation to the delivery of the Croom Regional Sporting Complex, the Proponent must prepare an **Ancillary Facilities Management Plan** which details the management of the ancillary facilities. The **Ancillary Facilities Management Plan** must be prepared in consultation with relevant government agencies and the Relevant Council(s) and submitted to the Secretary for approval one month prior its establishment. The **Ancillary Facilities Management Plan** must include: (a) a description of activities to be undertaken during construction, operational and decommissioning (including scheduling of construction); (b) a program for ongoing analysis of the key environmental risks arising from the activities described in subsection (a) of this condition, including an initial risk assessment undertaken prior to the commencement of construction of the SSI; and (c) details of how the activities described in subsection (a) of this condition will be carried out to: i. meet the performance outcomes stated in the EIS as amended by the SPIR; and ii. manage the risks identified in the risk analysis undertaken in subsection (b) of this condition.	Yes	Construction	Compliant	An Ancillary Facilities Management Plan (AFMP - Rev 7) was approved by the Secretary on 16 November 2018. The AFMP was prepared for Stage 2 works in accordance with CoA A17. The AFMP Appendix B details consultation with stakeholders and relevant agencies undertaken before establishment of any ancillary facility. The approved AFMP describes the activities undertaken during construction, operation and decommissioning and provides for the monitoring and assessment of key risks arising from use of the facilities to ensure compliance with performance outcomes set out in the EIS as amended by the SPIR. Ongoing monitoring is evidenced in weekly site environmental checklists and targeted site reviews of facilities with TfNSW and the ER.
A18	Minor ancillary facilities comprising lunch sheds, office sheds, and portable toilet facilities, that are not identified in the EIS as amended by the SPIR and which do not satisfy the criteria set out in **Condition A16** of this approval must satisfy the following criteria: (a) have no greater environmental and amenity impacts than those that can be managed through the implementation of environmental measures detailed in the CEMP required under Condition C1 of this approval; and (b) have been assessed by the ER to have: i. minimal amenity impacts to surrounding residences and businesses, after consideration of matters such as compliance with the ICNG, traffic and access impacts, dust and odour impacts, and visual (including light spill) impacts; ii. minimal environmental impact with respect to waste management and flooding; and iii. no impacts on biodiversity, soil and water, and heritage beyond those already approved under other terms of this approval.	Yes	Construction	Not Triggered	All minor ancillary facilities have been planned and established to satisfy the criteria set out in Condition A16 and assessment under CoA A18 has not been triggered during the reporting period. FHC has assessed 24 minor ancillary facilities which have been documented in accordance with the Ancillary Facilities Checklist - Appendix G of the approved AFMP (Rev 9). All minor ancillary facilities are inspected during periodic environmental inspections with TfNSW and the ER.
A19	Boundary fencing must be erected around ancillary facilities that are adjacent to sensitive receivers for the duration of construction unless otherwise agreed with the affected receiver(s).	Yes	Construction	Compliant	Boundary fencing has been erected for the ancillary sites where adjacent to sensitive receivers as part of the initial construction activities.
A20	Boundary fencing required under **Condition A19** of this approval must minimise visual, noise and air quality impacts on adjacent sensitive receivers.	Yes	Construction	Compliant	The ancillary site fencing adjacent to sensitive receivers utilises TfNSW project banner mesh which is regularly monitored and repaired as required after weather events such as high velocity winds. The banner mesh helps to minimise visual impacts, whilst other forms of fencing such as acoustic blankets attached to fencing helps reduce noise impacts to sensitive receivers. Air quality management is detailed against CoA E1.

A21	Ancillary facility AS10 must only be used for works associated with the Croom Regional Sporting Complex, and must be rehabilitated on the completion of those works. The construction access road near Swansea Farm House must be rehabilitated to its pre-construction condition, unless otherwise agreed with Shellharbour City Council.	No	Construction	Compliant	Ancillary facility AS10 is not being used for Stage 2 works. Completion of Stage 1 - construction of Croom Regional Sporting Complex was achieved in July 2019. Rehabilitation of AS10 is complete, with rehabilitation of the site compound completed in September 2019.

ENVIRONMENTAL REPRESENTATIVE					
A22	A suitably qualified and experienced Environmental Representative (ER) who is independent of the design and construction personnel must be nominated by the Proponent, approved by the Secretary and engaged for the duration of works of the SSI. Additional ERs may be engaged for the purpose of **Condition A24**, in which case the obligations to be carried out by an ER under the terms of this approval may be satisfied by any ER that is approved by the Secretary. The details of nominated ER(s) must be submitted to the Secretary for approval no later than one month prior to the commencement of works, or within another timeframe agreed with the Secretary.	Yes	Construction	Compliant	A suitably qualified experienced and independent ER has been appointed by TfNSW as follows: TOBY HOBBS Principal Vantage Environmental Management Pty Ltd PO Box 378 Albury NSW 2640 T (02) 6021 8655 M 0420 922 955 thobbs@venv.com.au Details of the nominated ER were submitted to the Secretary for approval on 31 January 2018. The ER's availability and independence was determined on 7 February 2018. The Secretary's approval of ER was received on 8 February 2018. An alternative ER will be appointed in the event that Toby Hobbs is away or unavailable. The alternative ER is: CAMERON WELLER Vantage Environmental Management Pty Ltd The details of the alternative ER were submitted to the Secretary for approval on 29 March 2018, and the Secretary' approval of the alternative ER was received on 9 April 2018.
A23	Works must not commence until an ER nominated under **Condition A22** of this approval in respect of such works has been approved by the Secretary.	Yes	Construction	Compliant	The Secretary's approval of the nominated ER and alternative ER was received on 8 February 2018 and 9 April 2018, respectively. Stage 2 construction works commenced on 7 January 2019.
A24	From commencement of works until completion of construction, the approved ER must: (a) receive and respond to communications from the Secretary in relation to the environmental performance of the SSI; (b) consider and inform the Secretary on matters specified in the terms of this approval; (c) consider and recommend any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community; (d) review all work and construction related documents required to be prepared under the terms of this approval, ensure they address any requirements in or under this approval and if so, endorse them prior to submission to the Secretary (if required to be submitted to the Secretary) or prior to implementation (if not required to be submitted to the Secretary); (e) regularly monitor the implementation of all work and construction related documents required by the terms of this approval for implementation in accordance with what is stated in the document and the terms of this approval; (f) as may be requested by the Secretary, help plan, attend or undertake Department audits of the SSI, briefings, and site visits; (g) if conflict arises between the Proponent and the community in relation to the environmental performance of the SSI, follow the procedure in the Community Communication Strategy approved under Condition B2 of this approval to attempt to resolve the conflict, and if it cannot be resolved, notify the Secretary; (h) review any draft consistency assessment that may be carried out by the Proponent, and provide advice on any additional mitigation measures required to minimise the impact of the work; (i) consider any minor amendments to be made to the CEMP, CEMP sub-plans and monitoring programs that comprise updating or are of an administrative nature, and are consistent with the terms of this approval and the CEMP, CEMP sub-plans and monitoring programs approved by the Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of this approval; (j) assess the impacts of minor ancillary facilities as required by Condition A18 of this approval; and (k) prepare and submit to the Secretary and other relevant regulatory agencies, for information, a monthly Environmental Representative Report detailing the ER's actions and decisions on matters for which the ER was responsible in the preceding month (or other timeframe agreed with the Secretary). The Environmental Representative Report must be submitted within seven (7) days following the end of each month for the duration of the delivery of the SSI, or as otherwise agreed with the Secretary.	Yes	Construction	Compliant	Evidence of the ER actively fulfilling the requirements of CoA 24 is found in various forms of documentation including formal endorsement letters and email correspondence, document reviews, fortnightly site inspection records, routine monthly reporting and consistency assessment reviews.

COMPLIANCE TRACKING PROGRAM					
CoA	**Condition of Approval (CoA)**	**Applicable to Stage 2?**	**Project Phase applicable to Condition**	**Stage 2 Compliance**	**Evidence of Stage 2 Pre-Construction Compliance/ Notes**
A25	A **Compliance Tracking Program** to monitor compliance with the terms of this approval must be prepared, taking into consideration any staging of the SSI that is proposed in a **Staging Report** submitted in accordance with **Condition A12** and **Condition A13** of the approval.	Yes	Construction and Operation	Compliant	A Compliance Tracking Program (CTP) has been prepared to monitor compliance with the terms of the approval and take into consideration staging of the SSI as proposed in the Staging Report. The CTP was endorsed by the ER on 16 February 2018, and submitted to the Secretary for information, 18 February 2018.
A26	The **Compliance Tracking Program** must be endorsed by the ER and then submitted to the Secretary for information prior to the commencement of works or within another timeframe agreed with the Secretary.	Yes	Construction and Operation	Compliant	A Compliance Tracking Program (CTP) has been prepared to monitor compliance with the terms of the approval and take into consideration staging of the SSI as proposed in the Staging Report. The CTP was endorsed by the ER, 16 February 2018 and submitted to the Secretary for information, 18 February 2018. Stage 2 construction works commenced on 7 January 2019.
A27	The **Compliance Tracking Program** in the form required under **Condition A25** of this approval must be implemented for the duration of works and for a minimum of one (1) year following commencement of operation, or for a longer period as determined by the Secretary based on the outcomes of independent environmental audits, **Environmental Representative Reports** and regular compliance reviews submitted through **Compliance Reports**. If staged operation is proposed, or operation is commenced of part of the SSI, the **Compliance Tracking Program** must be implemented for the relevant period for each stage or part of the SSI.	Yes	Construction and Operation	Compliant	The Compliance Tracking Program (CTP) has been incorporated into Section 3 of the approved CEMP under "Monitoring, Inspections and Auditing". This table is evidence of compliance tracking. This table is further utiised to support evidence of pre-operational planning, review and compliance monitoring as required under Condition A31.
CONSTRUCTION COMPLIANCE REPORTING					
A28	A **Pre-Construction Compliance Report** must be prepared and submitted to the Secretary for information no later than one month before the commencement of works or within another timeframe agreed with the Secretary. The **Pre-Construction Compliance Report** must include: (a) details of how the terms of this approval that must be addressed before the commencement of works have been complied with: and (b) the commencement date for works.	Yes	Construction	Compliant	The Pre-Construction Compliance Report (PCCR, Rev 5) was endorsed by the ER and submitted for information to the Secretary, 2 October 2018. The PCCR detailed an anticipated construction start date of 2 November 2018, however the milestone of Albion Park Rail bypass Stage 2 construction works commencement was confirmed to the Department 8 January 2019 as 7 January 2019.
A29	Works must not commence until the **Pre-Construction Compliance Report** has been submitted to the Secretary.	Yes	Construction	Compliant	The Pre-Construction Compliance Report (PCCR, Rev 5) was endorsed by the ER and submitted for information to the Secretary, 2 October 2018. Albion Park Rail bypass Stage 2 construction works commenced, 7 January 2019.
A30	**Construction Compliance Reports** must be prepared and submitted to the Secretary for information every six (6) months from the date of the commencement of works or within another timeframe agreed with the Secretary, for the duration of works. The **Construction Compliance Reports** must include (as applicable): (a) a results summary and analysis of environmental monitoring; (b) the number of any complaints received, including a summary of main areas of complaint, action taken, response given and proposed strategies for reducing the recurrence of such complaints; (c) details of any review of, and minor amendments made to, the CEMP as a result of construction carried out during the reporting period; (d) a register of any consistency assessments undertaken and their status; (e) results of any environmental audits and details of any actions taken in response to the recommendations of an audit; (f) a summary of all incidents notified in accordance with Condition A38 and Condition A41 of this approval; and (g) any other matter relating to compliance with the terms of this approval or as requested by the Secretary.	Yes	Construction	Compliant	The Construction Compliance Report # 5 (8 January - 7 July 2021) addresses the requirements of this condition inclusive of: a) Environmental monitoring; b) Complaints management; c) CEMP implementation, review and updates; d) Consistency assessment status; e) Audit results and actions implemented; f) Incident management and reporting; and g) Compliance with the terms of approval. This tracking table is evidence of compliance monitoring in accordance with CoA A30 (g).
PRE-OPERATIONAL COMPLIANCE					
A31	A **Pre-Operation Compliance Report** must be prepared and submitted to the Secretary for information no later than one month before the commencement of operation (or stage of operation) or within another timeframe agreed with the Secretary. The **Pre-Operation Compliance Report** must include: (a) details of how the terms of this approval that must be addressed before the commencement of operation have been complied with; and (b) the commencement date for operation.	Yes	Operation	Compliant	This Construction and Pre-Operation Compliance Report #5 (8 January - 7 July 2021) satisfies this condition. Date of operation is scheduled for late October 2021 weather permitting
A32	Operation (or stage of operation) must not commence until the **Pre-Operation Compliance Report** has been submitted for information to the Secretary.	Yes	Operation	Compliant	Construction and Pre-Operation Compliance Report #5 submitted 31 August 2021 prior to the date of operation as stated above in A31

AUDITING					
A33	An **Environmental Audit Program** for independent environmental auditing against the terms of this approval must be prepared in accordance with *AS/NZS ISO 19011:2014 - Guidelines for Auditing Management Systems* and submitted to the Secretary for information no later than one month before the commencement of works except in relation to the works at the Croom Regional Sporting Complex, or within another timeframe agreed with the Secretary.	Yes	Construction and Operation	Compliant	The Environmental Audit Program was endorsed by the ER and submitted to the Department, 20 September 2018. The Department provided an acknowledgement letter, 26 September 2018. Albion Park Rail bypass Stage 2 Construction works commenced, 7 January 2019.
A34	The **Environmental Audit Program**, as submitted to the Secretary**,** must be implemented for the duration of the works except in relation to the works at the Croom Regional Sporting Complex.	Yes	Construction and Operation	Compliant	Fulton Hogan acknowledges the requirements outlined within the Environmental Audit Program (EAP - Rev 4) provided to the Secretary, 20 September 2018. No independent audits was undertaken during the current reporting period.
A35	All independent environmental audits of the SSI must be conducted by a suitably qualified, experienced and independent team of experts in auditing and be documented in an **Environmental Audit Report** which: (a) assesses the environmental performance of the SSI, and its effects on the surrounding environment; (b) assesses whether the project is complying with the terms of this approval; (c) reviews the adequacy of any document required under this approval; and (d) recommends measures or actions to improve the environmental performance of the SSI, and improvements to any document required under this approval.	Yes	Construction and Operation	Compliant	Fulton Hogan acknowledges the requirements outlined within the Environmental Audit Program (EAP - Rev 4) provided to the Secretary, 20 September 2018. No independent audits was undertaken during the current reporting period. Future Audits will be undertaken every 12 months for the duration of the Stage 2 works. The independent audit team will refer to the "Independent Audit" Post Approvals Requirements guidance document (NSW DP&E, June 2018) to achieve general consistency with the Department's requirements inclusive of all components relating to CoA A35. No independent audits were scheduled during the current reporting period.
A36	The **Environmental Audit** must be carried out within 12 months of works commencing except in relation to the works at the Croom Regional Sporting Complex, and annually thereafter during the delivery of the SSI, and within 12 months of the commencement of operation and then as required by the Secretary.	Yes	Construction and Operation	Compliant	Fulton Hogan acknowledges the requirements outlined within the Environmental Audit Program (EAP - Rev 4) provided to the Secretary, 20 September 2018. Albion Park Rail bypass Stage 2 construction works commenced, 7 January 2019.
A37	The Proponent must submit a copy of the **Environmental Audit Report** to the Secretary with a response to any recommendations contained in the audit report within six (6) weeks of completing the audit, or within another timeframe agreed with the Secretary.	Yes	Construction and Operation	Compliant	No independent audits were scheduled during the current reporting period.
INCIDENT NOTIFICATION					
A38	The Secretary must be notified as soon as possible and in any event within 24 hours of any incident associated with the delivery of the SSI.	Yes	Construction and Operation	Compliant	Provisions for incident notification to the Secretary as soon as possible and in any event within 24 hours of any incident associated with the delivery of the SSI are described in the CEMP. The CEMP (Rev 9) was approved by the Secretary on 7 December 2018. One reportable incident (Non-compliance with E36) notified in accordance with Condition A38.The matter has been closed as advised by DPIE.
A39	Notification of an incident under **Condition A38** of this approval must include the time and date of the incident, details of the incident and must identify any non-compliance with this approval.	Yes	Construction and Operation	Compliant	Detailed incident reporting is submitted to the Department's Compliance Team as required.
A40	Any requirements of the Secretary or relevant government authority (as determined by the Secretary) to address the cause or impact of an incident reported in accordance with **Condition A38** of this approval, must be met within the timeframe determined by the Secretary or relevant government authority.	Yes	Construction and Operation	Compliant	Fulton Hogan and TfNSW have supplied all requested information to the Department and relevant authorities within the requested time frames. This is evidenced in emails, letters and reports to the Department and relevant authorities.
A41	If statutory notification is given to the EPA as required under the POEO Act in relation to the SSI, such notification must also be provided to the Secretary within 24 hours after the notification was given to the EPA.	Yes	Construction and Operation	Compliant	Fulton Hogan submitted a statutory notification to EPA and the secretary on the 26 February 2021 for the Site Audit Statement (SAS) and Site Audit Report (SAR) under condition E58. Copies of the SAS and SAR can be found in Appendix C of this Construction and Pre-Operation Compliance Report #5 (8 January - 7 July 2021).

PART B: COMMUNITY INFORMATION AND REPORTING					
COMMUNITY INFORMATION, COMMUNICATION AND INVOLVEMENT					
B1	A **Community Communication Strategy** must be prepared to facilitate communication between the Proponent and the community (including Relevant Council(s), adjoining affected landowners and businesses, and others directly impacted by the SSI), during the delivery of the SSI and for a minimum of 12 months following the completion of the SSI.	Yes	Construction and Operation	Compliant	A Community Consultation Strategy (CCS) has been prepared to facilitate communication between Fulton Hogan and the community. The CCS (Rev 6) was endorsed by the ER, 13 November 2018 and approved by the Secretary, 14 November 2018. The CCS describes the methods used to facilitate communication between Transport for NSW (TfNSW), Fulton Hogan, key stakeholders and the community.
B2	The Community Communication Strategy must: (a) identify people or organisations to be consulted during the delivery of the project; (b) set out procedures and mechanisms for the regular distribution of accessible information about or relevant to the SSI; (c) identify opportunities to provide accessible information regarding regularly updated site activities, schedules and milestones at each construction site; (d) identify opportunities for the community to visit construction sites (taking into consideration workplace health and safety requirements); (e) involve construction personnel from each construction site in engaging with the local community; (f) provide for the formation of issue or location-based community forums, that focus on key environmental management issues of concern to the relevant community(ies) for the SSI; and (g) set out procedures and mechanisms: i. through which the community can discuss or provide feedback to the Proponent; ii. through which the Proponent will respond to enquiries or feedback from the community; and iii. to resolve any issues and mediate any disputes that may arise in relation to the environmental management and delivery of the SSI.	Yes	Construction and Operation	Compliant	Compliance with CoA B2 is detailed as follows: (a) CCS Section 2.2 identifies key stakeholders including people, organisations and community groups to be consulted during delivery of the project. (b) CCS Section 3.2 details potential issues and impacts to the community and outlines the communication strategy adopted to address and minimise these including setting out procedures for the regular distribution of accessible information relevant to the project. (c) CCS Section 5.4 outlines activities and tools used to provide accessible information to stakeholders and the community about the project. (d) A community display centre has been established within the main site compound, and is accessible to the public to make face-to-face enquiries and/or complaints about the project. The display centre is staffed and open Monday to Fridays between 9am and 5pm (excluding public holidays). Between June 2020 and December 2020, we had 14 visitors to the display centre. (e) Construction personnel from each discipline are involved in engaging with the local community through a range of mechanisms, including providing site tours, participating in community information sessions, stakeholder presentations and community involvement activities such Planet Ark National Tree Day. (f) Due to COVID-19 no community information sessions have been held during the reporting period. (g) CCS Section 5.5.1 details the facilities established on the project through which the community may discuss or provide feedback on the project, including a toll free community information line, community email address and postal address. These facilities are included on all printed or digital communication materials sent to the community. A Complaints Management Strategy has also been prepared and approved which sets out procedures and mechanisms in place to resolve any issues or mediate disputes in relation to the environmental management and delivery of the project.
B3	The **Community Communication Strategy** must be submitted to the Secretary for approval no later than one (1) month before commencement of any works, or within another timeframe agreed with the Secretary.	Yes	Construction and Operation	Compliant	The Community Consultation Strategy for Stage 2 (CCS Rev 6) was endorsed by the ER, 13 November 2018 and approved by the Secretary, 14 November 2018. The Albion Park Rail bypass Stage 2 Construction works commenced on 7 January 2019.
B4	Work for the purposes of the SSI must not commence until the **Community Communication Strategy** has been approved by the Secretary.	Yes	Construction and Operation	Compliant	The Community Consultation Strategy for Stage 2 (CCS Rev 6) was endorsed by the ER, 13 November 2018 and approved by the Secretary, 14 November 2018. The Albion Park Rail bypass Stage 2 Construction works commenced on 7 January 2019.
B5	The **Community Communication Strategy**, as approved by the Secretary, must be implemented for the duration of the works and for 12 months following the completion of construction.	Yes	Construction and Operation	Compliant	The project team commenced implementation of the Community Consultation Strategy (CCS - Rev 3) on 14 November 2018. During the reporting period, 843 events have been recorded in the project's stakeholder database Consultation Manager, including incoming and outgoing phone calls, emails and letters; notifications and letterbox drops; door knocks; visits to the display centre; face-to-face meetings; and community information and involvement activities. Due to COVID-19, face to face communications were limited during the reporting period. Fulton Hogan acknowledge that implementation of the CCS will be ongoing until 12 months after completion of the works.

COMPLAINTS MANAGEMENT SYSTEM					
B6	A **Complaints Management System** must be prepared and submitted to the Secretary for information prior to the commencement of any works in respect of the SSI and must be implemented and maintained for the duration of works and for a minimum for 12 months following completion of construction of the SSI.	Yes	Construction and Operation	Compliant	The Complaints Management System (CMS) was submitted to DP&E for information on 19 September 2018 to address the requirements of CoA B6 and has been implemented since commencement of project activities. The CMS describes the approach adopted by the project team for handling complaints related to works associated with the project. Section 1.3 of the CMS details the scope of the complaints management system. It is anticipated that implementation of the CMS will be ongoing until 12 months after completion of the works.
B7	The **Complaints Management System** must include a **Complaints Register** to be maintained recording information on all complaints received about the SSI during the carrying out of any works associated with the SSI, and for a minimum of 12 months following the completion of construction. The Complaints Register must record the: (a) number of complaints received; (b) number of people affected in relation to a complaint; and (c) nature of the complaint and means by which the complaint was addressed and whether resolution was reached, with or without mediation.	Yes	Construction and Operation	Compliant	The Complaints Management System (CMS) Section 2.2 highlights the project's approach to recording, investigating and handling all community and stakeholder complaints relating to the project. Information about all complaints are recorded in both the project Complaints Register and stakeholder database Consultation Manager. Information contained in the register, including the number of complaints received, number of people affected and nature of the complaint/s, is summarised in a monthly report which is made available to the ER and RMS at the end of each month or as required. Both RMS and the ER are notified immediately of any complaint or issue that has the potential to attract media or political attention, or requires escalation or advice to the Department.
B8	The **Complaints Register** must be provided to the Secretary upon request, within the timeframe stated in the request.	Yes	Construction and Operation	Not Triggered	No request has been received. The ER provides a summary of complaints to the Department in the ER's monthly report submission.
B9	The following facilities must be made available within one (1) month from the date of this approval or within another timeframe agreed with the Secretary, and for 12 months following the completion of construction: (a) a 24 hour telephone number for the registration of complaints and enquiries about the SSI; (b) a postal address to which written complaints and enquires may be sent; (c) an email address to which electronic complaints and enquiries may be transmitted; and (d) a mediation system for complaints unable to be resolved.	Yes	Construction and Operation	Compliant	The Complaints Management System (CMS) Section 2.1 details the facilities in place for receiving complaints. These facilities include a toll free community information line (available 24 hours a day, 7 days a week); an email address to allow the community to transmit electronic complaints, and a postal address to send written complaints to the project team. The telephone number was established by Transport for NSW in October 2015 and is managed by Fulton Hogan during construction of the project. The telephone number will be available for the duration of the project and for 12 months following completion of construction. All enquiries, feedback and complaints are registered in the project's stakeholder database, Consultation Manager. CMS Section 2.4.1 details the project's approach to complaint escalation for complaints unable to be resolved or requiring mediation.
B10	The telephone number, postal address and email address required under **Condition B9** of this approval must be published in a newspaper circulating in the local area prior to the commencement of works and published in the same way again prior to the commencement of operation. This information must also be provided on the website required under **Condition B11** of this approval.	Yes	Construction and Operation	Compliant	In compliance with CoA B10, the project telephone number, postal address and email address were published prior to commencement of works as follows: - Wednesday 26 September 2018, Illawarra Mercury (page 23) - Wednesday 26 September 2018, South Coast Register (page 31) - Wednesday 3 October 2018, The Advertiser incorporating the Lake Times (page 26) This information is also available on the project website at rms.nsw.gov.au/aprb under 'project contact' section and is included on all printed notifications, contact cards, newsletters and written materials sent to the community. Albion Park Rail bypass Stage 2 construction works commenced on 7 January 2019. This information is set to be re-published on 31 August 2021
PROVISION OF ELECTRONIC INFORMATION					
B11	A website providing information in relation to the SSI must be established before the commencement of works and maintained during the delivery of the SSI, and for a minimum of 12 months following the completion of construction or within another timeframe agreed with the Secretary. The following up-to-date information (excluding confidential, private and commercial information) must be published and maintained on the website or dedicated pages: (a) information on the current implementation status of the SSI; (b) a copy of the documents listed in Table 2 of this approval, and any documentation relating to any modifications made to the SSI or the terms of this approval; (c) a copy of this approval in its original form, a current consolidated copy of this approval (that is, including any approved modifications to its terms), and copies of any approval granted by the Minister to a modification of the terms of this approval; (d) a copy of each statutory approval, licence or permit required and obtained in relation to the SSI; and (e) a current copy of each document required under the terms of this approval and any endorsements, approvals or requirements from the ER and Secretary, all of which must be published prior to the commencement of any works to which they relate or prior to their implementation as the case may be.	Yes	Construction and Operation	Compliant	Transport for NSW has established a website for the project (https://www.rms.nsw.gov.au/projects/albion-park-rail-bypass/index.html) Community Consultation Strategy (CCS) Section 5.4.1 outlines the approach to maintaining up to date information on the project website, including: (a) information on the current status of the project via the 'latest news' section of the website. This section is updated as required to notify the community of construction activities, project milestones and events. (b) a copy of the documents listed in Table 2, which can be found in the 'project documents' section of the website. (c) a copy of the NSW Government Infrastructure Approval SSI6878, which can be found in the 'project documents' section of the website. (d) copies of licences and permits required in relation to the project, including a link on the home page of the website to the Environment Protection Licence (EPL 21139), available on the Fulton Hogan website at www.fultonhogan.com/managementplans/albion-park-rail-bypass/ (e) a copy of each document required under the terms of approval, which can be found in the 'project documents' section of the website under 'Conditions of Approval Project Documents'.

PART C: CONSTRUCTION ENVIRONMENTAL MANAGEMENT					
C1	A **Construction Environmental Management Plan** (**CEMP**) must be prepared in accordance with the Department's *Guideline for the Preparation of Environmental Management Plans* to detail how the performance outcomes, commitments and mitigation measures specified in the EIS as amended by the SPIR will be implemented and achieved during construction.	Yes	Construction	Compliant	The CEMP was prepared in accordance with the Guideline for the Preparation of Environmental Management Plans and submitted to DP&E, 19 September 2018. Stage 2 works are proceeding in accordance with the management plans approved by the Department prior to construction and all requirements of the Secretary are being complied with. Approval of the noted plans was provided by the Secretary as follows: - Heritage Management Sub-Plan - Rev 8 approved 29 November 2018 - Traffic and Transport Management Sub-Plan - Rev 11 approved 29 November 2018 - Construction Environmental Management Plan (CEMP) - Rev 9 approved 7 December 2018 - Noise and Vibration Management Sub-Plan - Rev 6 approved 7 December 2018 - Flora and Fauna Management Sub-Plan - Rev 9 approved 7 December 2018 - Soil and Water Management Sub-Plan - Rev 8 approved 7 December 2018 - Air Quality Management Sub-Plan - Rev 7 approved 7 December 2018 - Flooding and Hydrology Management Sub-Plan - Rev 11 approved 21 December 2018 - Waste and Energy Management Sub-Plan - Rev 4 submitted as information 12 October 2018 - Contaminated Land Management Sub-Plan - Rev 4 submitted as information 12 October 2018
C2	The **CEMP** must provide: (a) a description of activities to be undertaken during construction (including the scheduling of construction); (b) details of environmental policies, guidelines and principles to be followed in the construction of the SSI; (c) a schedule for compliance auditing; (d) a program for ongoing analysis of the key environmental risks arising from the activities described in subsection (a) of this condition, including an initial risk assessment undertaken before the commencement of construction of the SSI; (e) details of how the activities described in subsection (a) of this condition will be carried out to: i. meet the performance outcomes stated in the EIS as amended by the SPIR; and ii. manage the risks identified in the risk analysis undertaken in subsection (d) of this condition; (f) an inspection program detailing the activities to be inspected and frequency of inspections; (g) a protocol for managing and reporting any: i. incidents; and ii. manage the risks identified in the risk analysis undertaken in subsection (d) of this condition; (h) procedures for rectifying any non-compliance with this approval identified during compliance auditing, incident management or at any time during construction; (i) a list of all the CEMP Sub-plans required in respect of construction, as set out in Condition C4. Where staged construction of the SSI is proposed, the CEMP must also identify which CEMP Sub-plan applies to each of the proposed stages of construction; (j) a description of the roles and environmental responsibilities for relevant employees and their relationship with the ER; (k) for training and induction for employees, including contractors and sub-contractors, in relation to environmental and compliance obligations under the terms of this approval; and (l) for periodic review and update of the CEMP and all associated plans and programs.	Yes	Construction	Compliant	The CEMP (Rev 9) was approved by the Secretary, 7 December 2018. The approved management plans provide all information required by CoA C2 as set out below: C2a) CEMP Sections 2.1, 2.3, 2.4 C2b) CEMP Sections 3.1.2, 3.1.2, 3.1.4 C2c) CEMP Section 3.7.3 C2d) CEMP Sections 3.1.1, 3.1.2, 3.1.5, 3.7, Appendix A2 C2e) CEMP Sections 3.1.1, 3.1.2, 3.1.4, 3.1.5, Appendix A2, Appendices B1-B9 (CEMP sub-plans) C2f) CEMP Section 3.7.1 C2g) CEMP Sections 3.6, 3.8 C2h) CEMP Section 3.8 C2i) CEMP Section 4 C2j) CEMP Section 3.2 C2k) CEMP Section 3.4 C2l) CEMP Sections 1.6, 3.10. Revision 10 of CEMP was updated and approved by the ER in August 2019 as minor updates.
C3	The **CEMP** must be endorsed by the ER and then submitted to the Secretary for approval no later than one (1) month before the commencement of construction or within another timeframe agreed with the Secretary.	Yes	Construction	Compliant	The CEMP was submitted to DPIE (formally DP&E), 19 September 2018. The CEMP (Rev 9) was endorsed by the ER, 5 December 2018. The Secretary approved the CEMP (Rev 9), 7 December 2018. Stage 2 construction works commenced on 7 January 2019. This is evidenced in formal letters to the Department, 8 January 2019 and in email correspondence.
C4	The following **CEMP Sub-plans** must be prepared in consultation with the relevant government agencies identified for each **CEMP Sub**-plan and be consistent with the **CEMP** referred to in **Condition C1.** **Table 3: CEMP Sub-plan Consultation Requirements** | | Required CEMP Sub-plan | Relevant government agencies to be consulted for each CEMP Sub-plan | |---|---|---| | a) | Traffic and transport | Relevant Council(s) | | b) | Noise and vibration | EPA | | c) | Fauna and Flora | OEH and DPI Fisheries | | d) | Soil and water | EPA and DPI Water and Fisheries | | e) | Heritage | OEH, Relevant Council(s), Registered Aboriginal Parties | | f) | Flooding and Hydrology | OEH and Relevant Council(s) |	Yes	Construction	Compliant	The CEMP and Sub-plans have been prepared in consultation with relevant government agencies and was approved by the Secretary as detailed under CoA C1. CEMP Section 1.3 identifies a list of Agencies or representatives who contributed to the preparation of the CEMP during the consultation period. Consultation was sought from: - Wollongong City Council - Shellharbour City Council - NSW Environment Protection Authority (EPA) - NSW Office of Environment and Heritage (OEH) - NSW Department of Primary Industries Fisheries - NSW Department of Primary Industries Water (formerly NSW Office of Water) - Registered Aboriginal Parties. This is evidenced in Appendix A5 of the approved CEMP which includes all details of the stakeholders input during preparation of the CEMP and sub-plans.

C5	The **CEMP Sub-plans** must state how: (a) the environmental performance outcomes identified in the EIS as amended by the SPIR as modified by these conditions will be achieved; (b) the mitigation measures identified in the EIS as amended by the SPIR as modified by these conditions will be implemented; (c) the relevant terms of this approval will be complied with (in particular Part E of this approval); (d) the identification of the relevant environmental specific training and induction processes for construction personnel; and (e) issues requiring management during construction, as identified through ongoing environmental risk analysis, will be managed.	Yes	Construction	Compliant	The approved CEMP Sub-plans have been approved by the Secretary as they provide relevant information regarding implementation throughout the sub-plans as required by CoA C5. Specific references are set out below: **Sub-plan** **AQMP** **SWMP** **NVMP** **FFMP** **HMP** **TTMP** **FHMP** **C5 (a)** Section 2.4 Section 2.4 Section 2.4 Section 2.4 Section 2.4 Section 2.3 Section 2.4 **C5 (b)** Section 6 Section 6 Section 8 Section 6 Section 6 Section 4 Section 6 **C5 (c)** Section 3.3 Section 3.2 Section 3.2 Section 3.2 Section 3.2 Section 4.3 Section 3.2 **C5 (d)** Section 7.2 Section 7.2 Section 9.2 Section 7.2 Section 7.2 Section 25 Section 7.2 **C5 (e)** Section 5 Section 5 Section 6 Section 4.1 Section 5 Section 21 Section 5
C6	The **CEMP Sub-plans** must be developed in consultation with relevant government agencies identified in **Table 3** of **Condition C4** of this approval. Where an agency(ies) request(s) is not included, the Proponent must provide the Secretary justification as to why. Details of all information requested by an agency to be included in a **CEMP Sub- plan** as a result of consultation**,** including copies of all correspondence from those agencies, must be provided with the relevant **CEMP Sub-Plan**.	Yes	Construction	Compliant	The CEMP Sub-plans have been prepared in consultation with relevant government agencies and was approved by the Secretary as detailed under CoA C1. CEMP Section 1.3 identifies a list of Agencies or representatives who contributed to the preparation of the CEMP during the consultation period. Consultation included: - Wollongong City Council (WCC) - Shellharbour City Council (SCC) - NSW Environment Protection Authority (EPA) - NSW Office of Environment and Heritage (OEH) - NSW Department of Primary Industries Fisheries - NSW Department of Primary Industries Water (formerly NSW Office of Water) - Registered Aboriginal Parties. This is evidenced in Appendix A5 of the approved CEMP which includes all details of the stakeholders input during preparation of the CEMP and sub-plans.
C7	Any of the **CEMP Sub-plans** may be submitted to the Secretary for approval along with, or subsequent to, the submission of the **CEMP** but in any event, no later than one (1) month before commencement of construction.	Yes	Construction	Compliant	The CEMP sub-plans were approved by the Secretary as below: - Heritage Management Sub-Plan - Rev 8 approved 29 November 2018 - Traffic and Transport Management Sub-Plan - Rev 11 approved 29 November 2018 - Noise and Vibration Management Sub-Plan - Rev 6 approved 7 December 2018 - Flora and Fauna Management Sub-Plan - Rev 9 approved 7 December 2018 - Soil and Water Management Sub-Plan - Rev 8 approved 7 December 2018 - Air Quality Management Sub-Plan - Rev 7 approved 7 December 2018 - Flooding and Hydrology Management Sub-Plan - Rev 11 approved 21 December 2018 - Waste and Energy Management Sub-Plan - Rev 4 submitted for information 12 October 2018 - Contaminated Land Management Sub-Plan - Rev 4 submitted for information 12 October 2018 Stage 2 construction works commenced on 7 January 2019. No works were conducted that influenced potential flooding or hydrology impacts for more than one month after approval of the FHMP. This is evidenced in the construction program, site inspection notes, photographic records, EWMS preparation and "Works around Waterways" workshop documentation which occurred with relevant agencies, 8 March 2019.
C8	Construction must not commence until the **CEMP** and all **CEMP Sub-plans** have been approved by the Secretary. The **CEMP** and **CEMP Sub-plans**, as approved by the Secretary, including any minor amendments approved by the ER must be implemented for the duration of construction. Where the SSI is being staged, construction of that stage is not to commence until the relevant CEMP and sub-plans have been approved by the Secretary, unless otherwise agreed by the Secretary.	Yes	Construction	Compliant	Albion Park Rail bypass Stage 2 construction works commenced, 7 January 2019. Stage 2 works are proceeding in accordance with the management plans approved by the Department prior to construction and all requirements of the Secretary are being complied with. Approval of the CEMP and sub-plans are noted in CoC C7 however current revisions of the plans as approved by the Department or project ER as minor updates are as follows: - Construction Environmental Management Plan (CEMP) - Rev 11 approved 30 September 2020 by the ER - Heritage Management Sub-Plan - Rev 9 approved 16 March 2020 by the ER - Traffic and Transport Management Sub-Plan - Rev 13 approved 23 January 2020 the ER - Noise and Vibration Management Sub-Plan - Rev 9 approved 30 September 2020 by the ER - Flora and Fauna Management Sub-Plan - Rev 11 approved 20 March 2020 by the ER - Soil and Water Management Sub-Plan - Rev 9 approved 9 June 2020 by the Department - Air Quality Management Sub-Plan - Rev 8 approved 23 March 2020 by the Department - Flooding and Hydrology Management Sub-Plan - Rev 12 approved 21 June 2020 by the Department CEMP implementation is ongoing and is evidenced by annual reviews, independent audit reports and ongoing liaison with the ER regarding matters of environmental management and compliance with the approved plans.

CONSTRUCTION MONITORING PROGRAMS					
C9	The following **Construction Monitoring Programs** must be prepared in consultation with the relevant government agencies identified for each **Construction Monitoring Program** to compare actual performance of construction of the SSI against performance predicted performance: **Table 4: Construction Monitoring Program Consultation Requirements** a) Air Quality — EPA b) Groundwater — DPI Water c) Surface Water — EPA and DPI Fisheries d) Noise — EPA	Yes	Construction	Compliant	The requirements of the Construction Monitoring Programs (CMPs) noted in CoA C9 Table 4 were approved by the Secretary, 7 December 2018. During preparation of the CMPs, consultation was sought from: - NSW Environment Protection Authority (EPA) - NSW Department of Primary Industries Water (formerly NSW Office of Water) - NSW Department of Primary Industries Fisheries This is evidenced in Appendix A5 of the approved CEMP which includes all details of the stakeholders input during preparation of the CEMP, sub-plans and CMPs.
C10	Each **Construction Monitoring Program** must provide: (a) details of baseline data available; (b) details of baseline data to be obtained and when; (c) details of all monitoring of the project to be undertaken; (d) the parameters of the project to be monitored; (e) the frequency of monitoring to be undertaken; (f) the location of monitoring; (g) the reporting of monitoring results; (h) procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and (i) any consultation to be undertaken in relation to the monitoring programs.	Yes	Construction	Compliant	The requirements of the Construction Monitoring Programs (CMPs) noted in CoA C10 were approved by the Secretary, 7 December 2018. The CEMP Sub-plans identify the monitoring program requirements of CoA C10 as outlined in Section 3.7.2 of the CEMP (Rev 9). CMPs have been incorporated into the respective CEMP sub-plan as follows: - Air quality monitoring is detailed in CEMP Appendix B6 (AQMP - Appendix A) - Ground Water Monitoring is detailed in CEMP Appendix B4 (SWMP - Appendix B) - Surface Water Monitoring is detailed in CEMP Appendix B4 (SWMP - Appendix B) - Noise Monitoring is detailed in CEMP Appendix B3 (NVMP - Section 9.3).
C11	The **Construction Monitoring Programs** must be developed in consultation with relevant government agencies as identified in **Table 4** of **Condition C9** of this approval and must include, to the written satisfaction of the Secretary, information requested by an agency to be included in a **Construction Monitoring Programs** during such consultation. Details of all information requested by an agency including copies of all correspondence from those agencies, must be provided with the relevant **Construction Monitoring Program**.	Yes	Construction	Compliant	The CMPs have been incorporated in the relevant CEMP Sub-plans as permitted by CoA C16. CMP consultation with relevant government agencies identified in CoA C9 Table 4 was undertaken as part of CEMP consultation, recorded in Appendix A5 of the CEMP (Rev 9). The CEMP, Sub-plans inclusive of CMPs were approved by the Secretary, 7 December 2018.
C12	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Secretary for approval at least one (1) month before the commencement of construction or within another timeframe agreed with the Secretary.	Yes	Construction	Compliant	The ER first endorsed the respective CEMP sub-plans inclusive of CMPs as follows: - Air quality monitoring program - CEMP Appendix B6 (AQMP Rev 7): 5 December 2018 - Ground Water Monitoring program - CEMP Appendix B4 (SWMP Rev 8): 5 December 2018 - Surface Water Monitoring program - CEMP Appendix B4 (SWMP Rev 8): 5 December 2018 - Noise Monitoring program - CEMP Appendix B3 (NVMP Rev 6): 13 November 2018 Minor amendments were made to the CNVMP and endorsed by the ER 13 December 2018. The CEMP was submitted to the Department, 19 September 2018 and The CEMP Sub-plans and CMPs noted above were approved by the Secretary, 7 December 2018. Albion Park Rail bypass Stage 2 construction works commenced, 7 January 2019.
C13	Construction must not commence until the Secretary has approved all of the required **Construction Monitoring Programs**, and all relevant baseline data for the specific construction activity has been collected.	Yes	Construction	Compliant	The CEMP Sub-plans and CMPs noted in CoA C9 Table 4 were approved by the Secretary, 7 December 2018. Albion Park Rail bypass Stage 2 construction works commenced, 7 January 2019. Relevant baseline data has been collected and is evidenced in monitoring records and relevant monitoring reports.
C14	The **Construction Monitoring Programs**, as approved by the Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period as set out in the monitoring program or specified by the Secretary, whichever is the greater.	Yes	Construction	Compliant	Stage 2 works are proceeding in accordance with the management plans approved by the Secretary prior to construction and all requirements of the CMP are being complied with. Environmental monitoring data is being recorded, reviewed and reported monthly. This is evidenced in monitoring records and relevant monitoring reports . This Construction Compliance Report # 5 (8 January - 7 July 2021) Appendix B - Construction Monitoring Report demonstrates implementation as required by CoA C14 and A30.
C15	The results of the **Construction Monitoring Programs** must be submitted to the Secretary, and relevant regulatory agencies and Relevant Council(s), for information in the form of a **Construction Monitoring Report** at the frequency identified in the relevant **Construction Monitoring Program**.	Yes	Construction	Compliant	Stage 2 works are proceeding in accordance with the management plans approved by the Secretary prior to construction and all requirements of the CMP are being complied with. Environmental monitoring data is being recorded, reviewed and reported. This Construction Compliance Report # 5 (8 January - 7 July 2021) includes the necessary information for construction monitoring reporting requirements under CoA C15 and is incorporated as Appendix B within the CCR for the same reporting period.
C16	Where a relevant **CEMP Sub-plan** exists, the relevant **Construction Monitoring Program** may be incorporated into that **CEMP Sub-plan.**	Yes	Construction	Compliant	The relevant CMP has been incorporated into the appropriate CEMP Sub-plan. The CEMP Sub-plans and CMPs noted in CoA C9 Table 4 were approved by the Secretary, 7 December 2018.

PART D: OPERATIONAL ENVIRONMENTAL MANAGEMENT					
OPERATIONAL ENVIRONMENTAL MANAGEMENT					
D1	An **Operational Management Plan (OEMP)** must be prepared in accordance with the Department's *Guideline for the Preparation of Environmental Management Plans* to detail how the performance outcomes, commitments and mitigation measures made and identified in the EIS as amended by the SPIR will be implemented and achieved during operation. This condition (**Condition D1**) does not apply if **Condition D2** of this approval applies.	Yes	Operation	Not Triggered	Not applicable as Condition D2 applies.
D2	An **OEMP** is not required for the SSI if the Proponent has an **Environmental Management System** (**EMS**) or equivalent as agreed with the Secretary, and can demonstrate, to the written satisfaction of the Secretary at least one (1) month prior to the commencement of operation or within another timeframe agreed with the Secretary, that through the **EMS**: (a) the performance outcomes, commitments and mitigation measures, made and identified in the EIS as amended by the SPIR, and these conditions of approval can be achieved; (b) issues identified through ongoing risk analysis can be managed; and (c) procedures are in place for rectifying any non-compliance with this approval identified during compliance auditing, incident management or any other time during operation.	Yes	Operation	Not Triggered	TfNSW has an Environmental Management System and has submitted it to the Secretary to seek the Secretary's written satisfaction that it achieves (a), (b) and (c) of this condition. Approval from the Secretary was received on 6 July 2021
D3	The **OEMP** or **EMS** or equivalent as agreed with the Secretary, must be submitted to the Secretary for information no later than one (1) month before the commencement of operation or within another timeframe agreed with the Secretary.	Yes	Operation	Not Triggered	TfNSW has made a submission to the Secretary regarding use of the EMS with sufficient time to achieve this timeframe.
D4	Where an **OEMP** is required, the Proponent must include the following **OEMP Sub-plans** in the **OEMP**: Table 5: OEMP Sub-plan Consultation Requirements a) Noise and vibration — EPA b) Soil and Water — EPA, DPI Water and Fisheries c) Traffic and Transport — Relevant Council(s) d) Flooding — OEH and Relevant Council(s)	Yes	Operation	Not Triggered	Not applicable as Condition D2 applies.
D5	Each of the **OEMP Sub-plans** must include the information set out in **Condition D2** of this approval.	Yes	Operation	Not Triggered	Not applicable as Condition D2 applies.
D6	The **OEMP Sub-plans** must be developed in consultation with relevant government agencies as identified in **Table 5** of **Condition D4.** Where an agency(ies) request(s) is not included in an OEMP sub-plan, the Proponent must provide to the Secretary justification as to why**.** Details of all information requested by an agency to be included in an **OEMP Sub-plan** as a result of consultation**,** including copies of all correspondence from those agencies, must be provided with the relevant **OEMP Sub-Plan**.	Yes	Operation	Not Triggered	Not applicable as Condition D2 applies.
D7	The **OEMP Sub-plans** must be submitted to the Secretary as part of the **OEMP.**	Yes	Operation	Not Triggered	Not applicable as Condition D2 applies.
D8	The **OEMP** or **EMS** or equivalent as agreed with the Secretary, as submitted to the Secretary and amended from time to time, must be implemented for the duration of operation and the **OEMP** or **EMS** must be made publicly available prior to the commencement of operation.	Yes	Operation	Not Triggered	The Secretary has provided written satisfaction in D2 on 6 July 2021, the EMS Manual has been made publically available on the projects website prior to commencement of operation.
OPERATIONAL MONITORING PROGRAM					
Transport and Access					
D9	Within 12 months and 5 years of the commencement of operation of the SSI, or within another timeframe agreed to by the Secretary, the Proponent must prepare a **Road Network Performance Report** to confirm the operational traffic impacts of the project on surrounding roads and intersections. The review must be carried out in consultation with the Relevant Councils, and include: (a) an updated traffic analysis, including traffic modelling if required, of movements on the surrounding road network; (b) an assessment of the level of service at key intersections and sections of the road network; (c) mitigation measures to manage any actual or predicted traffic performance impacts; and (d) a comparison of the pre-construction and post construction road network performance for all road users. The assessment must be based on actual traffic counts, and take into consideration the Tripoli Way and Yallah Road projects, should they be operational, and the Illawarra Highway Corridor Strategy should it be adopted by RMS, during the review periods. The Road Network Performance Report must be submitted to the Secretary and Relevant Council(s) for information within 60 days of its completion or as otherwise agreed by the Secretary, and made publicly available. The Proponent is responsible for the implementation of the identified measures under Condition D9(c). Note: Identified mitigation measures may need to be further assessed under the Environmental Planning and Assessment Act, 1979. Works will need to meet relevant design standards and be subject to independent road safety audits.	Yes	Operation	Not Triggered	TfNSW recognises this requirement and will ensure it is complied with. Not yet triggered within current reporting period.

Operational Noise					
D10	Within 12 months of the commencement of operation of the SSI, except for the Croom Regional Sporting Complex, or as otherwise agreed by the Secretary, the Proponent must undertake monitoring of operational noise to compare actual noise performance of the SSI against the noise performance predicted in the review of noise mitigation measures required by **Condition E46.** The Proponent must prepare an Operational Noise Compliance Report to document this monitoring. The Report must include, but not necessarily be limited to: (a) noise monitoring to assess compliance with the operational noise levels predicted in the review of operational noise mitigation measures required under Condition E46; (b) a review of the operational noise levels in terms of criteria and noise goals established in the NSW Road Noise Policy 2011; (c) methodology, location and frequency of noise monitoring undertaken, including monitoring sites at which SSI noise levels are ascertained, with specific reference to locations indicative of impacts on sensitive receivers; (d) details of any complaints and enquiries received in relation to operational noise generated by the SSI between the date of commencement of operation and the date the report was prepared; (e) any required recalibrations of the noise model taking into consideration factors such as noise monitoring and actual traffic numbers and proportions; (f) an assessment of the performance and effectiveness of applied noise mitigation measures together with a review and if necessary, reassessment of mitigation measures; and (g) identification of additional measures to those identified in the review of noise mitigation measures required by Condition E46, that would be implemented with the objective of meeting the criteria outlined in the NSW Road Noise Policy 2011, when these measures would be implemented and how their effectiveness would be measured and reported to the Secretary and the EPA. The Operational Noise Report must be submitted to the Secretary and the EPA within 60 days of completing the operational noise monitoring or as otherwise agreed by the Secretary, and made publicly available.	Yes	Operation	Not triggered	TfNSW recognises this requirement and will ensure it is complied with. Not yet triggered within current reporting period.

PART E: KEY ISSUE CONDITIONS					
AIR QUALITY					
E1	In addition to the performance outcomes, commitments and mitigation measures specified in the EIS as amended by the SPIR, all feasibly and reasonably practicable measures must be implemented to minimise the emission of dust and other air pollutants during works and operation of the SSI.	Yes	Construction	Compliant	Management of air quality impacts is addressed in the CEMP Air Quality Management Sub-plan (rev8) as approved by the Secretary, 23 March 2020. All reasonable and feasibly practicable measures are being implemented during the stage 2 works, inclusive of traditional dust suppression techniques such as water carts and the use of enhanced erosion controls including application of soil binding polymers and progressive stabilisation of earthworks which significantly reduces dust emissions. This is evidenced in site inspection records, ER site inspection notes, EPA inspection notes and through air quality monitoring records.
AVIATION					
E2	The SSI must be delivered and operated to comply with the Code 2 (Runway 08/26) and Code 3 (Runway 16/34) OLS for the Illawarra Regional Airport, except as provided for under Condition E3 and Condition E7.	Yes	Detailed design	Compliant	Code 2 & Code 3 compliance is detailed in the Aviation Management Plan (AMP - Rev 7) inclusive of Method of Working Plan in Sections 2.4, 5 and 6.1.5. Compliance with Code 2 and Code 3 within the detailed design is specifically detailed in specialist reports as follows: - OLS Intrusion Aeronautical Study, Final Report, Albion Park Rail (Doc. Ref. APR-JJR-AR-01-RPT-0001, Revision 2 dated 02 April 2019 was prepared in consultation with CASA, Air Services Australia (AsA), Shellharbour City Council, the Illawarra Regional Airport and Transport for NSW. The report was endorsed by the ER 8 April 2019. - Technical Note No 31 "Intrusions into the OLS" documents compliance in regard to the locations and heights of all obstacle intrusions into the Obstacle Limitation Surface (OLS) across the design of the Albion Park Rail bypass (Stage 2). The OLS design has been modelled in detail using design software and approval by Shellharbour City Council (SCC) / Illawarra Regional Airport of the surface provided by Airport Surveys, 09 October 2018 was received by email, 14 October 2018.
E3	An **Aviation Method of Working Plan** must be developed for the Illawarra Regional Airport by an appropriately qualified expert in aviation safety in consultation with the airport operator. The Plan must provide details of any proposed works that may impact on airport operations and events. The plan must include: (a) identification of works likely to cause a hazard to or impact on aircraft and airport operations including but not limited to, intrusions into the Code 2 (Runway 08/26) and Code 3 (Runway 16/34) OLS, dust and debris, wildlife hazards, lighting and light spill, glare and reflection, and impacts from plant and equipment on aviation infrastructure (such as communication, navigation and surveillance facilities and structures); (b) identification and consultation with appropriate operators of impacted aviation infrastructure and instrument flight procedures at the airport, and known flight scheduling; (c) procedures to ensure that the runways can operate when required; (d) procedures to ensure impacts resulting in the closures or restriction of operations at either runway are limited to a duration considered reasonable in consultation with the airport operator; (e) mitigation measures for the management of those impacts and hazards to aircraft and airport operations from works; and (f) monitoring of the effectiveness of mitigation measures to ensure impacts and hazards to aircraft and airport operations is managed at all times throughout the works. The Plan must be must be made publicly available prior to the commencement of any works that impact the operation of the Illawarra Regional Airport or within two weeks of any update to the Plan.	Yes	Construction	Compliant	An Aviation Method of Working Plan for the Illawarra Regional Airport (IRA) has been prepared in consultation with IRA Manager, by a qualified expert in aviation safety. This is evidenced in monthly meeting minutes, acceptance of the plan by IRA 22 October 2018 and in Aviation Management Plan (AMP) Section 3.2. The Aviation Management Plan incorporating the Method of Working Plan was endorsed by the ER, 17 December 2018. Compliance with CoA E3 is detailed as follows: E3(a): AMP Section 6.1; Method of Working Plan (MoWP) Section 3; OLS Intrusion Aeronautical Study, Final Report, Albion Park Rail (Doc. Ref. APR-JJR-AR-01-RPT-0001, Revision 2 dated 02 April 2019; and Technical Note No 31 "Intrusions into the OLS". E3(b): AMP Section 3.2 E3(c): MoWP Section 3.1.7 E3(d): MoWP Sections 3 and 4 E3(e): MoWP Sections 3 and 4 E3(f): MoWP Sections 6.3 Compliance with CoA E3 is evidenced in email correspondence, minutes of meetings, inspections records and records of NOTAMS issued by IRA. The AMP (Rev 7, Aug 2020) and MoWP was updated and endorsed by the ER during the previous reporting period.
E4	Should any works have the potential to interfere with aircraft operations, CASA, ASA, the Airport Operator and aircraft operators must be advised at least two weeks in advance of such works. All appropriate notices as may be required of these stakeholders including **Notices to Airmen (NOTAM)**, must be prepared and received 3 days prior to the carrying out of the works.	Yes	Construction	Compliant	The requirements of CoA E4 are detailed in the Aviation Management Plan (AMP - Rev 7) inclusive of Method of Working Plan in Sections 3.3, 3.4, 6.1.5, 7.1, 7.2 and the Method of Working Plan required under CoA E3. Fulton Hogan has a dedicated management resource to regularly consult with the Illawarra Airport Manager with at least 2 weeks forward advice of works that may represent potential for interaction with aircraft. The IRA Manager determines if a NOTAM is required. Evidence is demonstrated in regular emails and formal NOTAM review meeting minutes with SCC / IRA and records of NOTAMS issued by IRA.
E5	Works must not impede the running of the Wings Over Illawarra Air Show (nominally the first weekend of May (12:00 am Thursday to 11:59 pm Sunday)). This includes the full operation of Runway 16/34 for the duration of the Air Show. Consultation must be undertaken with Shellharbour City Council to address this matter at least two weeks prior to the Air Show.	Yes	Construction	Not Triggered	The Wings Over the Illawarra Air Show was cancelled due to COVID-19 restrictions during reporting period. Fulton Hogan will ensure compliance with CoA C5 through consultation with the Illawarra Regional Airport (IRA) Manager and Shellharbour City Council (SCC) during the next reporting period if the revised Air Show goes ahead.

E6	All lighting associated with works (including outside standard construction hours) and operation of the SSI, including lighting associated with the Croom Regional Sporting Complex, must comply with Section 9.21 of the *Manual of Standards Part 139 – Aerodromes* (as updated from time to time) and the *National Airports Safeguarding Framework Guideline E 'Managing the Risk of Distraction to Pilots from Lighting in the Vicinity of Airports."*	Yes	Detailed design and Construction	Compliant	Compliance with CoA E6 is detailed in the Aviation Management Plan (AMP - Rev 7) inclusive of Method of Working Plan in Sections 5 and 7.2. Consideration of CoA E6 identified constraints such as lighting intensity, light pole heights and luminaire upcast angle for all temporary and permanent lighting design as detailed within the ITS and Street Lighting Report (Rev 4), 12 April 2019. A specific MOS 129 assessment has been detailed in Section 3.4.7 and includes photometric testing results such as intensity and elevation angles. Additionally the OLS Intrusion Aeronautical Study Figure 26 identifies the IRA lighting zones and photometric test results for the road lighting which were reviewed to confirm compliance of the proposed fittings with MOS Part 139 Section 9.2.1 .
E7	Where an intrusion into the Code 2 (Runway 08/26) and Code 3 (Runway 16/34) OLS is unavoidable during operation of the SSI, an **OLS Intrusion Aeronautical Study** for each intrusion must be prepared by an appropriately qualified expert in aviation safety. Each Study must identify all intrusions height and location information, assess risks to ongoing aviation safety and demonstrate how these risks will be satisfactorily managed.	Yes	Detailed design	Compliant	The OLS Intrusion Aeronautical Study, Final Report, Albion Park Rail (Doc. Ref. APR-JJR-AR-01-RPT-0001, Revision 2 dated 02 April 2019 was prepared in consultation with and provided to CASA, Air Services Australia (AsA), Shellharbour City Council, the Illawarra Regional Airport and Transport for NSW. This study has assessed current, designed and future airspace potential intrusions inclusive of shielding associated with road infrastructure (including bridges & temporary traffic intrusions), ITS and street lighting, signage line marking and road furniture, utilities such as mobile phone towers and overhead power lines, landscaping, fencing, and miscellaneous structures. The report was endorsed by the ER 8 April 2019.
E8	Vegetation and landscaping other than groundcover within the road reserve must not intrude into the Code 2 (Runway 08/26) and Code 3 (Runway 16/34) OLS.	Yes	Detailed design and Construction	Compliant	The OLS Intrusion Aeronautical Study, Final Report, Albion Park Rail (Doc. Ref. APR-JJR-AR-01-RPT-0001, Rev 2, 02 April 2019 recognises landscaping constraints in relation to compliance with CoA E8. OLS restrictions have been considered in the landscape design for the project and are illustrated in the cross sections in Chapter 5 of the Urban Design & Landscape Character Strategy, 20 December 2018. The design response has been either to limit the presence of trees or the scale of trees in most cases. During construction, Fulton Hogan regularly consults with Illawarra Regional Airport regarding OLS compliance as evidenced in emails, meeting minutes, risk assessments and safe work method statements.
E9	Mitigation measures described in section 4 of the Albion Park Rail Bypass SPIR, Appendix B Addendum Aviation Assessment, September 2017, Hyder Cardno Joint Venture, must be implemented, except as required by this approval.	Yes	Detailed design and Construction	Compliant	The OLS Intrusion Aeronautical Study, Final Report, Albion Park Rail (Doc. Ref. APR-JJR-AR-01-RPT-0001, Rev 2, 02 April 2019 is consistent with the requirements of CoA E9 and E10. Mitigation measures relevant to Stage 2 APRB are addressed in Tale 2 of the Aviation Management Plan (AMP - Rev 5) inclusive of Aviation Method of Working Plan (MOWP) required under CoA E3. This is evidenced in detailed design reports referred to in CoAE8 and in emails, meeting minutes, MOWP, NOTAMs, risk assessments and safe work method statements.
E10	During detailed design, any amendments to structures identified in the *Albion Park Rail Bypass SPIR, Appendix B Addendum Aviation Assessment, September 2017, Hyder Cardno Joint Venture,* will require further windshear and turbulence assessment in accordance with the NASF Guideline B 'managing the Risk of Building Generated Windshear and Turbulence at Airports. This additional assessment must be undertaken in consultation with CASA, Shellharbour City Council and the Airport Operator.	Yes	Detailed design	Compliant	The OLS Intrusion Aeronautical Study, Final Report, Albion Park Rail (Doc. Ref. APR-JJR-AR-01-RPT-0001, Revision 2 dated 02 April 2019 was prepared in consultation with CASA, Air Services Australia (AsA), Shellharbour City Council and the airport operator. The report was endorsed by the ER 8 April 2019. The document is consistent with the requirements of Condition E7 (and associated requirements under conditions E2, E6, E8, E9 and E10). Windshear and turbulence assessment compliance is detailed in Table 1 and Table 2 under "design compliance" in the report detailed in Table 20. Further details are provided in Section O of the report.

BIODIVERSITY					
E11	The Proponent must offset impacts to the Plant Community Types and Endangered Population specified in the *Albion Park Rail, Biodiversity Addendum, ngh environmental, December 2017,* in accordance with the requirements of the *NSW Biodiversity Offsets Policy for Major Projects* (OEH, 2014), *the Framework for Biodiversity Assessment 2014* , or as otherwise agreed by the Secretary in consultation with OEH.	Yes	Construction	Not Triggered	Transport for NSW recognises this requirement and will ensure it is complied with.
E12	The Proponent must submit a progress report to the Secretary which identifies offsets required and evidence that they are achievable, or alternatively provide details on how the offset requirements will be met using the Biodiversity Conservation Fund. This report must be provided to the Secretary for information prior to any impacts on vegetation communities and the Eastern Flame Pea endangered population, except those within the Croom Regional Sporting Complex.	Yes	Construction	Compliant	A Biodiversity Offset Progress Report was endorsed by the ER, 22 June 2018 and was submitted to the Secretary, 22 June 2018.
E13	Within 24 months of the submission of the progress report (as required under **Condition E12**), or as otherwise agreed by the Secretary, the Proponent must finalise and submit to the Secretary for approval, a **Biodiversity Offset Package**. The Package must be prepared in consultation with OEH and confirm how the impacts of the SSI will be offset. The Package must be consistent with the biodiversity offset strategy requirements of the *NSW Biodiversity Offsets Policy for Major Projects* (OEH, 2014), unless otherwise agreed by OEH. The Package must include, but not necessarily be limited to: (a) details on the biodiversity credits (including number and type) identified to offset the impacts of the SSI and evidence that they be attained and secured in accordance with the NSW Biodiversity Offsets Policy for Major Projects (OEH, 2014); and (b) for offsets not secured through the retirement of biodiversity credits, details on how offset requirements will be met.	Yes	Construction	Compliant	Transport for NSW submitted the Biodiversity Offset Package to the Department on the 22 June 2020. TfNSW has been consulting with DPIE since the submission of the BOP in order to reassess the credit obligation from the project due to a reduction in the areas of cleared vegetation. It is envisaged that an updated BOP will be prepare and resubmitted during the next reporting period.
E14	Should supplementary measures be proposed, the Package must also provide details on: (a) the management and monitoring requirements for compensatory habitat works and other biodiversity offset measures proposed to ensure that outcomes of the package are achieved, including: i. the monitoring of condition of species and ecological communities at offset (including translocation) locations, ii. the methodology for the monitoring programs(s), including the number and location of offset monitoring sites, and the sampling frequency at these sites, iii. provisions for the annual reporting of the monitoring results to the Department, OEH and the public for a set period of time, as determined in consultation with OEH, and iv. timing and responsibilities for the implementation of the supplementary measures; and (b) processes and/or measures that would be implemented to ensure that any land offsets are protected and managed in perpetuity. The supplementary measures must be implemented by the Proponent according to the timeframes set out in the Biodiversity Offset Package.	Yes	Construction	Not Triggered	Transport for NSW recognises this requirement and will ensure it is complied with.
E15	All required offsets must be secured in consultation with the OEH, within 12 months of the approval of the Biodiversity Offset Package or within another timeframe agreed with the Secretary. The Proponent must submit to the Secretary a copy of the credit retirement report issued by the OEH once the offsets are retired, within one month of receiving the report.	Yes	Construction	Not Triggered	Transport for NSW recognises this requirement and will ensure it is complied with.
E16	During vegetation clearing, timber and root balls must be retained for reuse in habitat enhancement and rehabilitation work. The retained timber and root balls may be used on or off the SSI site. The Proponent must consult with community and Landcare groups and government agencies to determine if retained timber and root balls can be used for environmental rehabilitation projects, before pursuing other disposal options.	Yes	Construction	Compliant	Management of root balls for reuse within the project as habitat enhancement and rehabilitation works is addressed in the CEMP Flora and Fauna Management Sub-plan. During the reporting period, implementation of the FFMP has resulted in many examples of coarse woody debris reused in the landscape, in open forest and riparian zones. This is evidenced in site photos, emails and ER monthly reports. Fulton Hogan has also provided government agencies, community and Landcare groups with the opportunity to utilise timber or root balls for off site rehabilitation works. This is evidenced in email offers to Wollongong City Council, Shellharbour City Council, NSW Local Land Services, NSW OEH, NSW EPA, NSW DPI Fisheries, NSW Office of Water, NSW TAFE, Illawarra Local Aboriginal Land Council and Landcare Illawarra.

FLOODING AND HYDROLOGY					
E17	The design of the motorway must achieve a 100 year ARI flood immunity (minimum) for the extent of the SSI, except for the low point south of the existing Duck Creek bridge which must achieve a 50 year ARI flood immunity.	Yes	Detailed design	Compliant	The development of the detailed design for drainage considers hydraulic analysis as documented the Flooding and Scour Assessment Report (FSAR - Rev 3). The FSAR was endorsed by the ER 4 February 2019 and issued to the Department for information, 4 February 2019. The FSAR details consideration of CoA E17 at Table 7 and Sections 3.5.6, 3.7.6 and 3.8.5. Compliance with CoA E17 is further demonstrated in flood figures provided in the FSAR Appendices A, B, C and D.
E18	Where the flood model(s) of the Duck Creek or Macquarie Rivulet or Horsley Creek floodplains have been updated and made available to the Proponent by the Relevant Council(s) and prior to the commencement of each stage of construction, the Proponent must undertake further flood modelling of the SSI. The flood models must be operated by experienced flood modellers and be consistent with the policies and practices of the Relevant Council(s).	Yes	Detailed design	Not Triggered	Transport for NSW have not been provided with updated flood models for the specific floodplains.
E19	The design of the detention basins adjacent to the new East-West Link Road must maintain (or increase) the flood immunity of the existing East West Link Road and ensure that the flood consequence category (risk to downstream residents) of the new basin (including hazards associated with dam-break) is not increased.	Yes	Detailed design	Compliant	Compliance with CoA E19 is documented in the Flooding and Scour Assessment Report (FSAR - Rev 3) Table 7 and Section 3.8. Key design conformance checks are provided at Section 3.8.5. The FSAR was endorsed by the ER 4 February 2019 and issued to the Department for information, 4 February 2019. The design of the detention basins adjacent the new East West Link Road is also evidenced in the FSAR Appendix I, Detailed Design Technical Note 7 - Dams Safety Assessment, which provides analysis on the safe design and dam failure risks of Croom Road and Green Meadows detention basins.
E20	The Proponent must consult the Shellharbour City Council and the Dam Safety Committee in the design of the new Green Meadows Basin and if required, the basin bounded by Croom Road, the motorway and the East West Link Road.	Yes	Detailed design	Compliant	Evidence of consultation with the Dam Safety Committee (DSC) and Shellharbour City Council (SCC) is provided at Section 6 of the FSAR (Rev 3). The FSAR design considerations are detailed at Section 3.8.1 for Croom Road detention basin and at Section 3.8.2 for Green Meadows detention basin. Compliance with CoA E20 is evidenced in email correspondence, transmittals, project design group meeting minutes and meeting minutes between the project and SCC, 30 January 2019 "Update on Design and Opportunity to Raise Concerns or Issues."
E21	The Proponent must ensure the detailed design of the SSI is undertaken in consultation with the Shellharbour City Council and not impact any of the recommendations of the Horsley Creek Floodplain Risk Management Study and Plan (FRMS&P) 2017, except as described in the EIS as amended by the SPIR.	Yes	Detailed design	Compliant	The development of the detailed design for drainage considered hydraulic analysis as documented the Flooding and Scour Assessment Report (FSAR - Rev 3). The FSAR details consideration of CoA E21 compliance at Table 7 and Sections 3.8.3 - 3.8.5. This is evidenced in email correspondence, transmittals, project design group meeting minutes and meeting minutes between the project and SCC, 30 January 2019 "Update on Design and Opportunity to Raise Concerns or Issues."
E22	Prior to construction commencing (except works related to Croom Regional Sporting Complex), the Proponent must undertake an assessment of the flood access into and out of Albion Park, including areas of frequent inundation in the vicinity of Taylors Road and the Illawarra Highway, Tongarra Road and East West Link. The assessment must be prepared in consultation with Shellharbour City Council and must demonstrate that the SSI does not reduce flood access to Albion Park more than as described in the EIS as amended by the SPIR.	Yes	Detailed design	Compliant	The development of the detailed design for drainage considered hydraulic analysis as documented the Flooding and Scour Assessment Report (FSAR - Rev 3). The FSAR details consideration of CoA E22 compliance at Table 7, Section 3.9 and Figure 32. Evidence of consultation with Shellharbour City Council (SCC) is provided at Section 6 of the FSAR and in email correspondence, transmittals, project design group meeting minutes and meeting minutes between the project and SCC, 30 January 2019 "Update on Design and Opportunity to Raise Concerns or Issues."
E23	Measures identified in the EIS, as amended by the SPIR, to maintain or improve flood characteristics must be incorporated into the detailed design of the SSI. The incorporation of these measures into the detailed design must be reviewed and endorsed by a suitably qualified and experienced person in consultation with directly affected landowners, OEH, SES and Relevant Council(s). The review must be documented and provided to the Secretary, OEH, SES and Relevant Council(s) prior to construction commencing in areas affected by increased flooding impacts. For any construction stages where detailed design starts later than 12 months from the date of this approval or otherwise agreed by the Secretary, the flood modelling must incorporate updated flood modelling undertaken under Condition E18.	Yes	Detailed design	Compliant	The development of the detailed design for drainage considered hydraulic analysis as documented in the Flooding and Scour Assessment Report (FSAR - Rev 3). Measures identified in the EIS and SPIR to maintain or improve flood characteristics have been incorporated and refined in the detailed design. As a consequence there are no areas of increased flooding impacts modelled associated with the Stage 2 detailed design. The FSAR details consideration of CoA E23 compliance at Table 7 and Sections 3.9, 3.5.4, 3.7.1 and 3.7.2. The FSAR was endorsed by the ER 4 February 2019 and issued to the Department for information, 4 February 2019. The FSAR Section 6 details consultation with relevant Councils, OEH and SES. Additional consultation with individual affected landowners was not required because the detailed design modifications did not result in any increased flooding impacts in comparison to impacts identified in the EIS and SPIR.
E24	For Properties 1, 2 and 3 (identified in Technical Paper 3 of the EIS, as amended by Volume 3 of the SPIR) the measures identified in environmental management measure HF06 must be completed prior to construction commencing in areas affected by increased flooding impacts, unless otherwise agreed by the Secretary.	Yes	Construction	Compliant	Compliance with CoA E24 is detailed in the Flooding and Scour Assessment Report (FSAR - Rev 3) Table 7 and Sections 3.5.4, 3.7.1 and 3.7.2. The REMM HF06 is described in Table 3-2. Prior to commencement of construction of Stage 2 works, 7 January 2019, detailed flood modelling of potential impacts to properties 1, 2 and 3 was performed during detailed design development. The flood model assessments are presented in Figures 16, 20 and 21. Additional environmental management measures are not required because the detailed design modifications have not resulted in any increased flooding impacts in comparison to impacts identified in the EIS and SPIR.

E25	Flood information including flood reports, models and geographic information system outputs, and work as executed information from a registered surveyor certifying finished ground levels and the dimensions and finished levels of all structures that have been constructed for the SSI within the flood prone land, must be provided to the OEH, SES and Relevant Council(s). The OEH, SES and Relevant Council(s) must be notified in writing that the information is available no later than three (3) months following the completion of construction. Information requested by the OEH, SES or Relevant Council(s) must be provided no later than six months following the completion of construction and be provided with that information or within another timeframe agreed with the OEH, SES or Relevant Council(s).	Yes	Construction	Not Triggered	Stage 2 is presently under construction, howeverTfNSW recognises this requirement and will ensure it is complied with.

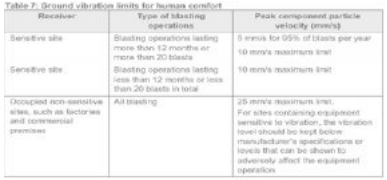
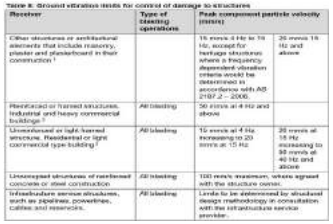
HERITAGE					
E26	Impacts to heritage, unless approved, must be avoided and minimised. Where impacts are unavoidable, works must be undertaken in accordance with the Construction Heritage Management Sub Plan required by **Condition C4 (e),** except those within the Croom Regional Sporting Complex.	Yes	Construction	Compliant	No unapproved impacts to heritage items have occurred during the reporting period. Compliance with CoA E26 has been achieved through design development, careful construction planning, exclusion fencing and project staff education and is evidenced in site photos, records, inspection notes and ER monthly reports. An updated Aboriginal Heritage Information Management System (AHIMS) search was conducted, 23 December 2018 prior to construction commencement and found that no new Aboriginal heritage items had been identified since the EIS and SPIR heritage assessments. Heritage aspects and impacts are addressed in the CEMP Heritage Management Sub-plan (HMP- Rev 8) approved by the Secretary, 29 November 2018. Implementation of the HMP has resulted in a number of approved impacts being avoided or reduced through design refinements and careful construction planning. This is evidenced by avoiding all impacts to Aboriginal heritage area YTOF AS05 and significantly reducing impacts to non-Aboriginal heritage areas such as Boles Meadows and the Swansea dairy heritage curtilage. Heritage items are also detailed in the approved CEMP (Rev 9) Appendix A6, Sensitive Area Plan, approved by the Secretary 7 December, 2018. The mapped sensitive areas have been identified and protected through high visibility flagging and signage as "Environmental Protection Areas" in accordance with Environmental Work Method Statement 006 "Early Installation of Environmental Protection Measures".
E27	This approval does not allow the Proponent to harm, modify, or otherwise impact human remains uncovered during the construction and operation of the SSI.	Yes	Construction	Compliant	Compliance with CoA E27 is maintained through implementation of the Unexpected Heritage Finds and Human Remains Procedure at Appendix A of the CEMP Heritage Management Sub-plan (HMP- Rev 8) approved by the Secretary, 29 November 2018. Awareness of this procedure has been promoted through targeted toolbox training in areas of known sensitivity for possible historic Aboriginal burials, such as Macquarie Rivulet. CoA E27 compliance is evidenced by filed photographs, site inspections, reports and emails between the Fulton Hogan, RMS, NSW OEH and NSW Police following the discovery of bone fragments on site.
E28	The Proponent must implement the mitigation measures described in: (a) Tables 11 and 12 of the Albion Park Rail Bypass SPIR, Appendix G Addendum Statement of Heritage Impact, September 2017; and (b) Table 6 and section 7.0 of the Albion Park Rail Bypass Project PACHCI Stage 3, Aboriginal Cultural Heritage Assessment Report, Report to HCJV, October 2015. except as required by this approval.	Yes	Construction	Compliant	Implementation of the mitigation measures referred to by CoA is ongoing and in accordance with the approved Heritage Management Sub-plan (HMP - Rev 8), approved by the Secretary, 29 November 2018. In relation to **CoA E28 (a)**, Fulton Hogan has consulted with the project archaeologist, TfNSW, the ER and the NSW Heritage Council via NSW OEH regarding implementation of mitigation measures proposed in Table 12 - ID No's HH02 and HH03 of the SPIR Appendix G Addendum Statement of Heritage Impact (Artefact, Sept 2017). - In satisfying HH02, the project archaeologist had limited success in conducting archival recording of the existing Boles Meadows homestead due to partial resistance from the homeowner. This has been recorded in the report "Boles Meadows Homestead and Terrys Meadows Homestead Archival Recording 18 December 2018". - In satisfying HH03, on 27 February 2019, the Heritage Council advised that the project archaeologist's proposed excavation and salvage methodology was deemed appropriate and pre-construction archaeological works proceeded at the site of the former Tongarra Rd Homestead. A report was produced and submitted to the Heritage Council, 25 March 2019. - Archaeological investigations are yet to take place adjacent to the Illawarra Highway at the Boles property and if permission is granted by the property owner, Fulton Hogan anticipate completing the works in a future reporting period. In relation to **CoA E28 (b)**, Fulton Hogan is managing compliance through the implementation of the mitigation measures identified in Table 6-1 of the HMP.
E29	The Aboriginal culturally sensitive area associated with the Macquarie Rivulet area directly adjoining the construction footprint must be protected for the duration of works.	Yes	Construction	Compliant	Implementation of the mitigation measures referred to by CoA is ongoing and in accordance with the approved Heritage Management Sub-plan (HMP - Rev 8), approved by the Secretary, 29 November 2018. The culturally sensitive areas of Macquarie Rivulet adjacent to the site have been protected through installation of temporary steel fencing, high visibility flagging and signage. The areas have been designated "Environmental Protection Areas" in accordance with Environmental Work Method Statement 006 "Early Installation of Environmental Protection Measures" and project Sensitive Area Plan, Appendix A6 of the approved CEMP (Rev 9). These measures are regularly inspected by the site Environment Team, TfNSW and the ER to ensure ongoing compliance with CoA E29 and are evidenced in site photos, inspection records and ER reports.

E30	Salvage of sites YTOF AS 4 and YTOF AS 5 must be undertaken in accordance with the salvage methodology described in Section 6 of *Albion Park Rail Bypass Project PACHCI Stage 3, Aboriginal Cultural Heritage Assessment Report, Report to HCJV, October 2015* .	Yes	Construction	Compliant	Impacts have been avoided to YTOF AS05 and the area has been protected through the installation of permanent rural fencing. It is further identified as a sensitive area with high visibility flagging and signage stating "Environmental Protection Area - Keep Out" in accordance with Environmental Work Method Statement 006 "Early Installation of Environmental Protection Measures". Impacts to YTOF AS04 could not be fully avoided during detailed design. In accordance with the Aboriginal Cultural Heritage Assessment Report (Oct 2015), the project archaeologist undertook representative sampling with Aboriginal participants across 29 square metres of the site. These works were conducted under the guidance of Environmental Work Method Statement 005 "Aboriginal Artefact Salvage Works" endorsed by the ER 4 December 2018. During salvage, compliance with CoA E30 was verified during inspections of YTOF AS4 hand excavations and sieving by the ER, TfNSW and representatives of NSW OEH. Further evidence is recorded in site inspection notes, photos, emails and the December 2018 ER report.
E31	Following completion of all salvage works required under **Condition E30**, the Proponent must prepare a **Heritage Report** in accordance with any guidelines and standards required by the Heritage Council of NSW, OEH or Registered Aboriginal Parties (as relevant).The Report must provide details of any archival recording, further historical research either undertaken or to be carried out, and archaeological excavations (with artefact analysis and identification of a final repository for finds) carried out for the SSI.	Yes	Construction	Compliant	Compliance with CoA E31 is ongoing as not all final consultation has been completed. A lithic analysis was conducted on all salvaged artefacts and a report was produced entitled "Salvage Excavation Program for Aboriginal Site YTOF AS4" (February 2019). NSW OEH has been provided a copy of the draft report and the draft has also been issued to all Registered Aboriginal Participants. The report was presented to the Aboriginal Focus Group (AFG) at AFG Meeting 2 during the current reporting period and consultation regarding community wishes around care and potential repatriation of the salvaged materials was briefly discussed and and a feedback form was distributed to allow preferences as to where retrieved cultural material would be stored during construction. Further discussions on preferences will occur at the next AFG.
E32	The **Heritage Report** must be submitted to the Secretary, and for Aboriginal heritage to the OEH or Registered Aboriginal Parties (as relevant), and for non-Aboriginal heritage to the OEH the Relevant Council and local Historical Society, for information no later than 12 months after the completion of the work referred to in **Conditions E26** to **E31** or within another timeframe agreed by the Secretary.	Yes	Construction	Not Triggered	Compliance with CoA E32 is ongoing. Fulton Hogan anticipate providing all relevant reports as required under CoA E32 within 12 months after completion of the relevant works. TfNSW are liasiing with the Project AFG and local Aboriginal Land Council regarding post construction management of salvaged artefacts. It is anticipated that more information will be available regarding the repatriation and final management of artefacts salvaged as part of the pre-construction archeaological excavation at AS4 within the next reporting period. Upon confirmation of the activity status as final, the AHIMS database will be updated and a report will be provided to the Department, OEH and registered Aboriginal parties. Non-Aboriginal heritage reports will be provided to the Department, NSW OEH (Heritage Council), TfNSW, the appropriate local Council and local Historical Society (as relevant) withing 12 months of completion of works.
E33	Prior to conducting acoustic treatment at any heritage item, the advice of a suitably qualified and experienced built heritage expert must be obtained and implemented, to ensure any such work does not have an adverse impact on the heritage significance of the item	Yes	Construction	Compliant	A number of properties that are listed within either the Wollongong or Shellharbour Local Environmental Plans for local heritage significance have been identified during the assessment of properties that may qualify for acoustic treatment. Where landowner approval was granted, these properties have been assessed by suitably qualified and experienced built heritage specialists. Where it is determined that operational noise impacts warrant at house treatment, Fulton Hogan has been liaising with the property owners, acoustic consultants and heritage specialists to ensure measures specified are appropriate for implementation such that they are assessed to not have an adverse impact on the heritage significance of the item.
E34	An **Unexpected Heritage Finds and Human Remains Procedure** must be prepared to manage unexpected heritage finds in accordance with any guidelines and standards prepared by the Heritage Council of NSW or OEH. The Procedure must undertake consultation with the RAPs in the event that previously unidentified Aboriginal heritage is discovered. The Procedure must be prepared by a suitably qualified and experienced heritage specialist in consultation with OEH and or the Heritage Council of NSW and submitted to the Secretary for information no later than one month prior to the commencement of works or within another timeframe agreed with the Secretary.	Yes	Construction	Compliant	Compliance with CoA E34 is evidenced in the project Unexpected Heritage Finds and Human Remains Procedure at Appendix A of the CEMP Heritage Management Sub-plan (HMP- Rev 8) approved by the Secretary, 29 November 2018. Stage 2 construction works commenced on 7 January 2019. During development of the procedure, use of the guidance provided in the RMS Unexpected Heritage Items Heritage Procedure 02 (Nov, 2015) was supported by NSW OEH, endorsed by the ER, 29 June 2018 and provided to the Department 9 July 2018. Consultation with OEH is recorded in Appendix of the CEMP (Rev 9) approved by the Secretary 7 December 2018
E35	The **Unexpected Heritage Finds and Human Remains Procedure**, as submitted to the Secretary, must be implemented for the duration of works. *Note: Human remains that are found unexpectedly during works are under the jurisdiction of the NSW State Coroner and must be reported to the NSW Police immediately* .	Yes	Construction	Compliant	In accordance with the requirements of CoA E35, the Unexpected Heritage Finds and Human Remains Procedure has been implemented on every occasion that site workers have encountered bone fragments, potential artefacts or relics. During the reporting period, the procedure was not implemented as no Unexpected finds were discovered. The project Archaeologist was present at the time of the discovery. CoA E35 compliance is evidenced by photographs, site inspections, reports and emails between the Fulton Hogan, TfNSW, NSW OEH and NSW Police following the discovery of bone fragments, potential artefacts or relics on site.

NOISE AND VIBRATION					
Standard Construction Hours					
E36	Works must only be undertaken during the following construction hours: (a) 7:00am to 7:00pm Mondays to Fridays, inclusive; (b) 8:00am to 5:00pm Saturdays; and (c) at no time on Sundays or public holidays.	Yes	Construction	Non-Compliant	Working hours are detailed in the CEMP Noise and Vibration Management Sub-Plan (Rev 6) approved by the Secretary, 7 December 2018. These working hours are promoted through the site induction and referred to in all public information notifications and associated collateral. Works performed outside of these hours are conducted in compliance with the NSW EPA Environment Protection Licence 21139 as permitted by CoA E38 (e). An update to the construction working hours was introduced by the Planning Minister through the Environmental Planning and Assessment (COVID-19 Development – Construction Work Days) Order 2020. During the reporting period one incident was reported to the Department as a non-compliance against CoA E36. This matter and mitigating circumstances were reviewed by the Department April 2021.
E37	Except as permitted by an EPL, activities resulting in impulsive or tonal noise emissions must only be undertaken: (a) between the hours of 8:00 am to 6:00 pm Monday to Friday; (b) between the hours of 8:00 am to 1:00 pm Saturday; and (c) in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block. For the purposes of this condition, 'continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work the subject of this condition.	Yes	Construction	Compliant	Working hours are detailed in the CEMP Noise and Vibration Management Sub-Plan (Rev 6) approved by the Secretary, 7 December 2018. The requirement of CoA E37 is detailed in the NVMP Chapter 8 and mitigation measure NVMM26. The NVMP are informed and guided by the Interim Construction Noise Guidelines (NSW DECC, 2009) in relation to impulsive or tonal noise management. Any works performed outside of these hours are conducted in compliance with the NSW EPA Environment Protection Licence 21139 as permitted by CoA E38 (e).
E38	Notwithstanding **Condition E36,** works associated with the SSI may be undertaken outside the specified hours in the following circumstances: (a) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or (b) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or (c) where it causes LAeq(15 minute) noise levels: i. no more than 5 dB(A) above the rating background level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009), and ii. no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses, and iii. continuous or impulsive vibration values at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), and iv. intermittent vibration values at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006), or (d) no more than 15dBA above the night time rating background level at any residence during the night time period, when measured using the LAeq(1 minute) noise descriptor; or (e) where different hours are permitted or required under an EPL in force in respect of the works, in which case those hours must be complied with.	Yes	Construction	Compliant	Working hours are detailed in the CEMP Noise and Vibration Management Sub-Plan (NVMP - Rev 6) approved by the Secretary, 7 December 2018. The working hours referred to in CoA E36 are promoted through the site induction and referred to in all public information notifications and associated collateral. In accordance with CoA E38(e) the NVMP Appendix C "Out of Hours Work Approval Procedure" Fulton Hogan has been implemented for works complying with the NSW EPA Environment Protection Licence 21139 during the reporting period. Compliance with the procedure is evidenced in consultation records detailing liaison with NSW EPA and potentially affected receivers.
E39	The Proponent must ensure that all works for the delivery of the SSI are coordinated with utility works, including those works undertaken by third parties, to minimise cumulative impacts of noise and vibration and provides maximise respite for affected sensitive receivers.	Yes	Construction	Compliant	The requirement of CoA E39 is detailed in the Noise and Vibration Management Sub-Plan, Chapter 8 and mitigation measure NVMM2. Significant management effort has been invested in consulting and coordinating with utilities works along the project, particularly along the M1 and Illawarra Highway to reduce the potential for cumulative impacts and inconvenience to motorists and residents. This is evidenced in email correspondence, letters, meeting minutes and community notifications.
E40	On becoming aware of the need for emergency works in accordance with **Condition E38** the Proponent must notify the ER and the EPA (if an EPL applies) of the need for those works. The Proponent must also use its best endeavours to notify all affected sensitive receivers of the likely impact and duration of those works.	Yes	Construction	Compliant	No emergency works were carried out during the reporting period

<table>
<tr><th colspan="6">Construction Vibration</th></tr>
<tr>
<td>E41</td>
<td>The SSI must be delivered with the aim of achieving the vibration goals detailed in CoA E41.
(a) for structural damage to heritage structures, the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration – Part 3 Effects of vibration on structures;
(b) for damage to other buildings and/or structures, the vibration limits set out in the British Standard BS 7385- 1:1990 – Evaluation and measurement of vibration in buildings—Guide for measurement of vibration and evaluation of their effects on buildings (and referenced in Australian Standard 2187.2 – 2006 Explosives – Storage and use – Use of explosives); and
(c) for human exposure, the acceptable vibration values set out in Assessing Vibration: A Technical Guideline (Department of Environment and Conservation, 2006).</td>
<td>Yes</td>
<td>Construction</td>
<td>Compliant</td>
<td>Vibration management is addressed in the CEMP Noise and Vibration Management Sub-Plan (Rev 6) approved by the Secretary, 7 December 2018.
Compliance with CoA E41 is detailed within the NVMP as follows:
E41 (a): CNVMP Sections 5.5, 7.5, 9.3.2, Tables 5-3, 5-5, 5-8, 5-11, 7-13, 7-14, 8-1 and 9-1
E41 (b): CNVMP Sections 5.5, 7.5.2, 5.5, 9.3.2, Tables 5-3, 5-5, 5-8, 5-11, 7-13, 7-14 and 9-1
E41 (c): CNVMP Sections 7.5.2, Tables 5-5, 5-6, 5-7, 5-10
During the reporting period, vibratory compaction work occurred within 50m of residential buildings. No activities have occurred within safe working distances for cosmetic damage, Compliance is evidenced through environmental inspection records and vibration monitoring records.</td>
</tr>
<tr>
<td>E42</td>
<td>Blasting associated with the SSI must only be undertaken during the hours detailed in CoA E42.
(a) 9:00am to 5:00pm, Monday to Friday, inclusive;
(b) 9:00am to 1:00pm on Saturday; and
(c) at no time on Sunday or public holidays.
This condition does not apply in the event of a direction from the NSW Police Force or other relevant authority for safety or emergency reasons to avoid loss of life, property loss and/or to prevent environmental harm.
Blasting may be undertaken outside the above hours where:
(a) no sensitive receivers would be impacted by blasting; or
(b) an agreement has been made with potentially affected receivers.</td>
<td>Yes</td>
<td>Construction</td>
<td>Not Triggered</td>
<td>Blasting is addressed in the CEMP Noise and Vibration Management Sub-Plan (Rev 6) approved by the Secretary, 7 December 2018.
No blasting has occurred within the reporting period.</td>
</tr>
<tr>
<td>E43</td>
<td>Air blast overpressure generated by blasting associated with the SSI must not exceed the criteria specified in Table 6 of CoA E43 when measured at the most affected residence or other sensitive receiver.
Note: a sensitive site includes houses and low rise residential buildings, theatres, schools and other similar buildings occupied by people

Table 6: Airblast overpressure limits for human comfort
<table>
<tr><th>Receiver</th><th>Type of blasting operations</th><th>Airblast Overpressure Limit</th></tr>
<tr><td rowspan="2">Sensitive site</td><td rowspan="2">Blasting operations lasting more than 12 months or more than 20 blasts</td><td>115 dBL for 95% of blasts per year</td></tr>
<tr><td>120 dBL maximum limit</td></tr>
<tr><td rowspan="2">Sensitive site</td><td rowspan="2">Blasting operations lasting less than 12 months or less than 20 blasts in total</td><td>120 dBL for 95% of blasts per year</td></tr>
<tr><td>125 dBL maximum limit</td></tr>
<tr><td>Occupied non-sensitive sites, such as factories and commercial premises</td><td>All blasting</td><td>125 dBL maximum limit.
For sites containing equipment sensitive to vibration, the vibration level should be kept below manufacturer's specifications or levels that can be shown to adversely affect the equipment operation</td></tr>
</table></td>
<td>Yes</td>
<td>Construction</td>
<td>Not Triggered</td>
<td>Blasting is addressed in the CEMP Noise and Vibration Management Sub-Plan (Rev 6) approved by the Secretary, 7 December 2018.
No blasting has occurred in the reporting period.</td>
</tr>
</table>

E44	Ground vibration generated by blasting associated with the SSI must not exceed the criteria specified in **Table 7** and **Table 8** of CoA E44 when measured at the most affected residence or other sensitive receiver. *Note: a sensitive site includes houses and low rise residential buildings, theatres, schools and other similar buildings occupied by people.* Table 7: Ground vibration limits for human comfort  Table 8: Ground vibration limits for control of damage to structures 	Yes	Construction	Not Triggered	Blasting is addressed in the CEMP Noise and Vibration Management Sub-Plan (Rev 6) approved by the Secretary, 7 December 2018. No blasting has occurred in the reporting period.
E45	The blasting criteria specified in the tables in **Conditions E43** and **E44** may be exceeded where the Proponent has obtained the written agreement of the landowner to increase the relevant criteria. In obtaining the agreement, the Proponent must make available to the landowner the details as further specified in CoA E45. (a) details of the proposed blasting program and justification for the proposed increase in blasting criteria including alternatives considered (where relevant); (b) an assessment of the environmental impacts of the increased blasting criteria on the surrounding environment and most affected residences or other sensitive receivers including, but not limited to noise, vibration and air quality and any risk to surrounding utilities, services or other structures; and (c) details of the blast management, mitigation and monitoring procedures to be implemented. The Proponent must provide a copy of the landowner written agreement to the Secretary and the EPA, including details of the consultation undertaken (with clear identification of proposed blast limits and potential property impacts, prior to commencing blasting at the higher limits. Unless otherwise agreed by the Secretary, the following exclusions apply: (a) The landowner may terminate at any time an agreement made with the Proponent to increase the blasting criteria, should concerns made by the landowner about the blasting criteria be unresolved. Where an agreement is terminated, the Proponent must not exceed the criteria specified in the tables in Conditions E43 and E44 for future blasting that affects the property; and (b) the blasting limit agreed to under any agreement must not exceed a maximum Peak Particle Velocity vibration level of 25 mm/s or maximum Air blast Overpressure level of 125 dBL.	Yes	Construction	Not Triggered	Blasting is addressed in the CEMP Noise and Vibration Management Sub-Plan (Rev 6) approved by the Secretary, 7 December 2018. No blasting has occurred in the reporting period.

Operational Noise Mitigation Report					
E46	The Proponent must undertake a review of the operational noise mitigation measures proposed to be implemented for the SSI. The review must be prepared in consultation with the EPA and submitted to the Secretary for approval prior to construction commencing, except for the Croom Regional Sporting Complex works, unless otherwise agreed by the Secretary. The review must comply with the details as further specified in CoA E46. (a) confirm the operational noise predictions of the SSI based on detailed design. The operational noise assessment shall be based on an appropriately calibrated noise model (which has incorporated additional noise monitoring, where necessary for calibration purposes); (b) review the suitability of the operational noise mitigation measures identified in the EIS as amended by the SPIR. The review must take into account the detailed design of the SSI and where necessary, refine the proposed measures with the objective of meeting the criteria outlined in the NSW Road Noise Policy (DECCW 2011), based on the operational noise performance of the SSI predicted under (a) above; (c) where necessary, investigate additional noise mitigation measures to achieve the criteria outlined in the NSW Road Noise Policy (DECCW, 2011); and (d) investigate noise mitigation measures to achieve the criteria outlined in the Industrial Noise Policy (DECCW 2011) for the Croom Regional Sporting Complex. Note: noise barriers that may penetrate the OLS must comply with the requirements of Condition E7.	Yes	Construction and Operation	Compliant	The Operational Noise Mitigation Report (ONMR - Rev 3) was submitted to the EPA for review and comment. Evidence of consultation is detailed in the ONMR Appendix 7 including email correspondence between Fulton Hogan and NSW EPA and a letter from EPA dated 30 November 2018. The ONMR (Rev 3A) was submitted to the Department, 2 April 2019 and approved by the Secretary, 10 May 2019. Compliance with CoA E46 is detailed as follows: E46 (a) ONMR Sections 2.2, 4.4, 4.6 and Appendix 2. E46 (b) ONMR Sections 4.6 and 5.1 E46 (c) Section 5.1 E46 (d) The Operational Noise Mitigation Report for the Croom Regional Sporting Complex was submitted to the Department by Transport for NSW on the 5 November 2018.
E47	Operational noise mitigation measures identified in **Condition E46** (such as at-property architectural treatments) that will not be affected by construction works, must be implemented within six (6) months of the commencement of construction, except for the Croom Regional Sporting Complex works or at other times during construction to minimise construction noise impacts. These measures must be detailed in the **Construction Noise and Vibration Management Plan** for the SSI, unless otherwise agreed by the Secretary. Where early implementation of noise mitigation measures are not proposed, the Proponent must comply with the requirements as further outlined in CoA E47. Where early implementation of noise mitigation measures are not proposed, the Proponent must submit to the Secretary a report providing justification as to why, along with details of temporary measures that would be implemented to reduce construction noise impacts, until such time that the operational noise mitigation measures identified in Condition E46 are implemented. The report must be provided to the Secretary for approval prior to the commencement of construction which would affect the identified receivers.	Yes	Construction and Operation	Compliant	At property architectural treatment is addressed in the CEMP Noise and Vibration Management Sub-Plan (NVMP - Rev 6) approved by the Secretary, 7 December 2018. The approach to early implement noise mitigation measures, including at-house acoustic treatments is outlined in the NVMP Section 7.4 and the Operational Noise Management Report (ONMR - Rev 3) Section 3.1.2. Fulton Hogan have successfully completed 95% of the at-house treatments at the end of this reporting period. Through the project team's planning and diligence in completing these treatments from the commencement of construction has allowed for only a few (5) properties yet to complete. A total 4 properties are currently in progress and 1 confirming scope of work. Details of the consultation process are listed below (as at 21/07/2021): • Total properties identified: 193 o Reports issued: 170 o Reports not issued: 5 (heritage-related) o Properties not inspected: 18 (owners unknown/unresponsive or properties ineligible) o Owners denied access to property: 8 • Properties signed up for treatment: 95 o Works complete: 90 o Works now in progress or booked in: 4 o Works assigned to contractor: 1 • Owners not proceeding with treatment: 95 o Owners uncontactable or denied access for initial inspection: 12 o Properties deemed ineligible or nil treatment: 18 o Properties being treated under the NAP: 7 o Owners who declined treatment: 29 o Owners refuse to accept or decline: 29 Consultation with property owners regarding at property treatments is ongoing. As this condition is wholly dependent on reaching agreement with property owners, Fulton Hogan anticipate further discussion with the Department regarding the constraints to with CoA E47 that are beyond the projects influence.

PROPERTY AND LANDUSE					
E48	Where the viability of existing agricultural operations are identified to be impacted by the land requirements of the SSI, the Proponent must, at the request of the landowner, employ a suitably qualified and experienced independent agricultural expert, to assist in identifying alternative farming opportunities for the land. Where the Proponent has commenced the requirements of this condition, prior to determination, the Proponent may rely on these activities to fulfil this requirement.	Yes	Construction	Compliant	In 2015, RMS engaged Neil Moss (Scibus) to investigate current dairy operations and identify opportunities to augment dairy operations to minimise impacts from the SSI. Following this study, and at the request of property owners, John Mulvany (OMJ Agricultural Consulting) was engaged to also review the agricultural impacts of the project on dairy operations and consider possible augmentation options. This process was undertaken with direction from the property owners at each stage. Input from both specialists has been used to assist in identifying alternative farming opportunities for the land. Note that both these studies are commercially sensitive documents and are not for public exhibition. The studies will be retained by TfNSW.
E49	Unencumbered access to private property must be maintained during construction, unless otherwise agreed with the landowner in advance. A landowner's access that is physically affected by the SSI must be reinstated to at least an equivalent standard, in consultation with the landowner.	Yes	Construction	Compliant	The construction team are very mindful of providing unencumbered access to private property at all times. This is achieved through diligent implementation of the CCS, careful construction planning and communication with neighbouring landowners as evidenced in records contained within the Consultation Manager database. Access to private property has been addressed in the Construction Traffic and Access Management Plan Section 6.5.2 as required under CoA E65. All property adjustments have been designed and are planned to be constructed in accordance with CoA E49.
E50	The SSI must be delivered in a manner that minimises intrusion and disruption to agricultural operations/activities in surrounding properties (e.g. stock access, access to farm dams, etc.), unless otherwise agreed by the landowner.	Yes	Construction	Compliant	Access to private property has been addressed in the Construction Traffic and Access Management Plan required under CoA E65. Compliance with CoA E50 is achieved through open and ongoing consultation with neighbouring property owners. Avoiding disruption to agricultural operations is a key topic when meeting with three property owners in particular (dairy operation, cattle grazing, horse agistment) and evidence is found in Consultation Manager database, records of meetings and emails.
Building and Structure Condition Survey					
E51	**Building and Structure Condition Survey Reports** must be undertaken for all building and structures identified in the EIS, as amended by the SPIR as being at risk of damage. The surveys must be prepared before the commencement of works that could cause damage to buildings and structures in the vicinity of those works. The results of the surveys must be documented in a **Building and Structure Condition Survey Report** for each building or structure surveyed. These surveys must be undertaken by a suitably qualified person. Copies of **Building and Structure Condition Survey Reports** must be provided to the landowners of the building and structures surveyed, and if agreed by the landowner, the Relevant Councils, within three weeks of completing the surveys and no later than one month prior to the commencement of works.	Yes	Construction	Compliant	62 Building and Structure Condition Surveys Reports have been performed by suitably qualified independent consultants at least 3 weeks prior to that work being undertaken. The Building Condition Surveys reports have been provided to the landowners of the buildings and structures surveyed.
E52	After completion of the works, condition surveys of all building and structures for which pre-construction condition surveys were undertaken in accordance with **Condition E51** must be undertaken by a suitably qualified person. The results of the surveys must be documented in a **Building and Structure Condition Survey Report** for each building and structure surveyed. Copies of **Building and Structure Condition Survey Reports** must be provided to the landowners of the buildings and structures surveyed, and if agreed by the landowner, the Relevant Council(s), within three weeks of completing the surveys and no later than three (3) months following the completion of the works.	Yes	Following Construction	Not Triggered	Stage 2 is presently under construction.
E53	Any damage caused to property as a result of the SSI must be rectified or the landowner compensated, within a reasonable timeframe, with the costs borne by the Proponent. This condition does not limit any claims that the landowner may have against the Proponent.	Yes	Construction	Not Triggered	No damage to property as a result of the SSI was identified within the reporting period.
Croom Regional Sporting Complex					
E54	The replacement sporting infrastructure and buildings must be of a comparable scale to existing facilities, unless that infrastructure or building is approved under the EP&A Act.	No	Construction	Not Triggered	Not applicable to Stage 2. Refer to Stage 1 Construction Compliance and Pre-Operational Compliance Report submitted 31 May 2019.
E55	The facilities and associated infrastructure and landscaping identified in the Croom Regional Sporting Complex Detailed Design dated 15 November 2017, must be delivered and be operational prior to any impact to the corresponding existing facilities, unless otherwise agreed by the Secretary following consultation with Shellharbour City Council and the relevant sporting group(s).	No	Construction	Not Triggered	Not applicable to Stage 2. Refer to Stage 1 Construction Compliance and Pre-Operational Compliance Report submitted 31 May 2019.

SOILS					
E56	Erosion and sediment controls must be installed and appropriately maintained to minimise water pollution. When implementing such controls, any relevant guidance in the *Managing Urban Stormwater* series must be considered.	Yes	Construction	Compliant	Erosion and sediment controls are addressed in the Soil and Water Management Sub-Plan - Rev 9 approved, 11 May 2020. Appendix A of the SWMP (Rev 9) provides overarching Primary Erosion and Sediment Control Plans (ESCP) and Standard Blue Book Drawings. The ESCP forms part of the NSW EPA Environment Protection Licence 21139. Implementation is ongoing and progressive. Guidance has sought from CPESCP for the development of Progressive Erosion and Sediment Control Plans in accordance with best practice including guidance provided in the Managing Urban Stormwater series. This is verified by inspection notes from a Certified Professional in Erosion and Sediment Control, NSW EPA, NSW TfNSW and the ER. Evidence of compliance is found in weekly site inspections, pre-rainfall checks, photographs and post-rainfall inspection records.
Contaminated Land					
E57	A **Site Contamination Report**, documenting the outcomes of Stage 1 and Stage 2 contamination assessments of land upon which the SSI is to be carried out, that is suspected, or known to be, contaminated must be prepared by a suitably qualified and experienced person in accordance with guidelines made or approved under the *Contaminated Land Management Act 1997* (NSW).	Yes	Construction	Compliant	In 2017, Hyder Cardno Joint Venture (HCJV) was engaged by Transport for NSW to prepare site contamination reports for seven areas as part of the Albion Park Rail bypass, including PAEC01-Rail Corridor, PAEC02-Industrial Estate, PAEC03-Nursery, PAE05-Quarry Entrances, PAEC06-Princes Highway Fly Tip, PAECA1-Noise Mounds and PAECA2-Southern Envirocycle System. The findings of the Site Contamination Reports have been documented in the Contaminated Land Management Sub-Plan (CLMP - Rev 4) submitted to the Department for information 12 October 2018. In April 2019, the Department and NSW EPA were made aware of the discovery of historic illegal landfilling at Yallah during Stage 2 works and the proposed implementation of a Remedial Action Plan (RAP). The subsequent contamination assessments are deemed to comply with the requirement for a Site Contamination Report under CoA E57. As a result of investigations, the following three reports have been produced and provided to NSW EPA: - Stage 2 - Detailed Site Investigations (DSI) PAEC02 Cut No.1 - Stage 2 - Detailed Site Investigations (DSI) The Island Fill No.1 - Remedial Action Plan - Asbestos in Soil (ASBINS RAP), Albion Park Rail Bypass. All reports have been prepared by suitably experienced and qualified consultants from ENRS Pty Ltd.
E58	If a **Site Contamination Report** prepared under Condition E57 finds such land contains contamination, a site audit is required to determine the suitability of a site for a specified use. If a site audit is required, a **Site Audit Statement** and **Site Audit Report** must be prepared by a NSW EPA Accredited Site Auditor. Contaminated land must not be used for the purpose approved under the terms of this approval until a **Site Audit Statement** is obtained that declares the land is suitable for that purpose and any conditions on the **Site Audit Statement** have been complied with.	Yes	Construction	Compliant	The ENRS Pty Ltd assessments and development of the Remedial Action Plan (RAP) referenced at CoA E57 have been overseen by an independent NSW EPA accredited Site Auditor from Cavvanba Pty Ltd. The implementation of the RAP and statutory contaminated site audit was undertaken during a previous reporting period (08 July 2019 - 07 January 2020). The Site Audit Statement (SAS) and Site Audit Report (SAR) have been produced by the EPA accredited Site Auditor in compliance with CoA E58 and submitted to the Secretary and relevant council (WCC) on 26 February 2021.
E59	A copy of the **Site Audit Statement** and **Site Audit Report** must be submitted to the Secretary and Relevant Council(s) for information no later than one (1) month before the commencement of operation.	Yes	Construction	Compliant	The SAS and SAR was submitted to the Secretary and relevant council (WCC) in accordance with the requirements of this condition on 26 February 2021.
E60	An **Unexpected Contaminated Land and Asbestos Finds Procedure** must be prepared and must be followed should unexpected contaminated land or asbestos be excavated or otherwise discovered during works.	Yes	Construction	Compliant	The Unexpected Contaminated Land and Asbestos Finds Procedure (UCLAFP) was endorsed by the ER on 20 August 2018. Awareness of the requirements of the UCLAFP has been developed through toolbox training and display of the procedure in highly visible areas within the site compound. The procedure has been followed each time material has been discovered that was suspected of being contaminated or including asbestos containing material as detailed at CoA E61.
E61	**The Unexpected Contaminated Land and Asbestos Finds Procedure** must be implemented throughout the delivery of the project.	Yes	Construction	Compliant	A number of isolated incidents of suspected contamination such as dumped debris generally comprising Asbestos Containing Material (ACM) have been identified during construction and two significant areas of ACM contamination (detailed under CoA E57-59) have been identified during the reporting period. The Unexpected Contaminated Land and Asbestos Finds Procedure (UCLAFP) was implemented three times during the reporting period, with notifications to TfNSW on each occasion. This is evidenced in emails submitted in the TfNSW EIR624 form with notification of the event.

SUSTAINABILITY					
E62	A **Sustainability Strategy** for the delivery for the SSI, except for the Croom Regional Sporting Complex works must be prepared in accordance with the Infrastructure Sustainability Council of Australia infrastructure rating tool or other justified rating mechanism.	Yes	Construction	Compliant	The Project Sustainability Strategy (Rev 1) was prepared in accordance with guidance from the Infrastructure Sustainability Council of Australia (ISCA) and was endorsed by the ER, 8 October 2018. The ISCA rating tool is being used during implementation of the design and construction phases of the Stage 2 works.
E63	The **Sustainability Strategy** must be submitted to the Secretary for information prior to the commencement of works, except for the Croom Regional Sporting Complex works, or within another timeframe agreed with the Secretary, and must be implemented throughout the delivery of the SSI. The Sustainability Strategy must include items (a)-(c) as detailed in CoA E63. (a) details of the sustainability objectives and targets for the design and delivery of the SSI; (b) details of the sustainability initiatives which will be investigated and / or implemented; and (c) a description of how the strategy will be implemented for the SSI.	Yes	Construction	Compliant	The Sustainability Strategy was submitted to the Secretary for information, 8 October 2018. Stage 2 construction works commenced on 7 January 2019. The Sustainability Strategy identifies the requirements of CoA E63 as follows: E62 a) Section 3 E62 b) Section 4.4 E62 c) Section 9.
TRAFFIC AND TRANSPORT					
E64	The SSI must be designed, delivered and operated to meet relevant road design standards, and ensure that it does not adversely impact network connectivity, or the safety and efficiency of the road network in the vicinity of the SSI.	Yes	Detailed design, Construction and Operation	Compliant	The requirements of CoA 64 include reference to three distinct phases of the project. Compliance is detailed as follows: - Detailed Design: Development of the road geometry and alignment along with design standards and relevant criteria is documented in the Detailed Design Road Alignment Report Rev 4 Section 2. Section 3 describes the overall design and how relevant road design standards have been met. - Delivery of the works: During construction, compliance is achieved through implementation of the CEMP Traffic and Transport Management Sub-plan (TTMP - Rev 9). The TTMP (Rev 9) was endorsed by the ER, 13 November 2018 and approved by the Secretary, 28 November 2018. The TTMP details key traffic management and safety issues and consideration of how the works will not adversely impact network connectivity or efficiency of the road network in the vicinity of the project. - Road operation will be addressed by Transport for NSW (TfNSW) in a later reporting period.
E65	Vehicles used in the delivery of the project must not use local roads unless no suitable alternatives are available. Where local roads are used, these must be identified in a **Construction Traffic and Access Management Plan**.	Yes	Construction	Compliant	The CEMP Traffic and Transport Management Sub-plan (TTMP - Rev 13), Appendix A 'Construction Traffic and Access Management Plan' (CTAMP) details the local roads required to be used for the delivery of the Project due to the absence of any alternatives in Section 5.3 and Figure 1. The use of local roads has been minimised and are only used where direct access to the work sites are required, such as East West Link, Croome Road, Tongarra Road and Yallah Road. This is evidenced in project Vehicle Movement Plans (VMP) and toolbox training for all delivery drivers. The VMPs establish vehicular movements and prohibits construction vehicle use on local roads unless there is no suitable alternative.
E66	During the delivery of the SSI, measures must be implemented to maintain pedestrian and vehicular access to, and parking in the vicinity of, businesses and affected properties. Alternative pedestrian and vehicular access, and parking arrangements must be developed in consultation with affected businesses.	Yes	Construction	Compliant	Measures to maintain pedestrian and vehicular access are addressed in the Construction Traffic and Transport Management Plan (TTMP - Rev 13) and Appendix A, the Construction Traffic and Access Management Plan (CTAMP). Relevant sections of the approved CTAMP address CoA E66 requirements as follows: Section 5.7 details existing pedestrian and cycle infrastructure; Section 6.2 identifies pedestrian access needs and provisions; Section 6.4 details impacts to parking in the vicinity of businesses and affected properties; Section 6.5.2 details maintenance of property access for businesses and affected properties. Evidence of implementation may be found in Fulton Hogan quality documentation relating to submission of Vehicle Movement Plans, Traffic Control Plans, Pedestrian and cyclist movement plans as approved by RMS in accordance with G10 specifications.
E67	Signage and directions to businesses must be provided before, and for the duration of, any disruption during the delivery of the SSI	Yes	Construction	Not Triggered	To date, no disruption to any businesses has occurred. No business related signage or way finding has been required during the reporting period. Additional signage was installed for residents and business' along Illawarra Highway prior to permanent closure from Croom Lane
E68	Operational signage must be provided along the project alignment to inform motorists of services and Council and community assets within the vicinity of the SSI including the Illawarra Regional Airport, community facilities and tourist areas, in accordance with the *Guide: Signposting* (RTA July 2007) and *Tourist Signposting Guide* (RMS and Destination NSW 2012).	Yes	Operation	Compliant	Operational signage has been installed during the reporting period in accordance with Guide: Signposting (RTA July 2007) and Tourist Signposting Guide (RMS and Destination NSW 2012). Compliance with CoA E68 is documented in Final Detailed Design "Signage, Line marking and Road Furniture Report" Rev 4, Sections 3.4, 3.5 and 3.6.

E69	The Proponent must implement the off-road shared path pedestrian and cyclist facilities connections indicated in Figure 3-8 and 3-9 of Appendix A of the SPIR, in consultation with the Relevant Council(s) and Bicycle NSW.	Yes	Detailed design and Construction	Compliant	As part of the detailed design development Fulton Hogan has included designs for the off-road shared path pedestrian and cyclist facilities connections indicated in Figure 3-8 and 3-9 of Appendix A of the SPIR. Compliance with CoA E69 is documented in the following Final Detailed Design documents: - "Road Alignment Report" Rev 4, Sections 3.7, Table 3-23, Fig 3-12 - "Signage, Line marking and Road Furniture Report" Rev 4, Sections 3.5.2, 3.5.3, 3.7.6 and 3.6. - "Urban Design and Landscape Character Strategy" (UDLCS), Section 4.7 Consultation with Shellharbour City Council (SCC) and Wollongong City Council (WCC) are evidenced in design review meeting minutes and project design updates. Consultation with Bicycle NSW is evidenced in email correspondence and telephone records whereby support for the Illawarra Bicycle User Group (I-BUG) was confirmed. Continuation of the shared user path construction has occurred during the reporting period

E70	The Proponent must provide improved connectivity for cyclist and pedestrians between Croome Lane and Darcy Dunster Reserve.	Yes	Detailed design and Construction	Compliant	As part of the detailed design development Fulton Hogan has included designs for the off-road shared path pedestrian and cyclist facilities between Croome Lane and Darcy Dunster Reserve. Compliance with CoA E70 is documented in "Road Alignment Report" Rev 4, Sections 3.7 "Active Transport Design", Table 3-23 and Fig 3-12 and "Urban Design and Landscape Character Strategy" (UDLCS), Section 4.7 "Connectivity".
E71	The Proponent must investigate options to minimise the interaction between pedestrians, cyclist and cattle.	Yes	Detailed design	Compliant	As part of the detailed design development Fulton Hogan has included designs for minimising the interactions between pedestrian, cyclists and cattle. This has been achieved through design of cattle proof fencing and a grade separated shared path at Bridges 7 and 14 to avoid interactions with cattle underpasses. Compliance with CoA E71 is documented in the Detailed Design Road Alignment Report (Rev 4), Sections 3.7 and 5 and within the Fencing Design Report (Rev 3), Sections 3.4 and 3.6.
E72	The Proponent must implement the facilities consistent with the reasonable requirements of the Relevant Council(s) and Bicycle NSW, prior to the operation of the SSI, unless otherwise agreed by the Secretary.	Yes	Construction	Compliant	Consultation with the relevant Councils and Bicycle NSW has been undertaken in accordance with CoA E72 and is ongoing via the monthly Traffic Steering Group meetings which include representation from RMS, Council, Police and the Illawarra Bicycle User Group. Compliance with CoA E72 is documented in the following Final Detailed Design documents: - "Road Alignment Report" Rev 4, Sections 3.7, Table 3-23, Fig 3-12 - "Signage, Line marking and Road Furniture Report" Rev 4, Sections 3.5.2, 3.5.3, 3.7.6 and 3.6.
E73	The SSI must be designed to not preclude delivery of the Tripoli Way and Yallah Road projects. Consultation with the Relevant Council(s) must be undertaken during detailed design of the SSI to facilitate future integration with these projects. Current traffic modelling and assessment, and the result of the **Road Network Performance Review Plan** required under **Condition D9** must be provided to the relevant road authority for their consideration in the development of the Tripoli Way and Yallah Road projects.	Yes	Detailed design	Compliant	Compliance with CoA E73 is documented in the Detailed Design Road Alignment Report (Rev 4), Sections 2.8.8, 3.3.5, 3.4 and 9. The projects 'future third lane strategy' for the Albion Park Interchange provides for a tie-in to allow for connection to the potential future bypass of Albion Park along Tripoli Way which is under planning by Shellharbour City Council. Additionally, the bridge superstructures have been designed for the four-lane configuration with consideration of future widening requirements to accommodate the additional median side lanes. The results of the Road Network Performance Review Plan required under Condition D9 must be provided to the relevant road authority for their consideration in the development of the Tripoli Way and Yallah Road projects in a future reporting period.
E74	The Proponent must consult with Wollongong City Council and the Tallawarra Lands developer on the timing of the proposed closure of Cormack Avenue.	No	Detailed design and Construction	Not Triggered	Not applicable to Stage 2 works.
E75	Before any local road is used by a heavy vehicle for the purpose of constructing the SSI, a **Road Dilapidation Report** must be prepared for the road. The report must be prepared by a suitably qualified person before commencement of the works that have the potential to damage local roads (and associated infrastructure). Copies of the **Road Dilapidation Report** must be provided to the Relevant Council(s) within three weeks of completing the surveys and no later than one (1) month before the use of local roads by heavy vehicles of construction of the SSI.	Yes	Construction	Compliant	Road Dilapidation Reports have been prepared for all roads potentially impacted by the project works and heavy vehicles associated with the construction of the SSI. The condition of each road has been recorded in video by specialist consultants AusDilaps and provided to the relevant Councils, via TfNSW prior to commencement of use of those roads by heavy vehicles.
E76	If damage to roads occurs as a result of works associated with the SSI, the Proponent must rectify the damage so as to restore the road to at least the condition it was in pre-works, unless otherwise agreed by the Relevant Council(s).	Yes	Construction	Not Triggered	No damage to roads as a result of the SSI was identified within the reporting period. Fulton Hogan monitor the condition of the roads and will co-operate with Transport for NSW, Wollongong City Council and Shellharbour City Council and its personnel or contractors in carrying out maintenance of existing roads. If damage to roads occurs as a result of works associated with the SSI, Fulton Hogan will rectify the damage so as to restore the road to at least the condition that was recorded during the dilapidation survey unless this is otherwise agreed by the Relevant Councils.

URBAN DESIGN AND VISUAL AMENITY					
E77	The SSI must be designed to retain as many trees as possible. Where trees are to be removed on areas that are zoned for residential, commercial or industrial, the Proponent must provide a net increase in the number of replacement trees. Replacement trees must be planted within the SSI boundary, unless otherwise agreed by the Secretary.	Yes	Detailed design	Compliant	The project design has sought to reduce the project footprint and associated clearing required by refining the approved concept road alignment and drainage infrastructure to conserve treed areas. This is specifically evidenced in modifications to: - Drainage plans detailed in the Detailed Design Drainage Report (Rev 4), where Critically Endangered Ecological Communities (CEEC) previously approved for impacts have been conserved at Yallah and Croome Reserve. - Local Roads detailed in the Detailed Design Road Alignment Report (Rev 4), where road alignment plans have been adjusted to reduce tree clearing on the east side of the main alignment. The Urban Design and Landscape Character Strategy (UDLCS), Section 7.2 outlines the extent of clearing required as part of the project and the strategy for compliance with CoA E77. Subject to OLS restrictions from Illawarra Regional Airport, replacement plantings will be undertaken in the general location of the site from which they are removed and provides for a net increase in trees. Section 6 (LD-01-0010) of the Landscape Design package further outlines the landscape requirements adopted as part of the project, including extent of clearing, number of trees proposed, revegetation and planting strategy during construction. All replacement trees have been designed to be planted within the project boundary. Through the reduction in actual impacted areas achieved by Fulton Hogan, the project's impacts to CEEC/EEC were reduced by approximately 3 hectares from that originally assessed in the EIS
E78	Replacement trees are to have a variable pot size consistent with the pot sizes specified in the Relevant Council(s) plans / programs/ strategies for vegetation management, street planting, or open space landscaping, unless otherwise agreed by the Secretary. This condition does not apply to landscaping associated with the Croom Regional Sporting Complex.	Yes	Detailed design and Construction	Compliant	Compliance with CoA E78 is detailed in the Landscape Design package Master Plant List (LD-01-0021) which details the size, density and application rates of plants; including grasses, shrubs, ground covers, wetland plants and trees to be planted as part of the Stage 2 works. Appendix B of the Urban Design and Landscape Character Strategy (USLCS) and Section 7.3 provide further evidence of consultation with the relevant City Councils.
E79	The **Urban Design and Landscape Character Strategy** must be finalised based on the detailed design, and in accordance with the commitments made in *Technical Paper 10 – Landscape character and visual amenity* of the EIS and the SPIR. The Urban Design and Landscape Character Strategy must incorporate monitoring and maintenance procedures for the built elements, rehabilitated vegetation (including the requirements of Condition E77) and landscaping (including visual screening and weed control) and performance indicators, responsibilities, timing and duration and contingencies where rehabilitation of vegetation and landscaping measures fail. The Strategy does not include the Croom Regional Sporting Complex works as subject to Condition E55.	Yes	Detailed design and Construction	Compliant	The Urban Design and Landscape Character Strategy (UDLCS) demonstrates compliance with CoA E79 in Section 8. During a previous reporting period, a Landscape Management Plan was developed by Fulton Hogan's landscape architecture consultants, TRACT. This document will guide future maintenance activities as part of the Operations and Maintenance Manual.
E80	The **Urban Design and Landscape Character Strategy** must be finalised in consultation with the Relevant Council(s) and the community.	Yes	Detailed design	Compliant	The Urban Design and Landscape Character Strategy (USLCS) Section 7.3 and Appendix B provide evidence of consultation with the relevant City Councils during development of the Strategy. The UDLCS was exhibited on the project website during November and December 2018, along with staffed pop-up displays at Albion Park Shopping Village, Illawarra Convoy event, Stockland Shellharbour and an unstaffed display at the Transport for NSW Regional Office in Wollongong. Attendees at these pop-up displays were able to view hard copies of the UDLCS and were provided with information about how to access the online version and provide feedback. Feedback was sought directly from Wollongong City Council and Shellharbour City Council. Details about the UDLCS and community feedback period were included in a community newsletter, November 2018 which was distributed to around 3,000 properties and emailed to around 250 stakeholders. The newsletter was also uploaded to the project website, 20 November 2018. A media release advising the exhibition of the UDLCS was issued by Member for Kiama, Gareth Ward, 19 November and was also featured in the Illawarra Mercury, 19 November. An online survey was uploaded to the project website, 20 November 2018 seeking feedback on the UDLCS and included questions relating to design, cyclist connectivity, heritage, cultural values and urban development. Targeted information sessions were further held with key stakeholder groups to provide information on the UDLCS, including residents and businesses in Yallah, the Albion Park Chamber of Commerce and the Illawarra Bicycle User Group. A total of 66 submissions were received during the exhibition period.
E81	The **Urban Design and Landscape Character Strategy** must be made publicly available and submitted to the Secretary for information prior to the commencement of works that require community consultation, unless otherwise agreed by the Secretary. The Strategy shall incorporate evidence of consultation on the proposed urban design and landscape measures and the monitoring and maintenance procedures. *Note: Works that are subject to community consultation include those design and landscaping details that are not required to meet the other requirements of this approval and/or specific technical criteria. For example, it does not include structures or landscaping works associated with riparian areas, fauna crossings and the like.*	Yes	Detailed design	Compliant	The Urban Design and Landscape Character Strategy (UDLCS) was endorsed by the ER and provided to the Secretary 4 February 2019. The UDLCS was also exhibited for public review on the project website during November and December 2018, along with staffed pop-up displays at Albion Park Shopping Village, Illawarra Convoy, Stockland Shellharbour and an unstaffed display at the Transport for NSW Regional Office in Wollongong. The UDLCS Community consultation report was uploaded to the project website in June 2019.

E82	Operational noise barriers must be designed to minimise visual and amenity impacts and be designed in accordance with the *Noise wall design guideline – Design guideline to improve the appearance of noise walls in NSW, Roads and Maritime Services, March 2016.*	Yes	Construction and Operation	Compliant	The project includes one operational noise mound, located along the northern side of the East West Link. The noise mound has been designed at approximately five meters high and has been designed in accordance with the Noise wall design guideline - Design guideline to improve the appearance of noise walls in NSW, Roads and Maritime Services, March 2016. The noise mound is a key element in the integration of a noise attenuation structure within the landscape. Planting will consist of canopy trees at the toe of the embankment to enhance screening and visual amenity .

UTILITIES AND SERVICES

E83	Utilities, services and other infrastructure potentially affected by the delivery of the SSI must be identified before works affecting them commence, to determine the requirements for access to, diversion protection, and/or support of such services. The relevant owner and/or provider of services must be consulted to make suitable arrangements for access to diversion, protection, and/or support of the affected infrastructure as required. The Proponent must ensure that disruption to any service is minimised and be responsible for advising local residents and businesses affected before any planned disruption of service occurs.	Yes	Construction	Compliant	All potentially impacted utilities and services have been identified before commencement of any works affecting them. All utility owners have been consulted with regard to access, diversion, protection and/or support of such services as **Utility Owner / Provider** / **Utility Package** / **Approval Date** Endeavour Energy / Electrical Package 1 / 27-Dec-18 Endeavour Energy / Electrical Package 2 / 5-Nov-18 Endeavour Energy / Electrical Package 3 / 3-Dec-18 Endeavour Energy / Electrical Package 4 / 25-Oct-18 Endeavour Energy / Electrical Package 5 / 10-Dec-18 Endeavour Energy / Electrical Package 6 / 19-Feb-19 Endeavour Energy / Electrical Package 8B / 18-Apr-19 Sydney Water / Water Main relocation - Stage 3 / For a future reporting period Sydney Water / Cleary Bros Sewer / For a future reporting period Sydney Water / Cleary Bros Sewer / For a future reporting period Jemena / High Pressure Gas relocation / 20-Sep-18 Jemena / Eastern Gas Pipeline protection / 12-Dec-18 Sydney Trains / 33KV relocation / 21-Feb-19 Sydney Trains / DTRS/Signals/Comms relocations / 18-Oct-18 Telstra / Comms relocations / 26-Oct-18 NBN Co / Comms relocations / 23-Nov-18 All utilities and services have been identified in the Infrastructure Utility Coordination Plans (Detailed Design - Rev 2) and Detailed Design ITS and Street Lighting Report (Rev 4). Management of communication and consultation with the local residents regarding impacted utilities is described in the Community Communication Strategy (CCS).

WASTE

E84	Waste generated in the delivery of the SSI must be dealt with in accordance with the following priorities: (a) waste generation is to be avoided and where avoidance is not reasonably practicable, waste generation is to be reduced; (b) where avoiding or reducing waste is not possible, waste is to be re-used, recycled, or recovered; and (c) where re-using, recycling or recovering waste is not possible, waste is to be treated or disposed of at a waste management facility or premises lawfully permitted to accept the materials.	Yes	Construction	Compliant	Waste management for Stage 2 is addressed in the Waste and Energy Management Sub-Plan (WEMP - Rev 5) approved by the ER on 31 March 2020. Compliance with CoA E84 is detailed in the Project induction and implementation of the WEMP as follows: E84 (a): Sections 5.1 and 5.1.1, Chapter 6 including mitigation measures WEMM 1, 4 and 5 E84 (b): Sections 5.1 and 5.1.2, Chapter 6 including mitigation measures WEMM 1 and 6-18 E84 (c): Sections 5.1 and 5.1.5, Chapter 6 including mitigation measures WEMM 1, 7-11, 15, 19 and 20.
E85	Waste generated outside the site must not be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence or waste exemption under the *Protection of the Environment Operations Act 1997,* if such a licence is required in relation to that waste.	Yes	Construction	Compliant	Waste management for Stage 2 is addressed in the Waste and Energy Management Sub-Plan (WEMP - Rev 5) approved by the ER on 31 March 2020. Compliance with CoA E85 is evidenced through implementation of the WEMP as follows: Chapter 6 mitigation measure: WEMM3. Fulton Hogan regularly consults with NSW EPA to ensure ongoing compliance. This is evidenced in email records, minutes of meetings and in a formal letter from NSW EPA, 8 April 2019. Wastes generated outside the project that comply with a current NSW EPA Resource Recovery Order (RRO) and Resource Recovery Exemption (RRE) and may be lawfully used as engineering fill are utilised in Stage 2 works under strict management protocols detailed in the project Material Import Approval Process, Import Checklist and associated due diligence documentation. The implementation of these measures is ongoing.
E86	All waste materials removed from the SSI site must only be directed to a waste management facility or premise lawfully permitted to accept the materials or in accordance with a Resource Recovery Exemption or Order issued under the *Protection of the Environment Operations (Waste) Regulation 2014* , or to any other place that can lawfully accept such waste.	Yes	Construction	Compliant	Waste management for Stage 2 is addressed in the Waste and Energy Management Sub-Plan (WEMP - Rev 5) approved by the ER on 31 March 2020. Compliance with CoA E86 is detailed in the Project induction and the WEMP Sections 5.1.5, 5.3 and 5.4 as well as Chapter 6 including mitigation measures WEMM 6-10 and 15. This is evidenced in the project waste register, waste disposal dockets and the Section 143 Notice records.
E87	All waste must be classified in accordance with the EPA's *Waste Classification Guidelines* , with appropriate records and disposal dockets retained for audit purposes.	Yes	Construction	Compliant	Waste management for Stage 2 is addressed in the Waste and Energy Management Sub-Plan (WEMP - Rev 5) approved by the ER on 31 March 2020. Compliance with CoA E87 is detailed in the Project induction and the WEMP Sections 5.2 and 5.4 as well as Chapter 6 including mitigation measures WEMM 8-10. This is evidenced in waste classification reports, waste disposal dockets and the Section 143 Notice records.

WATER					
E88	Strategies for the management of Acid Sulfate Soils during works must be implemented.	Yes	Construction	Compliant	All acid sulfate soils encountered are managed in accordance with the CEMP Soil and Water Management Sub Plan (SWMP - Rev 9), approved by the Secretary 9 June 2020. Strategies implemented during construction are detailed in Sections 4.1.4 and 5.1 of the SWMP and Appendix C "Acid Sulfate Soil Management Procedure". Implementation is evidenced in geotechnical documentation, site inspection records and site photos and laboratory analysis records of neutralisation.
E89	Where available and practicable, and of appropriate chemical and biological quality, stormwater, recycled water or other water sources shall be used in preference to potable water for the delivery of the SSI, including dust control.	Yes	Construction	Compliant	Compliance with CoA E89 is evidenced through the site actions in accordance with the CEMP Soil and Water Management Sub Plan (SWMP - Rev 8), endorsed by the ER, 5 December 2018. The SWMP (Rev 8) was approved by the Secretary, 7 December 2018. Where practicable, alternate water sources have been utilised in consultation with NSW Resources Access Regulator (formerly NSW Office of Water) and NSW DPI Fisheries. The use of stormwater, recycled water or other water sources is detailed in the SWMP and is evidenced on site at water cart overhead filling stations using non-potable water. In the reporting period, dust suppression water was sourced from dams requiring dewatering, captured rainfall runoff in sediment basins and from Frazers Creek in preference to the Sydney Water potable supply.
E90	Drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drainage swales and depressions must be undertaken in accordance with relevant guidelines and designed by a suitably qualified and experienced person in consultation with DPI Fisheries and the EPA.	Yes	Construction	Compliant	Fulton Hogan and TfNSW have met with DPI Fisheries, DPI Water and EPA to discuss the drainage design, temporary and permanent crossings and the realignment of Frazers Creek on matters of fish passage and riparian landscaping. Designs of the crossings and the realignments of Frazers creek have been submitted to the agencies during the detailed design and construction phases and regular updates have been provided during construction. Evidence of this consultation is included in Appendix A5 of the CEMP, consultation records regarding preparation of the Environmental Work Method Statement 11 "Working in or Near Waterways", minutes of the "Works around Waterways" workshop, 8 March 2019, emailed construction updates, ER monthly reports, site inspection notes and site photos. During the reporting period drainage infrastructure was completed with regular consultation and updates provided to DPI Fisheries on 8 April 2021
E91	The realignment of Frazers Creek must be undertaken in consultation with and meet the reasonable requirements of DPI Fisheries.	Yes	Construction	Compliant	Fulton Hogan and TfNSW have met with DPI Fisheries, DPI Water and EPA and discussed the realingments of Frazers Creek. Design of the Creek realignments at Frazers 1 and 3 have been submitted and endorsed by NSW DPI Fisheries. Evidence of this consultation is included in Appendix A5 of the CEMP, minutes of the "Works around Waterways" workshop, 8 March 2019, Environment Review Group meeting minutes, email records, construction updates, ER monthly reports, site inspection notes, and site photos. Realignment works have now been completed to the satisfaction of DPI Fisheries, email correspondence dated 8 April 2021, regarding closeout inspection with DPI Fisheries on 8 February 2021

Appendix B Construction Monitoring Program Report

Fulton Hogan

SSI 6878 Albion Park Rail Bypass

Construction Monitoring Report

Report 5
8 January – 7 July 2021

Contents

1 Environmental monitoring 3
1.1 Water quality 3
1.1.1 Introduction 3
1.1.2 Surface Water monitoring results 5
1.1.3 Surface Water monitoring discussion 7
1.1.4 Groundwater monitoring results 9
1.1.5 Groundwater monitoring discussion 12
1.1.6 Water quality monitoring conclusion 12
1.2 Sediment Basin Discharge 13
1.3 Air quality 13
1.3.1 Introduction 13
1.3.2 Results 16
1.3.3 Conclusion 24
1.4 Noise and vibration 26
1.4.1 Introduction 26
1.4.2 Results 27
1.4.3 Conclusion 30
1.5 Summary 31

Appendices

Annexure A Construction Monitoring Location Maps
Annexure B Surface Water Quality Monitoring Reports
Annexure C Groundwater Monitoring Reports
Annexure D Noise Monitoring Results

1 Environmental monitoring

In accordance with Infrastructure Approval (SSI 6878) Condition of Approval (CoA) C14, the Albion Park Rail bypass project is implementing a range of environmental monitoring programs as set out within the framework of the Construction Environmental Management Plan and monitoring programs contained within the associated sub-plans as detailed below:

- Air Quality Monitoring Program - CEMP Appendix B6 (AQMP Rev 9)
- Ground Water Monitoring Program - CEMP Appendix B4 (SWMP Rev 9)
- Surface Water Monitoring Program - CEMP Appendix B4 (SWMP Rev 9)
- Noise Monitoring Program - CEMP Appendix B3 (NVMP Rev 9).

Consistent with CoA C16, the Construction Monitoring Programs (CMP's) have been incorporated into the respective sub-plans to guide all environmental monitoring and document the findings. The results of these monitoring activities are to be used in establishing trends and drive improvements, where necessary.

The Secretary of the NSW Department of Planning, Industry and Environment (then DP&E now DPIE), approved the CEMP sub-plans and CMPs noted above on 7 December 2018. The CEMP and relevant sub-plans have been updated and revised since the original approval. The Air Quality Management Plan was approved by DPIE on the 23 March 2020 and the Soil and Water Management Plan was approved by DPIE on the 9 June 2020.

The results of the construction monitoring described herein for reporting period #5 (8 January 2021 – 7 July 2021) are to be provided to the Secretary, relevant agencies and Councils for information in compliance with CoA C15. It is to note that surface water monitoring event #25 dated 5 January 2021 is included in this reporting period due to results received during this period.

Construction monitoring location maps can be found in Annexure A.

1.1 Water quality

1.1.1 Introduction

The purpose of water quality monitoring during the construction phase is to determine potential impacts resulting from construction of the project only (i.e. road construction) and does not detail other sources of potential impacts, such as agricultural operations or upstream developments.

The approved Soil and Water Management sub-plan (SWMP) describes the potential impacts from road construction activities as being most likely to result from erosion and sediment control failures and spills originating from construction plant and activities. The Construction water quality monitoring program established in the CEMP Appendix B4 SWMP sets out the requirements for water monitoring as below:

Surface water

Surface water monitoring focuses on the parameters associated with road construction and include:

- Total suspended solids (TSS)
- pH

- visible oil and grease.

Groundwater

Groundwater monitoring focuses on the parameters associated with road construction and include:

- pH
- electrical conductivity
- temperature
- visible oil and grease
- dissolved metals for GW2 only, which is located in a Potential Acid Sulphate Soil (PASS) risk area.

Groundwater levels are also measured at each groundwater monitoring location.



Figure 1-1: Water quality monitoring location SW2DS at Duck Creek

Following consultation with the NSW EPA, NSW Natural Resource Access Regulator, formerly NSW Department of Primary Industries (NSW Office of Water), and NSW Department of Primary Industries (Fisheries), trigger levels have been included in the Construction Water Quality Monitoring Program (WQMP). Implementation of the standard mitigation measures listed in Construction SWMP have ensured surface water and groundwater impacts have been minimised during construction.

In the reporting period, five surface water and two groundwater monitoring campaigns were completed. A sixth surface water monitoring event recorded on 5 January 2021 is included in this report due to not receiving laboratory results to report in the previous period. The water quality monitoring program did not find any results attributable to construction impacts during this monitoring period.

1.1.2 Surface Water monitoring results

The below tables present the recorded levels plotted against trigger levels set out in the Construction water quality monitoring program. For Total Suspended Solids (TSS) a trigger level exceedance is when two consecutive results are recorded to be above the trigger level. A trigger level for pH is a single result outside the trigger range. Although December is not in this monitoring period it has been included to highlight any potential trigger level exceedances. In the event that a trigger level exceedance has been identified, the Environmental Manager will investigate the issue to determine possible causes and to develop appropriate mitigation measures.

During the reporting period, the ongoing health of the waterways was clear during the monitoring events with consistent pH and TSS results and water flows remained consistent with the previous reporting period. Two major flood events occurred in March and May 2021.

No Oil and Grease was visible during the six monitoring events.

No significant trends were identified in the data below.

Table 1-1: Surface water quality monitoring trigger levels and results for pH

No.	Trigger Level	5/01/21	22/02/21	25/03/21	22/04/21	10/05/21	17/06/21	Number of results outside Trigger Level
SW1	<6.6 and >7.9 (< 6.9 and >8.4 for SW3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW2		7.6	7.5	7.3	7.6	7.7	N/A	0
SW2 DS		7.6	7.4	7.4	7.8	7.7	N/A	0
SW3 US		7.5	7.5	7.3	7.8	7.5	7.9	0
SW3		7.5	7.5	7.3	7.7	7.5	7.9	0
SW4		7.3	7.4	7.1	7.4	7.5	7.6	0
SW5A		7.7	7.9	7.3	7.7	7.8	7.9	NR
SW6		7.6	7.4	7.4	7.9	7.8	7.9	0
SW7		8.0	7.9	7.9	8.0	7.9	7.9	2
SW8		7.3	7.4	7.2	7.6	7.4	7.7	0
SW9		7.7	7.7	7.8	No Sample	7.7	7.7	0

Note: 1) N/A is representative of SW1 monitoring location being removed from the monitoring program as it is in an upstream catchment not influenced by construction works.

2) NR (Not Reportable) is representative of SW5A monitoring location being an upstream control site and therefore is not influenced by works being undertaken on the APRb project.

3) No Sample is representative of laboratory samples not being taken due to no or stagnant water in the creek during monitoring

Two exceedances against the trigger level identified in the monitoring program have occurred during the reporting period for pH levels. It is noted that marginally elevated pH levels were recorded in January and April at SW7 (Horsley Inlet) however a review of the site during the monitoring event found no construction related influence. The pH level exceedances were still within the ANZECC/ARMCANZ (2000) guidelines for pH being between 6.5 and 8.5. All results at SW7 have remained consistent with only a minor variation in pH during the reporting period. A 'No Sample' result is due to no water or stagnant water during monitoring. Stagnant water in creeks will alter the chemistry of the water due to an increase in bacteria and algal growth, which is not representative of the creek and therefore monitoring, was not undertaken. SW1 (Brooks Creek) was removed from the monitoring program as it is in an upstream catchment not influenced by construction works due the location of the creek being 1km north of the project boundary. The requirement to report exceedances of trigger levels at SW5A (Macquarie Rivulet) was removed in reporting period #3. SW5A is an upstream control site and therefore is not influenced by works being undertaken on the APRb project. Monitoring will still be undertaken as per the monitoring program however, exceedances against the monitoring criteria have been removed and not reported on.

Table 1-2: Surface water quality monitoring trigger levels and results for TSS

No.	Trigger level (greater than for two consecutive monitoring events)	8/12/20	5/01/21	22/02/21	25/03/21	22/04/21	10/05/21	17/06/21	Number of results exceeding Trigger Level
SW1	**7.42**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
SW2	**8.5**	No Sample	12	<5	<5	<5	<5	N/A	0
SW2 Downstream	**8.5**	No Sample	11	5	<5	<5	<5	N/A	0
SW3 Upstream	**9.4**	<5	<5	7	14	<5	6	6	0
SW3	**9.4**	<5	<5	10	10	<5	6	8	1
SW4	**10.7**	9	<5	<5	<5	<5	<5	7	0
SW5A	**6.9**	<5	10	7	17	<5	14	7	NR
SW6	**8.3**	<5	<5	5	<5	<5	<5	6	0
SW7	**33.9**	<5	<5	6	<5	12	<5	12	0
SW8	**91.2**	<5	<5	<5	<5	7	<5	<5	0
SW9	**6.7**	No Sample	<5	<5	<5	No Sample	5	6	0

Note: 1) N/A is representative of SW1 monitoring location being removed from the monitoring program after the August monitoring event as it is in an upstream catchment not influenced by construction works.

2) NR (Not Reportable) is representative of SW5A monitoring location being an upstream control site and therefore is not influenced by works being undertaken on the APRb project.

3) No Sample is representative of laboratory samples not being taken due to no or stagnant water in the creek during monitoring

There was one exceedance against the TSS trigger levels for SW3 (Macquarie Rivulet) during the reporting period from consecutive events (26 & 27) 22 February and 25 March. Elevated TSS records were consistent across upstream and downstream monitoring locations and proportionate to the rainfall received prior to the monitoring date.

A 'No Sample' result is due to stagnant water during monitoring. Stagnant water in creeks will alter the chemistry of the water due to an increase in bacteria and algal growth, which is not representative of the creek characteristics and therefore monitoring not undertaken. SW1 (Brooks Creek) was removed from monitoring program as it is not influenced by construction works due the location of the creek being 1km north (i.e. upstream) of the project boundary.

A visual assessment of the conditions at the monitoring point and nearby construction works are undertaken and any potential impacts to trigger level exceedances from construction are noted on the field sheets.

1.1.3 Surface Water monitoring discussion

Each monitoring event is discussed below in relation to potential impacts from construction.

- 5 January 2021 (TSS, pH, visible oil and grease) – One rain event ranging from 58-71mm of rain occurred prior to the monitoring event, the increase in average rainfall over the December and January period has increased flow

conditions and overall health. Duck Creek was the only creek that had no flow and as such, no samples were taken. All waterways were noted to have low to medium flow with discolouration observed in both upstream and downstream locations of Duck Creek and Macquarie Rivulet (SW2, SW2DS, SW3US, SW3 & SW5A). Consequently, there were no observed construction impacts noted during the monitoring event with comparable TSS and pH results between upstream and downstream locations. Field TSS and pH results were below the trigger level with the exception of SW7 (pH reading of 8.0). Although the SW7 pH result is above the trigger level, it is consistent with the trend throughout the monitoring program and remains within the ANZECC/ARMCANZ (2000) guidelines for pH being between 6.5 and 8.5. No Oil and Grease was visible during the monitoring event.

- 22 February 2021 (TSS, pH, visible oil and grease) – In the week prior to the monitoring event the site received between 11.4-28.6mm. All creeks were noted to have clear water and low to medium flow with exception of SW3US and SW3 which were noted to be slightly discoloured. TSS results indicated a slight increase between SW3US and SW3 at the time of monitoring but no visible difference was observable. A turbidity test was taken from SW3US and SW3 resulting in 3.99NTU and 4.13NTU respectively. Because of this, the exceedance is not considered to be construction related. No Oil and Grease was visible during the monitoring event.
- 25 March 2021 (TSS, pH, visible oil and grease) – In the week prior to the monitoring event the site received between 207-237mm of rain. Due to the high rainfall and subsequent flooding event most waterways experienced higher levels of turbidity and flow. Based on TSS and pH results there were no observed construction impacts at the time of monitoring. Comparable TSS and pH results were recorded for upstream and downstream locations and therefore no impacts from construction are considered. An exceedance in TSS for SW3 was triggered for two consecutive results over the trigger level. This exceedance relates to the increase in rainfall prior to the monitoring event. No Oil and Grease was visible during the monitoring event.
- 22 April 2021 (TSS, pH, visible oil and grease) – In the week prior to the monitoring event the site received between 0-1.8mm. All creeks were noted to have clear water and low to medium flow with exception of SW8 and SW8US which were noted to be slightly turbid. Monitoring records indicate there were no observed construction impacts noted during the monitoring event assessing upstream against downstream conditions. Field TSS and pH results were below the trigger level with the exception of SW7 (pH reading of 8.0). Although the SW7 pH result is above the trigger level, it is consistent with the trend throughout the monitoring program and remains within the ANZECC/ARMCANZ (2000) guidelines for pH being between 6.5 and 8.5. No Oil and Grease was visible during the monitoring event.
- 10 May 2021 (TSS, pH, visible oil and grease) – In the week prior to the monitoring event the project received between 62-94mm of rain. Due to the high rainfall event most waterways experienced slightly elevated levels of turbidity and flow. Based on TSS and pH results there were no observable construction impacts at the time of monitoring. Comparable TSS and pH results were recorded for upstream and downstream locations and therefore no impacts from construction are considered. No Oil and Grease was visible during the monitoring event.

- 17 June 2021 (TSS, pH, visible oil and grease) – In the day prior to the monitoring event the project site received between 8-11mm. All creeks were noted to have clear water and low to medium flow. In assessing upstream and downstream conditions, there were no observed construction impacts noted during the monitoring event. All field results had TSS and pH results below the trigger level and consistent in range. No oil or grease observed in all locations during the monitoring event.

For information regarding visible features of the monitoring location including but not limited to flow, vegetation, potential erosion of creek banks please refer to Water Quality monitoring report field sheet which can be found in Annexure B of the of this report.

1.1.4 Groundwater monitoring results

The below tables show the recorded data plotted against trigger levels set out in the Construction water quality monitoring program. Although Quarter 4 2020 (December) monitoring event is not in this monitoring period it has been included to highlight any potential trigger level exceedances. In the event that a trigger level exceedance has been identified the Environmental Manager will investigate the issue to determine possible causes and to develop appropriate mitigation measures.

All wells were sampled during both monitoring events.

No Oil and Grease was visible during the two monitoring events.

No significant trends were identified in the data below.

Table 1-3: Groundwater quality monitoring trigger levels and results for pH

No.	pH				Number of results exceeding Trigger Level
	Trigger Level (greater than for two consecutive monitoring events)	11/12/2020	23/02/2021	11/06/2021	
GW1	6.7	8.0	8.1	7.9	2
GW2	6.8	7.9	7.9	7.9	2
GW3	7.2	7.9	7.9	7.6	2
GW4	6.6	8.0	8.0	7.8	2
GW5	4.2	4.2	4.2	4.2	0
BH318	6.8	7.5	7.4	7.2	2

Ten exceedances against the trigger level identified in the monitoring program have occurred during the reporting period for pH levels in GW1, GW2, GW3, GW4 and BH318. All of the pH levels exceedances were still within the ANZECC/ARMCANZ (2000) guidelines for pH being between 6.5 and 8.5. All results are consistent with previously recorded results. The exceedances are not considered an impact from construction.

Table 1-4: Groundwater quality monitoring trigger levels and results for EC

No.	Electrical Conductivity (mS/cm)				Number of results exceeding Trigger Level
	Trigger level (greater than for two consecutive monitoring events)	11/12/2020	23/02/2021	11/06/2021	
GW1	2.2	2.8	2.7	2.6	2
GW2	1.3	1.3	1.3	1.1	0
GW3	1.3	16.9	17.1	14.7	2
GW4	2.4	2.7	2.8	1.7	1
GW5	17.0	21.7	21.6	22.0	2
BH318	5.1	5.3	6.6	6.8	2

Nine exceedances against the trigger level identified in the monitoring program occurred during the reporting period for EC levels in GW1, GW3, GW4, GW5 and BH318 however, the EC levels are consistent with previous recorded level and pre-construction levels that have been outside of ANZECC guideline levels for EC and are therefore not considered an impact from construction.

Table 1-5: Groundwater quality monitoring trigger levels and results for Temperature

No.	Temperature (°C)				Number of results exceeding Trigger Level
	Trigger level (greater than for two consecutive monitoring events)	11/12/2020	23/02/2021	11/06/2021	
GW1	21.2	22.4	22.4	19.6	1
GW2	17.7	19.8	18.1	17.3	1
GW3	18.4	19.3	19.8	19.3	2
GW4	18.3	20.8	18.6	18.8	2
GW5	19.1	20.1	19.7	19.6	2
BH318	18.3	18.7	18.5	18.7	2

Ten exceedances against the trigger level identified in the monitoring program have occurred during the reporting period for Temperature levels in all monitoring wells. The Temperature level was consistent with other groundwater wells monitored during the monitoring program and is also consistent with current environmental conditions and are therefore not considered an impact from construction.

Table 1-6: Groundwater quality monitoring trigger levels and results for Height

No.	Height (m) to Top of Casing (TOC)				Number of results exceeding Trigger Level
	Trigger level (greater than for two consecutive monitoring events)	11/12/2020	23/02/2021	11/06/2021	
GW1	6.31	5.90	6.51	6.28	0
GW2	1.69	2.80	1.96	1.82	2
GW3	6.91	2.30	2.67	2.43	0
GW4	6.20	12.00*	11.80*	12.98*	N/A
GW5	6.83	7.80	8.65	8.66	2
BH318	5.01	6.90	6.98	7.32	2

Note: 1) * is representative of GW4 Height has increased due to the monitoring well moving from the pre-construction location and the well casing increasing in height to facilitate construction fill works.

Six exceedances against the trigger level identified in the monitoring program occurred during the reporting period for Height. The Heights are consistent with current environmental conditions. GW4 Height has increased due to the monitoring well moving from the pre-construction location and the well casing increasing in height to facilitate construction fill works in within the immediate area of the groundwater monitoring location. Subsequent results (Q1 and Q2) have shown the well height to be stable over the monitoring period.

Table 1-7: Groundwater quality monitoring trigger levels and results for Dissolved Metals at GW2

No.	Dissolved Metal (mg/L)				
	Trigger level (greater than for two consecutive monitoring events)	11/12/2020	23/02/2021	11/06/2021	Number of results exceeding Trigger Level
Arsenic	0.0013	0.003	0.001	<0.001	0
Cadmium	0.0001	<0.0001	<0.0001	<0.0001	0
Chromium	0.001	<0.001	<0.001	<0.001	0
Copper	0.002	0.009	0.011	0.051	2
Nickel	0.003	0.004	0.002	0.008	0
Lead	0.001	<0.001	<0.001	<0.001	0
Zinc	0.01	<0.005	<0.005	0.25	0
Mercury	0.0001	<0.0001	<0.0001	<0.0001	0

Two exceedances against the trigger levels identified in the monitoring program occurred during the reporting period for dissolved metal copper. Copper concentration remains consistent above the trigger level during the monitoring program. Q2 2021 saw an increase in copper above levels previously recorded. This reading will remain an outlier until Q3 monitoring occurs to distinguish any trends. It is important to note

there has not been any change in construction activities within the GW2 area and pre-construction levels were recorded above the trigger level.

During Q2 monitoring event there was an increase in nickel concentration, although not triggering an exceedance it is worth noting and will be used to distinguish a potential trend or outlier in the next reporting period.

Overall groundwater monitoring results indicate consistency with previous monitoring levels.

1.1.5 Groundwater monitoring discussion

Each monitoring event is discussed below in relation to potential impacts from construction.

- 23 February 2021 – Q1 2021 results indicate that there are no impacts from construction activities however seasonal and climatic impacts appear to be affecting the groundwater across site. GW3 was observed to have groundwater in the well for the second consecutive quarter. Monitoring against these results will occur in the next reporting period. There were two exceedances in metal concentrations in GW2 against Q1 2021. Arsenic levels decreased very slightly compared to Q4 2020. Copper was stable with Q4 results however still consistent with levels found prior to construction commencing in the area. Nickel levels have slightly decreased below the trigger level however remain in a stable state. The concentrations were generally only marginally greater than the nominated trigger levels and associated laboratory reporting limits and are considered representative of natural groundwater quality variations rather than related to potential impacts from project construction works. GW4 Height has stabilised with Q4 2020 heights.
- 11 June 2021 – Q2 2021 results indicate that there are no impacts from construction activities however seasonal and climate impacts are affecting the groundwater across site. GW3 was observed to have groundwater in the well for the third consecutive quarter which present consistently across the previous monitoring events. Generally all parameters were consistent with previous events apart from a reduction in electrical conductivity for GW4 and increases in dissolved metals copper and zinc for GW2.

  Further trend analysis of GW2 dissolved metals copper and zinc indicates fluctuations in concentration levels being proportionate to large, seasonal rainfall events. This analysis indicates that concentration levels of copper and zinc represent natural groundwater quality variations with seasonal cycles rather than related to potential impacts from project construction works.

1.1.6 Water quality monitoring conclusion

Implementation of the standard mitigation measures listed in Table 6-1 of the SWMP ensures surface water and groundwater impacts are minimised during construction. Based on the available data and observed water quality during the reporting period, no modification was deemed to be required to the construction methods or environmental control measures being implemented onsite.

Seasonal rainfall has shown the effects it has on the surface water and groundwater health along the project alignment with fluctuating levels recorded across all parameters.

Whilst exceedances of trigger levels have been identified during water quality monitoring events, onsite reviews have determined no clear impact resulting from the project has occurred and therefore the exceedances were not considered to be related to construction impacts. No further unscheduled monitoring to further verify exceedances were undertaken during the monitoring period.

Surface Water Monitoring Reports and Groundwater Monitoring Reports can be found in Annexure B and Annexure C respectively.

1.2 Sediment Basin Discharge

The Project Environmental Protection Licence (EPL) prescribes water quality parameters to be measured and associated discharge criteria. For each sediment basin specified in the EPL, the concentration of a pollutant discharged at that point, must not exceed the concentration limits specified for that pollutant as shown in Table 1-8.

Table 1-8: Environmental Protection Licence concentration limits

Pollutant	Units of Measure	100th percentile concentration limit
Oil and Grease	Visible	Not Visible
pH	pH	6.5 – 8.5
Total Suspended Solids	Milligrams per litre	50
Turbidity	nephelometric turbidity units	31

Fulton Hogan released 84 compliant discharges from sediment basins during the reporting period. No exceedances have been recorded against the EPL criteria. Sediment basin discharge data can be found on the Fulton Hogan website at the following link:

https://www.fultonhogan.com/managementplans/albion-park-rail-bypass/

1.3 Air quality

1.3.1 Introduction

The purpose of air quality monitoring during the construction phase is to determine impacts resulting from construction of the project only (i.e. road construction) and not other adjacent but unrelated sources, such as quarry or agricultural operations. The key emissions from road construction are generally dust and Particulate Matter (PM). The EPA sets goals for ambient dust concentrations and dust deposition, which is a measure of the impacts of nuisance. Air quality goals relate to the total dust burden in the air and not just the dust from the Project. Because of this, there needs to be some consideration of background levels, including the two major operational quarries adjacent to the project, when using these goals to assess impacts. Particle levels ($PM_{2.5}$ and PM_{10}) do exceed national standard levels from time to time. Particle pollution included primary particles released directly from sources, and secondary particles produced by chemical reactions between gases or between gases and other particles in the air. The comparison of $PM_{2.5}$ has been found to typically include ammonium sulphate, sea salt, black carbon, organic matter and soil. This indicates

that particle and gaseous emissions from natural and human-made sources contribute to ambient $PM_{2.5}$ conditions. Exceedances of particle standards often coincide with regional dust storms or bushfire/back burning events.

Major source groups contributing to $PM_{2.5}$ and PM_{10} emissions in Kiama, Shellharbour and Wollongong LGAs are industrial sources (i.e. EPA-licensed industry), on-road mobile sources (e.g. cars and trucks), non-road mobile sources (e.g. bulldozers, haul trucks, ships and locomotives), domestic–commercial sources (e.g. residential heating during the cooler months), commercial activities (e.g. service stations) and natural sources (e.g. vegetation, bushfires and sea salt). The major sources of particle emissions are industrial (70% of $PM_{2.5}$ and 81% of PM_{10} emissions) and domestic-commercial sources (12% of $PM_{2.5}$ and 20% of PM_{10} emissions). Iron and steel production and mining and extractive activities account for the bulk of industrial emissions. Residential wood heating accounts for over 90% of particle emissions from domestic-commercial sources. Due to increases in residential wood heating, OEH have noted a 24% increase in fire particle emissions from domestic-commercial sources.

Industrial emissions are the dominant source of $PM_{2.5}$ emissions in Wollongong and Shellharbour LGAs, followed by domestic–commercial emissions (notably residential wood heating during the cooler months). Industrial and domestic–commercial sources contribute similar amounts of $PM_{2.5}$ emissions in Kiama LGA.

Industrial emissions are the most significant source of PM_{10} emissions, accounting for 75% to 86% of total PM_{10} emissions in the three LGAs, followed by domestic–commercial emissions, accounting for 10% to 13% of total emissions.

The top individual source types contributing to $PM_{2.5}$ and PM_{10} emissions by LGA are:

- Kiama – non-metallic mineral mining and quarrying, and residential wood heating
- Shellharbour – non-metallic mineral mining and quarrying, and residential wood heating
- Wollongong – basic ferrous metal manufacturing and residential wood heating.



Figure 1-2: Dust Deposition Gauge

Deposited dust is monitored monthly during construction using gravimetric Dust Monitoring Gauges (DMG) to assess compliance with the criteria detailed in Table 1-9. Particulate Matter ($PM_{2.5}$, PM_{10} and TSP) is monitored on a real-time continuous basis. The parameters monitored are those identified in the Air Quality Management Plan (AQMP) and include:

Table 1-9: Air quality monitoring criteria for $PM_{2.5}$, PM_{10}, total suspended particulates and deposited dust[a].

Pollutant	Averaging Period	Concentration	
		pphm	$\mu g/m^3$[d]
$PM_{2.5}$	24 hours	-	25
	Annual	-	8
PM_{10}	24 hours	-	50
	Annual	-	25
Total Suspended Particulates (TSP)	Annual	-	90
		$g/m^2/month$[c]	**$g/m^2/month$[d]**
Deposited dust[b]	Annual	2	4

Note:

a) Adapted from Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (EPA 2016).

b) Dust is assessed as insoluble solids as defined by AS 3580.10.1-2003 (AM-19).

c) Maximum increase in deposited dust level due to the project

d) Total cumulative concentrations and deposition rates due to the project plus background levels due to all other sources.

A trigger level has been included at Table A-2 of the Construction air quality monitoring program to protect the PM_{10} 24 hour standard criterion identified of 50 µg/m^3. The real time response trigger level provides a system to warn construction personnel when short-term average periods indicate that the 24-hour criterion may be exceeded. The real time monitoring system is used to trigger implementation of additional mitigation measures as identified in construction air quality monitoring program. This allows proactive dust management to control 24-hour and ultimately annual average impacts.

Implementation of the standard mitigation measures listed in the AQMP have ensured air quality impacts are minimised during construction.

1.3.2 Results

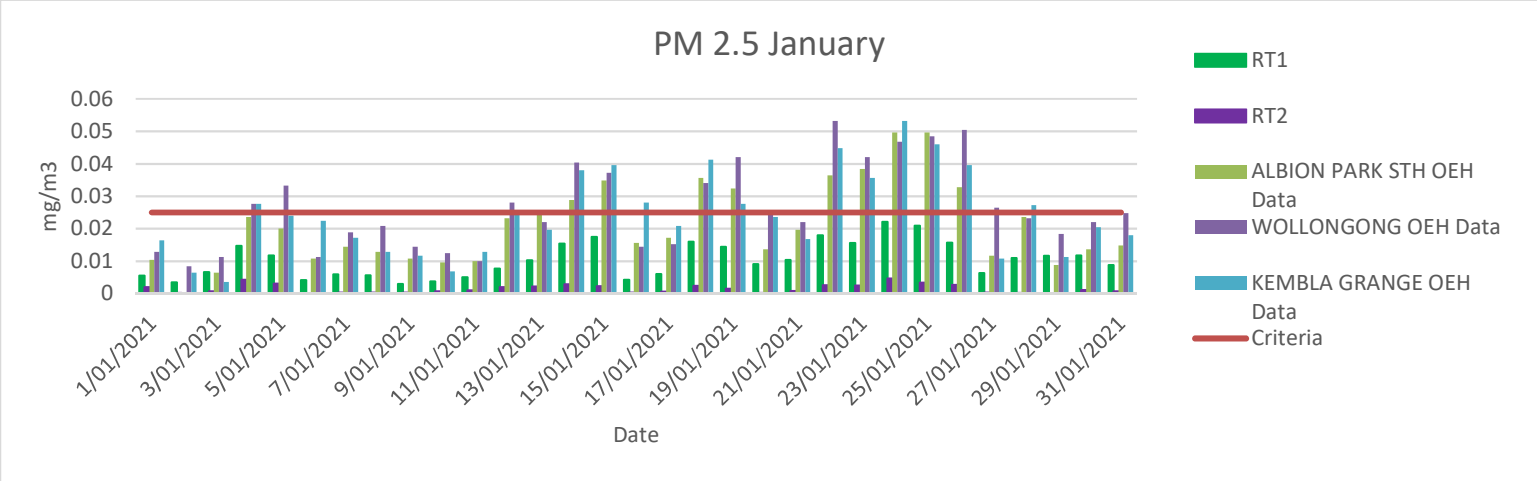
In general, Air Quality levels recorded at the Projects monitoring stations are consistent with the Illawarra and Greater Metropolitan Region and, as such, the results are considered to be reflective of regional background conditions, rather than construction impacts. The relationship between ambient air quality and air emissions is influenced by a range of factors including meteorology, topography (surrounding terrain), chemical reactions of pollutants in the air and source location and type.

$PM_{2.5}$ and PM_{10} 24 hour particulate matter levels were greater than the criteria identified in the AQMP at various times during the current reporting period as shown in Table 1-10 and Graphs 1-1 to 1-12. The rolling Annual Average for this reporting period $PM_{2.5}$ for RT1 and RT2 were 0.0095mg/m^3 and 0.0003mg/m^3 respectively and for PM_{10} for RT1 and RT2 were 0.0421mg/m^3 and 0.0003mg/m^3 respectively.

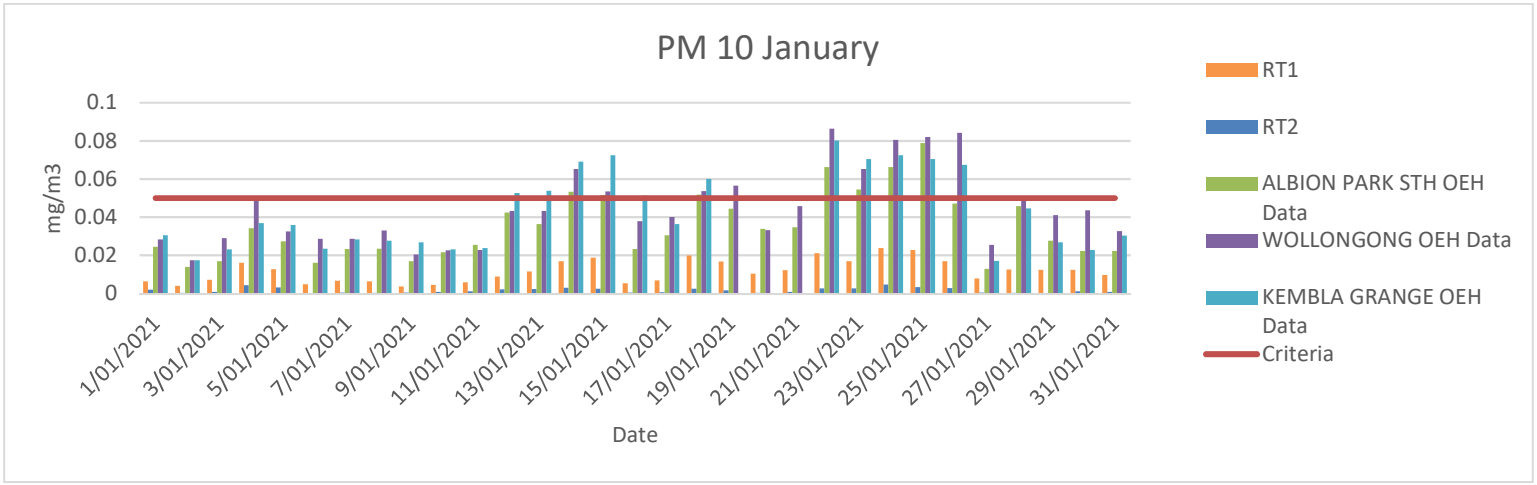
The recorded rolling Annual Averages are less than the criteria identified in the AQMP. The rolling Annual Average for PM_{TSP} for RT1 and RT2 is 0.0105mg/m^3 and 0.0003mg/m^3 respectively which is tracking below the annual average rate of 0.09mg/m^3.

The monthly dust deposition results as shown in Table 1-11 and Graph 1-13 are consistent with the anticipated impacts described in the Construction air quality monitoring program. During the reporting period, the annual averaging period levels for DMG1 and DMG Control were 2.3 g/m²/month and 0.9 g/m²/month respectively. These values show the results are below the 4 g/m²/month (Annual) anticipated maximum total deposited dust level and are consistent with pre-construction levels.

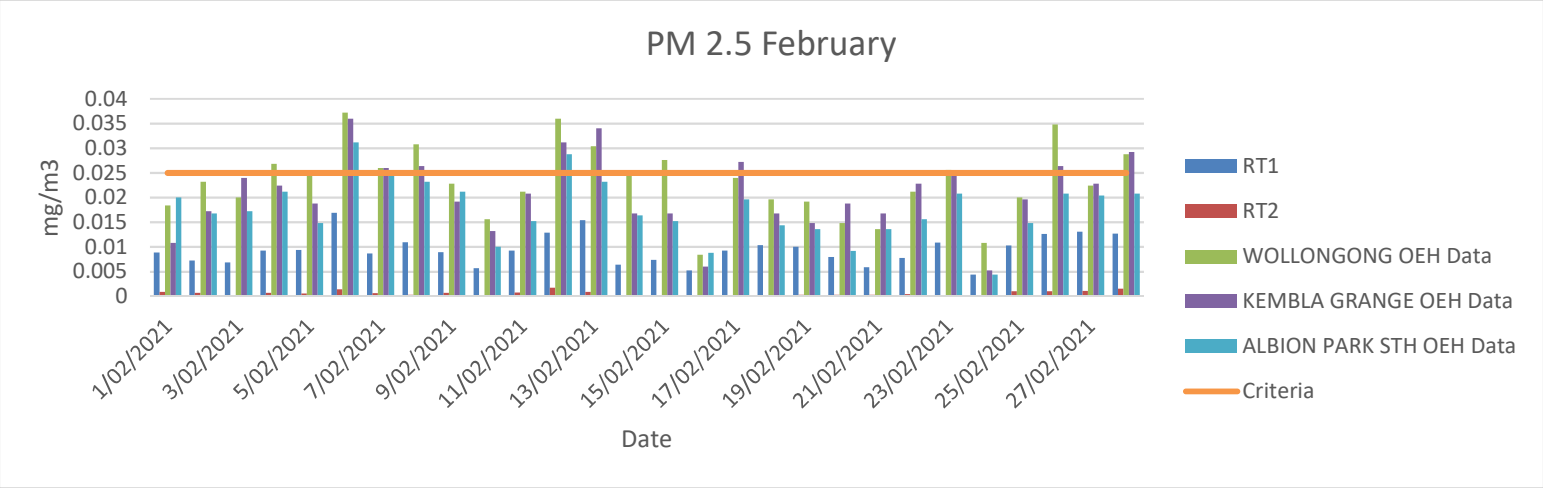
During the previous reporting period, the Construction Air Quality Management Plan and the Construction air quality monitoring program was updated to remove the criteria adopted for $PM_{2.5}$. The $PM_{2.5}$ data is primary influenced by regional emission sources and not wholly related to construction emission as discussed in the section above. These changes were approved by Department of Planning, Industry and Environment on the 25th March 2020 and as such will not be analysed in this monitoring report.



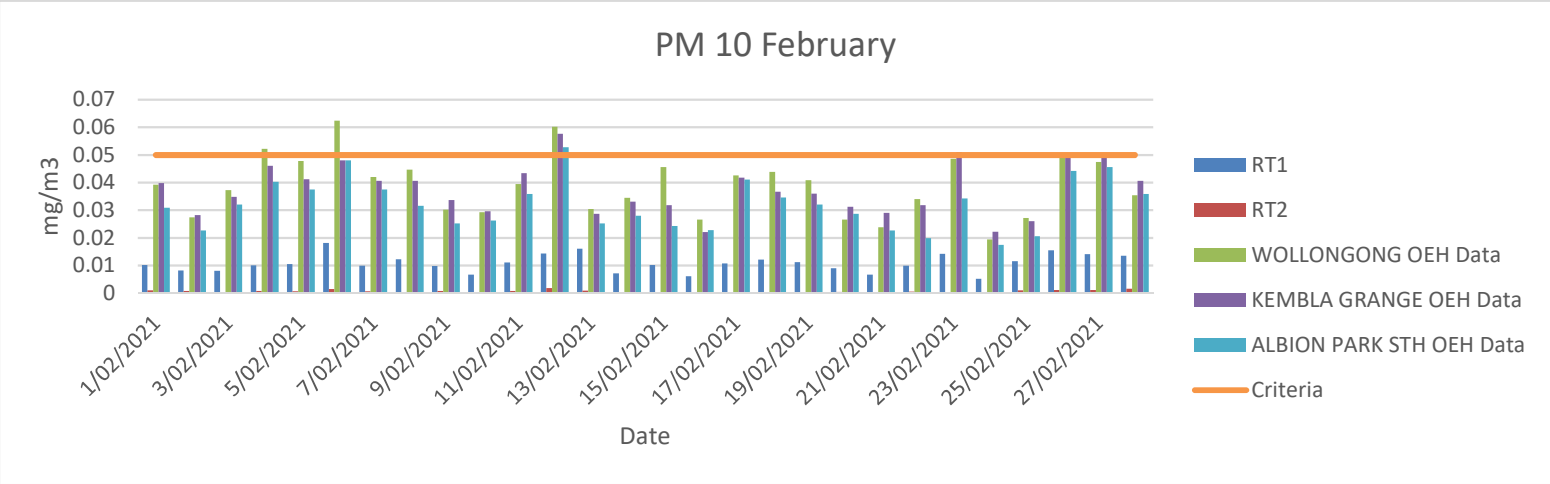
Graph 1-1: $PM_{2.5}$ January 24hr Average



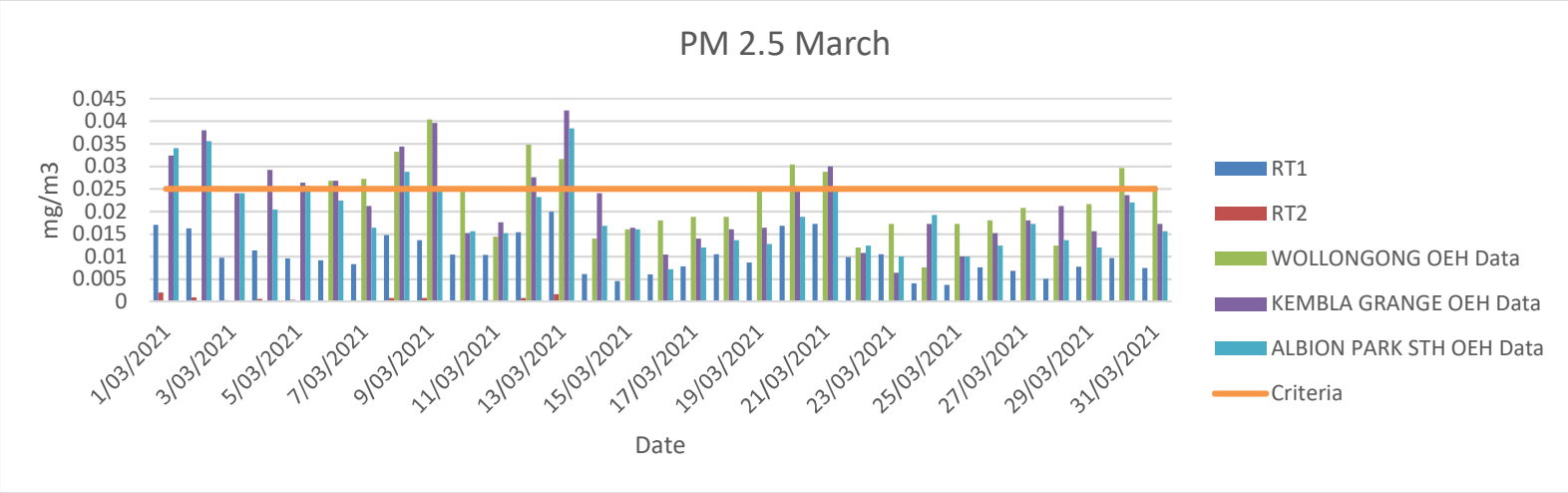
Graph 1-2: PM_{10} January 24hr Average



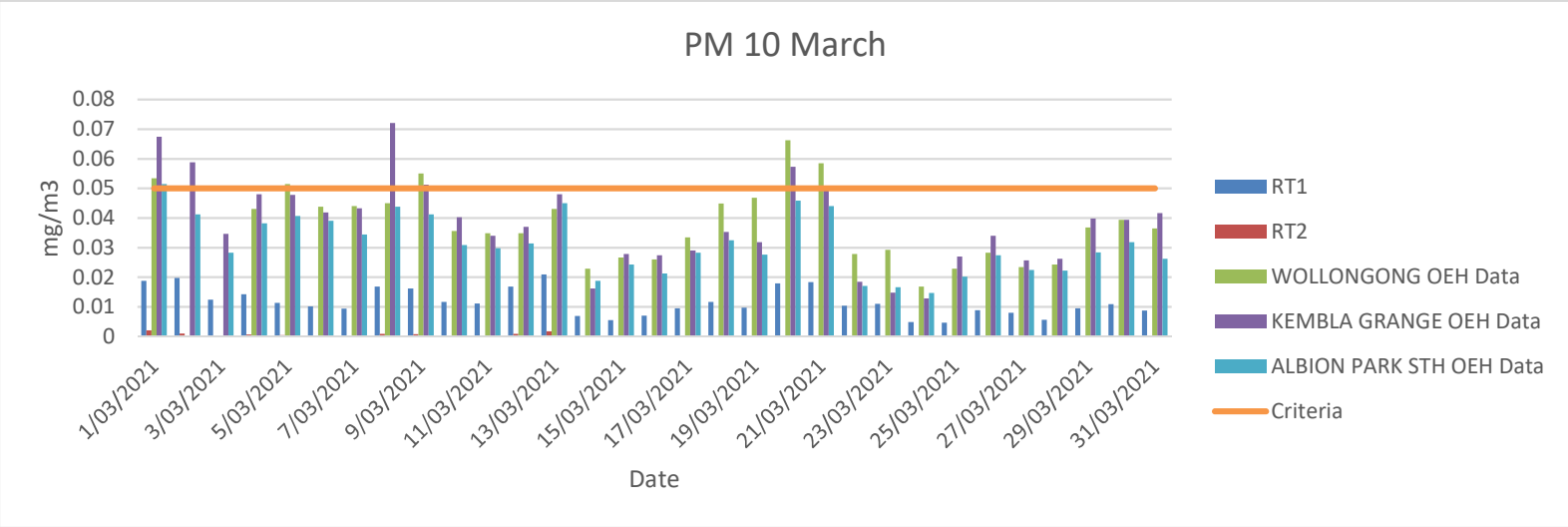
Graph 1-3: $PM_{2.5}$ February 24hr Average



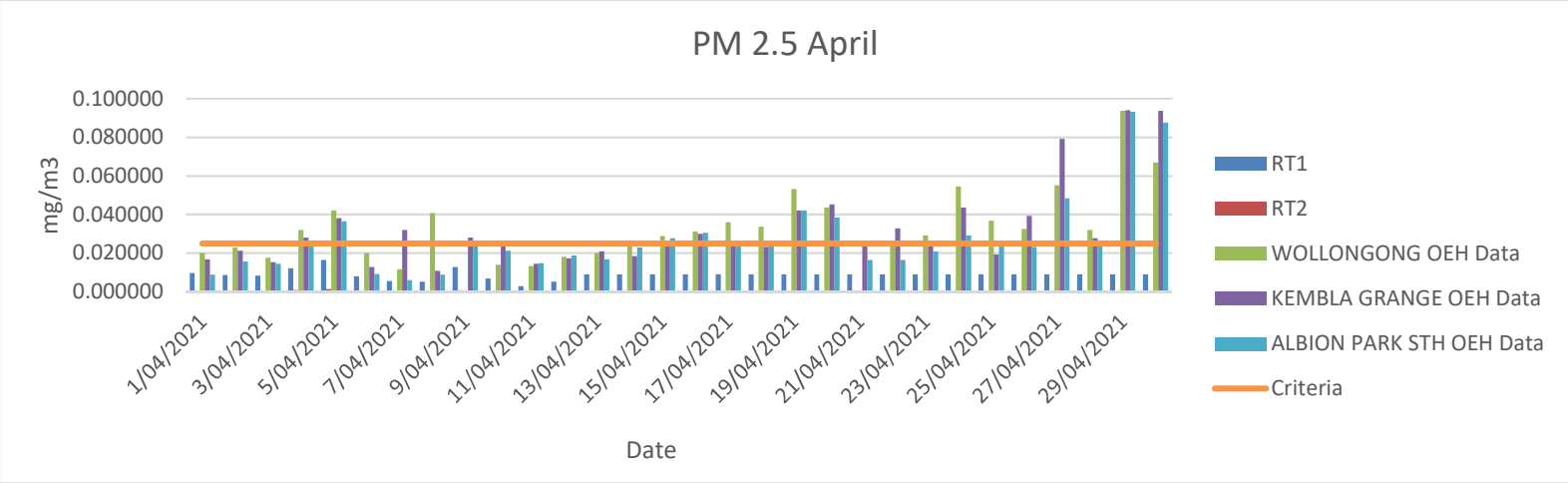
Graph 1-4: PM_{10} February 24hr Average



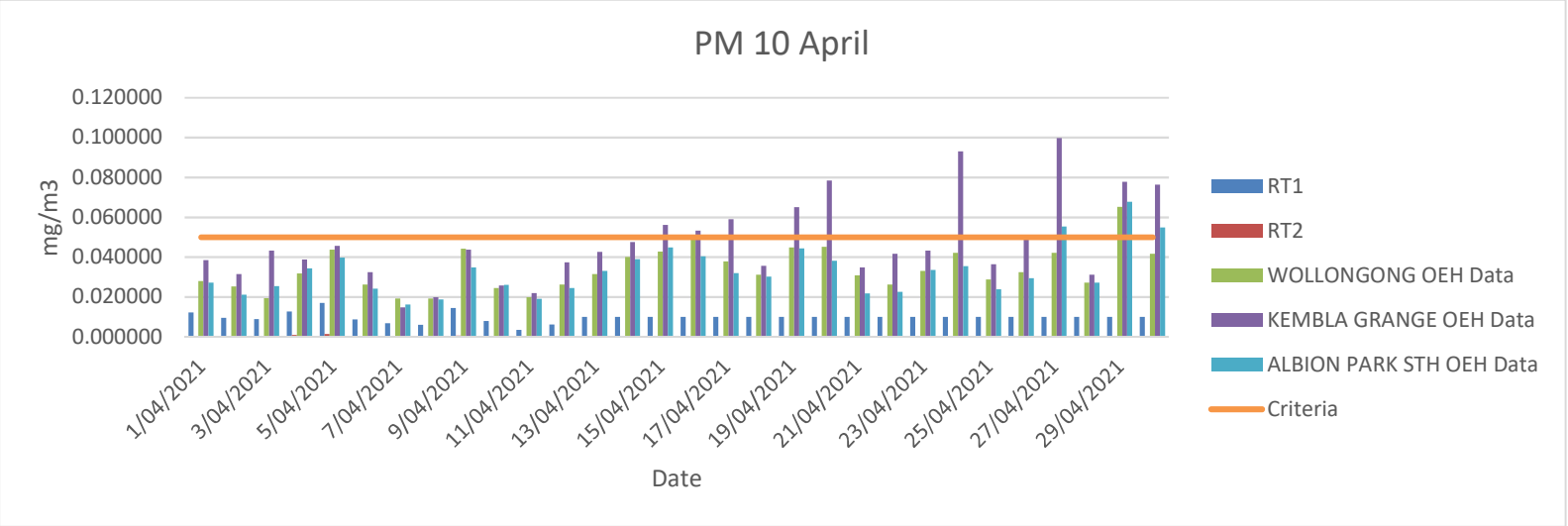
Graph 1-5: $PM_{2.5}$ March 24hr Average



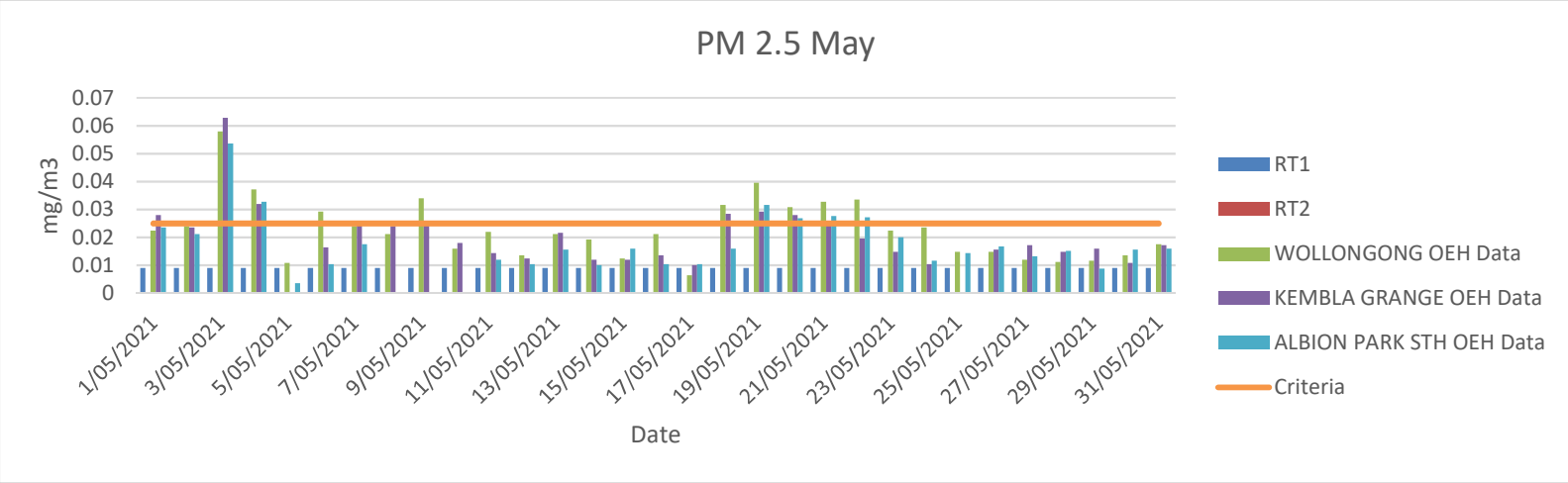
Graph 1-6: PM_{10} March 24hr Average



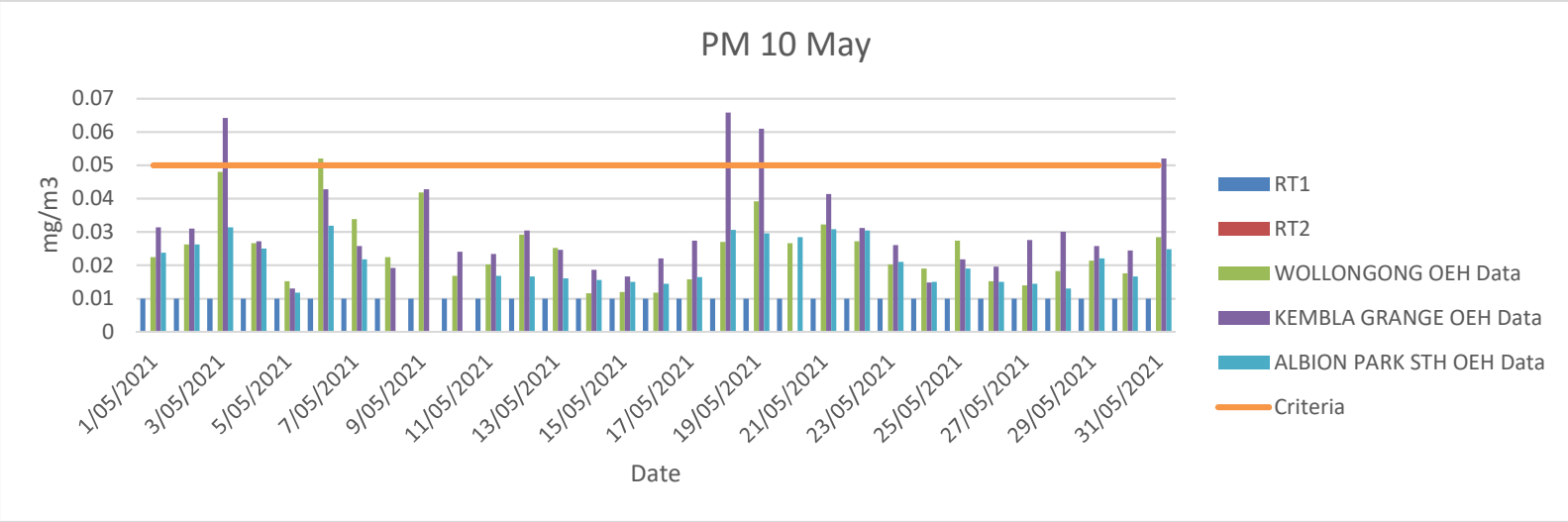
Graph 1-7: $PM_{2.5}$ April 24hr Average



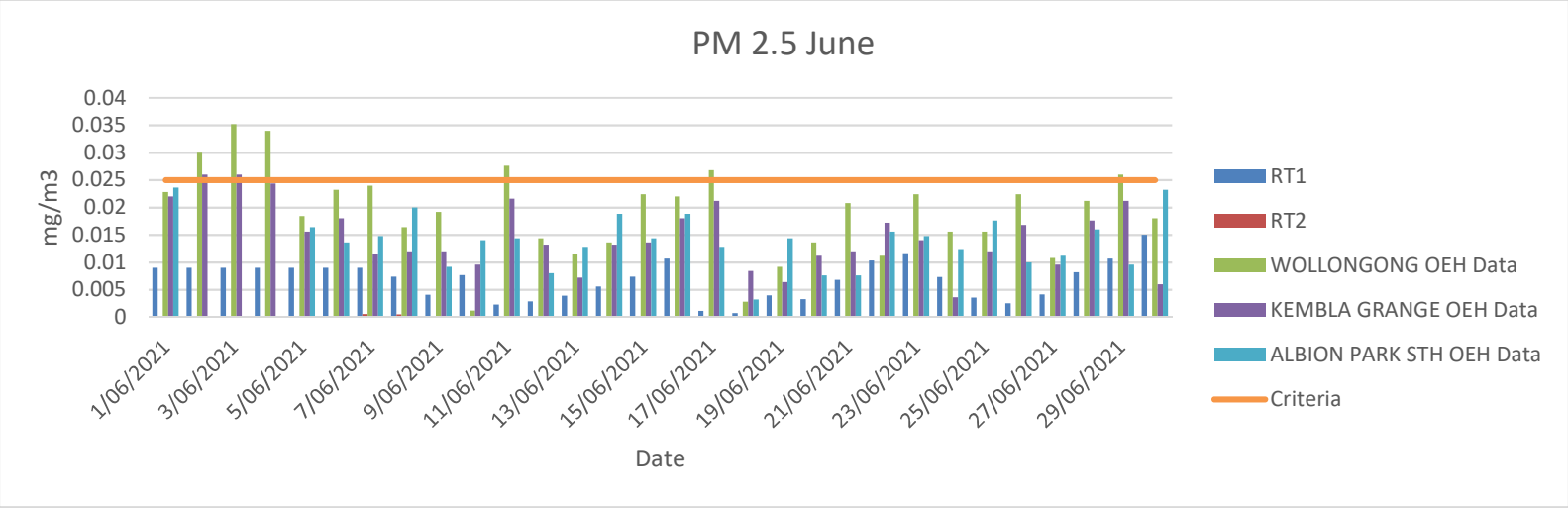
Graph 1-8: PM_{10} April 24hr Average



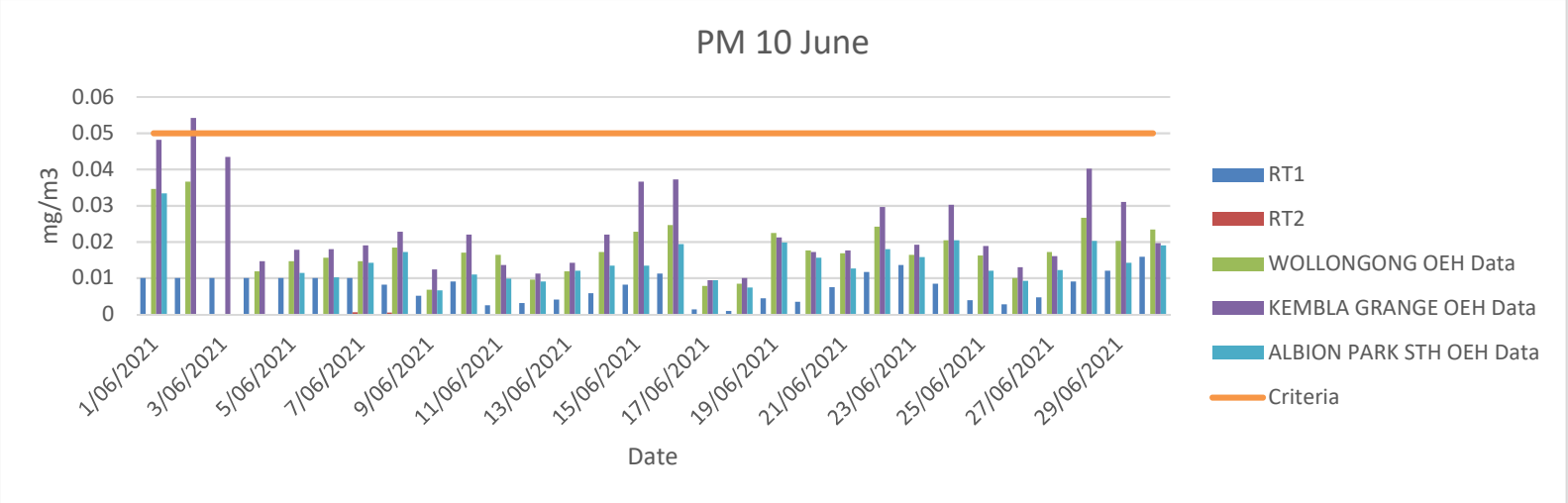
Graph 1-9: $PM_{2.5}$ May 24hr Average



Graph 1-10: PM_{10} May 24hr Average



Graph 1-11: $PM_{2.5}$ June 24hr Average



Graph 1-12: PM_{10} June 24hr Average

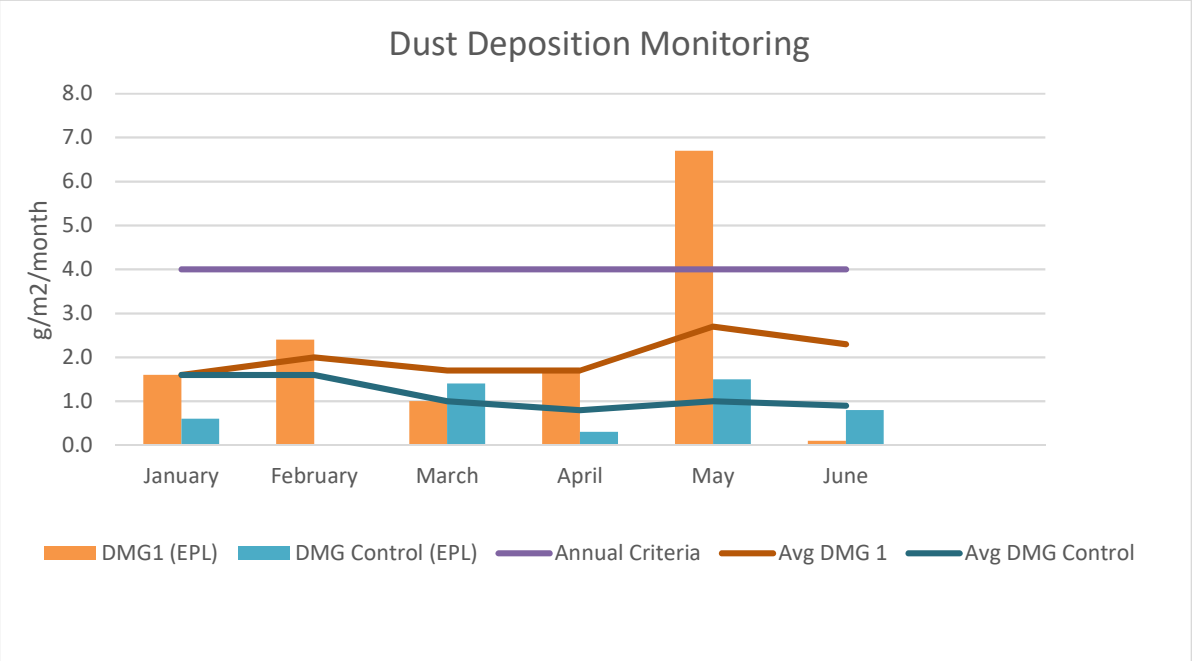
Table 1-10: PM_{10} Exceedance data

Monitoring Station/Pollutant	Number of Exceedances/Month					
	Jan	Feb	Mar	Apr	May	Jun
RT1 PM10 (mg/m3)	0	0	0	0	0	0
RT2 PM10 (mg/m3)	0	0	0	0	0	0
Albion Park Sth OEH PM10 (mg/m3) Data	7	1	1	3	0	0
Wollongong OEH PM10 (mg/m3) Data	9	3	5	2	1	0
Kembla Grange OEH PM10 (mg/m3) Data	11	2	5	9	4	1

.

Table 1-11: Deposited dust criteria and recorded data

Month	Date Started	Date Finished	Criteria (g/m²/ month) Annual	DMG 1 34 Princes Highway Yallah (g/m²/ month)	DMG Control Cnr Ash Ave and Tongarra Rd, Albion Park Rail (g/m²/ month)	Comments
January	16/12/20	16/01/21		1.6	0.6	
February	16/01/21	16/02/21		2.4	-	DMG control damaged during monitoring period no result recorded
March	16/02/21	15/03/21		1.0	1.4	
April	15/03/21	16/04/21		1.7	0.3	
May	16/04/21	14/05/21		6.7	1.5	DMG1 result not project related
June	14/05/21	16/06/21		0.1	0.8	
Reporting period Average			**4**	**2.3**	**0.9**	
2021 Annual Average			**4**	**2.3**	**1.6**	



Graph 1-13: Average Annual Dust Deposition rolling results per month

No exceedances against the criteria identified in the monitoring program have occurred during the reporting period for Deposited dust levels as shown in Table 1-11 and Graph 1-13.

1.3.3 Conclusion

PM_{10} 24 hour Average particulate levels were less than the criteria identified in the AQMP at all times during the reporting period as shown in Table 1-10. It is also noted that these monitoring results were less than or consistent with recorded ambient air quality levels across the Illawarra and the Greater Metropolitan Region and, as such, the results are considered to be reflective of regional background impacts rather than construction impacts. The rolling Annual Average for this reporting period $PM_{2.5}$ for RT1 and RT2 were 0.0095mg/m^3 and 0.0003mg/m^3 respectively and for PM_{10} for RT1 and RT2 were 0.0421mg/m^3 and 0.0003mg/m^3. The recorded rolling Annual Averages are less than the criteria identified in the AQMP and shown above in Table 1-9. The rolling Annual Average for PM_{TSP} for RT1 and RT2 is 0.0105mg/m^3 and 0.0003mg/m^3 respectively which is tracking below the annual average rate of 0.09mg/m^3.

Further, monthly dust deposition monitoring results for DMG1 and DMG Control were 2.3g/m²/month and 0.9g/m²/month respectively and were less than the nominated project criteria identified in the AQMP and shown above in Table 1-9.

The progressive completion of works and implementation of the standard mitigation measures listed in Table 6-1 of the AQMP ensure air quality impacts are minimised during construction. Minor modifications of work practices have occurred during the reporting period including completion of distinct areas of the project, along with changes to the construction methods and environmental control measures such as progressive stabilisation have assisted in mitigating air quality impacts from the project. As the project transitions into the completion phase mitigation measures focus on completing landscaping and pavement works to minimise air quality impacts where they move towards negligible in operation.



Figure 1-3: Local air quality in May looking west from Cut 5



Figure 1-4: Local air quality and stabilised construction footprint in June looking north adjacent to Croome Road Sporting Complex

1.4 Noise and vibration

1.4.1 Introduction

The NVMP has been developed in consultation with NSW EPA in accordance with CoA C4. The recommended management levels and goals when assessing construction noise and vibration are outlined in:

- The Interim Construction Noise Guideline (ICNG)
- The Roads and Maritime Construction Noise and Vibration Guideline (CNVG)
- Assessing Vibration: A technical guideline
- The ANZECC, Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration.

Construction activities generate noise and vibration of varying levels depending on the activities being carried out and the proximity to sensitive receivers such as residential areas. The type of work carried out during construction often involves the use of large plant and machinery, sometimes moving along the project alignment and sometimes working in a fixed location, which can cause varying noise and vibration at nearby receivers. These aspects of construction can exacerbate noise levels from the works and their effects, causing annoyance to those affected.

Noise monitoring was conducted as part of the EIS for the Albion Park Rail Bypass Project in February and July 2015. The results of the monitoring of existing noise levels, referred to as rating background levels (RBL) are presented in Table 4-2 of the NVMP. The RBL is a measure of the typical background ambient noise level in the environment.

The Fulton Hogan Environmental Officer undertakes attended noise monitoring at nominated locations monthly during the construction phase of the Project as stated in section 9.3.3 and Table 9-1 of the NVMP. These locations have been selected, where possible, to coincide with locations where previous baseline monitoring occurred during the EIS. For these locations, the EIS baseline noise monitoring data will be used as the baseline data for the construction noise monitoring. The recorded levels are consistent with the predicted levels as described in Table 7-3 of the NVMP.

At times during the Project, Out of Hours Work (OOHW) are required due to restrictions around works near major roads and intersections during standard hours. Attended monitoring has also been undertaken during approved OOHW. The recorded levels were consistent with the predicted levels shown in the corresponding noise assessments.

Effects of ground vibration on buildings resulting from construction may be segregated into the following three categories:

- Human exposure – disturbance to building occupants: vibration in which the occupants or users of the building are inconvenienced or possibly disturbed
- Effects on building contents – vibration where the building contents may be affected
- Effects on building structures – vibration in which the integrity of the building or structure itself may be prejudiced.

1.4.2 Results

The below table displays recorded data plotted against Noise Management Levels (NML) set out in Table 5-4 of the NVMP. Noise monitoring is undertaken to assess the influence of specific noise sources such as construction works, however background noise sources can influence the attended monitoring session. $L(A)_{eq\ 15min}$ represents the continuous sound level recorded at the time of monitoring including external (i.e. not construction) influences such as traffic, heavy industry, commercial or private impacts. Const $L(A)_{eq}$ is the determined effect of construction noise during the monitoring event and is plotted against the trigger levels to determine any potential impacts from construction. No significant trends were identified in the data below apart from works that are being undertaken within a very low rating background level (RBL). There were no exceedances for Const $L(A)_{eq}$ against the trigger level identified in the monitoring program. Ongoing monitoring found that the recorded Const $L(A)_{eq}$ levels reduced to near trigger levels as the permanent noise attenuation barriers were constructed, the installation of temporary noise attenuation barriers and the relocation of haul routes to move machinery away from sensitive receivers.

During the reporting period major traffic changes along the new alignment for Illawarra Highway traffic allowed for data collection under operational conditions in noise monitor locations L9 and L10. It is worth noting that L9 indicated a slight increase in noise under these conditions and L10 remained consistent with previous recordings due to normal traffic influences.

Attended vibration monitoring has occurred in response to community enquiries and on all occasions, vibration levels were within acceptable parameters established in International Standards and adopted in the approved NVMP.

Table 1-12: Attended Noise monitoring data recorded against Noise Management Levels

LOCATION DESCRIPTION	Noise Management Levels (NML) (dB)	Jan		Feb		Mar		Apr		May		Jun	
		L(A)eq (15min)	Const L(A)eq	L(A)eq (15min)	Const L(A)eq	L(A)eq (15min)	Const L(A)eq	L(A)eq (15min)	Const L(A)eq	L(A)eq (15min)	Const L(A)eq	L(A)eq (15min)	Const L(A)eq
L1 - 20 Westwood Drive, Blackbutt (NCA1)	**58**	59	41	58	42	57	42	58	42	55	47	54	43
L2 - 78 Jarrah Way, Albion Park Rail (NCA2)	**55**	47	47	47	51	50	45	55	49	47	34	61	46
L3 - 17 Gumnut Street, Albion Park Rail (NCA2)	**55**	57	51	48	35	54	35	55	50	55	49	53	28
L4 - 152 Croome Road, Albion Park (NCA4)	**54**	68	37	71	43	70	36	54	37	70	40	68	33
L5 - 59 Burdekin Drive, Albion Park (NCA5)	**45**	60	26	63	36	61	35	45	26	59	31	57	28
L6 - 25 Fraser Crescent, Albion Park (NCA5)	**45**	50	29	49	32	50	34	45	29	48	33	46	30
L7 - 52 Tongarra Road, Albion Park (NCA8)	**62**	74	47	72	39	72	39	57	41	72	44	69	42
L8 - 24 Terry Street, Albion Park (NCA10)	**57**	74	49	73	57	71	53	71	43	74	52	76	53
L9 - 42 Larkins Lane, Yallah (NCA13)	**58**	65	52	62	55	60	52	58	56	64	46	64	48
L10 - 4 Semillon Place, Mount Brown (NCA15)	**64**	64	49	60	48	62	48	64	48	58	45	59	45

Results from monthly and out of hours attended monitoring can be found in Annexure D of this report.



Figure 1-5: Attended noise monitoring



Figure 1-6: Attended vibration monitoring

1.4.3 Conclusion

Implementation of the standard mitigation measures listed in Table 8-1 and 8-2 of the NVMP ensure noise and vibration impacts are minimised during construction. The construction of the permanent noise wall will result in the construction noise levels reducing to below trigger levels in locations adjacent to the future highway. Based on the available data, no modification is required to the construction methods or environmental control measures being implemented onsite.

1.5 Summary

Implementation of the standard mitigation measures listed in the CEMP and sub plans ensure environmental impacts are minimised during construction. Based on the available data, no modification is required to the construction methods or environmental control measures being implemented onsite.

Seasonal rainfall has shown the effects it has on the surface water and groundwater health along the project alignment with fluctuating levels recorded across all parameters. Whilst exceedances of trigger levels were identified during water quality monitoring events, onsite reviews have determined no impact resulting from the project has occurred and therefore the exceedances are considered not related to construction works and are more likely related to natural fluctuations in quantity and quality.

PM_{10} 24 hour particulate levels were less than the criteria identified in the AQMP at all times during reporting period. These monitoring results were less than or consistent with recorded ambient air quality levels across the Illawarra and the Greater Metropolitan Region and, as such, the results are considered to be reflective of regional background conditions, rather than construction impacts directly from the project. Further, monthly dust deposition and annual average particulate monitoring results were less than the nominated project criteria.

Whilst exceedances of trigger levels were identified during the construction monitoring program, onsite reviews have determined no clear impact resulting from the project has occurred. The construction of the permanent noise wall has resulted in the construction noise levels reducing to below trigger levels.

No other additional monitoring outside that discussed in the construction monitoring program was undertaken to determine or verify a trend in impacts to surface water, groundwater, air quality and noise and vibration.

Annexure A Construction Monitoring Location Maps

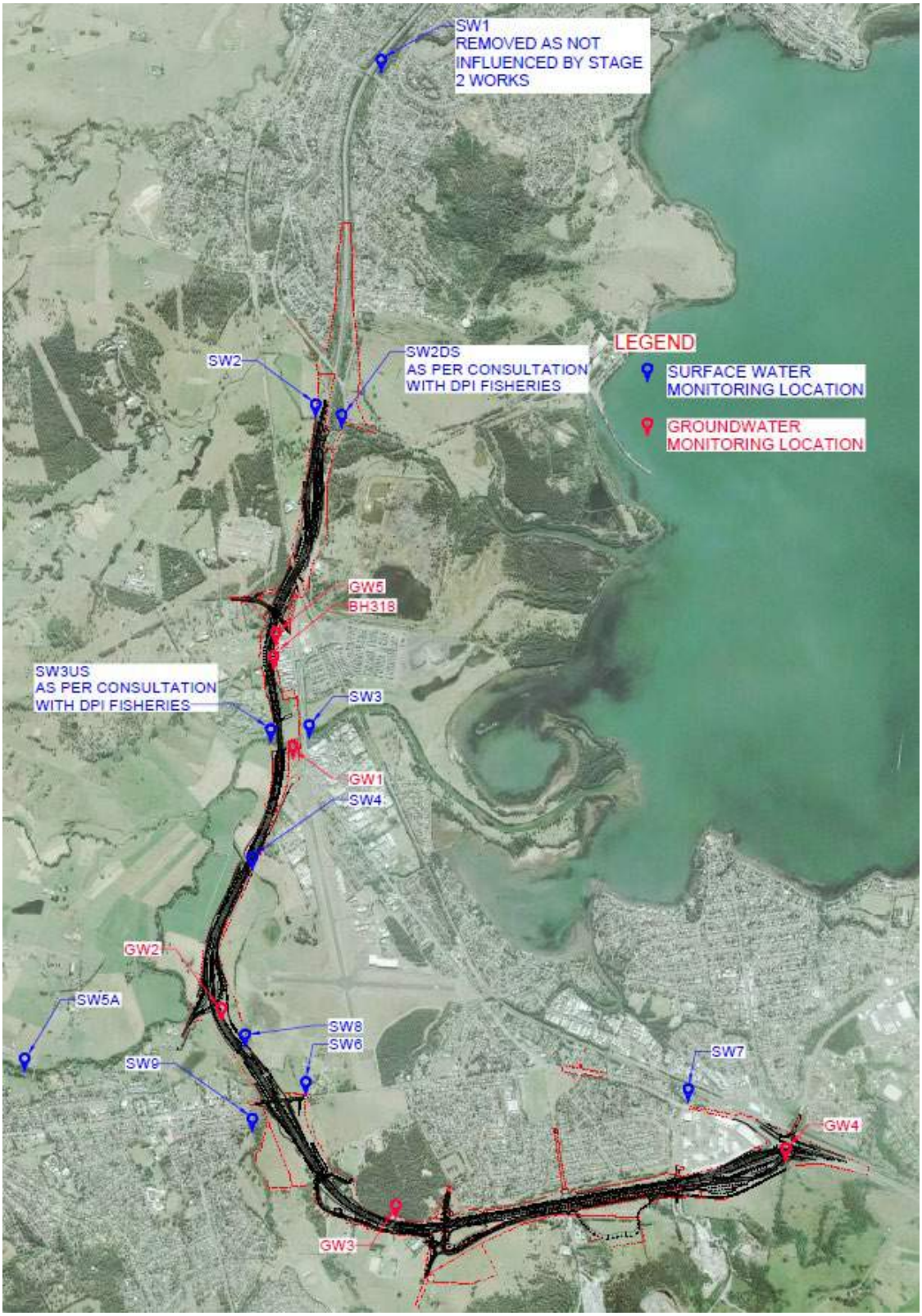


Figure A-1: Construction water quality monitoring network

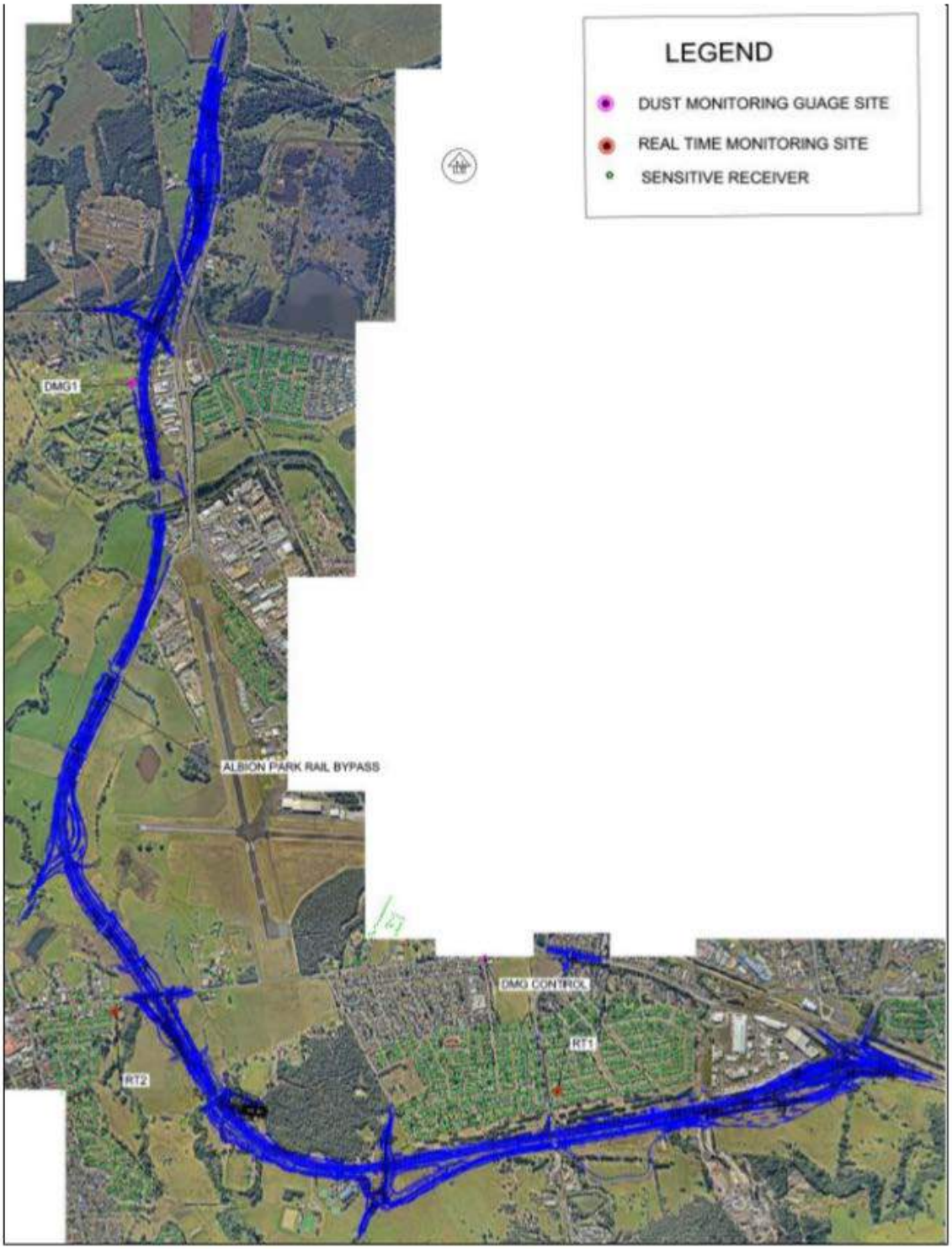


Figure A-2: Construction air quality monitoring network



Figure A-3: Construction noise monitoring locations and catchment areas

Annexure B Surface Water Monitoring Reports

Surface Water Monitoring

Construction Event 25

The purpose of water quality monitoring during the construction phase is to determine impacts resulting from construction of the project only (i.e. road construction) and no other unrelated sources, such as agricultural operations. The potential impacts from road construction activities will most likely result from erosion and sediment control loss and spills.

Date of Monitoring: 5th January 2021

Rainfall Monitoring is shown below.

	FH Northern AWS	FH Southern AWS	Albion Park Airport AWS
Date:	Rainfall Received:	Rainfall Received:	Rainfall Received:
02/01/2021	9.8mm	11.2mm	11.4mm
03/01/2021	17.2mm	24.3mm	31.0mm
04/01/2021	6.6mm	4.1mm	8.6mm
05/01/2021	24.8mm	20.4mm	20.4mm

Scope and Limitations

During the construction phase of the project, surface water quality will be monitored at the same locations as the baseline-monitoring program. Surface water quality will be monitored at eight locations (i.e. SW2-SW4, SW5A, SW6 to SW9).

In addition to the eight surface water monitoring locations identified for the baseline program (WSP, 2018), surface water quality will be monitored downstream of the bridge works at Duck Creek (i.e. SW2DS) and upstream of the bridge works at Macquarie Rivulet (i.e. SW3US) following feedback from DPI Fisheries. As a result, there will now be a total of 10 construction surface water quality monitoring locations for the project.

This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to upstream vs downstream conditions.

Field Programme

Surface water sampling was undertaken at all surface locations where flow conditions allowed a representative sample to be taken. This monthly water sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2018, Baseline Monitoring Program – Albion Park Rail Bypass;
- 2018 Appendix B4 Soil and Water Management Sub-plan Albion Park Rail bypass (Stage 2 – Princes Motorway between Yallah and Oak Flats) Appendix B Construction water quality monitoring program

Field parameter for Oil and grease of a visual inspections confirmed no impact.

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory services (ALS)) to be analysed for:

- Total suspended solids; and

- pH.

Weather Monitoring

The project uses the Bureau of Meteorology to monitor weather and onsite Automatic Weather Stations to monitor rainfall.

Surface water sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results
- Attachment C, Field sheets
- Attachment D, Laboratory results

Surface water locations

The upstream location represents the 'reference' (un-impacted) site while the down-stream locations represent the 'test' sites (potentially impacted sites during construction). By comparing upstream water quality with down-stream water quality, potential impacts from construction are assessed.

Table 1 Surface water locations within specific surface water bodies

Surface water	Upstream of Alignment (reference site)	Downstream of Alignment (test site)
Brooks Creek	SW1	-
Duck Creek	SW2	SW2DS
Macquarie Rivulet	SW3US and SW5A	SW3
Frasers Creek	SW4	-
Frasers Creek	-	SW6
Horsley Inlet	-	SW7
Frasers Creek	-	SW8
Tributary of Frasers Creek	SW9	-

Results summary

In the week prior to the monitoring event we received between 58.4-73.4mm. All waterways were noted to have low to medium flow with discolouration observed in both upstream and downstream locations of Duck Creek and Macquarie Rivulet (SW2, SW2DS, SW3US, SW3 & SW5A). Consequently, there were no observed construction impacts noted during the monitoring event with comparable TSS and pH results between upstream and downstream locations. Field TSS and pH results were below the trigger level with the exception of SW7 (pH reading of 8.0). Although the SW7 pH result is above the trigger level, it is consistent with the trend throughout the monitoring program and remains within the ANZECC/ARMCANZ (2000) guidelines for pH being between 6.5 and 8.5.

Brooks Creek: Removed from monitoring program as not influenced by construction works.

Duck Creek: Showed no impacts from construction. The creek had no flow at SW2 and low flow at SW2DS.

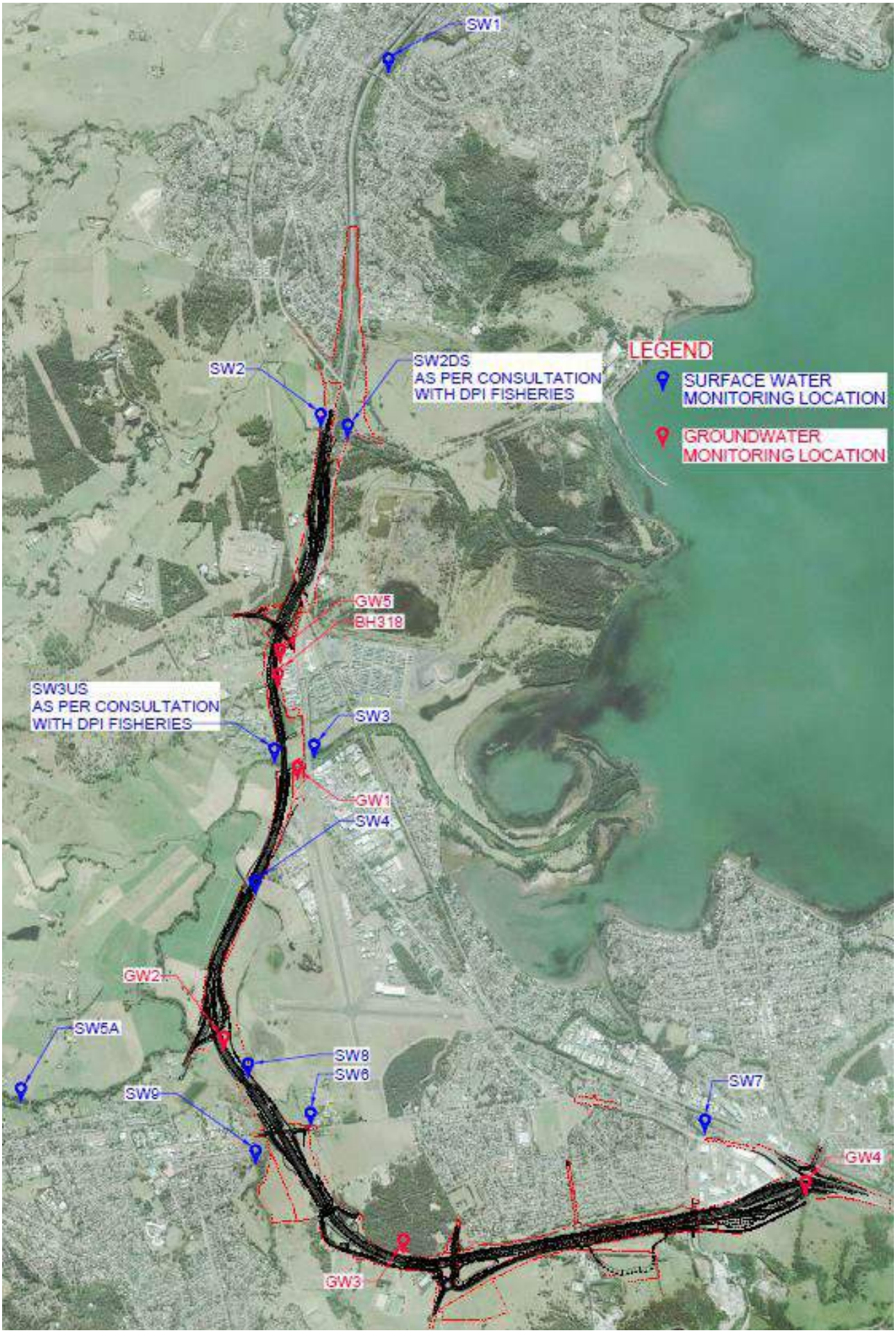
Macquarie Rivulet: Showed no impacts from construction. The creek had low flow at SW3US and SW3. SW5A was noted to have low to medium flow across the rock riffle/rapid below the monitoring location.

Frasers Creek: Showed no impacts from construction. The creek had low flow at all monitoring locations.

Horsley Inlet: Showed no impacts from construction. The creek had low flow.

Frasers Creek Tributary: Showed no impacts from construction. The creek had low flow due to a fallen tree causing a blockage upstream.

Attachment A, Location maps



Attachment B, Tabulated results

No.	Date	Time	pH	Total Suspended Solids (mg/L)
SW1	05/01/2021	N/A	N/A	N/A
SW2	05/01/2021	12:29pm	7.6	12
SW2DS	05/01/2021	12:33pm	7.6	11
SW3US	05/01/2021	12:58pm	7.5	<5
SW3	05/01/2021	12:48pm	7.5	<5
SW4	05/01/2021	11:33am	7.3	<5
SW5A	05/01/2021	11:07am	7.7	10
SW6	05/01/2021	12:07pm	7.6	<5
SW7	05/01/2021	10:08am	8.0	<5
SW8	05/01/2021	11:53am	7.3	<5
SW9	05/01/2021	10:50am	7.7	<5

Attachment C, Field sheets

Surface Water Field Sheet

Site	SW2 DS	
Date	Tue, 05 Jan 2021, 12:33 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of work area at Duck crk	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Partly Cloudy	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.6	
Checkbox	Visible oil and grease	No
Turbidity	See lab results	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW2DS				

Surface Water Field Sheet

Site	SW2 US	
Date	Tue, 05 Jan 2021, 12:29 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Upstream of wrk area at Duck Crk	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Partly Cloudy	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.6	
Checkbox	Visible oil and grease	No
Turbidity	See lab results	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW2US				

Surface Water Field Sheet

Site	SW3DS	
Date	Tue, 05 Jan 2021, 12:48 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of work area at Macquarie Rivulet	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Partly Cloudy	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.5	
Checkbox	Visible oil and grease	No
Turbidity	See lab results	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW3DS				

Surface Water Field Sheet

Site	SW3 US	
Date	Tue, 05 Jan 2021, 12:58 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Upstream of work area at Macquarie Rivulet	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Partly Cloudy	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.5	
Checkbox	Visible oil and grease	No
Turbidity	See lab results	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW3U				

Surface Water Field Sheet

Site	SW4	
Date	Tue, 05 Jan 2021, 11:33 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Frasers 2 downstream of work area	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Partly Cloudy	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.3	
Checkbox	Visible oil and grease	No
Turbidity	See lab results	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Clear	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW4				

Surface Water Field Sheet

Site	SW5A	
Date	Tue, 05 Jan 2021, 11:07 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Western side of underneath the bridge on Calderwood Rd.	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.7	
Checkbox	Visible oil and grease	No
Turbidity	See lab results	
Text	**FLOW OBSERVATIONS**	
Flow	Medium	
Colour	Turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW5A				

Surface Water Field Sheet

Site	SW6	
Date	Tue, 05 Jan 2021, 12:07 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	North side of Stapelton's bridge (Tongara Rd)	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Partly Cloudy	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.6	
Checkbox	Visible oil and grease	No
Turbidity	See lab results	
Text	**FLOW OBSERVATIONS**	
Flow	Medium	
Colour	Clear	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW6				

Surface Water Field Sheet

Site	SW7	
Date	Tue, 05 Jan 2021, 10:08 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of work area at Horsley Inlet	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	8.0	
Checkbox	Visible oil and grease	No
Turbidity	See lab results	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Clear	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW7				

Surface Water Field Sheet

Site	SW8 DS	
Date	Tue, 05 Jan 2021, 11:53 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of work area at bridge 9	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Partly Cloudy	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.3	
Checkbox	Visible oil and grease	No
Turbidity	See lab results	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Clear	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW8DS				

Surface Water Field Sheet

Site	SW9	
Date	Tue, 05 Jan 2021, 10:50 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	South of O Gorman st approx 150m along footpath	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.7	
Checkbox	Visible oil and grease	No
Turbidity	See lab results	
Text	**FLOW OBSERVATIONS**	
Flow	Very low	
Colour	Turbid	
Other	Vegetation has fallen over creek upstream causing a blockage, see photos	

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW9				

Attachment D, Laboratory results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2100059**	Page	: 1 of 5
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR JAMES DIAMOND	Contact	: Glenn Davies
Address	: LEVEL 3 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: +61 02 8346 9400	Telephone	: 02 42253125
Project	: Albion Park Bypass	Date Samples Received	: 05-Jan-2021 16:16
Order number	: ----	Date Analysis Commenced	: 12-Jan-2021
C-O-C number	: ----	Issue Date	: 14-Jan-2021 16:34
Sampler	: TOM DEWHURST		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- Analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation is not held for results reported in g/m².mth.
- Sampling completed as per FWI-EN010 Sampling of Dust Depositon Gauges.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	SW02US	SW02DS	SW03US	SW03DS	SW04
			Sampling date / time	05-Jan-2021 00:00	05-Jan-2021 00:00	05-Jan-2021 00:00	05-Jan-2021 00:00	05-Jan-2021 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EW2100059-001**	**EW2100059-002**	**EW2100059-003**	**EW2100059-004**	**EW2100059-005**
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**12**	**11**	<5	<5	<5

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	SW05A	SW06US	SW06DS	SW07	SW08 US
			Sampling date / time	05-Jan-2021 00:00	05-Jan-2021 00:00	05-Jan-2021 00:00	05-Jan-2021 00:00	05-Jan-2021 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EW2100059-006**	**EW2100059-007**	**EW2100059-008**	**EW2100059-009**	**EW2100059-010**
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**10**	**6**	<5	<5	<5

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	**SW08 DS**	**SW09**	**----**	**----**	**----**
			Sampling date / time	05-Jan-2021 00:00	05-Jan-2021 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW2100059-011**	**EW2100059-012**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	**----**	**----**	**----**

Surface Water Monitoring

Construction Event 26

The purpose of water quality monitoring during the construction phase is to determine impacts resulting from construction of the project only (i.e. road construction) and no other unrelated sources, such as agricultural operations. The potential impacts from road construction activities will most likely result from erosion and sediment control loss and spills.

Date of Monitoring: 22nd February 2021

Rainfall Monitoring is shown below.

	FH Northern AWS	FH Southern AWS	Albion Park Airport AWS
Date:	Rainfall Received:	Rainfall Received:	Rainfall Received:
19/02/2021	9.4mm	5.0mm	11.8mm
20/02/2021	0mm	0mm	0mm
21/02/2021	0mm	0mm	0mm
22/02/2021	0mm	0mm	0mm

Scope and Limitations

During the construction phase of the project, surface water quality will be monitored at the same locations as the baseline-monitoring program. Surface water quality will be monitored at eight locations (i.e. SW2-SW4, SW5A, SW6 to SW9).

In addition to the eight surface water monitoring locations identified for the baseline program (WSP, 2018), surface water quality will be monitored downstream of the bridge works at Duck Creek (i.e. SW2DS) and upstream of the bridge works at Macquarie Rivulet (i.e. SW3US) following feedback from DPI Fisheries. As a result, there will now be a total of 10 construction surface water quality monitoring locations for the project.

This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to upstream vs downstream conditions.

Field Programme

Surface water sampling was undertaken at all surface locations where flow conditions allowed a representative sample to be taken. This monthly water sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2018, Baseline Monitoring Program – Albion Park Rail Bypass;
- 2018 Appendix B4 Soil and Water Management Sub-plan Albion Park Rail bypass (Stage 2 – Princes Motorway between Yallah and Oak Flats) Appendix B Construction water quality monitoring program

During monitoring, visual inspections in all locations indicated no oil and grease were present.

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory services (ALS)) to be analysed for:

- Total suspended solids; and
- pH.

Weather Monitoring

The project uses the Bureau of Meteorology to monitor weather and onsite Automatic Weather Stations to monitor rainfall.

Surface water sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results
- Attachment C, Field sheets
- Attachment D, Laboratory results

Surface water locations

The upstream location represents the 'reference' (un-impacted) site while the down-stream locations represent the 'test' sites (potentially impacted sites during construction). By comparing upstream water quality with down-stream water quality, potential impacts from construction are assessed.

Table 1 Surface water locations within specific surface water bodies

Surface water	Upstream of Alignment (reference site)	Downstream of Alignment (test site)
Brooks Creek	SW1	-
Duck Creek	SW2	SW2DS
Macquarie Rivulet	SW3US and SW5A	SW3
Frasers Creek	SW4	-
Frasers Creek	-	SW6
Horsley Inlet	-	SW7
Frasers Creek	-	SW8
Tributary of Frasers Creek	SW9	-

Results summary

In the week prior to the monitoring event we received between 11.4-28.6mm. All creeks were noted to have clear water and low to medium flow with exception of SW3US and SW3 which were noted to be slightly discoloured. Consequently, there were no observed construction impacts noted during this monitoring event assessing upstream against downstream conditions. All field results had TSS results below the trigger level and pH results were consistent in range.

Brooks Creek: Removed from monitoring program as not influenced by construction works.

Duck Creek: Showed no impacts from construction. The creek had very low flow at SW2 and SW2DS.

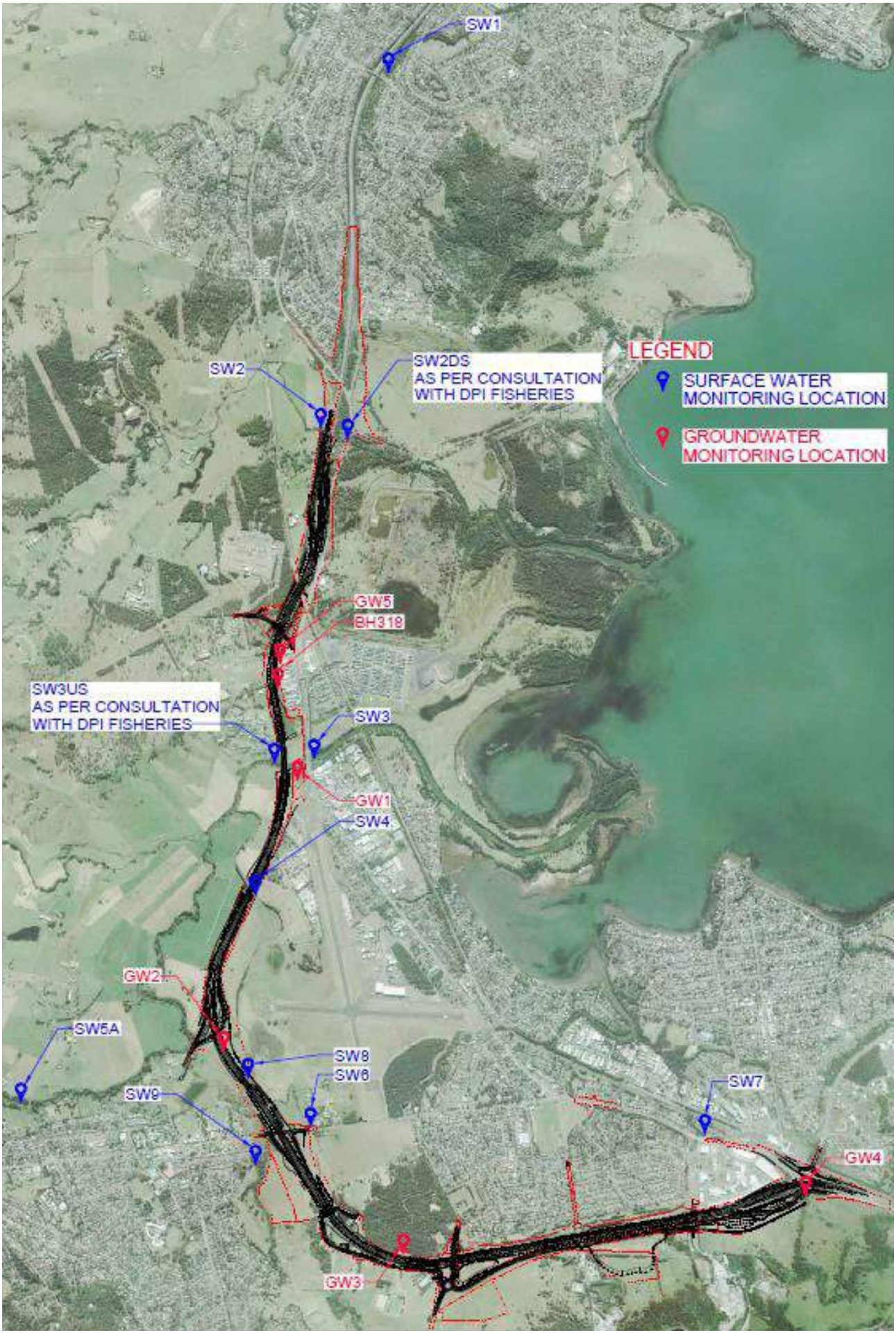
Macquarie Rivulet: Showed no impacts from construction. The creek had low flow at SW3US and SW3. SW5A was noted to have medium flow across the rock riffle/rapid below the monitoring location.

Frasers Creek: Showed no impacts from construction. The creek had low to very low flow at all monitoring locations.

Horsley Inlet: Showed no impacts from construction. The creek had very low flow.

Frasers Creek Tributary: Showed no impacts from construction. The creek had very low flow due to a fallen tree causing a blockage upstream.

Attachment A, Location maps



Attachment B, Tabulated results

No.	Date	Time	pH	Total Suspended Solids (mg/L)
SW1	22/02/2021	N/A	N/A	N/A
SW2	22/02/2021	11:09am	7.5	<5
SW2DS	22/02/2021	11:14am	7.4	5
SW3US	22/02/2021	12:44pm	7.5	7
SW3	22/02/2021	12:48pm	7.5	10
SW4	22/02/2021	11:45am	7.4	<5
SW5A	22/02/2021	10:48am	7.9	7
SW6	22/02/2021	1:15pm	7.4	<5
SW7	22/02/2021	9:43am	7.9	6
SW8	22/02/2021	12:58pm	7.4	<5
SW9	22/02/2021	10:10am	7.7	<5

Attachment C, Field sheets

Surface Water Field Sheet

Site	SW2 DS	
Date	Mon, 22 Feb 2021, 11:14 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of work at Duck creek	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Riparian and woody weeda	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.44	
Checkbox	Visible oil and grease	No
Turbidity	2.46	
Text	**FLOW OBSERVATIONS**	
Flow	Very low	
Colour	Clear, algae present	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW2DS				

Surface Water Field Sheet

Site	SW2 US	
Date	Mon, 22 Feb 2021, 11:09 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Upstream of work at Duck creek	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.50	
Checkbox	Visible oil and grease	No
Turbidity	2.33	
Text	**FLOW OBSERVATIONS**	
Flow	Very low	
Colour	Clear, algae present	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW2US				

Surface Water Field Sheet

Site	SW3DS	
Date	Mon, 22 Feb 2021, 12:36 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of work area at Macquarie rivulet	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.53	
Checkbox	Visible oil and grease	No
Turbidity	4.12	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Slightly turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW3DS				

Surface Water Field Sheet

Site	SW3 US	
Date	Mon, 22 Feb 2021, 12:44 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Upstream of work area at Macquarie rivulet	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.52	
Checkbox	Visible oil and grease	No
Turbidity	3.99	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Slightly turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW3 US				

Surface Water Field Sheet

Site	SW4	
Date	Mon, 22 Feb 2021, 11:45 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of work area at Frasers 3	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.40	
Checkbox	Visible oil and grease	No
Turbidity	1.86	
Text	**FLOW OBSERVATIONS**	
Flow	Very low	
Colour	Clear	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW4				

Surface Water Field Sheet

Site	SW5A	
Date	Mon, 22 Feb 2021, 10:48 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Just up stream of Calderwood bridge	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.88	
Checkbox	Visible oil and grease	No
Turbidity	4.07	
Text	**FLOW OBSERVATIONS**	
Flow	Medium	
Colour	Clear	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW5A				

Surface Water Field Sheet

Site	SW6	
Date	Mon, 22 Feb 2021, 1:15 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of Stapleton a bridge frazers creek	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Medium from agriculture crossing	
Other	Algae present and lily pads present	
Text	**FIELD MEASUREMENTS**	
pH	7.36	
Checkbox	Visible oil and grease	No
Turbidity	6.57	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour		
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW6				

Surface Water Field Sheet

Site	SW7	
Date	Mon, 22 Feb 2021, 9:43 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of work area at Horsley creek	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.94	
Checkbox	Visible oil and grease	No
Turbidity	2.00	
Text	**FLOW OBSERVATIONS**	
Flow	Very low	
Colour	Clear, signs of algae forming	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW7				

Surface Water Field Sheet

Site	SW8	
Date	Mon, 22 Feb 2021, 12:58 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of work area at bridge 11	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.43	
Checkbox	Visible oil and grease	No
Turbidity	2.80	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Clear, green algae present	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW8				

Surface Water Field Sheet

Site	SW9	
Date	Mon, 22 Feb 2021, 10:10 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	West of AS 8	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Partly Cloudy	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.7	
Checkbox	Visible oil and grease	No
Turbidity	1.89	
Text	**FLOW OBSERVATIONS**	
Flow	Very low	
Colour	Clear green algae present	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW9				

Attachment D, Laboratory results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2100800**	Page	: 1 of 5
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR JAMES DIAMOND	Contact	: Glenn Davies
Address	: LEVEL 3 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: +61 02 8346 9400	Telephone	: 02 42253125
Project	: Albion Park Rail Bypass	Date Samples Received	: 22-Feb-2021 14:07
Order number	: ----	Date Analysis Commenced	: 24-Feb-2021
C-O-C number	: ----	Issue Date	: 26-Feb-2021 14:17
Sampler	: TOM DEWHURST		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 12		
No. of samples analysed	: 12		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	SW02US	SW02DS	SW03US	SW03DS	SW04
				Sampling date / time	22-Feb-2021 00:00	22-Feb-2021 00:00	22-Feb-2021 00:00	22-Feb-2021 00:00	22-Feb-2021 00:00
					EW2100800-001	EW2100800-002	EW2100800-003	EW2100800-004	EW2100800-005
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	**5**	**7**	**10**	<5
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.01**	**0.01**	**0.10**	**0.10**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	**0.4**	**0.2**	**0.2**	**0.4**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**0.4**	**0.4**	**0.3**	**0.3**	**0.4**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.04**	**0.04**	**0.06**	**0.05**	**0.08**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW05A	SW06US	SW06	SW07	SW08US
			Sampling date / time	22-Feb-2021 00:00	22-Feb-2021 00:00	22-Feb-2021 00:00	22-Feb-2021 00:00	22-Feb-2021 00:00
Compound	CAS Number	LOR	Unit	EW2100800-006	EW2100800-007	EW2100800-008	EW2100800-009	EW2100800-010
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**7**	<5	**5**	**6**	<5
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.15**	**0.03**	<0.01	**0.31**	**0.02**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.2**	**0.2**	**0.6**	**0.2**	**0.4**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.4**	**0.2**	**0.6**	**0.5**	**0.4**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.05**	**0.04**	**0.07**	**0.10**	**0.10**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW08	SW09	----	----	----
			Sampling date / time	22-Feb-2021 00:00	22-Feb-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EW2100800-011	EW2100800-012	--------	--------	--------
				Result	Result	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.09**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.4**	**0.4**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ **Total Nitrogen as N**	----	0.1	mg/L	**0.4**	**0.5**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.05**	**0.04**	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

(WATER) EK067G: Total Phosphorus as P by Discrete Analyser

(WATER) EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser

(WATER) EK061G: Total Kjeldahl Nitrogen By Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

Surface Water Monitoring

Construction Event 27

The purpose of water quality monitoring during the construction phase is to determine impacts resulting from construction of the project only (i.e. road construction) and no other unrelated sources, such as agricultural operations. The potential impacts from road construction activities will most likely result from erosion and sediment control loss and spills.

Date of Monitoring: 25th March 2021

Rainfall Monitoring is shown below.

	FH Northern AWS	FH Southern AWS	Albion Park Airport AWS
Date:	Rainfall Received:	Rainfall Received:	Rainfall Received:
22/03/2021	89.0mm	57.9mm	65.8mm
23/03/2021	44.1mm	47.8mm	38.4mm
24/03/2021	28.7mm	25.4mm	31.0mm
25/03/2021	0mm	0mm	0mm

Scope and Limitations

During the construction phase of the project, surface water quality will be monitored at the same locations as the baseline-monitoring program. Surface water quality will be monitored at eight locations (i.e. SW2-SW4, SW5A, SW6 to SW9).

In addition to the eight surface water monitoring locations identified for the baseline program (WSP, 2018), surface water quality will be monitored downstream of the bridge works at Duck Creek (i.e. SW2DS) and upstream of the bridge works at Macquarie Rivulet (i.e. SW3US) following feedback from DPI Fisheries. As a result, there will now be a total of 10 construction surface water quality monitoring locations for the project.

This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to upstream vs downstream conditions.

Field Programme

Surface water sampling was undertaken at all surface locations where flow conditions allowed a representative sample to be taken. This monthly water sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2018, Baseline Monitoring Program – Albion Park Rail Bypass;
- 2018 Appendix B4 Soil and Water Management Sub-plan Albion Park Rail bypass (Stage 2 – Princes Motorway between Yallah and Oak Flats) Appendix B Construction water quality monitoring program

Field parameter for Oil and grease of a visual inspections confirmed no impact.

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory services (ALS)) to be analysed for:

- Total suspended solids; and

- pH.

Weather Monitoring

The project uses the Bureau of Meteorology to monitor weather and onsite Automatic Weather Stations to monitor rainfall.

Surface water sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results
- Attachment C, Field sheets
- Attachment D, Laboratory results

Surface water locations

The upstream location represents the 'reference' (un-impacted) site while the down-stream locations represent the 'test' sites (potentially impacted sites during construction). By comparing upstream water quality with down-stream water quality, potential impacts from construction are assessed.

Table 1 Surface water locations within specific surface water bodies

Surface water	Upstream of Alignment (reference site)	Downstream of Alignment (test site)
Brooks Creek	SW1	-
Duck Creek	SW2	SW2DS
Macquarie Rivulet	SW3US and SW5A	SW3
Frasers Creek	SW4	-
Frasers Creek	-	SW6
Horsley Inlet	-	SW7
Frasers Creek	-	SW8
Tributary of Frasers Creek	SW9	-

Results summary

In the week prior to the monitoring event we received between 206.8-236.6mm. All creeks were noted to have clear water and low to medium flow with exception of SW2, SW2DS, SW3US, SW3, SW4, SW5A, SW6 and SW8 which were noted to be turbid and brown in colour. SW3 had a slight increase in of TSS upstream vs downstream due to potential debris entering the sample bottle during monitoring as no visible difference in the water quality upstream vs downstream. Other than SW3 there were no observed construction impacts noted during this monitoring event assessing upstream against downstream conditions.

Brooks Creek: Removed from monitoring program as not influenced by construction works.

Duck Creek: Showed no impacts from construction. The creek had medium flow at SW2 and SW2DS.

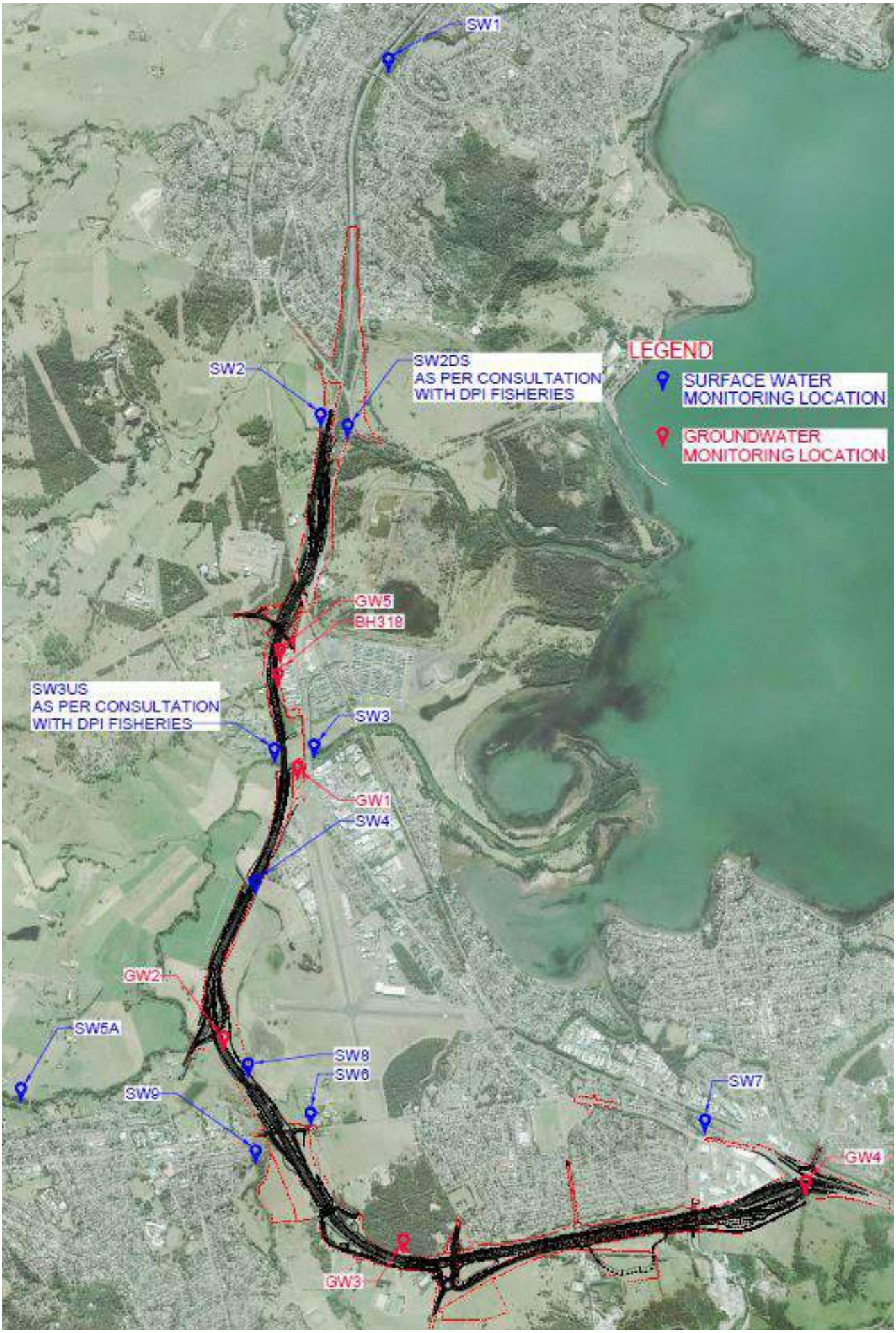
Macquarie Rivulet: Showed no impacts from construction. The creek had medium flow at SW3US and SW3. SW5A was noted to have high flow across the rock riffle/rapid below the monitoring location.

Frasers Creek: Showed no impacts from construction. The creek had low flow at all monitoring locations.

Horsley Inlet: Showed no impacts from construction. The creek had low flow.

Frasers Creek Tributary: Showed no impacts from construction. The creek had low flow.

Attachment A, Location maps



Attachment B, Tabulated results

No.	Date	Time	pH	Total Suspended Solids (mg/L)
SW1	25/03/2021	N/A	N/A	N/A
SW2	25/03/2021	12:20am	7.3	<5
SW2DS	25/03/2021	12:15pm	7.4	<5
SW3US	25/03/2021	1:04pm	7.3	14
SW3	25/03/2021	12:50pm	7.3	10
SW4	25/03/2021	10:07am	7.1	<5
SW5A	25/03/2021	9:54am	7.3	17
SW6	25/03/2021	1:44pm	7.4	<5
SW7	25/03/2021	7:45am	7.9	<5
SW8	25/03/2021	1:21pm	7.2	<5
SW9	25/03/2021	9:26am	7.8	<5

Attachment C, Field sheets

Attachment D, Laboratory results

Surface Water Field Sheet

Site	SW2DS	
Date	Thu, 25 Mar 2021, 12:15 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream boundary of bridge 2	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.4	
Checkbox	Visible oil and grease	No
Turbidity	13.28	
Text	**FLOW OBSERVATIONS**	
Flow	Medium	
Colour	Turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW2 DS				

Surface Water Field Sheet

Site	SW2 US	
Date	Thu, 25 Mar 2021, 12:20 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Upstream of project boundary at bridge 2	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.3	
Checkbox	Visible oil and grease	No
Turbidity	13.70	
Text	**FLOW OBSERVATIONS**	
Flow	Medium	
Colour	Turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW2 US				

Surface Water Field Sheet

Site	SW3DS	
Date	Thu, 25 Mar 2021, 12:50 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of boundary at bridge 6 Macquarie Rivulet	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.3	
Checkbox	Visible oil and grease	No
Turbidity	20.4	
Text	**FLOW OBSERVATIONS**	
Flow	Medium	
Colour	Turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW3DS				

Surface Water Field Sheet

Site	SW3US	
Date	Thu, 25 Mar 2021, 1:04 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Upstream of bridge 6 boundary, Macquarie rivulet	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.3	
Checkbox	Visible oil and grease	No
Turbidity	22.1	
Text	**FLOW OBSERVATIONS**	
Flow	Medium	
Colour	Turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW3 US				

Surface Water Field Sheet

Site	SW4	
Date	Thu, 25 Mar 2021, 10:07 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of work area at Frasers 1	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.12	
Checkbox	Visible oil and grease	No
Turbidity	10.47	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW4				

Surface Water Field Sheet

Site	SW5A	
Date	Thu, 25 Mar 2021, 9:54 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Upstream of Macquarie rivulet upstream of Calderwood rd bridge	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Moderate from recent rain	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.3	
Checkbox	Visible oil and grease	No
Turbidity	19.5	
Text	**FLOW OBSERVATIONS**	
Flow	Fast	
Colour	Turbid	
Other	Lots of debris and sand washed up bank from recent rain event	

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW5A				

Surface Water Field Sheet

Site	SW6	
Date	Thu, 25 Mar 2021, 1:44 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of Stapletons bridge at Frasers creek	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.4	
Checkbox	Visible oil and grease	No
Turbidity	11.1	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Slightly turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW6				

Surface Water Field Sheet

Site	SW7	
Date	Thu, 25 Mar 2021, 7:45 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of Horsley Inlet	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.9	
Checkbox	Visible oil and grease	No
Turbidity	5.73	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Clear	
Other	Plants on top of water washed down from upstream from recent rain.	

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW7				

Surface Water Field Sheet

Site	SW8 DS	
Date	Thu, 25 Mar 2021, 1:21 pm	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Downstream of boundary at bridge 8	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Riparian and woody weeds	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.2	
Checkbox	Visible oil and grease	No
Turbidity	9.34	
Text	**FLOW OBSERVATIONS**	
Flow	Low	
Colour	Slightly turbid	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW8DS				

Surface Water Field Sheet

Site	SW9	
Date	Thu, 25 Mar 2021, 9:26 am	
Sampling Officer	Tom Dewhurst	
Sampling Method	Grab	
Detailed sample location description	Upstream waterway of Ogormam ave and Stapleton st	
Text	**ENVIRONMENTAL OBSERVATIONS**	
Weather	Sunny	
Vegetation	Pastural	
Bank Slope	Gentle	
Erosion	Minor	
Other		
Text	**FIELD MEASUREMENTS**	
pH	7.8	
Checkbox	Visible oil and grease	No
Turbidity	9.89	
Text	**FLOW OBSERVATIONS**	
Flow	Medium	
Colour	Clear	
Other		

Sample Information

Sample ID	No. of Containers	Preservatives	Duplicate	Comments
SW9				

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2101357**	Page	: 1 of 5
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR JAMES DIAMOND	Contact	: Aneta Prosaroski
Address	: LEVEL 3 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: +61 02 8346 9400	Telephone	: 02 42253125
Project	: Albion Park Rail Bypass	Date Samples Received	: 25-Mar-2021 15:25
Order number	: ----	Date Analysis Commenced	: 26-Mar-2021
C-O-C number	: ----	Issue Date	: 01-Apr-2021 17:02
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 13		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW02US	SW02DS	SW03US	SW03DS	SW04
			Sampling date / time	25-Mar-2021 00:00	25-Mar-2021 00:00	25-Mar-2021 00:00	25-Mar-2021 00:00	25-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EW2101357-001	EW2101357-002	EW2101357-003	EW2101357-004	EW2101357-005
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	14	10	<5
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	0.66	0.65	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	0.4	0.4	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	1.1	1.0	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	0.10	0.10	----
EP008: Chlorophyll a & Pheophytin a								
Chlorophyll a	----	1	mg/m³	----	----	<1	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	SW05A	SW06US	SW06	SW07US	SW07
			Sampling date / time	25-Mar-2021 00:00	25-Mar-2021 00:00	25-Mar-2021 00:00	25-Mar-2021 00:00	25-Mar-2021 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EW2101357-006**	**EW2101357-007**	**EW2101357-008**	**EW2101357-009**	**EW2101357-010**
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**17**	<5	<5	<5	<5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW08US	SW08	SW09	----	----
			Sampling date / time	25-Mar-2021 00:00	25-Mar-2021 00:00	25-Mar-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	EW2101357-011	EW2101357-012	EW2101357-013	--------	--------
				Result	Result	Result	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.45**	**0.42**	**----**	**----**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.5**	**0.6**	**----**	**----**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**1.0**	**1.0**	**----**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.09**	**0.08**	**----**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

(WATER) EP008: Chlorophyll a & Pheophytin a

(WATER) EK067G: Total Phosphorus as P by Discrete Analyser

(WATER) EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser

(WATER) EK061G: Total Kjeldahl Nitrogen By Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

Surface Water Monitoring

Construction Event 28

The purpose of water quality monitoring during the construction phase is to determine impacts resulting from construction of the project only (i.e. road construction) and no other unrelated sources, such as agricultural operations. The potential impacts from road construction activities will most likely result from erosion and sediment control loss and spills.

Date of Monitoring: 22nd April 2021

Rainfall Monitoring is shown below.

	FH Northern AWS	FH Southern AWS	Albion Park Airport AWS
Date:	Rainfall Received:	Rainfall Received:	Rainfall Received:
19/04/2021	0mm	0mm	0mm
20/04/2021	1.8mm	0mm	0mm
21/04/2021	0mm	0mm	0mm
22/04/2021	0mm	0mm	0mm

Scope and Limitations

During the construction phase of the project, surface water quality will be monitored at the same locations as the baseline-monitoring program. Surface water quality will be monitored at eight locations (i.e. SW2-SW4, SW5A, SW6 to SW9).

In addition to the eight surface water monitoring locations identified for the baseline program (WSP, 2018), surface water quality will be monitored downstream of the bridge works at Duck Creek (i.e. SW2DS) and upstream of the bridge works at Macquarie Rivulet (i.e. SW3US) following feedback from DPI Fisheries. As a result, there will now be a total of 10 construction surface water quality monitoring locations for the project.

This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to upstream vs downstream conditions.

Field Programme

Surface water sampling was undertaken at all surface locations where flow conditions allowed a representative sample to be taken. This monthly water sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2018, Baseline Monitoring Program – Albion Park Rail Bypass;
- 2018 Appendix B4 Soil and Water Management Sub-plan Albion Park Rail bypass (Stage 2 – Princes Motorway between Yallah and Oak Flats) Appendix B Construction water quality monitoring program

Field parameter for Oil and grease of a visual inspections confirmed no impact.

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory services (ALS)) to be analysed for:

- Total suspended solids; and

- pH.

Weather Monitoring

The project uses the Bureau of Meteorology to monitor weather and onsite Automatic Weather Stations to monitor rainfall.

Surface water sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results
- Attachment C, Field sheets
- Attachment D, Laboratory results

Surface water locations

The upstream location represents the 'reference' (un-impacted) site while the down-stream locations represent the 'test' sites (potentially impacted sites during construction). By comparing upstream water quality with down-stream water quality, potential impacts from construction are assessed.

Table 1 Surface water locations within specific surface water bodies

Surface water	Upstream of Alignment (reference site)	Downstream of Alignment (test site)
Brooks Creek	SW1	-
Duck Creek	SW2	SW2DS
Macquarie Rivulet	SW3US and SW5A	SW3
Frasers Creek	SW4	-
Frasers Creek	-	SW6
Horsley Inlet	-	SW7
Frasers Creek	-	SW8
Tributary of Frasers Creek	SW9	-

Results summary

In the week prior to the monitoring event we received between 0-1.8mm. All creeks were noted to have clear water and low to medium flow with exception of SW8 and SW8US which were noted to be slightly turbid. Monitoring records indicate there were no observed construction impacts noted during the monitoring event assessing upstream against downstream conditions. All field results had TSS results below the trigger level and pH results were consistent in range with the exception of SW7 that had a pH reading of 8.0 which is slightly higher than the trigger level however still within the ANZECC/ARMCANZ (2000) guidelines for pH being between 6.5 and 8.5.

Brooks Creek: Removed from monitoring program as not influenced by construction works.

Duck Creek: Showed no impacts from construction. The creek had low flow at SW2 and SW2DS.

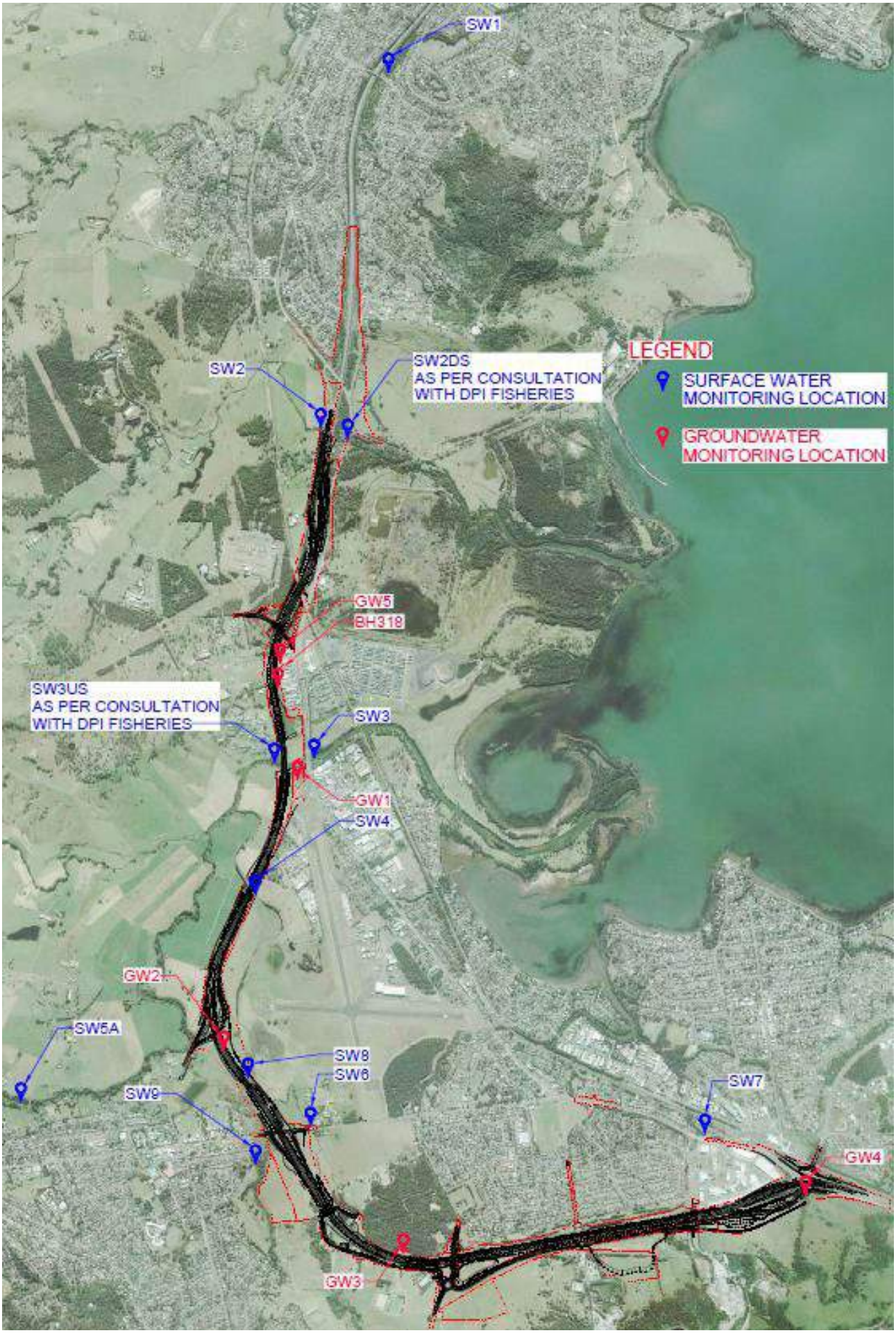
Macquarie Rivulet: Showed no impacts from construction. The creek had low flow at SW3US and SW3. SW5A was noted to have low to medium flow across the rock riffle/rapid below the monitoring location.

Frasers Creek: Showed no impacts from construction. The creek had low to very low flow at all monitoring locations.

Horsley Inlet: Showed no impacts from construction. The creek had very low flow.

Frasers Creek Tributary: Showed no impacts from construction. The creek had no flow.

Attachment A, Location maps



Attachment B, Tabulated results

No.	Date	Time	pH	Total Suspended Solids (mg/L)
SW1	22/04/2021	N/A	N/A	N/A
SW2	22/04/2021	12:52am	7.6	<5
SW2DS	22/04/2021	12:48pm	7.8	<5
SW3US	22/04/2021	9:33am	7.8	<5
SW3	22/04/2021	9:26am	7.7	<5
SW4	22/04/2021	11:55am	7.4	<5
SW5A	22/04/2021	11:28am	7.7	<5
SW6	22/04/2021	2:31pm	7.9	<5
SW7	22/04/2021	10:30am	8.0	12
SW8	22/04/2021	2:38pm	7.6	7
SW9	22/04/2021	9:26am	-	-

Attachment C, Field sheets

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW2

DATE: 22/4/2021 TIME: 12:52 pm

SAMPLING OFFICERS: Tom Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Upstream of boundary at Bridge 2 (Duck Creek)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER: Green algea present

FIELD MEASUREMENTS

pH: 7.6

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU: 4.96

FLOW OBSERVATIONS

FLOW: Low

COLOUR: Clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW2	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW2 DS

DATE: 22/4/2021 TIME: 12:48

SAMPLING OFFICERS: Tom Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of boundary @ Bridge 2 (Duck Creek)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds

SLOPE: Gentle

EROSION: Minor

OTHER: Green algea present

FIELD MEASUREMENTS

pH: 7.8

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU: 3.53

FLOW OBSERVATIONS

FLOW: Low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW2 DS	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW3

DATE: 22/4/2021 TIME: 9:26

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of work area @ Bridge to Macquarie Rivulet

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Minor

EROSION: Gentle

OTHER:

FIELD MEASUREMENTS

pH: 7.7

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU: 4.01

FLOW OBSERVATIONS

FLOW: Low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW3	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW3 US

DATE: 22/4/2021 TIME: ~~22/4/2021~~ 9:33

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Upstream of work area, bridge 6 (Macquarie Rivulet)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.8

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU : 4.71

FLOW OBSERVATIONS

FLOW: Low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW3 US	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW4

DATE: 22/4/2021 TIME: 11:55

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of work area at Frasers 1 (Bridge 7 - Frasers Gl)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER: Algea present

FIELD MEASUREMENTS

pH: 7.4

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU : 4.92

FLOW OBSERVATIONS

FLOW: Low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW4	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW5A

DATE: 22/4/2021 TIME: 11:28

SAMPLING OFFICERS: T Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Upstream of work @ Macquarie Rivulet upstream of Calderwood Rd bridge.

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: moderate erosion from recent rain events

OTHER: algea present

FIELD MEASUREMENTS

pH: 7.7

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU: 2.89

FLOW OBSERVATIONS

FLOW: Medium

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW5A	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW6

DATE: 22/4/2021 TIME: 2:31

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of Stapletons Bridge at Frasers Creek.

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER: Green algea present

FIELD MEASUREMENTS

pH: 7.9

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU : 1.80

FLOW OBSERVATIONS

FLOW: very low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW6	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW7

DATE: 22/4/2021 TIME: 10:30

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of work area @ Horsley Inlet.

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds

SLOPE: Gentle

EROSION: minor

OTHER:

FIELD MEASUREMENTS

pH: 8.0

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results. NTU : 3.78

FLOW OBSERVATIONS

FLOW: very low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW7	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW8

DATE: 22/4/2021 TIME: 2:38

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of work area @ Bridge 9 (Frasers Crk)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.6

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results. NTU: 9.53

FLOW OBSERVATIONS

FLOW: Low

COLOUR: Turbid / Brown

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW 8	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW9

DATE: 22/4/2021 TIME: 11:15

SAMPLING OFFICERS: T. Denhurst

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Upstream waterway @ Organnar Ave & Stapleton St. (Tributary of Frasers Crk)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH:

VISIBLE OIL AND GREASE: YES / NO NO SAMPLE

SUSPENDED SOLIDS (mg/L):

FLOW OBSERVATIONS

FLOW: NO FLOW

COLOUR:

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Denhurst T. Denhurst 22/4/2021

Attachment D, Laboratory results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2101824**	Page	: 1 of 5
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR JAMES DIAMOND	Contact	: Aneta Prosaroski
Address	: 1 EAST STREET NOWRA 2541	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: +61 02 8346 9400	Telephone	: 02 42253125
Project	: Albion Park Rail Bypass	Date Samples Received	: 22-Apr-2021 15:30
Order number	: ----	Date Analysis Commenced	: 26-Apr-2021
C-O-C number	: ----	Issue Date	: 28-Apr-2021 16:29
Sampler	: TOM DEWHURST		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 12		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW02US	SW02DS	SW03US	SW03DS	SW04
			Sampling date / time	22-Apr-2021 00:00	22-Apr-2021 00:00	22-Apr-2021 00:00	22-Apr-2021 00:00	22-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EW2101824-001	EW2101824-002	EW2101824-003	EW2101824-004	EW2101824-005
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	SW05A	SW06US	SW06	SW07	SW08 US
			Sampling date / time	22-Apr-2021 00:00	22-Apr-2021 00:00	22-Apr-2021 00:00	22-Apr-2021 00:00	22-Apr-2021 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EW2101824-006**	**EW2101824-007**	**EW2101824-008**	**EW2101824-010**	**EW2101824-011**
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	**12**	**7**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	**SW08**	**----**	**----**	**----**	**----**
			Sampling date / time	22-Apr-2021 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW2101824-012**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**7**	**----**	**----**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

Surface Water Monitoring

Construction Event 29

The purpose of water quality monitoring during the construction phase is to determine impacts resulting from construction of the project only (i.e. road construction) and no other unrelated sources, such as agricultural operations. The potential impacts from road construction activities will most likely result from erosion and sediment control loss and spills.

Date of Monitoring: 10th May 2021

Rainfall Monitoring is shown below.

	FH Southern AWS	Albion Park Airport AWS
Date:	Rainfall Received:	Rainfall Received:
7/05/2021	56.2mm	86.8mm
8/05/2021	6.2mm	6.8mm
9/05/2021	0mm	0mm
10/05/2021	0mm	0mm

Scope and Limitations

During the construction phase of the project, surface water quality will be monitored at the same locations as the baseline-monitoring program. Surface water quality will be monitored at eight locations (i.e. SW2-SW4, SW5A, SW6 to SW9).

In addition to the eight surface water monitoring locations identified for the baseline program (WSP, 2018), surface water quality will be monitored downstream of the bridge works at Duck Creek (i.e. SW2DS) and upstream of the bridge works at Macquarie Rivulet (i.e. SW3US) following feedback from DPI Fisheries. As a result, there will now be a total of 10 construction surface water quality monitoring locations for the project.

This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to upstream vs downstream conditions.

Field Programme

Surface water sampling was undertaken at all surface locations where flow conditions allowed a representative sample to be taken. This monthly water sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2018, Baseline Monitoring Program – Albion Park Rail Bypass;
- 2018 Appendix B4 Soil and Water Management Sub-plan Albion Park Rail bypass (Stage 2 – Princes Motorway between Yallah and Oak Flats) Appendix B Construction water quality monitoring program

Field parameter for Oil and grease of a visual inspections confirmed no impact.

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory services (ALS)) to be analysed for:

- Total suspended solids; and

- pH.

Weather Monitoring

The project uses the Bureau of Meteorology to monitor weather and onsite Automatic Weather Stations to monitor rainfall.

Surface water sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results
- Attachment C, Field sheets
- Attachment D, Laboratory results

Surface water locations

The upstream location represents the 'reference' (un-impacted) site while the down-stream locations represent the 'test' sites (potentially impacted sites during construction). By comparing upstream water quality with down-stream water quality, potential impacts from construction are assessed.

Table 1 Surface water locations within specific surface water bodies

Surface water	Upstream of Alignment (reference site)	Downstream of Alignment (test site)
Brooks Creek	SW1	-
Duck Creek	SW2	SW2DS
Macquarie Rivulet	SW3US and SW5A	SW3
Frasers Creek	SW4	-
Frasers Creek	-	SW6
Horsley Inlet	-	SW7
Frasers Creek	-	SW8
Tributary of Frasers Creek	SW9	-

Results summary

In the week prior to the monitoring event the project received between 62-94mm of rain. Due to the high rainfall event most waterways experienced higher levels of turbidity and flow. Based on TSS and pH results there were no observed construction impacts at the time of monitoring. Comparable TSS and pH results were recorded for upstream and downstream locations and therefore no impacts from construction are considered. No Oil and Grease was visible during the monitoring event.

Brooks Creek: Removed from monitoring program as not influenced by construction works.

Duck Creek: Showed no impacts from construction. The creek had low to medium flow at SW2 and SW2DS.

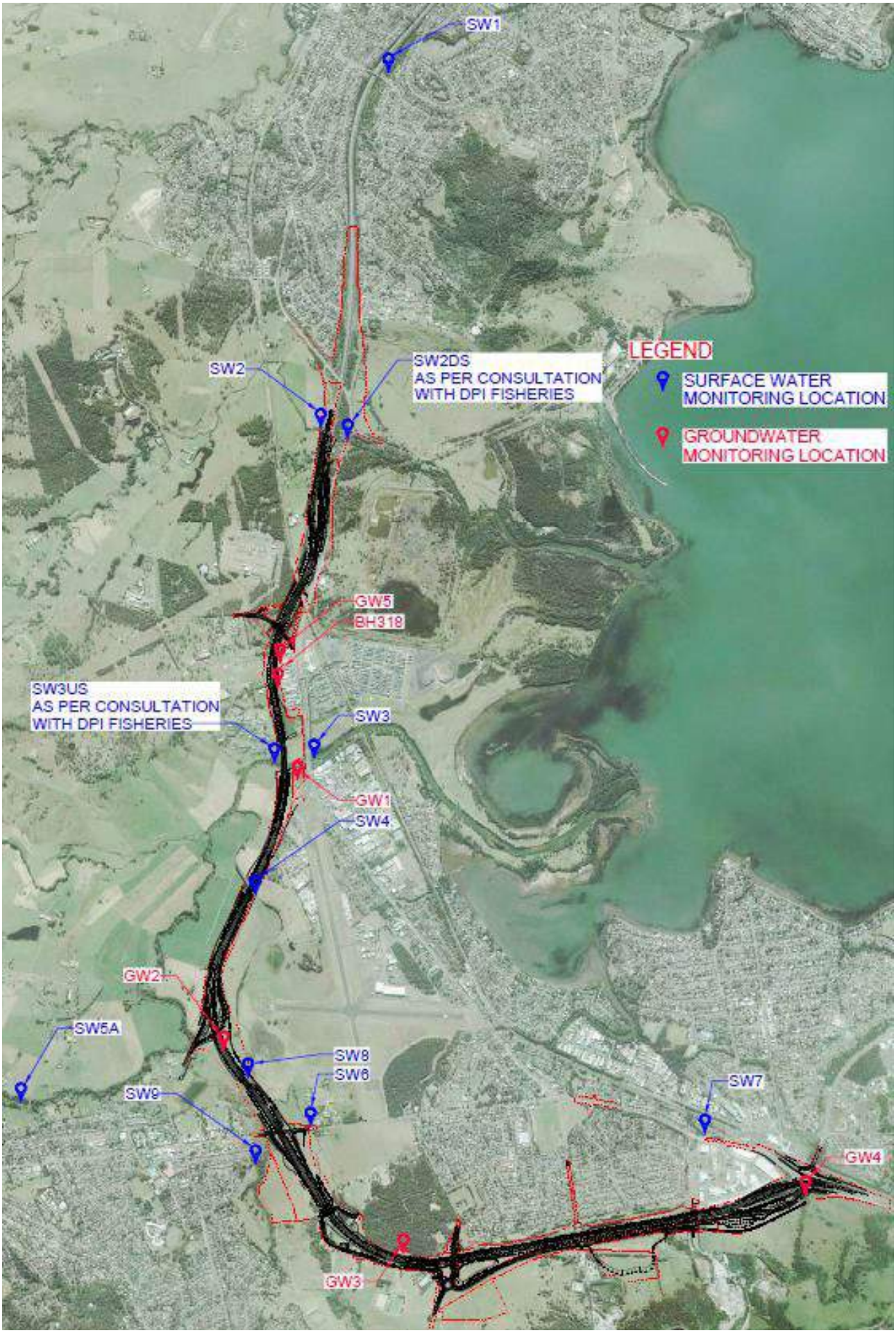
Macquarie Rivulet: Showed no impacts from construction. The creek had low flow at SW3US and SW3. SW5A was noted to have high flow across the rock riffle/rapid below the monitoring location.

Frasers Creek: Showed no impacts from construction. The creek had medium flow at all monitoring locations.

Horsley Inlet: Showed no impacts from construction. The creek had low flow.

Frasers Creek Tributary: Showed no impacts from construction. The creek had low at SW9.

Attachment A, Location maps



Attachment B, Tabulated results

No.	Date	Time	pH	Total Suspended Solids (mg/L)
SW1	10/05/2021	N/A	N/A	N/A
SW2	10/05/2021	12:51pm	7.7	<5
SW2DS	10/05/2021	12:56pm	7.7	<5
SW3US	10/05/2021	2:31pm	7.5	6
SW3	10/05/2021	2:28pm	7.5	6
SW4	10/05/2021	11:35am	7.5	<5
SW5A	10/05/2021	11:06am	7.8	14
SW6	10/05/2021	1:59pm	7.8	<5
SW7	10/05/2021	10:18am	7.9	<5
SW8	10/05/2021	2:12pm	7.4	<5
SW9	10/05/2021	1:43pm	7.7	5

Attachment C, Field sheets

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW2

DATE: 22/4/2021 TIME: 12:52 pm

SAMPLING OFFICERS: Tom Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Upstream of boundary at Bridge 2 (Duck Creek)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER: Green algea present

FIELD MEASUREMENTS

pH: 7.6

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU: 4.96

FLOW OBSERVATIONS

FLOW: Low

COLOUR: Clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW2	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW2 DS

DATE: 22/4/2021 TIME: 12:48

SAMPLING OFFICERS: Tom Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of boundary @ Bridge 2 (Duck Creek)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds

SLOPE: Gentle

EROSION: Minor

OTHER: Green algea present

FIELD MEASUREMENTS

pH: 7.8

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU: 3.53

FLOW OBSERVATIONS

FLOW: Low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW2 DS	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW3

DATE: 22/4/2021 TIME: 9:26

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of work area @ Bridge to Macquarie Rivulet

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Minor

EROSION: Gentle

OTHER:

FIELD MEASUREMENTS

pH: 7.7

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU: 4.01

FLOW OBSERVATIONS

FLOW: Low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW3	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW3 US

DATE: 22/4/2021 TIME: ~~22/4/2021~~ 9:33

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Upstream of work area, bridge 6 (Macquarie Rivulet)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.8

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU : 4.71

FLOW OBSERVATIONS

FLOW: Low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW3 US	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW4

DATE: 22/4/2021 TIME: 11:55

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of work area at Frasers 1 (Bridge 7 - Frasers Gl)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER: Algea present

FIELD MEASUREMENTS

pH: 7.4

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU : 4.92

FLOW OBSERVATIONS

FLOW: Low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW4	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW5A

DATE: 22/4/2021 TIME: 11:28

SAMPLING OFFICERS: T Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Upstream of work @ Macquarie Rivulet upstream of Calderwood Rd bridge.

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: moderate erosion from recent rain events

OTHER: algea present

FIELD MEASUREMENTS

pH: 7.7

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU: 2.89

FLOW OBSERVATIONS

FLOW: Medium

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW5A	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW6

DATE: 22/4/2021 TIME: 2:31

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of Stapletons Bridge at Frasers Creek.

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER: Green algea present

FIELD MEASUREMENTS

pH: 7.9

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU : 1.80

FLOW OBSERVATIONS

FLOW: very low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW6	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW7

DATE: 22/4/2021 TIME: 10:30

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of work area @ Horsley Inlet.

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds

SLOPE: Gentle

EROSION: minor

OTHER:

FIELD MEASUREMENTS

pH: 8.0

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results. NTU : 3.78

FLOW OBSERVATIONS

FLOW: very low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW7	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW8

DATE: 22/4/2021 TIME: 2:38

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of work area @ Bridge 9 (Frasers Crk)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.6

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results. NTU: 9.53

FLOW OBSERVATIONS

FLOW: Low

COLOUR: Turbid / Brown

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW 8	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	22/4/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW9

DATE: 22/4/2021 TIME: 11:15

SAMPLING OFFICERS: T. Denhurst

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Upstream waterway @ Organnar Ave & Stapleton St. (Tributary of Frasers Crk)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH:

VISIBLE OIL AND GREASE: YES / NO NO SAMPLE

SUSPENDED SOLIDS (mg/L):

FLOW OBSERVATIONS

FLOW: NO FLOW

COLOUR:

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Denhurst T. Denhurst 22/4/2021

Attachment D, Laboratory results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2102079**	Page	: 1 of 5
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR JAMES DIAMOND	Contact	: Aneta Prosaroski
Address	: LEVEL 3 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: +61 02 8346 9400	Telephone	: 02 42253125
Project	: Albion Park Rail Bypass	Date Samples Received	: 10-May-2021 16:18
Order number	: ----	Date Analysis Commenced	: 14-May-2021
C-O-C number	: ----	Issue Date	: 17-May-2021 15:56
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 13		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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- General Comments
- Analytical Results

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Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

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Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	SW02US	SW02DS	SW03US	SW03DS	SW04
			Sampling date / time	10-May-2021 00:00	10-May-2021 00:00	10-May-2021 00:00	10-May-2021 00:00	10-May-2021 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EW2102079-001**	**EW2102079-002**	**EW2102079-003**	**EW2102079-004**	**EW2102079-005**
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	**6**	**6**	<5

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	SW05A	SW06US	SW06	SW07US	SW07
			Sampling date / time	10-May-2021 00:00	10-May-2021 00:00	10-May-2021 00:00	10-May-2021 00:00	10-May-2021 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EW2102079-006**	**EW2102079-007**	**EW2102079-008**	**EW2102079-009**	**EW2102079-010**
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**14**	<5	<5	<5	<5

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	**SW08 US**	**SW08**	**SW09**	**----**	**----**
			Sampling date / time	10-May-2021 00:00	10-May-2021 00:00	10-May-2021 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW2102079-011**	**EW2102079-012**	**EW2102079-013**	**--------**	**--------**
				Result	Result	Result	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	**5**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

Surface Water Monitoring

Construction Event 30

The purpose of water quality monitoring during the construction phase is to determine impacts resulting from construction of the project only (i.e. road construction) and no other unrelated sources, such as agricultural operations. The potential impacts from road construction activities will most likely result from erosion and sediment control loss and spills.

Date of Monitoring: 17th June 2021

Rainfall Monitoring is shown below.

	FH Southern AWS	Albion Park Airport AWS
Date:	Rainfall Received:	Rainfall Received:
14/06/2021	0mm	0mm
15/06/2021	0mm	0mm
16/06/2021	0mm	0mm
17/06/2021	11.3mm	8.0mm

Scope and Limitations

During the construction phase of the project, surface water quality will be monitored at the same locations as the baseline-monitoring program. Surface water quality will be monitored at six locations (i.e. SW3-SW4, SW5A, SW6 to SW9).

In addition to the eight surface water monitoring locations identified for the baseline program (WSP, 2018), surface water quality will be monitored upstream of the bridge works at Macquarie Rivulet (i.e. SW3US) following feedback from DPI Fisheries. As a result, there will now be a total of 7 construction surface water quality monitoring locations for the project.

This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to upstream vs downstream conditions.

Field Programme

Surface water sampling was undertaken at all surface locations where flow conditions allowed a representative sample to be taken. This monthly water sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2018, Baseline Monitoring Program – Albion Park Rail Bypass;
- 2018 Appendix B4 Soil and Water Management Sub-plan Albion Park Rail bypass (Stage 2 – Princes Motorway between Yallah and Oak Flats) Appendix B Construction water quality monitoring program

Field parameter for Oil and grease of a visual inspections confirmed no impact.

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory services (ALS)) to be analysed for:

- Total suspended solids; and
- pH.

Weather Monitoring

The project uses the Bureau of Meteorology to monitor weather and onsite Automatic Weather Stations to monitor rainfall.

Surface water sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results
- Attachment C, Field sheets
- Attachment D, Laboratory results

Surface water locations

The upstream location represents the 'reference' (un-impacted) site while the down-stream locations represent the 'test' sites (potentially impacted sites during construction). By comparing upstream water quality with down-stream water quality, potential impacts from construction are assessed.

Table 1 Surface water locations within specific surface water bodies

Surface water	Upstream of Alignment (reference site)	Downstream of Alignment (test site)
Brooks Creek	SW1	-
Duck Creek	SW2	SW2DS
Macquarie Rivulet	SW3US and SW5A	SW3
Frasers Creek	SW4	-
Frasers Creek	-	SW6
Horsley Inlet	-	SW7
Frasers Creek	-	SW8
Tributary of Frasers Creek	SW9	-

Results summary

In the day prior to the monitoring event we received between 8-11mm. All creeks were noted to have clear water and low to medium flow. In assessing upstream and downstream conditions, there were no observed construction impacts

noted during the monitoring event. All field results had TSS and pH results below the trigger level and consistent in range. No oil or grease observed in all locations during the monitoring event.

Brooks Creek: Removed from monitoring program as not influenced by construction works.

Duck Creek: Removed from monitoring program as not influenced by construction works.

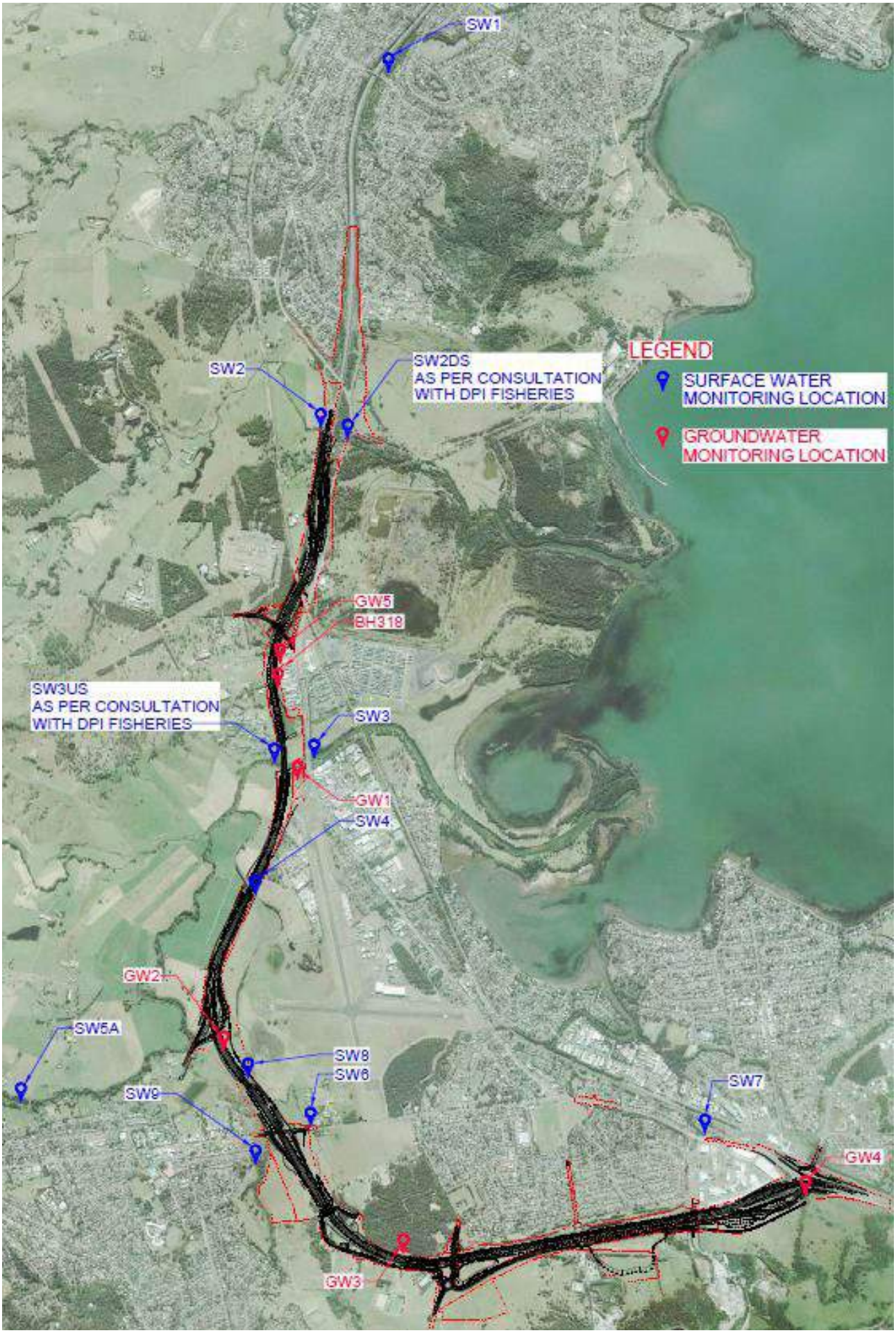
Macquarie Rivulet: Showed no impacts from construction. The creek had low to medium flow in all locations

Frasers Creek: Showed no impacts from construction. The creek had low flow at all monitoring locations.

Horsley Inlet: Showed no impacts from construction. The creek had low flow.

Frasers Creek Tributary: Showed no impacts from construction. The creek had low flow.

Attachment A, Location maps



Attachment B, Tabulated results

No.	Date	Time	pH	Total Suspended Solids (mg/L)
SW1	17/06/2021	N/A	N/A	N/A
SW2	17/06/2021	N/A	N/A	N/A
SW2DS	17/06/2021	N/A	N/A	N/A
SW3US	17/06/2021	3:06pm	7.9	6
SW3	17/06/2021	2:54pm	7.9	8
SW4	17/06/2021	1:12pm	7.6	7
SW5A	17/06/2021	11:44am	7.9	7
SW6	17/06/2021	12:02pm	7.9	6
SW7	17/06/2021	12:49pm	7.9	12
SW8	17/06/2021	12:12pm	7.7	<5
SW9	17/06/2021	11:30am	7.7	6

Attachment C, Field sheets

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW3

DATE: 17/6/2021 TIME: 2:54

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of Bridge 6 Macquarie Rivulet

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.9

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU: 4.31

FLOW OBSERVATIONS

FLOW: Low

COLOUR: Clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW3	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 17/6/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW3US

DATE: 17/6/2021 TIME: 3:06

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: upstream of Bridge 6 (Macquarie Rivulet)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.9

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See Lab Results. NTU : 4.62

FLOW OBSERVATIONS

FLOW: Low

COLOUR: Clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW3 US	1			

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	17/6/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW4

DATE: 17/6/2021 TIME: 1:12

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of work area at Fraser's 2 under Bridge 7.

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.6

VISIBLE OIL AND GREASE: YES / NO

SUSPENDED SOLIDS (mg/L): See lab results NTU: 6.19

FLOW OBSERVATIONS

FLOW: Low

COLOUR: clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW4	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 17/6/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW5A

DATE: 17/6/2021 TIME: 11:44

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)* (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION:

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.9

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results. NTU: 4.99

FLOW OBSERVATIONS

FLOW: Low to medium

COLOUR: slightly turbid

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW5A	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 17/6/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW6

DATE: 17/6/2021 TIME: 12:02

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of Stapelton's Bridge at Fraser's Creek.

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Pastural

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.9

VISIBLE OIL AND GREASE: YES / NO

SUSPENDED SOLIDS (mg/L): See lab results. NTU: 2.10

FLOW OBSERVATIONS

FLOW: Low

COLOUR: Clear

OTHER: algea present

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW6	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 17/6/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW7

DATE: 17/6/2021 TIME: 12:49

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of work area @ Horsley Inlet.

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.9

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results NTU: 9.62

FLOW OBSERVATIONS

FLOW: Low

COLOUR: clear

OTHER: Rubbish built up upstream of monitoring point

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW7	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 17/6/21

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW8

DATE: 17/6/2021 TIME: 12:12

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of Bridge 9 Frasers 2

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & woody weeds / Pastural

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.7

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results. NTU : 2.41

FLOW OBSERVATIONS

FLOW: Low

COLOUR: Clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW8	1			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Tom Dewhurst T. Dewhurst 17/6/2021

Fulton Hogan

SURFACE WATER SAMPLING RECORD

SITE: SW9

DATE: 17/6/2021 TIME: 11:30

SAMPLING OFFICERS: T. Dewhurst

SAMPLING METHOD *(ie grab, bucket)*: (GRAB)

DETAILED SAMPLE LOCATION DESCRIPTION: Upstream of waterway @ Orgorman Ave & Stapelton St. (Tributary of Frasers Creek)

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian & Woody Weeds

SLOPE: Gentle

EROSION: Minor

OTHER:

FIELD MEASUREMENTS

pH: 7.7

VISIBLE OIL AND GREASE: YES / (NO)

SUSPENDED SOLIDS (mg/L): See lab results. NTU: 4.66

FLOW OBSERVATIONS

FLOW: Low

COLOUR: Clear

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW9				

FIELD SUPERVISOR	CHECKED (SIGN & DATE)	
Tom Dewhurst	T. Dewhurst	17/6/2021

Attachment D, Laboratory results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2102686**	Page	: 1 of 5
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR JAMES DIAMOND	Contact	: Aneta Prosaroski
Address	: LEVEL 3 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: +61 02 8346 9400	Telephone	: 02 42253125
Project	: Albion Park Rail Bypass	Date Samples Received	: 17-Jun-2021 15:57
Order number	: ----	Date Analysis Commenced	: 21-Jun-2021
C-O-C number	: ----	Issue Date	: 23-Jun-2021 16:33
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- LOR raised due to sample matrix.
- EK061G:LOR raised due to sample matrix.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW03US	SW03DS	SW04	SW04US	SW05A
			Sampling date / time	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EW2102686-001	EW2102686-002	EW2102686-003	EW2102686-004	EW2102686-005
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**6**	**8**	**7**	<5	**7**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.19**	**0.17**	**----**	**----**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.2	<0.2	**----**	**----**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ **Total Nitrogen as N**	----	0.1	mg/L	<0.2	<0.2	**----**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.04**	**0.02**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	SW06US	SW06	SW07	SW08US	SW08
				Sampling date / time	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00
					EW2102686-006	EW2102686-007	EW2102686-008	EW2102686-009	EW2102686-010
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	**6**	**12**	<5	<5
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**----**	**----**	**----**	**0.04**	**0.10**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**----**	**----**	**----**	**0.3**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**----**	**----**	**----**	**0.3**	**0.4**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**----**	**----**	**----**	**0.04**	**0.03**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	**SW09**	----	----	----	----
			Sampling date / time	17-Jun-2021 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW2102686-011**	--------	--------	--------	--------
				Result	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**6**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

(WATER) EK067G: Total Phosphorus as P by Discrete Analyser

(WATER) EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser

(WATER) EK061G: Total Kjeldahl Nitrogen By Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

Annexure C Groundwater Monitoring Reports

Groundwater Monitoring

Construction Event 9

The purpose of groundwater quality monitoring during the construction phase is to determine impacts resulting from construction of the project. (i.e. road construction). Other sources such as agricultural operations etc. will not be monitored but possibly referred to if contributing impacts are found. Potential impacts to groundwater from road construction activities will most likely result from spills, water extraction and PASS disturbance.

Date of Monitoring: 23rd February 2021

Scope and Limitations

During the construction phase of the project, groundwater quality will be monitored at the same locations as the baseline-monitoring program. Groundwater quality will be monitored at six locations (i.e. GW1-GW5 and BH318).

This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to conditions.

Field Programme

Groundwater sampling was undertaken at all groundwater monitoring wells in the third quarter of 2019; refer to Attachment A for monitoring well locations. This quarterly sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2018, Baseline Monitoring Program – Albion Park Rail Bypass;
- 2018 Appendix B4 Soil and Water Management Sub-plan Albion Park Rail bypass (Stage 2 – Princes Motorway between Yallah and Oak Flats) Appendix B Construction water quality monitoring program

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory services (ALS)) to be analysed for:

- pH
- electrical conductivity
- temperature
- no visible oil and grease
- dissolved metals for GW2 only, which is located in a PASS risk area

Groundwater levels were also measured at each groundwater monitoring wells.

Groundwater sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results
- Attachment C, Field sheets
- Attachment D, Laboratory results

Results summary

Q1 2021 results indicate that there are no impacts from construction activities however seasonal and climate impacts are affecting the groundwater across site. GW3 was observed to have groundwater in the well for the second consecutive quarter. Monitoring against these results will occur in the next reporting period. There were two exceedances in metal concentrations in GW2 against Q1 2021. Arsenic levels decreased very slightly compared to Q4 2020. Copper was stable with Q4 results however still consistent with levels found prior to construction commencing in the area. Nickel levels have slightly decreased below the trigger level however remain in a stable state. The concentrations were generally only marginally greater than the nominated trigger levels and associated laboratory reporting limits and are considered representative of natural groundwater quality variations rather than related to potential impacts from project construction works. GW4 Height has stabilised with Q4 2020 heights.

GW1: All levels remained consistent and were below limit of recording or within nominated guidelines with no impact from construction

GW2: As stated above there were three exceedances in metal concentrations which were representative of natural groundwater quality variations.

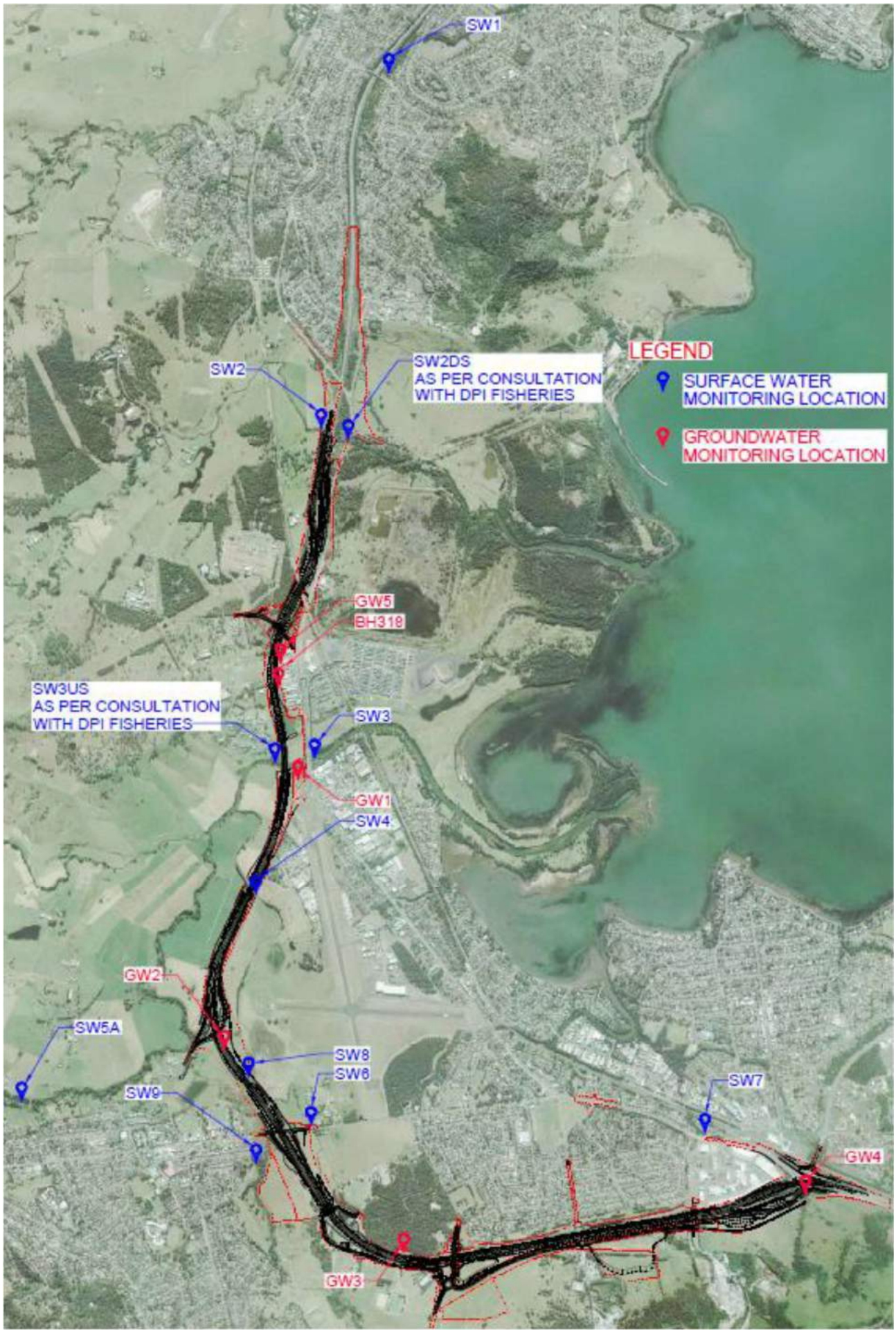
GW3: All levels remained consistent and were below limit of recording or within nominated guidelines with no impact from construction

GW4: All levels were below limit of recording or within nominated guidelines with no impact from construction. Height has stabilised in comparison to the last quarter.

GW5: All levels were below limit of recording or within nominated guidelines with no impact from construction.

BH318: All levels were below limit of recording or within nominated guidelines with no impact from construction.

Attachment A, Location maps



Attachment B, Tabulated results

No.	Date	Time	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Visible Oil and Grease	Depth from TOC (m)
GW1	23/2/2021	2:10 pm	22.4	8.13	2.74	No	6.51
GW2	23/2/2021	1:29 pm	18.1	7.94	1.33	No	1.96
GW3	23/2/2021	8:27 am	19.8	7.88	17.1	No	2.67
GW4	23/2/2021	7:53 am	18.6	8.01	2.84	No	11.8
GW5	23/2/2021	11:22 am	19.7	4.21	21.6	No	8.65
BH318	23/2/2021	11:59 am	18.5	7.38	6.63	No	6.98

GW2 Dissolved Metals results

Dissolved Metals	mg/L
Arsenic	<0.001
Cadmium	<0.0001
Chromium	<0.001
Copper	0.011
Nickel	0.002
Lead	<0.001
Zinc	<0.005
Mercury	<0.0001

Attachment C, Field sheets

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** GW3
Property name/owner:	**Purging Date:** 22/2/2021
Contact details:	**Sampling Date:** 23/2/2021
Depth to groundwater from TOC (m): 2.67	PVC Stickup (m):
Well depth from TOC (PVC) (m): 7.6	Casing diameter (mm):

Purging Information

Purging method: O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m)
Logger download: O YES ✓ NO	1 bore volume (L): 3 bore volumes (L):
Start time: 08:19	$1m^3$ = 1000L
Finish time: 08:27	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
8:19		19.6					7.9		slightly turbid
8:24		19.7					7.9		" "
8:27		19.8					7.9		" "
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos O 12V pump O Bailer O Flowing O Grab sample	Bottles collected: 1
Sampling time: 8:27	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dawhurst	Signature: T. Dawhurst

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** GW4
Property name/owner:	**Purging Date:** 22/2/2021
Contact details:	**Sampling Date:** 23/2/2021
Depth to groundwater from TOC (m): 11.80	PVC Stickup (m):
Well depth from TOC (PVC) (m): 30.12	Casing diameter (mm):

Purging Information

Purging method: O Micropurge O Grundfos ⊘ 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m) purged dry
Logger download: O YES ⊘ NO	1 bore volume (L): 3 bore volumes (L):
Start time: 07:31	$1m^3$ = 1000L
Finish time: 07:53	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
07:31		17.6					7.8		turbid
7:35		17.8					7.9		slightly turbid
7:41		17.9					7.9		clear
7:47		18.3					8.0		clear
7:53		18.6					8.0		clear
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos O 12V pump O Bailer O Flowing O Grab sample	Bottles collected: 1
Sampling time: 7:53	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst	Signature: T. Dewhurst

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** GW5
Property name/owner:	**Purging Date:** 22/2/2021
Contact details:	**Sampling Date:** 23/2/2021
Depth to groundwater from TOC (m):	PVC Stickup (m):
Well depth from TOC (PVC) (m): 11.03	Casing diameter (mm):

Purging Information

Purging method: O Micropurge O Grundfos ~~O~~ 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m) purged dry
Logger download: O YES ~~O~~ NO	1 bore volume (L): 3 bore volumes (L):
Start time: 11:03	$1m^3$ = 1000L
Finish time: 11:22	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
11:03		19.4					4.1		Slightly turbid
11:07		19.6					4.2		" "
11:13		19.6					4.2		" "
11:16		19.6					4.2		" "
11:22		19.7					4.2		" "
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos O 12V pump O Bailer O Flowing O Grab sample	Bottles collected: 1
Sampling time: 11:23	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst	Signature: T. Dewhurst

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** BH318
Property name/owner:	**Purging Date:** 22/2/2021
Contact details:	**Sampling Date:** 23/2/2021
Depth to groundwater from TOC (m):	PVC Stickup (m):
Well depth from TOC (PVC) (m):	Casing diameter (mm):

Purging Information

Purging method: O Micropurge O Grundfos ~~O~~ 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m)
Logger download: ~~O~~ YES O NO	1 bore volume (L): 3 bore volumes (L):
Start time: 11:41	$1m^3$ = 1000L
Finish time: 11:59	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
11:41		17.9					7.3		clear
11:45		18.2					7.3		" "
11:48		18.4					7.4		" "
11:54		18.5					7.5		" "
11:59		18.5					7.4		" "
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos ~~O~~ 12V pump O Bailer O Flowing O Grab sample	Bottles collected: 1
Sampling time: 11:59	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst	Signature: T. Dewhurst

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** GW1
Property name/owner:	**Purging Date:** 22/2/2021
Contact details:	**Sampling Date:** 23/2/2021
Depth to groundwater from TOC (m):	PVC Stickup (m):
Well depth from TOC (PVC) (m):	Casing diameter (mm):

Purging Information

Purging method: O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m)
Logger download: ✓ YES O NO	1 bore volume (L): 3 bore volumes (L):
Start time: 1:42	$1m^3$ = 1000L
Finish time: 2:10	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
1:42		21.3					8.0		slightly turbid
1:48		21.6					8.0		" "
1:54		22.1					8.1		" "
2:00		22.3					8.1		" "
2:10		22.4					8.1		" "
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Bottles collected: 1
Sampling time: 2:10	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst	Signature: T. Dewhurst

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** GW2
Property name/owner:	**Purging Date:** 22/2/2021
Contact details:	**Sampling Date:** 23/2/2021
Depth to groundwater from TOC (m): 1.96	PVC Stickup (m):
Well depth from TOC (PVC) (m): 11.39	Casing diameter (mm):

Purging Information

Purging method: O Micropurge O Grundfos O 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m)
Logger download: ✓YES O NO	1 bore volume (L): 3 bore volumes (L):
Start time: 1:15	$1m^3$ = 1000L
Finish time: 1:29	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
1:15		17.8					7.8		clear
1:19		17.9					7.9		clear
1:23		18.1					7.9		clear
1:29		18.1					7.9		clear
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos ✓12V pump O Bailer O Flowing O Grab sample	Bottles collected: 1
Sampling time: 1:29	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst	Signature: T. Dewhurst

Attachment D, Laboratory results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2100830**	Page	: 1 of 4
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR JAMES DIAMOND	Contact	: Glenn Davies
Address	: LEVEL 3 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: +61 02 8346 9400	Telephone	: 02 42253125
Project	: Albion Park Rail Bypass	Date Samples Received	: 23-Feb-2021 15:23
Order number	: ----	Date Analysis Commenced	: 05-Mar-2021
C-O-C number	: ----	Issue Date	: 08-Mar-2021 16:51
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	GW1	GW2	GW3	GW4	GW5
				Sampling date / time	23-Feb-2021 00:00	23-Feb-2021 00:00	23-Feb-2021 00:00	23-Feb-2021 00:00	23-Feb-2021 00:00
					EW2100830-001	EW2100830-002	EW2100830-003	EW2100830-004	EW2100830-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**8.13**	**7.94**	**7.88**	**8.01**	**4.21**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**2740**	**1330**	**17100**	**2840**	**21600**
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**----**	**0.001**	**----**	**----**	**----**
Cadmium	7440-43-9	0.0001	mg/L		**----**	<0.0001	**----**	**----**	**----**
Chromium	7440-47-3	0.001	mg/L		**----**	<0.001	**----**	**----**	**----**
Copper	7440-50-8	0.001	mg/L		**----**	**0.011**	**----**	**----**	**----**
Nickel	7440-02-0	0.001	mg/L		**----**	**0.002**	**----**	**----**	**----**
Lead	7439-92-1	0.001	mg/L		**----**	<0.001	**----**	**----**	**----**
Zinc	7440-66-6	0.005	mg/L		**----**	<0.005	**----**	**----**	**----**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		**----**	<0.0001	**----**	**----**	**----**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	**BH318**	**----**	**----**	**----**	**----**
			Sampling date / time	23-Feb-2021 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW2100830-006**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.38**	**----**	**----**	**----**	**----**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**6630**	**----**	**----**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA005P: pH by PC Titrator

(WATER) EA010P: Conductivity by PC Titrator

(WATER) EG035F: Dissolved Mercury by FIMS

(WATER) EG020F: Dissolved Metals by ICP-MS

Groundwater Monitoring

Construction Event 10

The purpose of groundwater quality monitoring during the construction phase is to determine impacts resulting from construction of the project. (i.e. road construction). Other sources such as agricultural operations etc. will not be monitored but possibly referred to if contributing impacts are found. Potential impacts to groundwater from road construction activities will most likely result from spills, water extraction and PASS disturbance.

Date of Monitoring: 11th June 2021

Scope and Limitations

During the construction phase of the project, groundwater quality will be monitored at the same locations as the baseline-monitoring program. Groundwater quality will be monitored at six locations (i.e. GW1-GW5 and BH318).

This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to conditions.

Field Programme

Groundwater sampling was undertaken at all groundwater monitoring wells in the third quarter of 2019; refer to Attachment A for monitoring well locations. This quarterly sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2018, Baseline Monitoring Program – Albion Park Rail Bypass;
- 2018 Appendix B4 Soil and Water Management Sub-plan Albion Park Rail bypass (Stage 2 – Princes Motorway between Yallah and Oak Flats) Appendix B Construction water quality monitoring program

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory services (ALS)) to be analysed for:

- pH
- electrical conductivity
- temperature
- no visible oil and grease
- dissolved metals for GW2 only, which is located in a PASS risk area

Groundwater levels were also measured at each groundwater monitoring wells.

Groundwater sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results
- Attachment C, Field sheets
- Attachment D, Laboratory results

Results summary

Q2 2021 results indicate that there are no impacts from construction activities however seasonal and climate impacts are affecting the groundwater across site. GW3 was observed to have groundwater in the well for the third consecutive quarter which present consistently across the previous monitoring events. Generally all parameters were consistent with previous events apart from a reduction in electrical conductivity for GW4 and increases in dissolved metals copper and zinc for GW2.

Further trend analysis of GW2 dissolved metals copper and zinc indicates fluctuations in concentration levels being proportionate to large, seasonal rainfall events. This analysis indicates that concentration levels of copper and zinc represent natural groundwater quality variations with seasonal cycles rather than related to potential impacts from project construction works.

GW1: All levels remained consistent and were below limit of recording or within nominated guidelines with no impact from construction

GW2: As stated above there were three exceedances in metal concentrations which were representative of natural groundwater quality variations.

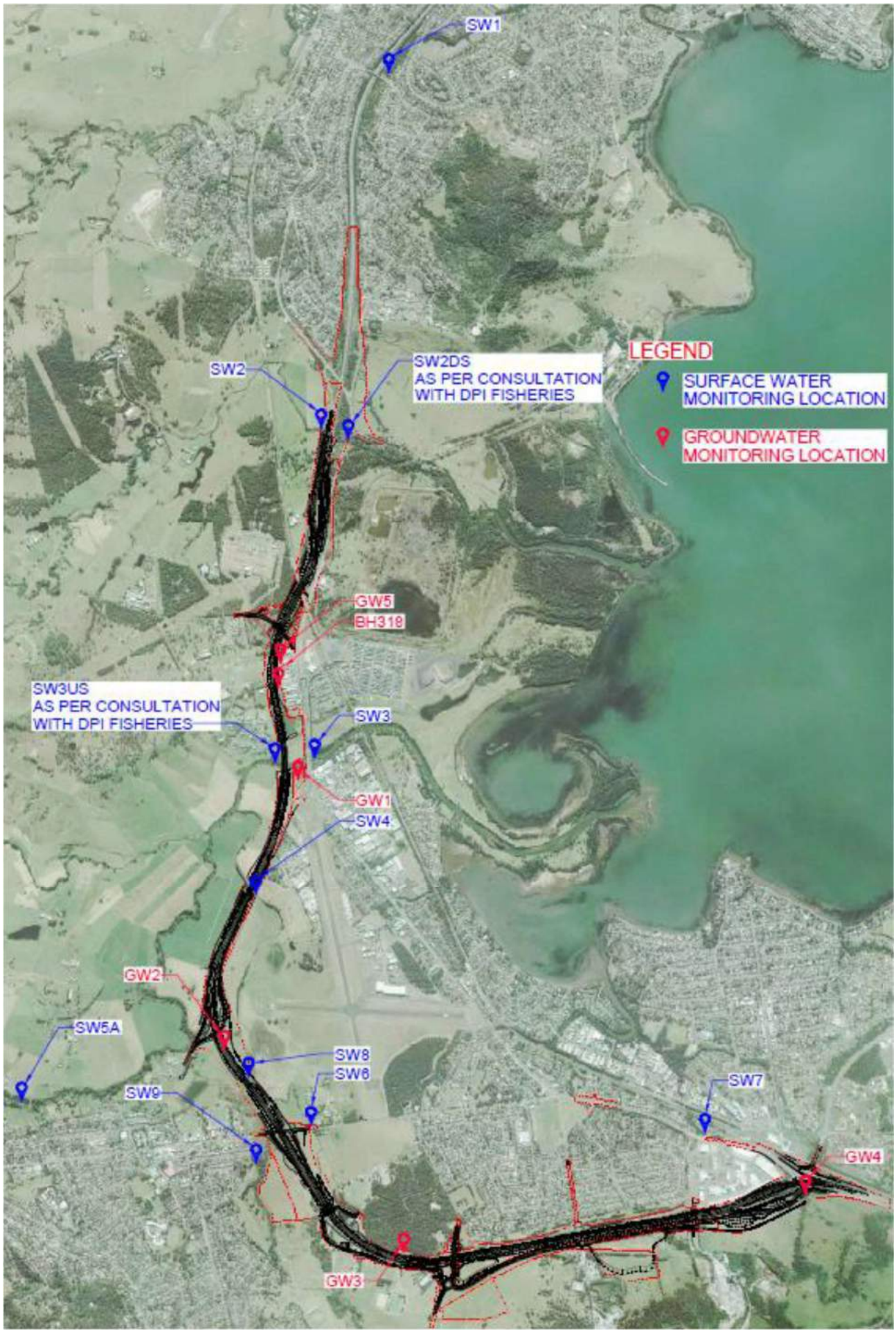
GW3: All levels remained consistent and were below limit of recording or within nominated guidelines with no impact from construction

GW4: All levels were below limit of recording or within nominated guidelines with no impact from construction. Height has stabilised in comparison to the last quarter.

GW5: All levels were below limit of recording or within nominated guidelines with no impact from construction.

BH318: All levels were below limit of recording or within nominated guidelines with no impact from construction.

Attachment A, Location maps



Attachment B, Tabulated results

No.	Date	Time	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Visible Oil and Grease	Depth from TOC (m)
GW1	11/6/2021		19.6	7.86	2.62	No	6.28
GW2	11/6/2021		17.3	7.89	1.12	No	1.82
GW3	11/6/2021		19.3	7.61	14.7	No	2.43
GW4	11/6/2021		18.8	7.80	1.64	No	12.98
GW5	11/6/2021		19.6	4.20	22.0	No	8.66
BH318	11/6/2021		18.4	7.19	6.80	No	7.32

GW2 Dissolved Metals results

Dissolved Metals	mg/L
Arsenic	<0.001
Cadmium	<0.0001
Chromium	<0.001
Copper	0.051
Nickel	0.008
Lead	<0.001
Zinc	0.25
Mercury	<0.0001

Attachment C, Field sheets

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** GW2
Property name/owner:	**Purging Date:** 10/6/2021
Contact details:	**Sampling Date:** 11/6/2021
Depth to groundwater from TOC (m): 1.82	PVC Stickup (m):
Well depth from TOC (PVC) (m): 11.39	Casing diameter (mm): 50 mm

Purging Information

Purging method: O Micropurge O Grundfos O 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ purged dry. π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m)
Logger download: ✓YES O NO	1 bore volume (L): 3 bore volumes (L):
Start time:	$1m^3$ = 1000L
Finish time: 12:16	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
12:00		16.9							clear
12:04		17.0							clear
12:09		17.1							clear
12:12		17.2							clear
12:16		17.3							clear
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos ✓12V pump O Bailer O Flowing O Grab sample	Bottles collected: 1
Sampling time: 12:16	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst	Signature: T. Dewhurst

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** GW3
Property name/owner:	**Purging Date:** 10/6/2021
Contact details:	**Sampling Date:** 11/6/2021
Depth to groundwater from TOC (m): 2.43	PVC Stickup (m):
Well depth from TOC (PVC) (m): ~~10/6/21~~ 7.6	Casing diameter (mm): 50 mm

Purging Information

Purging method: O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m) purged dry
Logger download: ~~YES~~ NO no logger.	1 bore volume (L): 3 bore volumes (L):
Start time: 9:14	$1m^3$ = 1000L
Finish time: 9:31	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
9:11		19.0					7.5		slightly turbid
9:16		19.2					7.5		" "
9:21		19.3					7.6		" "
9:26		19.3					7.6		" "
9:31		19.3					7.6		" "
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Bottles collected:
Sampling time: 9:31	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst Signature: T. Dewhurst

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** GW4
Property name/owner:	**Purging Date:** 10/6/2021
Contact details:	**Sampling Date:** 11/6/2021
Depth to groundwater from TOC (m): 12.98	PVC Stickup (m): 50mm
Well depth from TOC (PVC) (m): 31.61	Casing diameter (mm):

Purging Information

Purging method: O Micropurge O Grundfos O 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m)
Logger download: O YES O NO	1 bore volume (L): 3 bore volumes (L):
Start time: 8:10	$1m^3$ = 1000L
Finish time: 8:51	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
8:10			18.7				7.8		slightly turbid brown
8:21			18.7				7.8		" "
8:30			18.8				7.9		clear
8:40			18.8				7.9		clear
8:51			18.8				8.0		clear

CO_2 **(mg/L)** = mL in syringe x 10 =

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos O 12V pump O Bailer O Flowing O Grab sample	Bottles collected: 1
Sampling time: 8:51	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst	Signature: T. Dewhurst

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** GW5
Property name/owner:	**Purging Date:** 10/6/2021
Contact details:	**Sampling Date:** 11/6/2021
Depth to groundwater from TOC (m): 8.66	PVC Stickup (m): 50mm
Well depth from TOC (PVC) (m): 11.03	Casing diameter (mm):

Purging Information

Purging method: O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m) purged dry
Logger download: ✓ YES O NO	1 bore volume (L):
Start time: 10:57	3 bore volumes (L): $1m^3$ = 1000L
Finish time: 11:22	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
10:57		19.4					4.1		Slightly turbid
11:09		19.4					4.2		" "
11:14		19.5					4.2		" "
11:22		19.6					4.2		" "
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Bottles collected:
Sampling time: 11:22	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst	Signature: T. Dewhurst

Groundwater Sampling Record Sheet

Project: APRb	**Well Number:** BH318
Property name/owner:	**Purging Date:** 10/6/2021
Contact details:	**Sampling Date:** 11/6/2021
Depth to groundwater from TOC (m): 7.32	PVC Stickup (m):
Well depth from TOC (PVC) (m): 11.45	Casing diameter (mm): 50mm

Purging Information

Purging method: O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m) purged dry
Logger download: O YES ✓ NO no logger	1 bore volume (L): 3 bore volumes (L):
Start time: 11:30	$1m^3$ = 1000L
Finish time:	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
11:30		18.6					7.1		clear
11:36		18.7					7.1		clear
11:43		18.7					7.2		clear
11:49		18.7					7.2		clear
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Bottles collected:
Sampling time: 11:49	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst	Signature: T. Dewhurst

Groundwater Sampling Record Sheet

Project: APRD	**Well Number:** GW1
Property name/owner:	**Purging Date:** 10/6/2021
Contact details:	**Sampling Date:** 11/6/2021
Depth to groundwater from TOC (m): 2.62	PVC Stickup (m):
Well depth from TOC (PVC) (m): 7.9	Casing diameter (mm): 50 mm

Purging Information

Purging method: O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Calculated bore volume (m^3) = $\pi r^2 h$ π = 3.14 r = 0.5 x casing diameter (m) h = well depth – depth to GW (m)
Logger download: ✓ YES O NO	1 bore volume (L): purged dry 3 bore volumes (L):
Start time:	$1m^3$ = 1000L
Finish time:	Purging depth:

Field Results While Purging

Time	Vol (L)	Temp. °C	EC (uS/cm)	TDS (g/L)	DO %sat	DO mg/L	pH	Redox (mV)	Colour/odour/ turbidity
1:24		18.9					7.9		slightly turbid
1:28		19.3					8.0		" "
1:33		19.5					8.0		" "
1:38		19.5					8.0		" "
1:41		19.6					8.1		" "
	CO_2 (mg/L) = mL in syringe x 10 =								

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Sampling Details

Sampling method (*if different from purging* method): O Micropurge O Grundfos ✓ 12V pump O Bailer O Flowing O Grab sample	Bottles collected:
Sampling time: 1:41	QA/QC details

Other comments and observations (environmental/climatic conditions):

Sampler's name: Tom Dewhurst	Signature: T. Dewhurst

Attachment D, Laboratory results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2102625**	Page	: 1 of 4
Amendment	: **1**		
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR JAMES DIAMOND	Contact	: Aneta Prosaroski
Address	: LEVEL 3 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: +61 02 8346 9400	Telephone	: 02 42253125
Project	: Albion Park Rail Bypass	Date Samples Received	: 11-Jun-2021 13:46
Order number	: ----	Date Analysis Commenced	: 11-Jun-2021
C-O-C number	: ----	Issue Date	: 24-Jun-2021 14:40
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Aneta Prosaroski	Client Liaison Officer	Laboratory - Wollongong, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- Sample 5 analysed in Wollongong only.
- Amendment (23/06/2021): This report has been amended to allow the distribution of an Electronic Data Deliverable (EDD) not previously provided. All analysis results are as per the previous report.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Samples provided by client and tested as received. Any analysis performed by ALS Wollongong were completed on date of receival.

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	GW1	GW2	GW3	GW4	GW5
				Sampling date / time	11-Jun-2021 00:00	11-Jun-2021 00:00	11-Jun-2021 00:00	11-Jun-2021 00:00	11-Jun-2021 00:00
					EW2102625-001	EW2102625-002	EW2102625-003	EW2102625-004	EW2102625-005
					Result	Result	Result	Result	Result
EA005FD: Field pH									
pH	----	0.1	pH Unit		**----**	**----**	**----**	**----**	**4.2**
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.86**	**7.89**	**7.61**	**7.80**	**----**
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm		**----**	**----**	**----**	**----**	**22000**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**2620**	**1120**	**14700**	**1640**	**----**
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**----**	<0.001	**----**	**----**	**----**
Cadmium	7440-43-9	0.0001	mg/L		**----**	<0.0001	**----**	**----**	**----**
Chromium	7440-47-3	0.001	mg/L		**----**	<0.001	**----**	**----**	**----**
Copper	7440-50-8	0.001	mg/L		**----**	**0.051**	**----**	**----**	**----**
Nickel	7440-02-0	0.001	mg/L		**----**	**0.008**	**----**	**----**	**----**
Lead	7439-92-1	0.001	mg/L		**----**	<0.001	**----**	**----**	**----**
Zinc	7440-66-6	0.005	mg/L		**----**	**0.025**	**----**	**----**	**----**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		**----**	<0.0001	**----**	**----**	**----**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	**BH318**	**----**	**----**	**----**	**----**
			Sampling date / time	11-Jun-2021 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW2102625-006**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.19**	**----**	**----**	**----**	**----**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**6800**	**----**	**----**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA005P: pH by PC Titrator

(WATER) EA010P: Conductivity by PC Titrator

(WATER) EG035F: Dissolved Mercury by FIMS

(WATER) EG020F: Dissolved Metals by ICP-MS

Annexure D Noise Monitoring Results

Noise monitoring results – January 2021

EPA ID#	LOCATION DESCRIPTION	Date	$L(A)_{eq(15min)}$	Comments
2	L1 - 20 Westwood Drive, Blackbutt	20/01/2021	59	No construction noises audible at time of monitoring. Most dominant noise sources: dogs barking (58-65) and traffic (50-54)
3	L2 - 78 Jarrah Way, Albion Park Rail	20/01/2021	47	Construction noises audible: Hammering (44-48) and 20T Excavator (43-50)
4	L3 - 17 Gumnut Street, Albion Park Rail	20/01/2021	57	Construction noises audible: Moxies (44-55). Most dominant noise sources birds (41-50) and traffic (44-52)
5	L4 - 152 Croome Road, Albion Park	20/01/2021	68	No construction audible at time of monitoring. Most dominant noise source: Traffic on Croome Rd (44-82)
6	L5 - 59 Burdekin Drive, Albion Park	20/01/2021	60	No construction at time of monitoring. Most dominant noise source: Traffic on Burdekin Dr (46-78)
7	L6 - 25 Fraser Crescent, Albion Park	20/01/2021	50	No construction at time of monitoring. Most dominant noise source: Birds (35-56)
8	L7 - 52 Tongarra Road, Abion Park	20/01/2021	74	Construction audible at time of monitoring: Vac truck (43-51) Most dominant noise source: Traffic on Tongarra Rd (60-83)
9	L8 - 24 Terry Street, Albion Park	20/01/2021	74	No construction audible at time of monitoring. Most dominant noise source: Traffic on Terry St (45-91) and Cicadas (50-66)
10	L9 - 42 Larkins Lane, Yallah	21/01/2021	65	Construction noise audible: 5 tonne excavator (44-56) and squawker (42-49). Most dominant noise sources: Princes HWY (50-56) and cicadas (45-56)
11	L10 - 4 Semillon Place, Mount Brown	21/01/2021	64	No construction audible at time of monitoring. Traffic along Princes HWY (65-68) and insects (54-66) most dominant noise source.

Noise monitoring results – February 2021

EPA ID#	LOCATION DESCRIPTION	Date	$L(A)_{eq(15min)}$	Comments
2	L1 - 20 Westwood Drive, Blackbutt	24/02/2021	58	No construction noises audible at time of monitoring. Most dominant noise sources: traffic (51-78) and power tools in nearby house (52-64)
3	L2 - 78 Jarrah Way, Albion Park Rail	24/02/2021	47	Construction noises audible: Hammering (50-53), Squawker (47-48) and Excavator (47-51). Most dominant noise: Hammers (50-53) and Insects (47-50)
4	L3 - 17 Gumnut Street, Albion Park Rail	24/02/2021	48	No construction noise audible. Most dominant noise sources birds (38-45) and traffic (42-60)
5	L4 - 152 Croome Road, Albion Park	24/02/2021	71	No construction audible at time of monitoring. Most dominant noise source: Traffic on Croome Rd (53-83)
6	L5 - 59 Burdekin Drive, Albion Park	24/02/2021	63	No construction at time of monitoring. Most dominant noise source: Traffic on Burdekin Dr (50-80) and Birds (54-65)
7	L6 - 25 Fraser Crescent, Albion Park	24/02/2021	49	No construction at time of monitoring. Most dominant noise source: Birds (38-66)
8	L7 - 52 Tongarra Road, Abion Park	24/02/2021	74	Construction audible at time of monitoring: 20T excavator doing drainage works along Tongarra Rd (48-54), Squawker (51-53) Most dominant noise source: Traffic on Tongarra Rd (50-84)
9	L8 - 24 Terry Street, Albion Park	24/02/2021	72	No construction audible at time of monitoring. Most dominant noise source: Traffic on Terry St (48-85) and Birds (43-54)
10	L9 - 42 Larkins Lane, Yallah	24/02/2021	62	Construction noise audible: 12 tonne excavator tracking on main alignment (50-68) and an LV (42-49). Most dominant noise sources: Princes HWY (53-56) and cicadas (48-53)
11	L10 - 4 Semillon Place, Mount Brown	24/02/2021	60	No construction audible at time of monitoring. Traffic along Princes HWY (58-66) and birds (42-51) most dominant noise source.

Noise monitoring results – March 2021

EPA ID#	LOCATION	Date	$L(A)_{eq(15min)}$	Comments
2	L1 - 20 Westwood Drive, Blackbutt	26/03/2021	57	No construction noises audible at time of monitoring. Most dominant noise sources: Traffic - Princesw HWY (48-77)
3	L2 - 78 Jarrah Way, Albion Park Rail	29/03/2021	50	Construction noises audible: Hammering (42-45), Squawker (40-43) and Moxies (44-47). Most dominant noise: Dogs barking (51-55) and Birds (43-53)
4	L3 - 17 Gumnut Street, Albion Park Rail	29/03/2021	54	No construction noise audible. Most dominant noise sources birds (43-54) and Traffic (46-62)
5	L4 - 152 Croome Road, Albion Park	26/03/2021	70	No construction audible at time of monitoring. Most dominant noise source: Traffic on Croome Rd (50-85) and birds (48-56)
6	L5 - 59 Burdekin Drive, Albion Park	26/03/2021	61	No construction at time of monitoring. Most dominant noise source: Traffic on Burdekin Dr (48-82)
7	L6 - 25 Fraser Crescent, Albion Park	26/03/2021	50	No construction at time of monitoring. Most dominant noise source: Birds (40-68) and Traffic on nearby roads (50-71)
8	L7 - 52 Tongarra Road, Abion Park	26/03/2021	76	Construction audible at time of monitoring: 20T excavator working on bridge 10 abutments (49-51), Squawker (48-50) Most dominant noise source: Traffic on Tongarra Rd (50-88)
9	L8 - 24 Terry Street, Albion Park	29/03/2021	72	Construction noise audible: Excavator (49-51) and squawker (44-47) Most dominant noise source: Traffic on Terry St (48-88) and Birds (45-52)
10	L9 - 42 Larkins Lane, Yallah	29/03/2021	60	Construction noise audible: Ashpahlt crew on main alignment - north bound(48-52) and an LVx7 (40-50). Most dominant noise sources: Princes HWY (50-58) and cicadas (44-54)
11	L10 - 4 Semillon Place, Mount Brown	26/03/2021	62	No construction audible at time of monitoring. Traffic along Princes HWY (56-69) and birds (40-53) most dominant noise source.

Noise monitoring results – April 2021

EPA ID#	LOCATION	Date	$L(A)_{eq(15min)}$	Comments
2	L1 - 20 Westwood Drive, Blackbutt	21/04/2021	56	No construction noises audible at time of monitoring. Most dominant noise sources: Traffic - Princesw HWY (52-64)
3	L2 - 78 Jarrah Way, Albion Park Rail	21/04/2021	52	Construction noises audible at time of monitoring: Moxies running on main alignment (48-50)
4	L3 - 17 Gumnut Street, Albion Park Rail	21/04/2021	52	Construction noises audible at time of monitoring: 35T Excavator working on Croome Rd rebuild (47-52)
5	L4 - 152 Croome Road, Albion Park	21/04/2021	68	No construction audible at time of monitoring. Most dominant noise source: Traffic on Croome Rd (44-83)
6	L5 - 59 Burdekin Drive, Albion Park	21/04/2021	56	No construction at time of monitoring. Most dominant noise source: Traffic on Burdekin Dr (47-75)
7	L6 - 25 Fraser Crescent, Albion Park	21/04/2021	46	No construction at time of monitoring. Most dominant noise source: Birds (39-47) and Traffic on nearby roads (43-57) X5
8	L7 - 52 Tongarra Road, Abion Park	21/04/2021	73	No construction audible at time of monitoring. Most dominant noise source: Traffic on Tongarra Rd (46-83)
9	L8 - 24 Terry Street, Albion Park	22/04/2021	70	No construction audible at time of monitoring. Most dominant noise source: Traffic on Terry St (50-84) and Birds (42-49)
10	L9 - 42 Larkins Lane, Yallah	21/04/2021	54	Construction noise audible: Truck on main alignment - north bound(53-62) and LV (53-59) X6. Most dominant noise sources: Princes HWY (51-54) and crickets (50-53)
11	L10 - 4 Semillon Place, Mount Brown	22/04/2021	56	No construction audible at time of monitoring. Traffic along Princes HWY (50-66) and birds (44-50) most dominant noise source.

Noise monitoring results – May 2021

EPA ID#	LOCATION	Date	$L(A)_{eq\ (15min)}$	Comments
2	L1 - 20 Westwood Drive, Blackbutt	27/05/2021	55	No construction noises audible at time of monitoring. Most dominant noise sources: Traffic - Princesw HWY (50-56)
3	L2 - 78 Jarrah Way, Albion Park Rail	27/05/2021	47	Construction noises audible at time of monitoring: Excavator on main alignment (46-49)
4	L3 - 17 Gumnut Street, Albion Park Rail	27/05/2021	55	Construction noises audible at time of monitoring: Asphalt crew (43-50)
5	L4 - 152 Croome Road, Albion Park	27/05/2021	70	No construction audible at time of monitoring. Most dominant noise source: Traffic on Croome Rd (50-85)
6	L5 - 59 Burdekin Drive, Albion Park	27/05/2021	59	No construction at time of monitoring. Most dominant noise source: Cars on Burdekin Dr (44-76) X 14
7	L6 - 25 Fraser Crescent, Albion Park	27/05/2021	48	No construction at time of monitoring. Most dominant noise source: Birds (42-49) and Traffic on nearby roads (48-66) X2
8	L7 - 52 Tongarra Road, Abion Park	27/05/2021	75	Construction noises at time of monitoring: Excavator working on Tongarra drainage (40-43). Most dominant noise source: Traffic on Tongarra Rd (50-88)
9	L8 - 24 Terry Street, Albion Park	27/05/2021	72	No construction audible at time of monitoring. Most dominant noise source: Traffic on Terry St (50-84) and Birds (35-47)
10	L9 - 42 Larkins Lane, Yallah	27/05/2021	64	No construction noises at time of monitoring. Most dominant noise source: Traffic on new alignment (52-74)
11	L10 - 4 Semillon Place, Mount Brown	27/05/2021	58	No construction audible at time of monitoring. Traffic along Princes HWY (52-64) and birds (42-49) most dominant noise source.

Noise monitoring results – June 2021

EPA ID#	LOCATION	Date	$L(A)_{eq\ (15min)}$	Comments
2	L1 - 20 Westwood Drive, Blackbutt	16/06/2021	54	No construction noises audible at time of monitoring. Most dominant noise sources: Traffic - Princesw HWY (47-56) Power tools from neighbours shed (48-62)
3	L2 - 78 Jarrah Way, Albion Park Rail	16/06/2021	61	Construction audible at time of monitoring: Hammers (42-48) other dominant noise soruces at time of monitoring: Navy Helicopter (60-80) and people talking at playground (40-52)
4	L3 - 17 Gumnut Street, Albion Park Rail	16/06/2021	53	No construction audible at time of monitoring. Most dominant noise source : dog barking (48-56) birds (44-51) and traffic on Croome Rd (48-69)
5	L4 - 152 Croome Road, Albion Park	16/06/2021	68	No construction audible at time of monitoring. Most dominant noise source: Traffic on Croome Rd (44-81)
6	L5 - 59 Burdekin Drive, Albion Park	16/06/2021	57	No construction audible at time of monitoring. Most dominant noise source: Cars on Burdekin Dr (46-74)X13
7	L6 - 25 Fraser Crescent, Albion Park	16/06/2021	46	No construction audible at time of monitoring. Most dominant noise source: Helicopter (48-65)
8	L7 - 52 Tongarra Road, Abion Park	16/06/2021	71	No construction audible at time of monitoring. Most dominant noise source: Traffic on Tongarra Rd (47-81)
9	L8 - 24 Terry Street, Albion Park	16/06/2021	69	No construction audible at time of monitoring. Most dominant noise source: Traffic on Terry St (47-88)
10	L9 - 42 Larkins Lane, Yallah	16/06/2021	64	No construction at time of monitoring. Most dominant noise source: Traffic on the new alignment (50-73)
11	L10 - 4 Semillon Place, Mount Brown	16/06/2021	59	No construction audible at time of monitoring. Traffic from Princes HWY (50-69) and birds (40-51) most dominant noise source.

Appendix C SAS and SAR

NSW Site Auditor Scheme

Site Audit Statement

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the *Contaminated Land Management Act 1997* on 12 October 2017.

For information about completing this form, go to Part IV.

Part I: Site audit identification

Site audit statement no. 1508-1904

This site audit is a:

☑ statutory audit

❑ non-statutory audit

within the meaning of the *Contaminated Land Management Act 1997*.

Site auditor details

(As accredited under the *Contaminated Land Management Act 1997*)

Name: [redacted]

Company: Cavvanba Consulting

Address: Unit 1, 66 Centennial Circuit, Byron Bay NSW

Postcode: 2483

Phone: (02) 6685 7811

Email: [redacted]

Site details

Address: Lot 99 DP 1076242; Lot 118 and Lot 119 DP 1223046, Part of Lot 61 DP 1041353

Lot 63 DP 1041353; and Part of Lot 3 DP 881749.

Princes Highway, Yallah, NSW

Postcode: 2530

Property description

(Attach a separate list if several properties are included in the site audit.)

Lot 99 DP 1076242; Lot 118 and Lot 119 DP 1223046, Part of Lot 61 DP 1041353

Lot 63 DP 1041353; and Part of Lot 3 DP 881749.

Refer to Figure 1 (attached) for the site. The site location is shown as the bold black line, and consists of the following subsections:

- investigation area (including two subsections); and
- encapsulation area.

Local government area: Wollongong City Council

Area of site: (include units, e.g. hectares): 3.54 hectares

Current zoning: SP2 Infrastructure

Regulation and notification

To the best of my knowledge:

❑ **the site is** the subject of a declaration, order, agreement, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985,* as follows: (provide the no. if applicable)

- ❑ Declaration no.
- ❑ Order no.
- ❑ Proposal no.
- ❑ Notice no.

☑ **the site is not** the subject of a declaration, order, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

To the best of my knowledge:

❑ the site **has** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*

☑ the site **has not** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*.

Site audit commissioned by

Name: [redacted]

Company: Fulton Hogan Construction

Address: PO Box 6099 Alexandria, NSW 2015

Site Office: PO Box 1014, Albion Park NSW Postcode: 2527

Phone: [redacted]

Email: [redacted]

Contact details for contact person (if different from above)

Name

Phone

Email

Nature of statutory requirements (not applicable for non-statutory audits)

❑ Requirements under the *Contaminated Land Management Act* 1997 (e.g. management order; please specify, including date of issue)

❑ Requirements imposed by an environmental planning instrument (please specify, including date of issue)

☑ Development consent requirements under the *Environmental Planning and Assessment Act 1979* (please specify consent authority and date of issue)

Part of the NSW RMS State Significant Infrastructure project (SSI 6678) Albion Park Rail bypass, approval under Section 115ZB. Condition E58. Approval Authority: Minister of Planning

❑ Requirements under other legislation (please specify, including date of issue)

Purpose of site audit

❑ **A1** To determine land use suitability

Intended uses of the land:

OR

☑ **A2** To determine land use suitability subject to compliance with either an active or passive environmental management plan

Intended uses of the land:

Commercial/industrial: Road corridor

OR

(Tick all that apply)

❑ **B1** To determine the nature and extent of contamination

❑ **B2** To determine the appropriateness of:

- ❑ an investigation plan
- ❑ a remediation plan
- ❑ a management plan

❑ **B3** To determine the appropriateness of a **site testing plan** to determine if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

❑ **B4** To determine the compliance with an approved:

- ❑ **voluntary management proposal** or
- ❑ **management order** under the *Contaminated Land Management Act 1997*

❑ **B5** To determine if the land can be made suitable for a particular use (or uses) if the site is remediated or managed in accordance with a specified plan.

Intended uses of the land:

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

Hyder Cardno Joint Venture (HCJV), Environment & Natural Resource Solutions, Cardno

Titles of reports reviewed:

- Hyder Cardno Joint Venture (HCJV, 2014) Phase 1 – *Preliminary Site Investigation Report, Albion Park Rail Bypass*.
- Hyder Cardno Joint Venture (HCJV, 2017) *Environmental site assessment – PAEC02: Industrial Estate, Albion Park Rail Bypass* (Ref. FK0004-APRB-R-02).

- Environment & Natural Resource Solutions (ENRS) (2019a) *Sampling, Analysis & Quality Control Plan (SAQP), Asbestos in Soil (ASBINS), Albion Park Bypass Project* (Ref. ENRS1153R1E1, April 2019).
- ENRS (2019b) Stage 2 – Detailed Site Investigation (DSI), Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project (Ref. ENRS1153_APRB_PAEC02 Cut#1_DSI, June 2019).
- ENRS (2019c) *Remediation Action Plan, Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153, June 2019).
- ENRS (2020a) *Stage 4 – Site Validation Report, PAEC02 – Cut No. 1, Albion Park Rail Bypass* (APRB) (Ref. ENRS1153).
- Cardno (2021) *Environmental Management Plan – Asbestos in Soils Encapsulation Cell – M1 Princes Motorway Chainages 18250 to 18490, Albion Park Rail Bypass* (Ref. 8201904701).
- ENRS (2019d) *Stage 2 – Detailed Site Investigation (DSI) The Island Fill No. 1, Albion Park Bypass (APRB) Project* (Ref. ENRS1153).

Other information reviewed, including previous site audit reports and statements relating to the site:

Site audit report details

Title: Site Audit Report for SAS 1508-1904

Report no. 19040 1508-1904 Date: 25/02/2021

Part II: Auditor's findings

Please complete either Section A1, Section A2 or Section B, not more than one section. (Strike out the irrelevant sections.)

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.

- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.

- Use **Section B** where the audit is to determine:
    - (B1) the nature and extent of contamination, and/or
    - (B2) the appropriateness of an investigation, remediation or management plan[1], and/or
    - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
    - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
    - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

[1] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

Section A1

I certify that, in my opinion:

The **site is suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

- ☐ Residential, including substantial vegetable garden and poultry
- ☐ Residential, including substantial vegetable garden, excluding poultry
- ☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- ☐ Day care centre, preschool, primary school
- ☐ Residential with minimal opportunity for soil access, including units
- ☐ Secondary school
- ☐ Park, recreational open space, playing field
- ☐ Commercial/industrial
- ☐ Other (please specify):

_____

OR

- ☐ I certify that, in my opinion, the **site is not suitable** for any use due to the risk of harm from contamination.

Overall comments:

_____

_____

_____

_____

_____

_____

Section A2

I certify that, in my opinion:

Subject to compliance with the **attached** environmental management plan[2] (EMP), the site is suitable for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ ~~Residential, including substantial vegetable garden and poultry~~

☐ ~~Residential, including substantial vegetable garden, excluding poultry~~

☐ ~~Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~

☐ ~~Day care centre, preschool, primary school~~

☐ ~~Residential with minimal opportunity for soil access, including units~~

☐ ~~Secondary school~~

☐ ~~Park, recreational open space, playing field~~

☑ Commercial/industrial

☐ ~~Other (please specify):~~

EMP details

Title: Environmental Management Plan – Asbestos in Soils Encapsulation Cell – M1 Princes Motorway Chainages 18250 to 18490

Author: Cardno

Date: 17 February 2021 No. of pages: 43

EMP summary

This EMP (attached) is required to be implemented to address residual contamination on the site.

The EMP: (Tick appropriate box and strike out the other option.)

☐ ~~requires operation and/or maintenance of **active** control systems~~[3]

☑ requires maintenance of **passive** control systems only[3].

[2] Refer to Part IV for an explanation of an environmental management plan.
[3] Refer to Part IV for definitions of active and passive control systems.

Purpose of the EMP:

To provide guidance on the ongoing and passive future management of the encapsulated material and assist any future site workers in developing project specific environmental controls.

Description of the nature of the residual contamination:

Approximately 8,725 m^3 of asbestos impacted soil, and 7 m^3 of lead impacted soil has been encapsulated. A geofabric encapsulation is present beneath the road corridor in a portion of the new M1 Princes Motorway as part of the Albion Park Rail Bypass.

Summary of the actions required by the EMP:

Maintenance, inspections and repair of the encapsulation cell which will naturally occur with maintenance of the road.

How the EMP can reasonably be made to be legally enforceable:

The Site Audit and EMP is a requirement of compliance with conditions of approval E57 to E58 of NSW Infrastructure Approval SSI 6878 for the ARPb project. It can therefore be considered to be Legally enforceable.

How there will be appropriate public notification:

As the containment cell is located wholly within the kerb to kerb road alignment of a major arterial roadway, the likelihood of future purchasers or interested parties being associated with the site is considered to be negligible. Public notification of the EMP to any authorities or interested parties should be made aware of the managed residual contamination. Public notification of the EMP to any authorities or interested public member would be made through appropriate notifications on the land title and to be issued under Section 10.7 (2) & (5) of the EP&A Act 1979.

Overall comments:

Section B

Purpose of the plan[4] which is the subject of this audit:

I certify that, in my opinion:

(B1)

☐ The nature and extent of the contamination **has** been appropriately determined

☐ The nature and extent of the contamination **has not** been appropriately determined

AND/OR (B2)

☐ The investigation, remediation or management plan **is** appropriate for the purpose stated above

☐ The investigation, remediation or management plan **is not** appropriate for the purpose stated above

AND/OR (B3)

☐ The site testing plan:

☐ **is** appropriate to determine

☐ **is not** appropriate to determine

if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

AND/OR (B4)

☐ The terms of the approved voluntary management proposal* or management order** (strike out as appropriate):

☐ **have** been complied with

☐ **have not** been complied with.

*voluntary management proposal no.

**management order no.

AND/OR (B5)

☐ The site **can be made suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

[4] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

- ❑ Residential with accessible soil, including garden (minimal home grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- ❑ Day care centre, preschool, primary school
- ❑ Residential with minimal opportunity for soil access, including units
- ❑ Secondary school
- ❑ Park, recreational open space, playing field
- ❑ Commercial/industrial
- ❑ Other (please specify):

IF the site is remediated/managed* in accordance with the following plan (**attached**):

*Strike out as appropriate

Plan title

Plan author

Plan date No. of pages

SUBJECT to compliance with the following condition(s):

Overall comments:

Part III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997*.

Accreditation no. 1508

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997,* and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed: 

Date: 25/02/2021

Part IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remediation plan or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use or uses of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A1 or Section A2 or Section B of Part II, **not** more than one section.

Section A1

In Section A1 the auditor may conclude that the land is *suitable* for a specified use or uses OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further investigation or remediation or management of the site was needed to render the site fit for the specified use(s). **Conditions must not be** imposed on a Section A1 site audit statement. Auditors may include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section A2

In Section A2 the auditor may conclude that the land is *suitable* for a specified use(s) subject to a condition for implementation of an environmental management plan (EMP).

Environmental management plan

Within the context of contaminated sites management, an EMP (sometimes also called a 'site management plan') means a plan which addresses the integration of environmental mitigation and monitoring measures for soil, groundwater and/or hazardous ground gases throughout an existing or proposed land use. An EMP succinctly describes the nature and location of contamination remaining on site and states what the objectives of the plan are, how contaminants will be managed, who will be responsible for the plan's implementation and over what time frame actions specified in the plan will take place.

By certifying that the site is suitable subject to implementation of an EMP, an auditor declares that, at the time of completion of the site audit, there was sufficient information satisfying guidelines made or approved under the *Contaminated Land Management Act 1997*

(CLM Act) to determine that implementation of the EMP was feasible and would enable the specified use(s) of the site and no further investigation or remediation of the site was needed to render the site fit for the specified use(s).

Implementation of an EMP is required to ensure the site remains suitable for the specified use(s). The plan should be legally enforceable: for example, a requirement of a notice under the CLM Act or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of *the Environmental Planning and Assessment Act 1979*.

Active or passive control systems

Auditors must specify whether the EMP requires operation and/or maintenance of active control systems or requires maintenance of passive control systems only. Active management systems usually incorporate mechanical components and/or require monitoring and, because of this, regular maintenance and inspection are necessary. Most active management systems are applied at sites where if the systems are not implemented an unacceptable risk may occur. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components.

Auditor's comments

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section B

In Section B the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or whether the terms of an approved voluntary management proposal or management order made under the CLM Act have been complied with, and/or whether the site can be made suitable for a specified land use or uses if the site is remediated or managed in accordance with the implementation of a specified plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement. The condition must not specify an individual auditor, only that further audits are required.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

Part III

In **Part III** the auditor certifies their standing as an accredited auditor under the CLM Act and makes other relevant declarations.

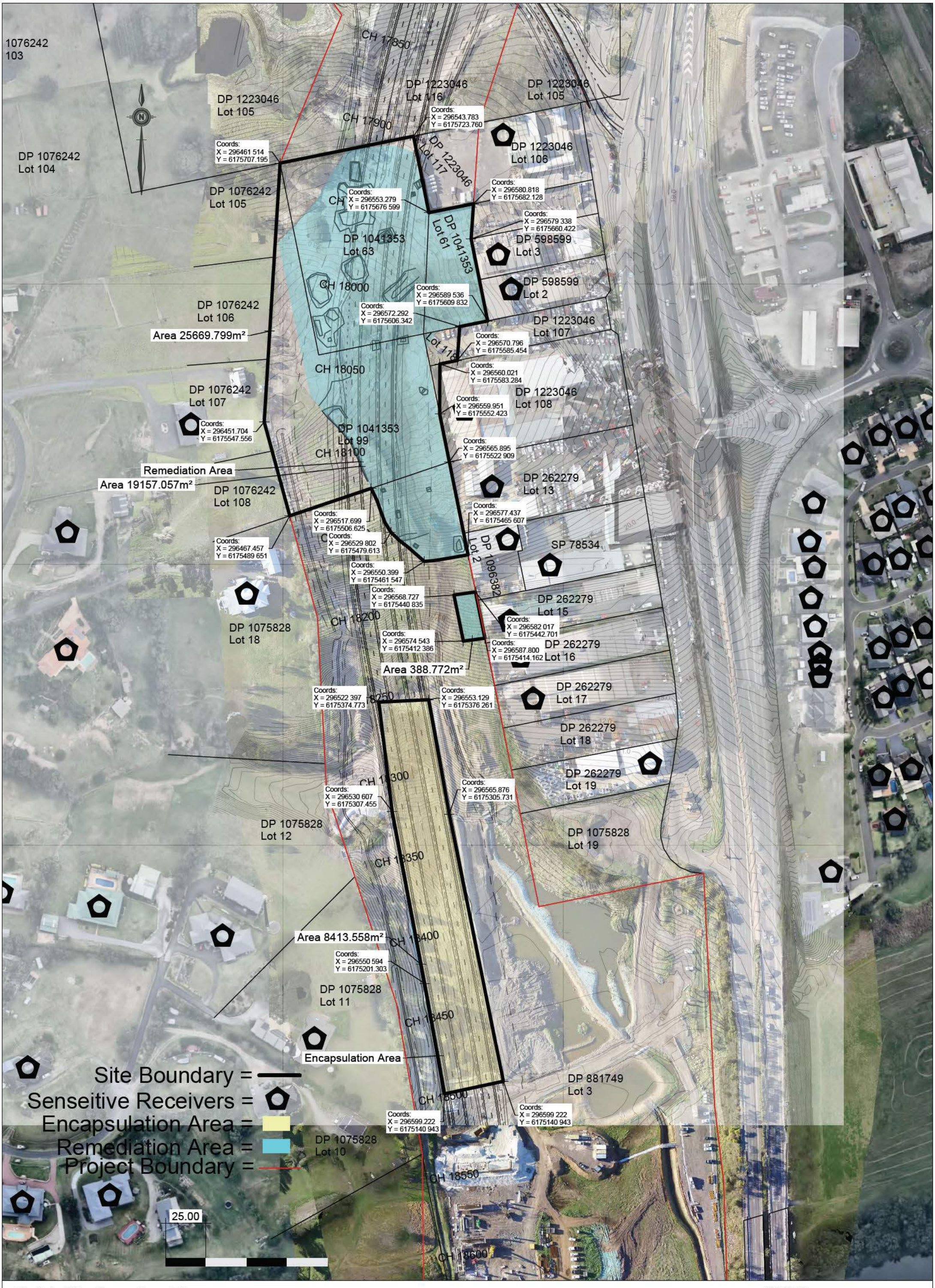
Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to

- the **NSW Environment Protection Authority**: nswauditors@epa.nsw.gov.au or as specified by the EPA

  AND

- the **local council** for the land which is the subject of the audit.



Cut 1 Site Location Plan

12d Model
Scale 1:2000
Fri Dec 18 10:27:43 2020

Environmental Management Plan – Asbestos in Soils Encapsulation Cell – M1 Princes Motorway Chainages 18250 to 18490

Albion Park Rail bypass



Prepared for
Transport for NSW

17 February 2021

Cardno

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[redacted] - CEnvP
Senior Environmental Scientist

[redacted]
Principal Environmental Scientist

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
A	15/09/20	Internal Review	CC	BC
1	21/09/20	Draft for external review	CC	BC
2	10/12/20	2nd Draft for external review	CC/CL	PC (TfNSW)
3	14/01/21	Final	CC	RL (TfNSW), SL
4	11/02/21	Final – Updated	CC	BW (Site Auditor), SL
5	17/02/21	Final – Updated	MB	BW (Site Auditor), SL

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the informa ion provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

Table of Contents

1	Introduction		1
	1.1	Purpose and objectives	1
	1.2	Relevant criteria	1
2	Site information		2
	2.1	Site details	2
	2.2	Environmental information	2
	2.3	Neighbouring land use	3
3	Site history		4
	3.1	ENRS (2019) Remediation Action Plan	4
	3.2	ENRS (2020) Stage 4 – Site Validation Report	4
4	Encapsulation details		6
5	Management and application		7
	5.1	Responsible parties	7
	5.2	EMP review and revision	8
	5.3	EMP enforcement	8
	5.4	Public notification and restrictions	8
	5.5	Communications	9
	5.6	Primary stakeholders	9
	5.7	Offsite migration	9
6	Ongoing management, maintenance and monitoring		10
	6.1	Unplanned breach of encapsulation	10
7	Site controls during ground disturbance		12
	7.1	Monitoring and compliance	14
8	References		15
9	Limitations		16

Appendices

Appendix A Figures

Appendix B Encapsulation Survey

Appendix C ENRS Figure Extracts

Appendix D UFP

Appendix E Inspection Checklist

Tables

Table 2-1	Site Information	2
Table 2-3	Surrounding land use	3

Table 4-1 Nature of contamination and details of encapsulation 6
Table 5-1 Summary of responsibilities 7
Table 5-2 Stakeholder summary 9
Table 6-1 Ongoing encapsulation management 10
Table 7-1 General controls during ground disturbance 12
Table 7-2 Sediment control requirements 12
Table 7-3 Dust control requirements 13
Table 7-4 Waste disposal requirements 13
Table 7-5 Fill importation requirements 14

1 Introduction

Transport for NSW (TfNSW) is undertaking the construction of the Albion Park Rail bypass (APRb) during which asbestos impacted soils were identified and were subsequently emplaced in an encapsulation cell. Cardno (NSW/ACT) Pty Ltd (Cardno) has been engaged by TfNSW to prepare the following Environmental Management Plan (EMP) to provide guidance on the ongoing future management of the encapsulation cell.

The encapsulation cell has been constructed and is located adjacent north of the Macquarie Rivulet at the northern end of the APRb alignment between Chainages 18250 and 18490 which will become part of the M1 Princes Motorway following completion of construction. The site location and surrounding features are shown in **Figures 1** and **2, Appendix A**.

1.1 Purpose and objectives

The purpose of this EMP is to provide guidance on the ongoing and passive future management of the encapsulated material and assist any future site workers in developing project specific environmental controls.

The objectives of this EMP are to:

- Identify the nature and location of contaminated material within the site; and
- Provide a passive methodology to manage ongoing risks, during and post road construction, associated with this contaminated material for current and future site users.

1.2 Relevant criteria

This document has been prepared with reference to the following guidelines and regulations.

- NEPC (1999) National Environment Protection (Assessment of Site Contamination) Measure 1999. National Environmental Protection Council.
- NSW EPA (2020) *Consultants reporting on contaminated land, Contaminated land guidelines*
- NSW EPA (2017) *Contaminated Land Management, Guidelines for the NSW Site Auditor Scheme (3rd Edition)*, NSW Environment Protection Authority, October 2017
- NSW Department of Urban Affairs and Planning (1998) *Managing Land Contamination: Planning Guidelines: SEPP 55 Remediation of Land*, 1998;
- SafeWork (2019) *Code of Practice: How to manage and control asbestos in the workplace*;
- SafeWork (2014) *Managing asbestos in or on soil*; and
- WA DOH, 2009. *Guidelines for Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia,* Western Australia Department of Health (WA DOH).
- Fowler, IR & Cole, D 2010, Safe on-site retention of contaminants. Part 1: Regulatory approaches and issues- a legal perspective, Technical Report no. 16, CRC for Contamination Assessment and Remediation of the Environment Pty Ltd, Adelaide, Australia.
- ANZECC (1999) Guidelines for The Assessment of On-Site Containment of Contaminated Soil Australian And New Zealand Environment and Conservation Council (ANZECC) September 1999
- CRC (2018a) CRC for Contamination Assessment and Remediation of The Environment National Remediation Framework: Guideline on Implementing Institutional Controls, Version 0.1: November 2018
- CRC (2018b) CRC for Contamination Assessment and Remediation of the Environment National Remediation Framework Technology guide: Containment, Version 0.1: August 2018

2 Site information

2.1 Site details

Details related to the Site are included in **Table 2-1**, below whilst **Figure 1 and 2, Appendix A** shows the site locality in the context of the local area.

Table 2-1 Site Information

Details	Comments		
Site address	M1 Princes Motorway, Yallah NSW		
Project identifications	Chainages 18250 and 18490 Fill No. 4 50-100 m north of Macquarie Rivulet under both carriageways		
Lot and Deposited Plan	Part Lot 3 DP 881749		
Current Land use	Motorway construction site		
Proposed Land use	Multilane dual carriageway motorway		
Local Government Authority (LGA)	Wollongong City Council		
Current Zoning - Wollongong Local Environment Plan (2009)	SP2 – Infrastructure		
Site Area	Approximately 6,900 m^2 encapsulation cell footprint		
Site Coordinates (GDA2020 MGA 56)	Vertex	X – Coordinate	Y – Coordinate
	North-east	296550.128	6175369.841
	South-east	296858.352	6175149.525
	South-west	296562.390	6175141.614
	North-west 1	296527.899	6175335.928
	North-west 2	296527.648	6175370.401
Current Site Owner	Transport for NSW		

2.2 Environmental information

Site information available from public datasets is summarised in **Table 2-2**.

Table 2-2 Site description

Item	Information
Site slope and drainage features	The Site slopes towards the south and east with Macquarie Rivulet as the proximal receiving body. Road construction makes understanding underlying slope difficult though based on survey data provided for this report and included in **Appendix B** the site falls from approximately 12 to 13 m Australian Height Datum (AHD) in the north to between 8 and 9 mAHD in the south. A dam was historically located on the site and was partially infilled as part of the road construction with portions remaining as sediment and treatment pods visible in June 2020 aerial imagery (Nearmap, 2020). Surface run-off from the site passes through these ponds before eventually draining into Macquarie Rivulet. During construction material overlying the encapsulation cell is unsealed with surface water and precipitation able to penetrate this material at a rate reflective of the material permeability. As road surface is placed this avenue for water infiltration will be removed with precipitation directed to surface drainage features.
Nearby water bodies (NSW DFSI, Spatial Services)	The Site is approximately 170 m from Macquarie Rivulet to the south.

Item	Information
Groundwater	Based on the supplied survey and cross-section (**Appendix B**) groundwater has been modelled for the site at a level of 1.9 m AHD
Soil landscapes (NSW OEH, 2013)	Based on a review of soil landscape mapping for the site indicates that northern areas of the site are underlain by the Albion Park landscape while southern areas within the floodplain are underlain by the Fairy Meadow landscape. The landscapes have the following descriptions: **Albion Park –** Characterized by short steep upper slopes with long gentle footslopes on the Berry Formation. Relief is generally between 60 and 100 m with footslope gradients of 5 to 15% and upper slopes gradients of 15 to 50%. Vegetation is mostly cleared with stands of tall open-forest. Soils are moderately deep (50–100 cm) Brown Podzolic Soils occur on crests, Yellow Podzolic Soils on midslopes and Soloths on footslopes and drainage lines. Soil limitations within the landscape include waterlogging, seasonally high watertable, shrink-swell, hardsetting (topsoil), sodicity, low wet bearing strength (subsoil), high available water-holding and capacity (topsoil and subsoil). **Fairy Meadow –** Characterized by alluvial plains, floodplains, valley flats and terraces below the Illawarra Escarpment. Relief is generally <10 m with slopes <5% gradient. Vegetation is almost completely cleared low open-forest and woodland. Soils are moderately deep (50–100 cm) Alluvial Loams and Siliceous Sands on terraces with Prairie Soils and Yellow Podzolic Soils occurring on the drainage plains. Soil limitations within the landscape include flood hazard, low wet bearing strength, highly permeable topsoils and high watertables.

2.3 Neighbouring land use

Surrounding land uses are summarised in **Table 2-3** below.

Table 2-3 Surrounding land use

Direction	Land use or activity
North	APRb construction and future road corridor
West	Rural residential land use
East	Light industrial and road construction land use
South	Macquarie Rivulet bridge and floodplain

3 Site history

Cardno has been supplied with the following documents with relation to the site contamination issues:

- ENRS (2019) *Remediation Action Plan – Asbestos in Soil, Albion Park Bypass Project*
- ENRS (2020) *Stage 4 – Site Validation Report, PAEC 02 – Cut No.1, Albion Park Rail Bypass Project*

These reports are summarised in **Section 3.1** and **3.2** below.

3.1 ENRS (2019) Remediation Action Plan

This report was written for the stated purpose of documenting the preferred remediation methodologies and protocols for managing asbestos in soil to facilitate construction of the bypass project. Two areas of asbestos impacted soils (shown in **Figure 3, Appendix A** and figure extracts in **Appendix C**) are identified by the Remediation Action Plan (RAP):

- **Cut 1** – detailed in **Section 3.2** below; and
- **Fill 1 – The Island** – a portion of road reserve containing bonded asbestos impacted soils located at the northern end of the APRb project

The identified preferred methodology was onsite encapsulation with the following information extracted from the RAP with regards to the encapsulation cell location and construction:

The level of the existing ground in the Fill No.4 area proposed for the encapsulation is predominantly at a level in excess of 2.0 m above the groundwater table. In areas where this is not the case Fulton Hogan will place and compact general fill materials to provide a level surface greater than 2.0 m above the groundwater level which the ACM encapsulation cell will then be constructed upon. This level will be verified by survey prior to commencement of any ACM encapsulation works.

The containment cell will be protected by rapping (sic) in geo-fabric so that all material is enclosed with the cell. High visibility webbing will also be placed as a warning layer outside the cell to highlight for any works in the future that the containment cell exists. In addition to the geo-fabric the cell will be protected from flood waters by the placement and compaction of general fill materials a minimum of 3.0 m from the edge of the embankment. This material will be good quality general fill compacted to 98 % compaction and will be competent to resist infiltration of any flood waters and stable so as not to be susceptible to any form of erosion. In addition to this, the batter will be topsoiled with a minimum of 150 mm of topsoil and planted out with red gum forest to ensure that this material cannot be eroded to leave any risk of exposure of the containment cell in the future.

Remaining items within the RAP pertain to remedial methodologies and do not relate to the construction or contents of the encapsulation cell. It is noted that the red gum forest seed mix that will be applied via hydromulching, rather than planting of seedlings, over the batters surrounding the encapsulation cell does not contain of any deep-rooted plants. This seed mix consists of a cover crop, native grass seed mix and native shrub mix only.

3.2 ENRS (2020) Stage 4 – Site Validation Report

This report was written to outline the validation of Cut 1, located adjacent north of the Site, following removal of asbestos impacted soil from this location for emplacement within the encapsulation cell. The following key pieces of information are noted from the report:

- Material from within Cut 1 was assessed by ENRS as part of a *Detailed Site Investigation* (DSI) prepared by ENRS in 2019 to inform management options for the material and inform preparation of a Remedial Action Plan (RAP). The DSI included a review of previous investigations for the area and a test pitting and sampling program of 48 test pits which identified:
  - With the exception of asbestos, no contaminants of potential concern were identified above the adopted commercial / industrial health screening levels (HIL D) from the ASC NEPM (NEPC, 1999);
  - Asbestos containing materials was identified in fill materials down to maximum depth of 0.85 m. Two samples were analysed and confirmed for asbestos presence by a NATA-accredited laboratory while remaining samples were visually assessed onsite. Observed fragments were all greater than 7 mm in size and did not crumble under hand pressure. Based on this asbestos impact was considered non-friable.

- Elevated lead in soil concentrations were identified in an area identified as a former car lot and wrecking yard. The results were below the adopted HIL D screening criteria with a maximum result of 633 mg/kg. Use of the toxicity characteristic leaching procedure (TCLP), as required in the NSW EPA (2014) Waste Classification Guidelines, to determine lead leachability and mobility identified results below the TCLP1 criteria (5mg/L). Based on these results it was determined that this material was suitable for encapsulation onsite.
- The following recommendations have been extracted from the DSI:
  - *Remove and dispose of Stockpile No.3 as Demolition Waste containing Asbestos, to a suitably licenced waste facility. Remove and dispose of all other non-soil stockpiles (such as car tyres) to a suitably licensed facility supported by visual clearance certificates to ensure no asbestos containing materials are present prior to disposal; and*
  - *Excavate all other areas of Fill and asbestos in soil and re-instate on site within a designated asbestos containment cell. Encapsulation should be conducted in general accordance with RMS (2018) Asbestos Management Procedure; Section 4.2. The base of the Cell is required to be above the groundwater table and suitably engineered to provide a stable structure with a cover of non-contaminated materials greater than 1 m in thickness.*

> The following is extracted from Section 10 of the ENRS *Site Validation Report* and summarises the construction and encapsulation of the asbestos impacted soil (ASBINS), this is consistent with the requirements noted in the RAP quoted above.

The ASBINS material from the Site was excavated and re-instated in an engineered capping cell in accordance with the RAP (ENRS;2019). The ASBINS containment cell was constructed within the Fill 4 road embankment, extending from Chainage 18250 to the SB06 Bridge Treatment at Chainage 18500. Initial cell construction provided an area of approximately 10,000 m_2, with ASBINS estimated to be placed to a final thickness of 1m. The cell was constructed at an elevation greater than 2.0 m above the groundwater table and further protected by wrapping all re-instated ASBINS in geo-fabric, thus enclosing all materials within the cell. The cell was protected from flood waters by the placement and compaction of a capping layer comprising general fill materials to a minimum of 3.0 m from the edge of the embankment. ENRS understand the capping material was characterised as 'good quality' general fill compacted to 98 % compaction and was competent to resist infiltration of any flood waters and stable so as not to be susceptible to any form of erosion. Further details on cell design and construction can be found in the project RAP (ENRS, 2019). ENRS understand that all suitable material excavated from the Site was placed into the cell as outlined in the RAP (ENRS; 2019). The ASBINS encapsulation cell was surveyed by Fulton Hogan to establish final quantities.

> The report conclusions stated the following with regards to the encapsulation cell:

It is recommended the ASBINS containment Cell be appended to the RMS asbestos register and managed in accordance with RMS requirements, including regular inspections for cell integrity, a no dig policy without asbestos controls, and the area should remain void of any deep-rooted plants which may penetrate the capping layer. Where necessary an Environmental Management Plan (EMP) may be issued for the Site to document the protocols for ongoing site management.

4 Encapsulation details

The nature of contamination and details of the encapsulation are summarised in **Table 4-1**.

Table 4-1 Nature of contamination and details of encapsulation

Nature of contamination	Approximately 8,725 m^3 of asbestos impacted soil sourced from Cut 1 and Fill 1 located north of the encapsulation area (see **Figure 3, Appendix A**). In addition to the asbestos impacted soil, approximately 7m^3 of lead impacted soil sourced from SP02 within Cut 1 is shown on **Figure 3** of **Appendix C.** There was no information identified during site investigations to suggest that other significant contaminants of concern are present on Site.		
Overview of contamination management	Asbestos impacted soils have been placed within a geofabric encapsulation beneath the road corridor between Chainages 18250 and 18500 of the new M1 Princes Motorway as part of the APRb. The encapsulation is bound by the coordinates listed below in lateral and vertical extent section.		
Landscaping	The encapsulation cell is located beneath a dual carriageway motorway.		
Capping material	The encapsulation is overlain by between approximately 2.1 m and 6.25 m of geotechnical suitable un-impacted, road construction material followed by the road pavement materials and asphaltic concrete wearing surface. Cap thickness at various chainages is indicated on the as-built cross-sections in **Appendix B.**		
Marker layer	High visibility webbing was placed as a marker layer above the geofabric encapsulated asbestos impacted material.		
Lateral and vertical extent	The lateral and vertical extent of the encapsulation area (including depth of encapsulation and location coordinates) is shown in the as-built survey drawings in **Appendix B** with the vertex coordinates listed below.		
	Vertex	**X – Coordinate**	**Y – Coordinate**
	North-east	296550.128	6175369.841
	South-east	296858.352	6175149.525
	South-west	296562.390	6175141.614
	North-west 1	296527.899	6175335.928
	North-west 2	296527.648	6175370.401
Built infrastructure	APRb as well as related stormwater infrastructure will be emplaced over the encapsulation cell, including within the overlying road construction material. Larger diameter stormwater infrastructure is also present under the northern end of the encapsulation cell. Infrastructure is noted in as-built surveys in **Appendix B.**		

5 Management and application

This EMP has been prepared to provide guidance on a passive methodology for the management of the identified encapsulation. Despite being passive the following items must be undertaken to ensure this EMP remains relevant and effective in the management of contamination issues associated with the site encapsulation cell:

- This EMP will remain relevant as long as encapsulation conditions do not change, the plan should be reviewed or updated based on changes to site conditions or relevant legislative requirements.
- While the EMP is active it must be referred to for any proposed construction or maintenance activities to take place on the Site.
- As this is an EMP for ongoing management of the encapsulation cell it should be stored in such a way as to be readily identifiable and accessible for current and future site users. This may include storage in TfNSW contaminated land management data bases or their property information systems as well as notification with the relevant regulatory bodies.

5.1 Responsible parties

Whilst the encapsulation cell remains onsite, this EMP applies to all construction and maintenance activities throughout the operational life of the APRb as well as any future land uses.

Table 5-1 Summary of responsibilities

Role	Entity	Responsibilities
Site owner	TfNSW	▪ Ensuring this EMP is included in the TfNSW contaminated land management database and/or the property information management system (PIMS). ▪ Notification of relevant public authorities including Wollongong City Council. ▪ The assignment of individual responsibilities for implementing, maintaining, monitoring, and reporting each environmental requirement as discussed in this EMP. ▪ Ensuring that all works are conducted in compliance with the EMP and regulatory requirements. ▪ Ensuring appropriate monitoring, corrective actions and reporting of the environmental requirements. ▪ Ensuring that all maintenance workers, contractors, subcontractors, employees and visitors conduct their work in accordance with the requirements of the EMP and the relevant Work Health and Safety (WH&S) requirements. ▪ Ensuring provision of updated information to the Environment Protection Authority (EPA), when significant changes to the contamination status of the site are detected. Information requirements to the EPA are to be conducted in accordance with the Section 60 reporting requirements of the Contaminated Land Management (CLM) Act 1997. ▪ Ensuring that all necessary reporting, as outlined within this EMP is conducted to an appropriate quality and standard. This may include preparation of the reports as necessary and archiving of the documentation.

Role	Entity	Responsibilities
Person/s conducting work[1]	Various including contractors and subcontractors to TfNSW	▪ Ensuring that the information within this EMP is incorporated into their environmental and WHS systems of work. ▪ Ensuring that procedures exist within their systems of work to inform all employees, contractors or subcontractors of this and the associated requirements. ▪ Ensuring that all persons physically conducting work on-site understand and comply with the requirements of this EMP and their associated systems of work, including training and inductions as required. ▪ Ensuring that their environmental and WH&S systems of work include a 'stop work' procedure, such that if conditions are encountered which differ significantly from those described in this EMP or the referenced relevant documents, all persons physically conducting the works can appropriately stop work in a controlled manner. ▪ Preparation of documents and reporting as required by the Site Owner to an appropriate quality and standard.
Site workers	All	▪ Complying with the requirements of this EMP, as detailed in the systems of work under which they are operating. ▪ To actively engage in inductions, JSAs, tool box meetings and the like as specified in the systems of work under which they operate. ▪ To seek clarification from their supervisor if they are unsure of the requirements or their environmental / WH&S responsibilities. ▪ To stop work and notify their supervisor if they know or suspect that works are being conducted in a manner which may result in environmental or WH&S incidents or accidents.

5.2 EMP review and revision

This EMP will be reviewed by the Site Owner to assess its effectiveness including audit and review of the application of control measures. Reviews should be conducted as required by TfNSW management systems with a minimum interval of 5 years between reviews. Where necessary, such as due to changes in site conditions or regulatory requirements, this EMP will be revised and updated by the Site Owner.

5.3 EMP enforcement

For future and ongoing management of the site the EMP should be recorded within TfNSW contaminated lands management systems and PIMS. The EMP should be immediately and readily identified as a necessary control measure should any work need to be undertaken in or around the encapsulation over the lifetime of the encapsulation cell.

All contractors working at the site will be inducted into this EMP for incorporation into their SWMSs.

If the site is to be redeveloped, subdivided and/or divested by the NSW Government, site contamination will be subject to planning process and SEPP55 planning requirements. The current Site Owner (TfNSW) must undertake necessary due diligence to ensure appropriate management of the site contamination for planning and property transactions purposes.

This EMP is a requirement of compliance with conditions of approval E57 to E58 of NSW Infrastructure Approval SSI 6878 for the ARPb project. It can therefore be considered to be legally enforceable.

5.4 Public notification and restrictions

As the containment cell is located wholly within the kerb to kerb road alignment of a major arterial roadway, the likelihood of future purchasers or interested parties being associated with the site is considered to be negligible. However future purchasers and/or interested parties should be made aware of the managed residual contamination. Public notification of the EMP to any authorities or interested public members would be made through appropriate notations on the land title and to be issued under Section 10.7 (2) & (5) of the EP&A Act 1979.

[1] Equivalent to Person Conducting a Business or Undertaking (PCBU) as defined by SafeWork NSW

5.5 Communications

Communication for maintenance activities will be managed by TfNSW Regional Maintenance Division under its existing Environmental Management System. This EMS documents the protocol for management of communication for maintenance planning, maintenance work crews and contractors. Communication for affected stakeholders will be managed by PIMS.

5.5.1 Emergency contact

Emergency contact is the Transport Management Centre on 131 700.

5.6 Primary stakeholders

Primary stakeholders in the implementation of this EMP include:

Table 5-2 Stakeholder summary

Role	Identity
Asset owner and manager	TfNSW Regional Maintenance Division
Pollution and incident authority	NSW Environmental Protection Authority
Local government authority	Wollongong City Council

This EMP will be included in the TfNSW contaminated land database and property information management system (PIMS). PIMS will manage the affected stakeholder notification procedure of the residual contaminated material within the cell.

5.7 Offsite migration

The following steps were implemented to ensure that offsite migration does not occur from the containment cell:

- The containment cell was not excavated to a depth where groundwater was intersected. As outlined in the validation report the construction of the containment cell did not require excavation into residual subsurface and therefore the potential for the contained material within the containment cell to interact with any underlying groundwater is low.
- The containment cell was not located where surface runoff/erosion will expose contaminated material or allow offsite migration.
  - Groundwater is identified as part of the containment cell design as having a depth of 1.9m AHD, the containment cell is a variable height above this, between approximately 2 m and 6 m.
- Permanent bound pavement materials and asphaltic concrete wearing surfaces (bitumen hardstand) will be installed above the containment cell. Survey information provided indicates that the geofabric layer above the contained asbestos contaminated soil within the containment cell will be between 2.1 m and 6.25 m below the proposed finished level of the new M1 Princes Motorway. Permanent bound pavement materials and asphaltic concrete wearing surfaces reduces the potential for the leaching of any contaminants from the contained soils within the containment cell. The containment cell does not present an unacceptable risk to either the onsite or offsite surrounding environments.

6 Ongoing management, maintenance and monitoring

Based on the location of the encapsulation cell beneath an active road corridor with substantial overburden material it is unlikely that any ongoing maintenance activities will be required to maintain the geofabric encapsulation of the asbestos impacted soils. Further to this, as the contamination is inert, non-mobile and placed above the measured water table at the site, provided the encapsulation is not breached in any way no ongoing monitoring is required.

Management of the site is necessary to ensure that the encapsulation remains intact and is not compromised, this can be achieved by regular road maintenance activities. Management objectives and strategies are summarised in **Table 6-1** below.

Table 6-1 Ongoing encapsulation management

Objective	The encapsulation is maintained so that it continues to provide adequate containment of asbestos impacted soils for site users and the environment.
Performance requirements	No breach of marker layer or geofabric layer, no ground depression, no ponding of water, no slope failure, no eroded rill and no marker layer exposed. No excavation or change of landform to occur without the approval of the Site Owner.
Management Strategy	Inspection by a suitably qualified person[2] during and after activities requiring ground disturbance greater than 1 m BGL above the extents of the encapsulation, including road maintenance activities. Inspect the surface level of the encapsulation area as part of weekly road maintenance inspections to identify the presence of unacceptable ground depression (e.g. >300mm drop exceeding an area of $4m^2$ as a guide), pavement damage (e.g. pavement pothole greater than $1m^2$) or slope failure which requires corrective action. Weekly inspections will capture and record all defects electronically. The inspection template provided in **Appendix E** would be used for a more detailed scheduled inspection which would be triggered if a noticeable defect occurred around the encapsulation cell area from the weekly inspections. Note should be made of these changes in a single event or in the cumulative as future land use as a high speed motorway make it unlikely that any of the above thresholds would be reached before preventative measures will be undertaken for road safety purposes. No planting of large or deep-rooted (>1.5 m below ground level) trees along the area of the encapsulation cell. Maintenance of road corridor to remove potential deep rooted trees that appear as a result of natural processes. Undertake and complete corrective actions within four (4) weeks of identification of the need to restore the encapsulation of overlying materials. If the underlying asbestos impacted material is exposed, appropriate reinstatement work to be undertaken to the required standard immediately and as practicable with reference to SafeWork NSW or equivalent guidelines on working with asbestos. Any excavation will be undertaken in accordance with **Table 7-1**. In the event of an unexpected discovery of potentially contaminated material not noted or managed by this EMP, refer to the Unexpected Finds Protocol (UFP) attached in **Appendix D**.
Record Keeping and Reporting	Maintain a logbook and record cap inspection notes, survey records, corrective actions undertaken and excavation details.
Responsibility	Site Owner

6.1 Unplanned breach of encapsulation

In the event that the encapsulation is breached in an unplanned fashion then works should stop immediately. The site is to be secured, including emplacement of a temporary cover and exclusion zone around the breach to prevent short term dispersal of contaminated material.

[2] A TfNSW environmental representative who is trained in environmental management, and is familiar with requirements of this EMP.

Once the site is secured the site controls during ground disturbance can be implemented as appropriate.

7 Site controls during ground disturbance

General controls during ground disturbance activities are outlined in **Table 7-1**.

Table 7-1 General controls during ground disturbance

Objective	Essential ground disturbance activities are appropriately managed such that the encapsulation of asbestos impacted material is not breached.
Performance requirements	No intrusive ground disturbance (such as excavation) is to be undertaken without firstly referring to this EMP and obtaining a consent to proceed from the Site Owner. No health and safety incidents are reported as a result of intrusive ground disturbance activities.
Management Strategy	All intrusive ground disturbance works are to be assessed and approved by the Site Owner prior to proceeding using an excavation permit system. Approvals are to be recorded in a logbook. A task specific SWMS is to be developed for each intrusive ground disturbance activity. Dial Before You Dig information and other site-specific information (such as as-built surveys included in **Appendix B**) from the Site Owner should be assessed and incorporated into the SWMS. Any ground disturbance in the vicinity of the encapsulation cell must only impact soils above or below the encapsulation cell. Works should seek to avoid the cell by at least 1 m in all directions however if the marker layer is encountered all works are to stop and be reassessed. All disturbance works are conducted in accordance with SafeWork NSW guidelines on the safe management of asbestos including: ▪ SafeWork (2019) *Code of Practice: How to manage and control asbestos in the workplace*; and ▪ SafeWork (2014) *Managing asbestos in or on soil*. If the cell is disturbed then it must be reinstated such that the encapsulation is restored with geofabric, marker layers and sufficient overlying material. All disturbance activities must be undertaken in accordance to sediment control requirements described in **Table 7-2**. All disturbance activities must be undertaken in accordance to dust management requirements described in **Table 7-3**. All disturbance activities must be undertaken in accordance to waste disposal requirements described in **Table 7-4.** Fill importation activities must be undertaken in accordance to requirements described in **Table 7-5**.
Record Keeping and Reporting	Maintain records of SWMS and records of approval.
Responsibility	Site Owner to provide consent and ensure compliance. Person/s conducting work and Site workers to comply with all identified controls and record any control failures.

Sediment control requirements are outlined in **Table 7-2**.

Table 7-2 Sediment control requirements

Objective	Essential ground disturbance activities are appropriately managed such that excavated asbestos impacted soil is contained.
Performance requirements	Asbestos impacted soil is not spread via sediment runoff.
Management Strategy	A task specific Erosion and Sediment Control Plan must be prepared and implemented in accordance with industry's standard practice. Examples of control measures to be included in the Erosion and Sediment Control Plan include but not limited to: Sediment fences or other appropriate sediment control devices to be constructed and maintained down-gradient of the disturbance area and stockpiles. Stockpiles to be placed on heavy duty plastic sheets.

	Stockpiles will be kept wet and covered. Vehicle loads will be covered with tarpaulins and wheels will be washed/brushed to remove site soil prior to leaving site. Following completion of ground disturbance, the ground should be restored similar to original state as soon as practicable, including re- establishment of any disturbed encapsulation or marker layers.
Record Keeping and Reporting	Maintain a copy of Erosion and Sediment Control Plans.
Responsibility	Site Owner, Person/s conducting work.

Dust control requirements are outlined in **Table 7-3**.

Table 7-3 Dust control requirements

Objective	Essential ground disturbance activities are appropriately managed such that environmental and health risks associated with dust generation are managed to acceptable levels.
Performance requirements	Boundaries of work site are free of visible dust. No dust is released during excavation or disturbance of the asbestos impacted soils. No environmental incident (such as dust complaint) is reported as a result of the ground disturbance activities. No asbestos fibres are identified in asbestos air monitoring to be conducted as part of disturbance.
Management Strategy	Undertake asbestos air monitoring as per *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres—2nd Edition* [NOHSC: 3003 (2005)] Dust suppression techniques must be implemented during ground disturbance activities such as excavation. Avoid ground disturbance activities during windy conditions and cease such work if visible dust occurs at site boundaries until such time as conditions improve. Reduce/minimise movement of vehicles, where practicable. Vehicle loads will be covered with tarpaulins and wheels will be washed/brushed to remove site soil prior to leaving site. Reduce/minimise excavation and movement of soils, where practicable. All asbestos impacted material (if exposed/disturbed during excavation), exposed ground and stockpiles will be kept wet and covered (if not in use). Following completion of ground disturbance, the ground should be restored similar to original state as soon as practicable, including re- establishment of any disturbed encapsulation or marker layers.
Record Keeping and Reporting	Maintain a site diary comprising dust observations, wind speed, wind direction and dust suppression/control records.
Responsibility	Site Owner, Person/s conducting works

Waste disposal requirements are outlined in **Table 7-4**.

Table 7-4 Waste disposal requirements

Objective	Essential ground disturbance activities are appropriately managed such that waste disposal activities comply with statutory/regulatory requirements.
Performance Requirements	Compliance with statutory/regulatory requirements. No excavated spoil is spread and no environmental incident (such as illegal dumping complaint) is reported as a result of the ground disturbance activities.
Management Strategy	If essential excavation is required, the work must be consulted with a suitably qualified environmental consultant and the excavated material must be classified in accordance with NSW EPA (2014) *Waste Classification Guidelines Part 1: Classifying Waste*. The classified waste soil must be disposed of to an appropriate waste facility licensed to accept the waste.
Record Keeping and Reporting	Maintain excavation details, material tracking details, waste classification documentations and disposal records/dockets.
Responsibility	Site Owner, Person/s conducting works

Fill importation requirements are outlined in **Table 7-5**.

Table 7-5 Fill importation requirements

Objective	Fill material imported to make up for material removed during any works is appropriately managed and does not pose an unacceptable risk to the environment and human health.
Performance Requirements	Compliance with statutory/regulatory requirements. No non -approved material is imported.
Management Strategy	Imported fill material (including topsoil) must be virgin excavated natural material (VENM) and/or exempt material(s) approved under the resource recovery exemptions (RRE) made under the Waste Regulation (2014). Commercial topsoil products, if specified by arborist/horticulturalist, may be considered on merit, subject to an assessment of the product. Imported fill material must be assessed and validated by a suitably qualified environmental consultant. The following procedures for validation of imported soils will be undertaken: Assessment and approval of proposed source sites prior to importation; and Checking of fill material as it enters the site to confirm if it is consistent with the approved fill material. As part of the assessment at source, sampling may be required depending on the type, observation, condition and/or history of the proposed source material. Commercial topsoil products which have not been purchased from a supplier who is able to provide a certificate to demonstrate the product is clean, must be tested for potential contamination (e.g. waste classification). Alternatively, certifications from the supplier confirming/validating the materials to be VENM or exempted under the RRE will be reviewed by the environmental consultant.
Record Keeping and Reporting	Maintain assessment/validation records, material tracking records and associated importation dockets.
Responsibility	Site Owner, Person/s conducting works

7.1 Monitoring and compliance

Person/s conducting works on-site should keep records of soil excavated, reused or disposed, as well as waste classification certificates and waste disposal dockets, significant environmental incidents, and any environmental data collected as part of their work. This information should be conveyed to the site owner/manager for their records and for action, as well as for reviewing the effectiveness of the EMP.

Compliance with this EMP during ground disturbance activities is managed using an excavation permit system. Satisfactory completions are to be signed-off by the Site Owner.

8 References

Nearmap. (2020). *Aerial Imagery Data*. Retrieved from Nearmap: maps.au.nearmap.com

NEPC. (1999). *National Environment Protection (Assessment of Site Contamination) Measure (NEPM).* National Environment Protection Council (NEPC).

NSW Dept of Urban Affairs and Planning. (1998). *Managing Land Contamination: Planning Guidelines: SEPP 55 Remediation of Land.* NSW Dept of Urban Affairs and Planning.

NSW DFSI, Spatial Services. (n.d.). *NSW Topographic Maps.* NSW Department of Finance, Services and Innovation, Spatial Services.

NSW EPA. (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.* NSW Environment Protection Authority.

NSW EPA. (2017). *Guidelines for the NSW Site Auditor Scheme (3rd Edition).* NSW Environment Protection Authority.

NSW EPA. (2020). *Consultants reporting on contaminated land; Contaminated land guidelines.* NSW Environment Protection Authority.

NSW OEH. (2013). *Soil Landscapes of Central and Eastern NSW, version 2*. Retrieved from eSpade v2.0: https://www.environment.nsw.gov.au/eSpade2WebApp

Safework NSW. (2019). *Code of Practice: How to manage and control asbestos in the workplace.* SafeWork NSW.

WA DOH. (2009). *Guidelines for Assessment, Remediation and Management of Asbestos - Contaminated Sites in Western Australia.* Western Australia Department of Health.

WorkCover NSW. (2014). *Managing asbestos in or on soil.* WorkCover NSW.

9 Limitations

This management plan has been prepared in general accordance with the current “industry standards” for an Environmental Management Plan for the purpose and objectives and scope identified in this report. These standards are set out in:

- National Environment Protection [Assessment of Site Contamination] Measure (NEPM), December 1999, National Environment Protection Council (NEPC).
- National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999 (NEPC, 1999) as varied May 2013 (the ‘NEPM 2013’).
- Consultants reporting on contaminated land, Contaminated land guidelines, NSW EPA (2020)

The agreed scope of this assessment has been limited for the current purposes of the Client. The assessment may not identify contamination occurring in all areas of the Site, or occurring after sampling was conducted. Subsurface conditions may vary considerably away from the sample locations where information has been obtained.

This Document has been provided by Cardno subject to the following limitations:

- This Document has been prepared for the particular purpose outlined in Cardno’s proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.
- The scope and the period of Cardno’s services are as described in Cardno’s proposal, and are subject to restrictions and limitations. Cardno did not perform a complete assessment of all possible conditions or circumstances that may exist at the Site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Cardno in regards to it.
- It is recognised that the passage of time affects the information and assessment provided in this Document. Cardno’s opinions are based upon information that existed at the time of the production of the Document. It is understood that the services provided allowed Cardno to form no more than an opinion of the actual conditions of the Site at the time this Document was prepared and cannot be used to assess the effect of any subsequent changes in the quality of the Site, or its surroundings, or any laws or regulations.
- Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
- Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Cardno for incomplete or inaccurate data supplied by others.
- Cardno may have retained sub consultants affiliated with Cardno to provide services for the benefit of Cardno. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any direct legal recourse to, and waives any claim, demand, or cause of action against, Cardno’s affiliated companies, and their employees, officers and directors.

This assessment report is not any of the following:

- A Preliminary Site Investigation, Detailed Site investigation, Remediation Action Plan or Validation Report.
- A Site Audit Report or Site Audit Statement (SAR/SAS) as defined under the Contaminated Land Management Act, 1997 or an assessment sufficient for an Environmental Auditor to be able to conclude a SAR/SAS.
- A geotechnical report and the bore logs/test pit logs may not be sufficient for geotechnical advice.
- A detailed hydrogeological assessment in conformance with NSW DEC (2007) Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination.

- An assessment of groundwater contaminants potentially arising from other sites or sources nearby.
- A total assessment of the Site to determine suitability of the entire parcel of land at the Site for one or more beneficial uses of land.

APPENDIX

A

FIGURES

Location Plan

ENVIRONMENTAL MANAGEMENT PLAN - ASBESTOS CELL

Legend

- Project Footprint
- Railway Station (NSW SS)
- Distance Buffer
- Major Road (NSW SS)
- Local Road (NSW SS)
- Railway (NSW SS)
- Major Watercourses (LPI)
- ACM Impacted Soil Containment Cell

Land Use (ABS, 2016)

- Other
- Commercial
- Education
- Hospital/Medical
- Industrial
- Parkland
- Primary Production
- Residential
- Water

FIGURE 1

1:30,000 Scale at A3

km
0 0.25 0.5 0.75 1

N

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (NW&E)
Date: 2020-09-15 | Project: 82019047
Coordinate System: GDA 1994 MGA Zone 56
Map: 82019047-GS-015-ACMContCell_Locality.mxd 01
Basemap suplied by ESRI and other third party suppliers

HUNTLEY
CLEVELAND
AVONDALE
DAPTO
KOONAWARRA
YALLAH
HAYWARDS BAY
MARSHALL MOUNT
CALDERWOOD
NORTH MACQUARIE
TULLIMBAR
ALBION PARK
ALBION PARK RAIL
OAK FLATS
BLACKBUTT
CROOM
PRINCES MOTORWAY
PRINCES HIGHWAY
ILLAWARRA HIGHWAY
TONGARRA ROAD
TERRY STREET
NEW LAKE ENTRANCE ROAD
ULLET CREEK
BROOKS CREEK
BARRONS GULLY
YALLAH GULLY
DUCK CREEK
WOLLONGURRY CREEK
MARSHALL MOUNT CREEK
ALBION CREEK
FRAZERS CREEK
OAKY GULLY
MACQUARIE RIVULET
HALELTON CREEK
YELLOW ROCK CREEK
HORSLEY WLET
5km
4km
3km
2km
1km

Site Plan

ENVIRONMENTAL MANAGEMENT PLAN - ASBESTOS CELL

Legend

- Project Footprint
- Watercourse (NSW SS)
- 1m Contours (LPI LiDAR, 2011)
- ACM Impacted Soil Containment Cell
- Lead Impacted Soil
- Cadastre (NSW SS, 2019)

PRINCES HIGHWAY

LARKINS LANE

FIGURE 2

1:1,500 Scale at A3

m
0 20 40 60 80

N

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (NW&E)
Date: 2020-09-15 | Project: 82019047
Coordinate System: GDA 1994 MGA Zone 56
Map: 82019047-GS-013-ACMContCell_SitePlan.mxd 01
Aerial imagery supplied by nearmap (June, 2020)

ACM Cell Source Areas

ENVIRONMENTAL MANAGEMENT PLAN - ASBESTOS CELL

Fill No.1 Investigation Area (Approx 1.5 ha)

Cut No.1 Investigation Area (Approx 3.5 ha)

MARSHALL MOUNT ROAD
PRINCES MOTORWAY
DUCK CREEK
YALLAH ROAD
CONDON PLACE
LARKINS LANE
PRINCES HIGHWAY
MACQUARIE PLACE
YALLAWARRA CRESCENT
WOLLINGURRY STREET
GERONGARR CRESCENT
RIVERSIDE CRESCENT
JOHNSTON AVENUE
WATERVIEW AVENUE
ATHANLIN AVENUE
SANDY BAY AVENUE
SHORELINE AVENUE
BAYVIEW AVENUE
ESTUARY AVENUE
PENINSULA AVENUE
DELTAVIEW AVENUE
EASTPOINT AVENUE
HAYWARDS BAY DRIVE
WOLLINGURRY CREEK
MACQUARIE RIVULET

Legend

- Project Footprint
- Watercourse (NSW SS)
- ACM Impacted Soil Containment Cell
- ACM Cell Source Area
- Cadastre (NSW SS, 2019)

FIGURE 3

1:7,000 Scale at A3

m
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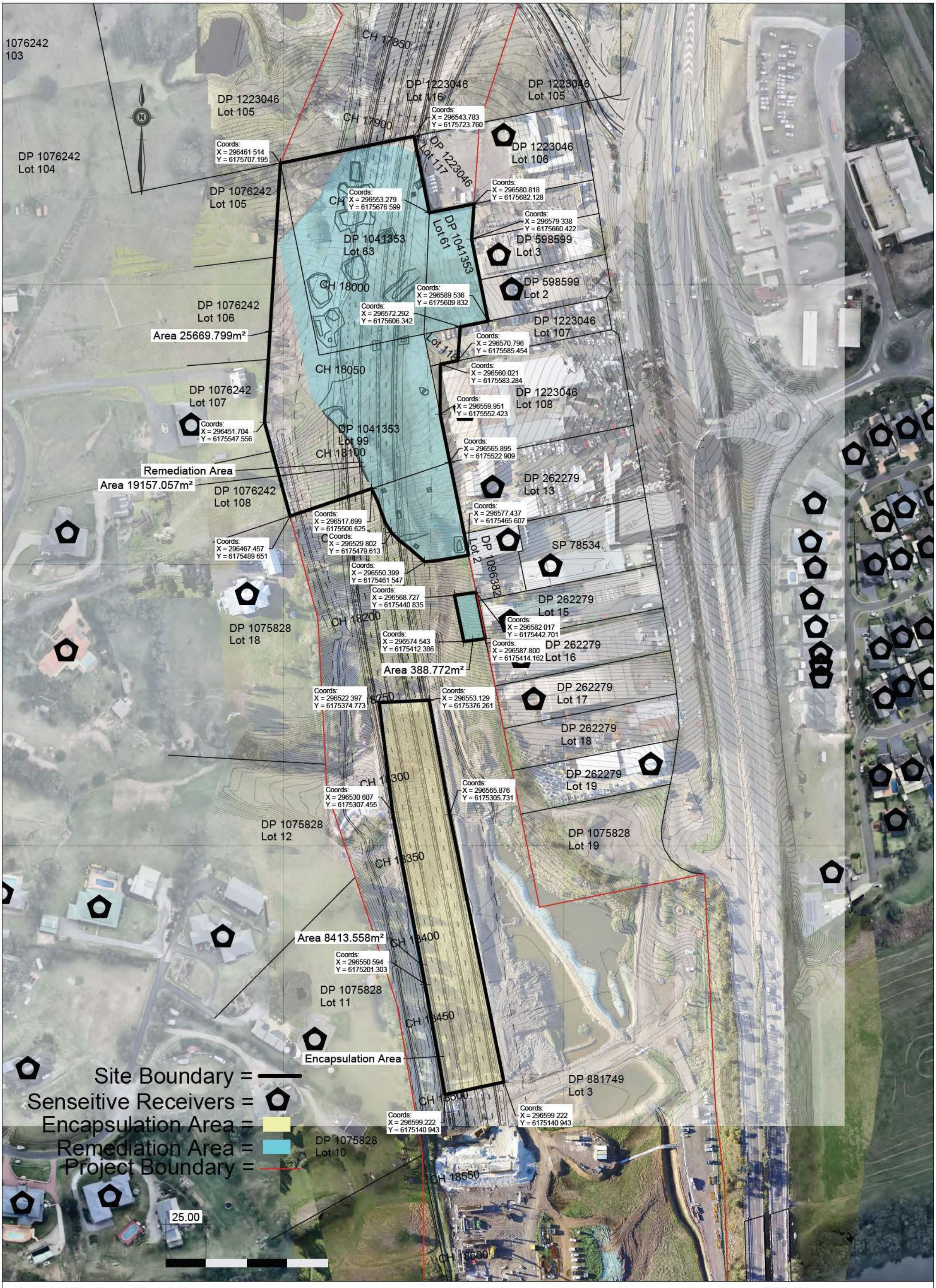
Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (NW&E)
Date: 2020-09-15 | Project: 82019047
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Map: 82019047-GS-014-ACMContCell_Source.mxd 01
Aerial imagery supplied by nearmap (June, 2020)

APPENDIX

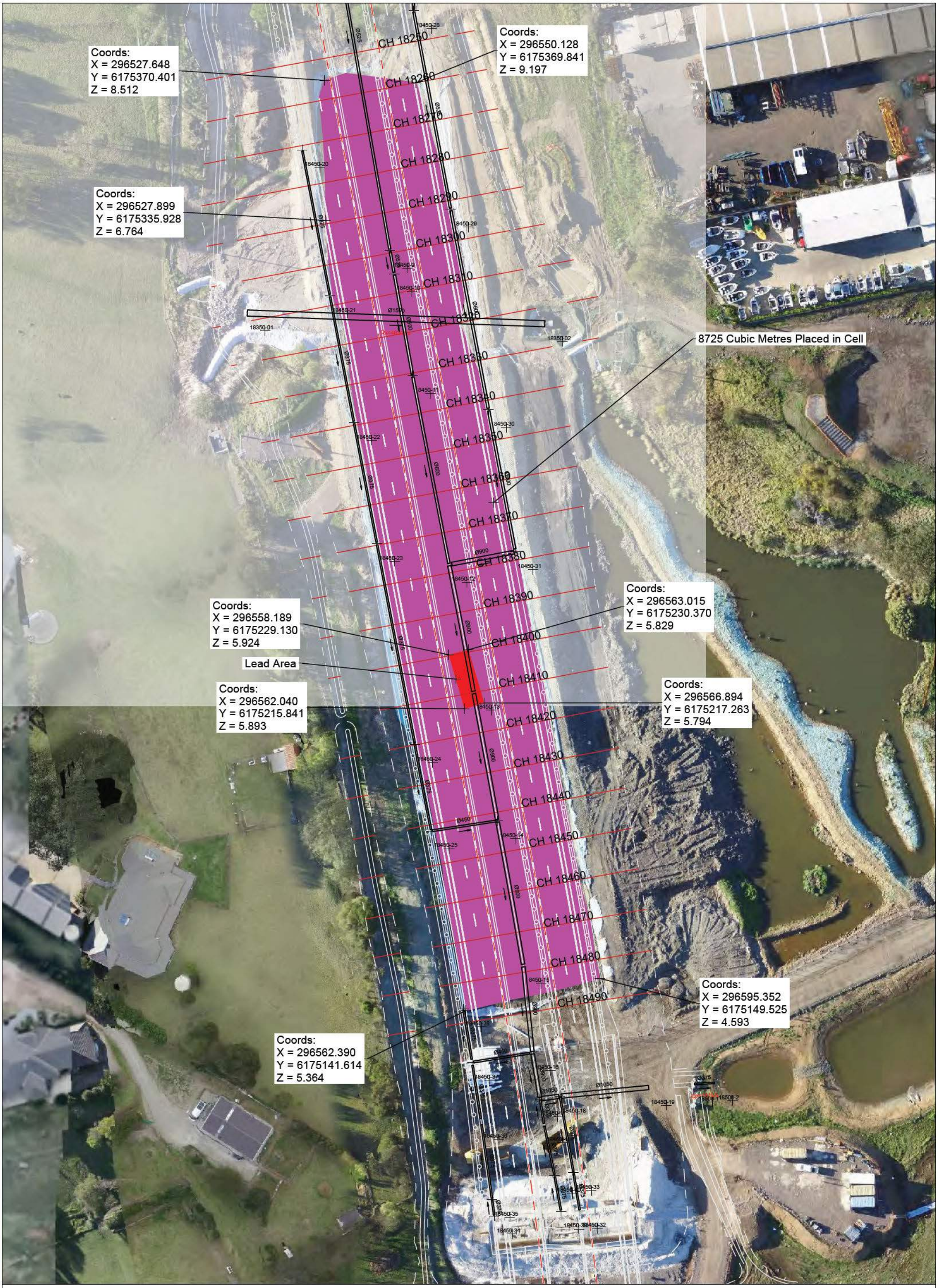
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ENCAPSULATION SURVEY



Cut 1 Site Location Plan

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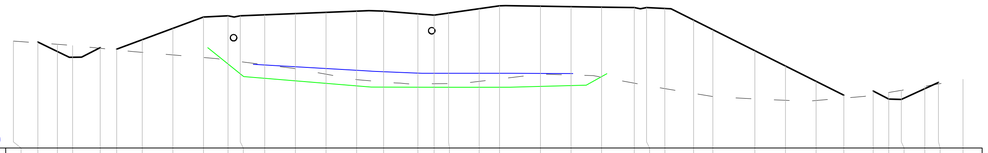
Fill 4 ACM Cell FINAL WAE Rev 1 Plan View

APRB Fill 4

12d Model

Scale 1:800

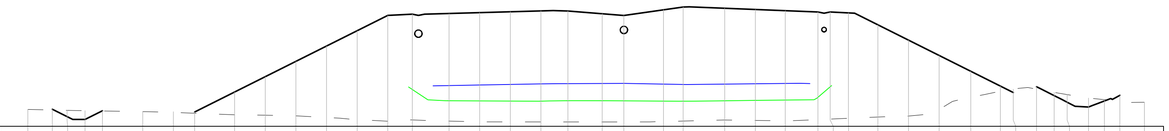
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Z = 13.06

Water Table RL 1.9

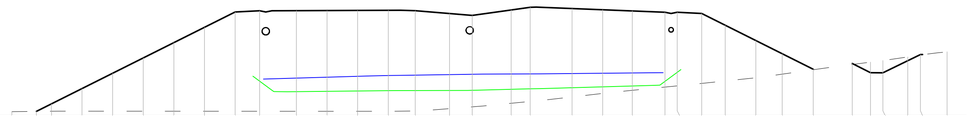
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Water Table RL 1.9

| | | |

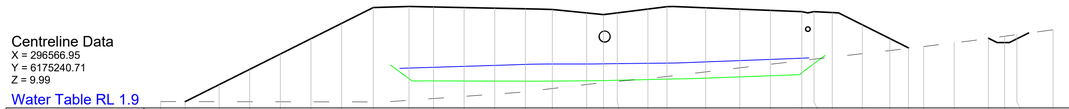


Centreline Data
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Water Table RL 1.9

DESIGN	2.35	2.96	4.21	5.46	6.71	7.96	9.21	10.46	10.56	10.57	10.58	10.59	10.60	10.56	10.33	10.18	10.62	10.84	10.74	10.64	10.54	10.44	10.44	10.34	9.38	8.13	7.05	5.79	6.26	5.50	5.50	6.48	6.99
Cell Base To FSL									-5.74	-6.61	-6.59	-6.57	-6.56	-6.52	-6.28	-6.11	-6.47	-6.65	-6.46	-6.29	-6.12	-5.64	-4.90											
Cell Base									4.82	3.96	3.99	4.01	4.04	4.05	4.06	4.07	4.15	4.19	4.28	4.35	4.42	4.8	5.53											
Cell Top To FSL										-5.50	-5.44	-5.37	-5.32	-5.26	-4.98	-4.80	-5.22	-5.43	-5.30	-5.18	-5.06												
Cell Top										5.07	5.14	5.21	5.28	5.31	5.35	5.38	5.4	5.41	5.44	5.46	5.48												
OFFSET	-30.72	-28.72	-27.50	-25.00	-22.50	-20.00	-17.50	-15.00	-12.50	-10.50	-7.50	-5.00	-2.50	0.00	2.20	5.00	6.85	10.03	11.58	15.00	17.50	19.92	22.58	23.58	25.58	27.50	30.00	32.15	34.68	37.87	39.36	40.37	42.40	43.43	45.61

CHAINAGE 18360

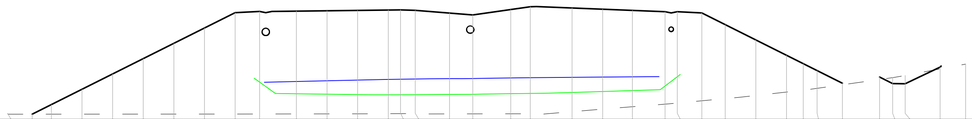


Centreline Data
X = 296566.95
Y = 6175240.71
Z = 9.99

Water Table RL 1.9

DESIGN	2.41	3.80	5.05	6.30	7.55	8.80	10.09	10.18	10.14	10.09	10.04	9.99	9.93	9.65	9.51	9.65	10.16	10.07	9.96	9.86	9.75	9.75	9.68	8.68	7.56	6.80	6.95	7.25	7.58	7.23	7.54
Cell Base To FSL								-5.89	-6.03	-5.99	-5.95	-5.90	-5.84	-5.54	-5.39	-5.50	-5.75	-5.91	-5.74	-5.52	-5.33	-4.99	-4.24								
Cell Base								4.28	4.11	4.1	4.09	4.08	4.09	4.11	4.13	4.15	4.21	4.25	4.33	4.43	4.52	4.76	5.51								
Cell Top To FSL								-5.02	-4.92	-4.80	-4.67	-4.54	-4.45	-4.16	-4.02	-4.14	-4.43	-4.60	-4.41	-4.20	-4.00	-3.80									
Cell Top								5.15	5.21	5.29	5.37	5.45	5.48	5.49	5.5	5.51	5.54	5.56	5.65	5.76	5.86	5.96									
OFFSET	-29.77	-27.77	-25.00	-22.50	-20.00	-17.50	-15.00	-12.42	-9.50	-7.50	-5.00	-2.50	0.00	2.20	5.00	6.38	7.50	10.00	11.56	14.71	17.50	20.00	22.56	23.56	25.05	27.50	29.75	31.27	32.50	35.00	37.79	39.11	40.11	43.07

CHAINAGE 18390

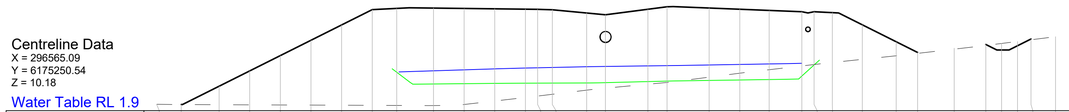


Centreline Data
X = 296559.53
Y = 6175280.02
Z = 10.82

Water Table RL 1.9

DESIGN	2.33	3.11	4.36	5.61	6.86	8.11	9.36	10.61	10.71	10.73	10.76	10.79	10.82	10.84	10.80	10.58	10.42	10.87	11.09	10.99	10.89	10.79	10.69	10.69	10.59	9.63	8.38	7.13	6.45	5.88	4.85	5.36	4.82	4.81	6.17
Cell Base To FSL									-5.77	-6.74	-6.81	-6.87	-6.92	-6.93	-6.88	-6.64	-6.48	-6.87	-7.07	-6.89	-6.72	-6.54	-6.07	-5.31												
Cell Base									4.94	3.99	3.96	3.92	3.9	3.91	3.92	3.94	3.94	3.99	4.02	4.1	4.18	4.25	4.62	5.38												
Cell Top To FSL										-5.74	-5.72	-5.69	-5.65	-5.65	-5.61	-5.35	-5.19	-5.59	-5.79	-5.66	-5.54	-5.42														
Cell Top										4.99	5.05	5.11	5.17	5.18	5.19	5.22	5.24	5.28	5.3	5.33	5.35	5.37														
OFFSET	-31.07	-29.07	-27.50	-25.00	-22.50	-20.00	-17.50	-15.00	-12.50	-10.50	-7.50	-5.00	-2.50	0.00	1.00	2.20	5.00	6.90	10.00	11.59	15.00	17.50	19.92	22.59	23.59	25.59	27.50	30.00	32.50	33.87	35.00	37.06	40.10	41.17	42.19	45.04	47.12

CHAINAGE 18350

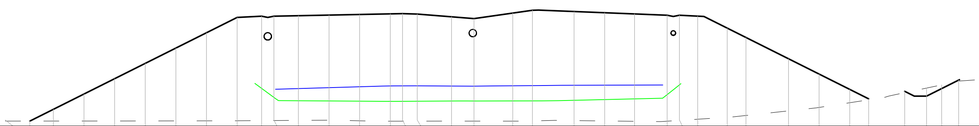


Centreline Data
X = 296565.09
Y = 6175250.54
Z = 10.18

Water Table RL 1.9

DESIGN	2.40	3.89	5.14	6.39	7.64	8.89	10.14	10.24	10.27	10.24	10.21	10.18	10.17	10.13	9.87	9.72	10.17	10.38	10.27	10.17	10.08	9.97	9.97	9.90	8.90	7.52	6.65	7.00	7.30	6.85	7.20	7.74
Cell Base To FSL								-5.21	-6.19	-6.14	-6.08	-6.04	-6.02	-5.98	-5.71	-5.54	-5.90	-6.06	-5.91	-5.77	-5.64	-5.25	-4.34								
Cell Base								5.03	4.08	4.1	4.12	4.14	4.14	4.15	4.16	4.18	4.27	4.31	4.36	4.4	4.44	4.72	5.63								
Cell Top To FSL									-5.12	-5.01	-4.90	-4.80	-4.77	-4.71	-4.38	-4.22	-4.62	-4.80	-4.65	-4.50	-4.37										
Cell Top									5.15	5.23	5.31	5.38	5.4	5.42	5.48	5.51	5.55	5.57	5.63	5.67	5.71										
OFFSET	-30.09	-28.09	-25.00	-22.50	-20.00	-17.50	-15.00	-12.50	-10.50	-7.50	-5.00	-2.50	0.00	1.00	2.20	5.00	6.53	10.00	11.56	15.00	17.50	19.90	22.56	23.56	25.05	27.50	30.26	32.01	35.00	37.58	38.87	40.17	41.27	43.27	

CHAINAGE 18380

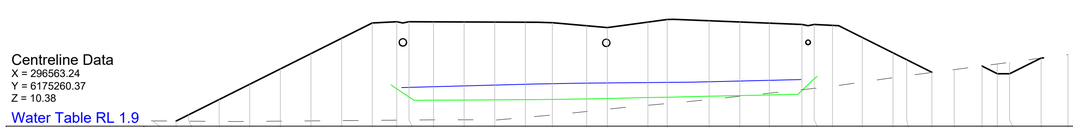


Centreline Data
X = 296557.68
Y = 6175289.84
Z = 11.06

Water Table RL 1.9

DESIGN	2.31	3.27	4.52	5.77	7.02	8.27	9.52	10.77	10.87	10.87	10.91	10.96	11.01	11.06	11.08	11.05	10.82	10.68	11.13	11.36	11.25	11.15	11.06	10.95	10.95	10.88	9.90	9.14	7.40	6.15	4.90	4.13	4.74	4.35	4.97	5.66
Cell Base To FSL									-5.89	-6.63	-6.94	-7.01	-7.07	-7.14	-7.15	-7.11	-6.87	-6.72	-7.17	-7.39	-7.24	-7.09	-6.93	-6.48	-5.68												
Cell Base									4.98	4.25	3.97	3.96	3.94	3.92	3.93	3.94	3.95	3.95	3.96	3.96	4.01	4.07	4.13	4.47	5.27												
Cell Top To FSL										-5.95	-5.92	-5.90	-5.88	-5.89	-5.86	-5.65	-5.51	-5.93	-6.15	-6.02	-5.91	-5.81														
Cell Top										4.97	5.04	5.12	5.18	5.19	5.19	5.17	5.16	5.19	5.21	5.24	5.24	5.25														
OFFSET	-31.42	-29.42	-27.50	-25.00	-22.50	-20.00	-17.50	-15.00	-12.50	-10.50	-9.50	-7.50	-5.00	-2.50	0.00	1.00	2.20	5.00	6.83	10.00	11.60	15.00	17.50	19.93	22.60	23.60	25.09	27.50	29.03	32.50	35.00	37.50	39.04	41.99	43.77	45.00	46.39	48.46

CHAINAGE 18340



Centreline Data
X = 296563.24
Y = 6175260.37
Z = 10.38

Water Table RL 1.9

DESIGN	2.32	2.82	4.07	5.32	6.57	7.82	9.07	10.32	10.42	10.42	10.41	10.40	10.39	10.38	10.34	10.09	9.94	10.39	10.60	10.50	10.40	10.30	10.20	10.20	10.12	9.13	7.88	7.32	6.30	6.52	6.80	6.18	6.17	7.45
Cell Base To FSL									-5.47	-6.14	-6.39	-6.37	-6.34	-6.32	-6.26	-5.96	-5.79	-6.16	-6.34	-6.16	-6.01	-5.86	-5.38	-4.42										
Cell Base									4.95	4.28	4.02	4.04	4.05	4.06	4.08	4.13	4.16	4.23	4.26	4.34	4.4	4.45	4.82	5.77										
Cell Top To FSL									-5.36	-5.29	-5.22	-5.14	-5.06	-4.98	-4.69	-4.52	-4.93	-5.13	-4.98	-4.82	-4.66												
Cell Top									5.06	5.12	5.18	5.25	5.32	5.36	5.4	5.43	5.46	5.47	5.52	5.58	5.64												
OFFSET	-30.51	-28.51	-27.50	-25.00	-22.50	-20.00	-17.50	-15.00	-12.50	-10.50	-9.50	-7.50	-5.00	-2.50	0.00	2.20	5.00	6.69	10.00	11.57	15.00	17.50	19.91	22.57	23.57	25.06	27.50	30.00	31.12	33.18	35.00	37.27	38.52	39.52	42.09	44.29

CHAINAGE 18370

PROJECT NAME:

PROJECT NUMBER:

APRB Fill 4 ACM Cell WAE

Joint Survey Between RMS and Fulton Hogan

Drawn By JQ

A1 HORZ SCALE: 1 : 250

A1 VERT SCALE: 1 : 250

DRAINAGE MODEL:

DESIGN A.R.I. (years):

DRAWING:

SHEET:

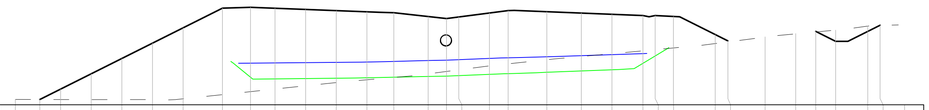
CHAINAGE: CH 18340 to CH 18390

DESIGNER:

REVISION: 1

Centreline Data
X = 296572.51
Y = 6175211.23
Z = 9.48

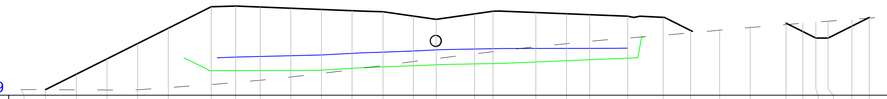
Water Table RL 1.9



| | | |

Centreline Data
X = 296583.41
Y = 6175152.23
Z = 8.80

Water Table RL 1.9

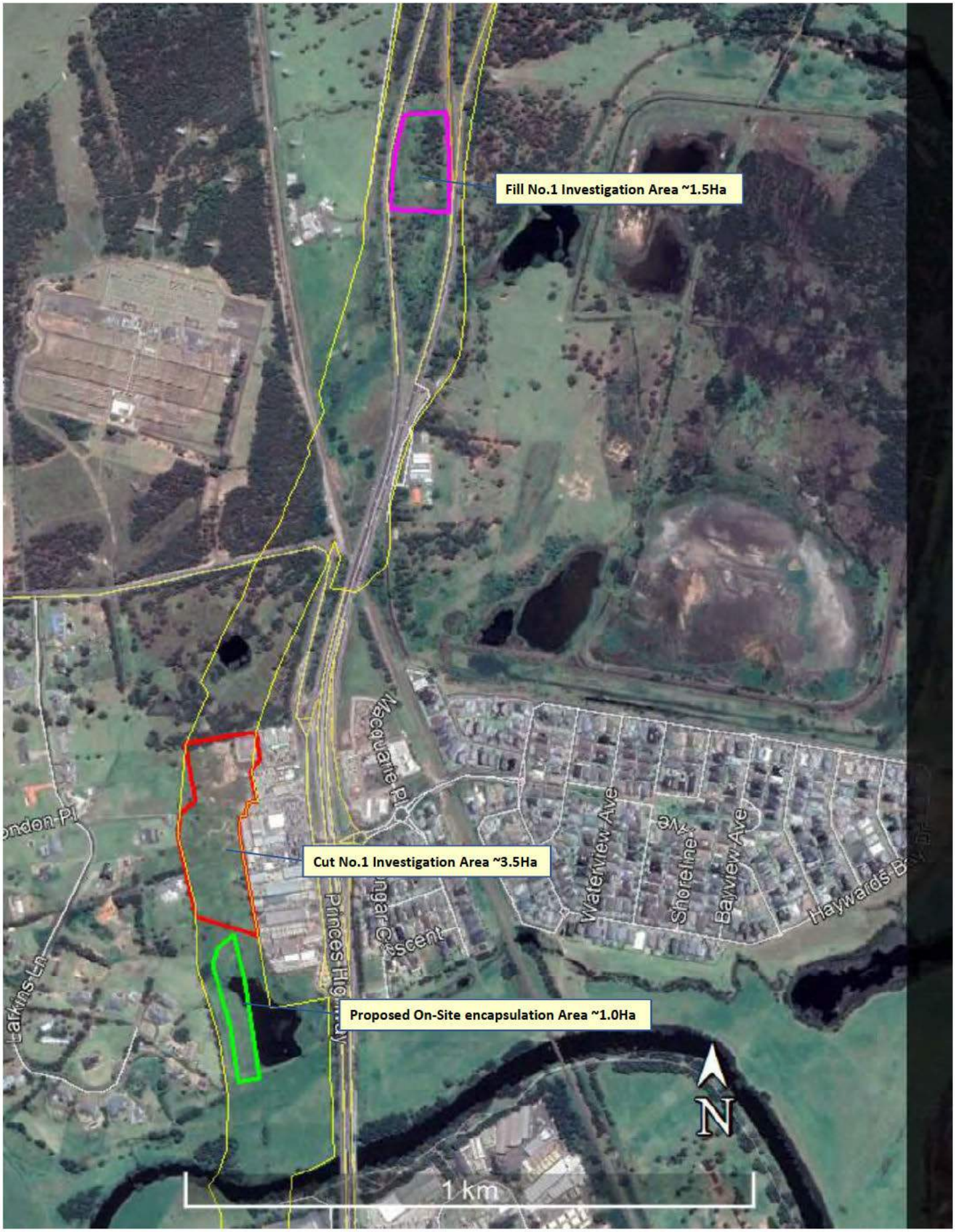


| | | |

APPENDIX

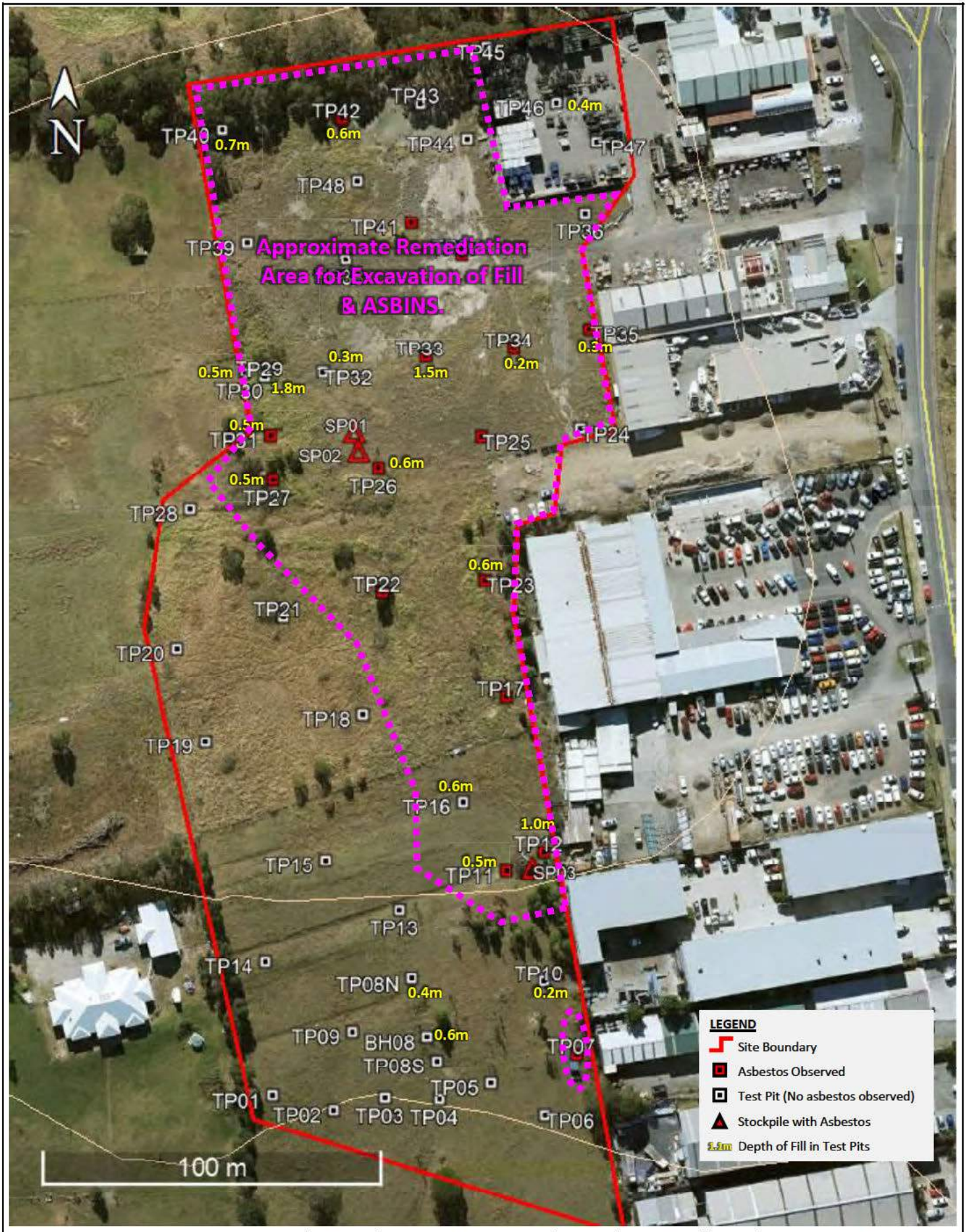
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ENRS FIGURE EXTRACTS



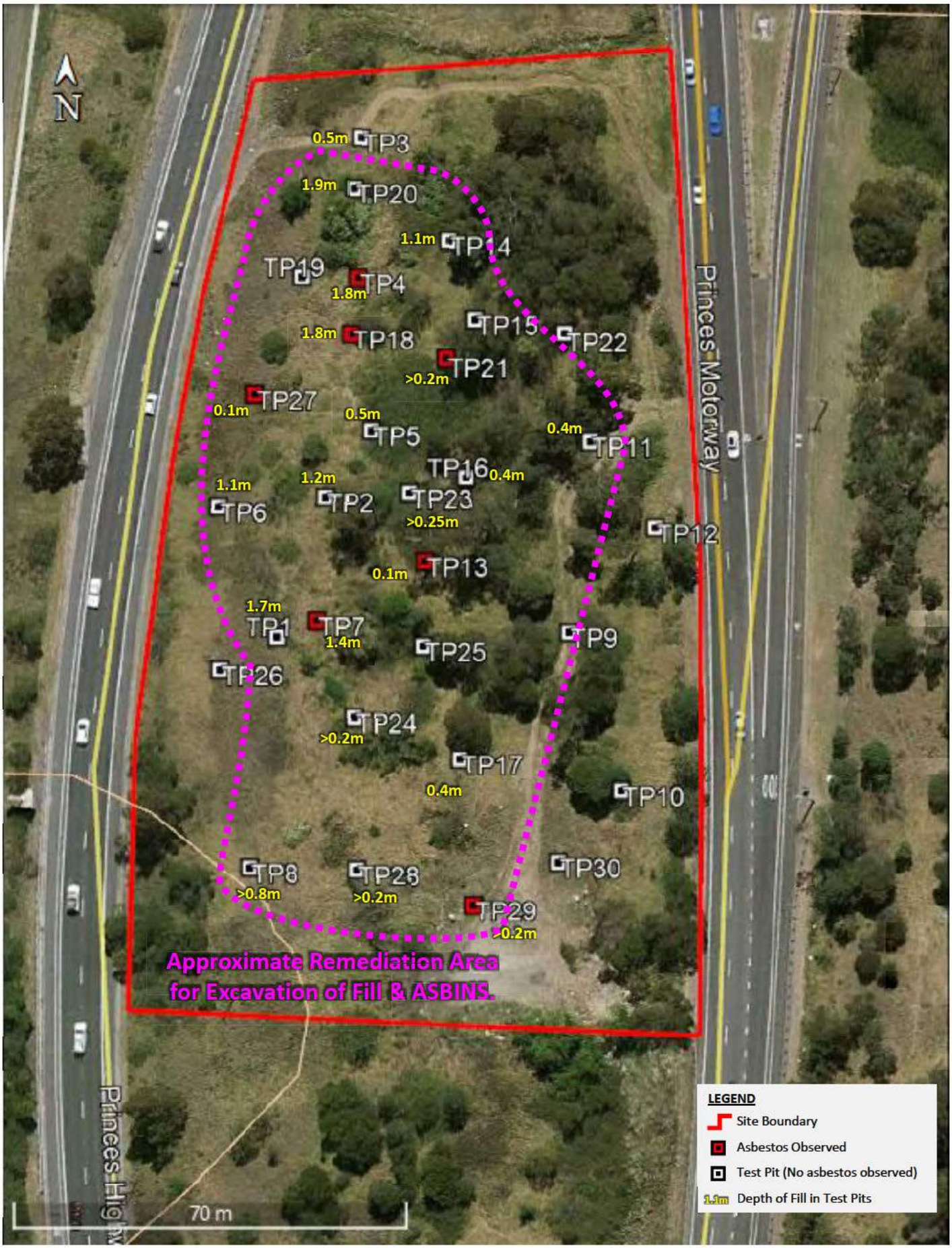
ENRS
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Tel: 02 4448 5490 Fax: 02 90374708
projects@enrs.com.au www.enrs.com.au

Client:	FH	Drawn:	RL	Figure:	2
Project:	ENRS1153	Source:	Sixviewer	Date:	13/06/2019
Location:	APRB Project Yallah Industrial Area	Scale:	NA	Title:	Site Location and Remediation Areas
		Status:	Rev 1		



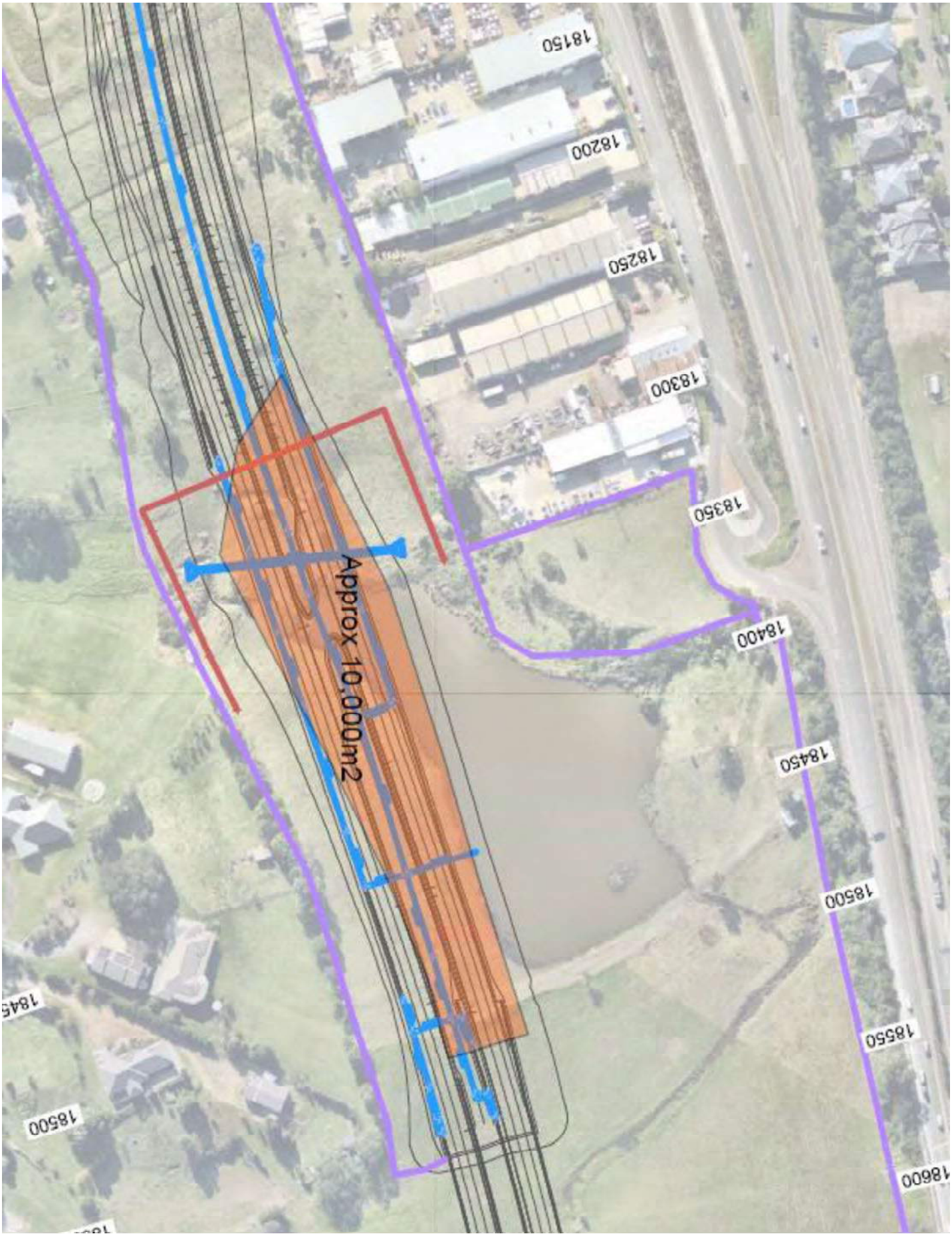
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Tel: 02 4448 5490 Fax: 02 90374708
projects@enrs.com.au www.enrs.com.au

Client:	FH	Drawn:	RL	Figure:	3
Project:	ENRS1153	Source:	Sixviewer	Date:	20/06/2019
Location:	Cut#1 (PAEC02) – Yallah Industrial Area	Scale:	NA	Title:	Asbestos Removal Areas and Depth of Fill
		Status:	Rev 2		



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Client:	FH	Drawn:	RL	Figure:	4
Project:	ENRS1153	Source:	Sixviewer	Date:	20/06/2019
Location:	Fill #1 – 'The Island'	Scale:	NA	Title:	Asbestos Removal Areas and Depth of Fill
		Status:	Rev 2		



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Client:	**FH**	Drawn:	**RL**	Figure:	**5**
Project:	**ENRS1153**	Source:	**Sixviewer**	Date:	**13/06/2019**
Location:	Fill #1 – 'The Island'	Scale:	**NA**	Title:	**Encapsulation Area**
		Status:	**Rev 1**		

APPENDIX

D

UFP

Types of Unexpected Finds	Specific Indicators to Look-Out for	Response Protocol
Asbestos	▪ Asbestos Containing Materials (ACM) which is buried, at the surface and/or in asbestos pipes ▪ Cement-bound asbestos e.g. fibro cement in the form of small fragments, flat sheets, corrugated roofing, or pipe ▪ Other bonded forms of asbestos e.g. bitumen, textured coatings and floor tiles. ▪ Friable forms of asbestos including lagging and insulation may be seen as fibrous material which flakes and powders easily.	**Stop Work** ▪ Prevent any activity at the location and in the surrounding area. ▪ Do not touch or disturb the item/material. ▪ Assess the potential risk to human health posed by the unexpected find and assess if evacuation or emergency services should be contacted. ▪ Delineate and secure the worksite using temporary fencing or equivalent, and install appropriate signage. **Notify** ▪ Report the Unexpected Find to the Site Manager. ▪ Site Manager to report the Unexpected Find to TfNSW immediately. **Inspect** ▪ Site Manager or TfNSW to coordinate inspection of the unexpected find by either: – Possible hazardous material / contamination - a suitably qualified practitioner (environmental consultant) in identifying potential hazardous materials / contamination; – Possible heritage item - a heritage consultant / archaeologist; – Or an alternative third party relevant to the type of unexpected find. ▪ Record critical details such as the location, visual appearance, odour, depth, surrounding material and mode of discovering the material. ▪ If safe document the unexpected find by taking photographs and / or video. **Manage** ▪ Establish management actions in compliance with regulatory requirements, including any further assessment/validation/clearance required prior to resuming work. **Resume Work** ▪ Obtain necessary regulator's approvals for the proposed management actions. – Do not commence work until the appropriate approvals have been received. ▪ Implement the approved management action plan (if relevant) and seek on-going advice as necessary. ▪ Remove temporary fencing or equivalent. **Document** ▪ Document the findings and compliance with the approved action plan and provide documentation to the Site Manager and TfNSW. – This may include additional validation sampling or asbestos clearance documentation. ▪ Update the site Environmental Management Plan procedures and controls as required.
Buried or Tipped Waste	▪ Waste materials including wood, plastic, metal fragments, building rubble (such as concrete, brick, asphalt, asbestos containing materials). ▪ Other household/farm waste e.g. tins and containers of chemicals and fuels.	
Chemical Impact	▪ Environmental media (water / soil / sediment) presenting odours, powders, staining and/or discolouration	
Other	▪ Discarded needles / sharps and other potentially dangerous items including knives and weapons ▪ Injured wildlife	

APPENDIX

E

INSPECTION CHECKLIST

Inspection item	Yes	No
Are there any unacceptable ground depressions? (e.g. >300mm drop exceeding an area of $4m^2$ as a guide)		
Is there any pavement damage? (e.g. pavement pothole greater than $1m^2$)		
Has there been any slope failure on roadside embankments?		
Are there any large trees or potentially large trees growing in the embankment?		
Has there been any change in ground surfaces that suggest that unplanned or uncontrolled ground disturbance has taken place between inepsctions?		
Comments and observations		
Corrective actions required		

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

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Site Audit Report 1508 - 1904

Albion Park Bypass Project,
Princes Highway, Yallah NSW 2530

26 February 2021

Ref. 19040

CAVVANBA
consulting

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ABN: 37 929 679 095

1/66 Centennial Circuit
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Table of contents

1.0 Introduction 1
1.1 Overview of site audits 1
1.2 Guidelines made or approved by the EPA 2

2.0 Limitations 4

3.0 Site audit details 5
3.1 Site audit statement 5
3.2 Site auditor 5
3.3 Audit independence 5
3.4 Technical support 5
3.5 Background to site audit 5
3.6 Proposed development 5
3.6.1 Type of site audit 6
3.7 Purpose of site audit 6
3.8 Documents reviewed 6
3.9 Site audit meetings and site inspection 7
3.10 Site audit correspondence 7
3.11 Site audit report format 8

4.0 Site identification and surrounds 10
4.1 Site identification and landuse 10
4.2 Surrounding landuse 11
4.3 Surrounding environment 11
4.4 Site audit discussion 11

5.0 Environmental setting 12
5.1 Local meteorology 12
5.2 Topography and drainage 12
5.3 Geology and soils 12
5.4 Hydrogeology 13
5.5 Site audit discussion 14

6.0 Site history 15
6.1 Site history summary 15
6.2 Landuse information 15
6.2.1 Land titles 15
6.2.2 Council records 15
6.2.3 Aerial photograph review 16

6.3 Activities conducted 17
6.3.1 Chemical usage and storage 17
6.3.2 Incidents and spills 17
6.3.3 Waste management 18
6.3.4 Use of PFAS compounds 18
6.4 Services 18
6.5 Licenses, permits and notices 19
6.6 Site audit discussion 19
6.7 Encapsulation area, site history 19

7.0 Pre-remediation site condition 21
7.1 Site audit discussion 22
7.2 Encapsulation area condition 22

8.0 Contaminants, media and assessment criteria 24
8.1 Potential contaminants 24
8.2 Environmental media 24
8.2.1 Groundwater discussion 24
8.3 Environmental criteria 25
8.3.1 National Environment Protection Measure (NEPM) 25
8.3.2 Aesthetic criteria 25
8.3.3 Asbestos in soil criteria 26
8.4 Site audit discussion 27

9.0 Site assessments 28
9.1 HCJV (2017) 28
9.1.1 Objectives and scope 28
9.1.2 Data quality objectives 29
9.1.3 Sampling and analytical strategy 29
9.1.4 Sampling and analytical methodology 30
9.1.5 Data usability 30

9.2 ENRS (2019b) 31
9.2.1 Objectives and scope 31
9.2.2 Data quality objectives 31
9.2.3 Sampling and analytical strategy 31
9.2.4 Sampling and analytical methodology 32
9.2.5 Data usability 33
9.3 Site audit discussion 33

10.0 Assessment results 35
10.1 Soil conditions 35

10.2 Asbestos conditions 35
10.3 Analytical results 36
10.4 Site audit discussion 39

11.0 Assessment conclusions 40
11.1 Conclusions 40
11.2 Site audit discussion 41

12.0 Remediation 43
12.1 Remediation goal 43
12.2 Extent of remediation required 43
12.3 Remediation option analysis 43
12.4 Remediation strategy 44
12.5 Encapsulation discussion 45
12.6 Suitability of encapsulated material 45
12.7 Summary of remediation works 46
12.8 Soil observations 47
12.9 Unexpected finds 48
12.10 Off-site disposal of waste 48
12.11 On-site encapsulation 49
12.12 Imported material 49
12.13 Site audit discussion 50

13.0 Additional encapsulation fill suitability investigation 51
13.1 Objective 51
13.2 Scope 51
13.3 Site history summary 51
13.4 Sampling and analytical strategy 52
13.5 Sampling and analytical methodology 52
13.6 Asbestos conditions 53
13.7 Analytical results 53
13.8 Site audit discussion 55

14.0 Encapsulation cell 56

15.0 Validation work 58
15.1 Objectives and scope 58
15.2 Data quality objectives 58
15.3 Soil sampling and analytical strategy 58
15.3.1 Asbestos soil sampling and analytical strategy 59
15.3.2 Soil sampling (other analytes) 60
15.4 Soil sampling and analytical methodology 61

15.4.1 Asbestos soil sampling 61
15.4.2 Soil sampling (other analytes) 62
15.5 Data usability 62
15.6 Asbestos clearances 63
15.7 Soil validation results 64
15.8 Site audit discussion 65

16.0 Validation discussion 66
16.1 Stratigraphic conditions discussion 66
16.2 Analytical discussion 66
16.3 Site audit discussion 68

17.0 Validation conclusions 69
17.1 Site audit discussion 70

18.0 Environmental management plan 71
18.1 Objective 71
18.2 Contamination to be managed 71
18.3 Stakeholders and responsibilities 71
18.4 EMP Checklist 72
18.5 EMP legal enforceability and public notification 73
18.6 Public notification 73
18.7 Site audit discussion 73

19.0 Conceptual site model 74
19.1 Consultant's interpretation 74
19.1.1 Sources of contamination 74
19.1.2 Pathways 74
19.1.3 Receptors 74
19.2 Site audit discussion 74

20.0 Site suitability discussion 76
20.1 Regulatory issues 76
20.2 Risk and migration 76
20.3 Landuse suitability 76

21.0 Glossary and references 83
21.1 Glossary 83
21.2 References 84

Figures

Figure 1 – Site audit area

Appendices

Appendix A - Audit correspondence – Interim Site Audit Advice letters and emails

Appendix B – Data usability assessments, including background to data usability

Attachments

Attachment 1 - Consultants' figures

Attachment 2 – Consultants' Test pit logs

Attachment 3 – Consultants' analytical tables

1.0 Introduction

[redacted], a Site Auditor accredited under the *Contaminated Land Management Act 1997* (CLM Act) (Accreditation Number 1508) and an employee of Cavvanba Consulting Pty Ltd (Cavvanba) was commissioned by Fulton Hogan Construction on 2 May 2019 to complete a site audit including preparation of a site audit report (SAR) and site audit statement (SAS). The audit is an independent review of contaminated land documents listed in Section 3.7, which report on environmental investigations and remediation completed for a portion of the Albion Park Bypass Project, Princes Highway, Yallah NSW 2530. The site consists of the following lots: Lot 99 DP 1076242, Lot 118 and 119 DP 1223046, Lot 63 DP 1041353, part of Lot 3 DP 881749 and part of Lot 61 DP 1041353.

The limitations to the site audit are detailed in Section 2.

1.1 Overview of site audits

The site audit has been conducted in accordance with the requirements of the Contaminated Land Management (CLM) Act 1997. The CLM Act describes a site audit as:

> *a review:*
>
> *(a) that relates to management (whether under this Act or otherwise) of the actual or possible contamination of land, and*
>
> *(b) that is conducted for the purpose of determining any one or more of the following matters:*
> *(i) the nature and extent of any contamination of the land,*
> *(ii) the nature and extent of any management of actual or possible contamination of the land,*
> *(iii) whether the land is suitable for any specified use or range of uses,*
> *(iv) what management remains necessary before the land is suitable for any specified use or range of uses,*
> *(v) the suitability and appropriateness of a plan of management, long-term management plan or a voluntary management proposal.*

In NSW, the site assessment and site audit process includes the following:

- the contaminated land consultant, or other relevant party, designs and implements the site assessment and, where required, all remediation and validation activities to achieve the stated objectives; and

- the site auditor independently reviews the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Section 53B of the CLM Act describes that site audits conducted by EPA accredited site auditors must:

- Contain a critical review of the information collected in relation to the site audit and must clearly set out the reasons for the findings proposed to be contained in the relevant site audit statement.

- Be undertaken in compliance with the provisions of the CLM Act and the CLM regulations.

- Be in accordance with the guidelines made or approved by the EPA.

- Have regard to the provisions of any environmental planning instruments applying to the site.

1.2 Guidelines made or approved by the EPA

The EPA can make or approve guidelines under section 105 of the CLM Act for the purposes connected with the objectives of the Act.

The guidelines made by EPA include the following:
- Department of Environment and Conservation NSW (DEC) (March 2007) *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination*. NSW EPA, Sydney;
- Environment Protection Authority (EPA) (September 1995) *Contaminated Sites: Sampling Design Guidelines*. NSW EPA, Sydney;
- EPA (October 1997) *Contaminated Sites: Guidelines for Assessing Banana Plantation Sites*, amended August 2003. NSW EPA, Sydney;
- EPA (May 2020) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Land*. EPA, Sydney;
- EPA (June 2003) *Contaminated Sites: Guidelines for the Vertical Mixing of Soil on Former Broad-acre Agricultural Land*. NSW EPA, Sydney;
- EPA (June 2005) *Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens*. NSW EPA, Sydney;
- EPA (October 2017) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)*. EPA, Sydney;
- EPA (May 2020) *Guidelines for the Assessment and Management of Hazardous Ground Gases*. NSW EPA, Sydney;
- EPA (September 2015) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*. NSW EPA, Sydney.

The guidelines approved by EPA include the following:
- Australian and New Zealand Governments and Australian State and Territory Governments (ANZAST) (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. ANZAST (2018);
- Department of Health and Ageing and EnHealth Council (2012) *Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards*. Commonwealth of Australia, Canberra;
- Lock, W. H., (1996) *"Composite Sampling", National Environmental Health Forum Monographs, Soil Series No. 3*. SA Health Commission, Adelaide; and
- NEPC (1999) *National Environment Protection (Assessment of Site Contamination) Measure, Schedule A and Schedules B(1)-B(10)*, amended April 2013. National Environment Protection Council, Adelaide.

Other documents listed include the following:
- NHMRC/ NRMMC (2011) *Australian Drinking Water Guidelines*. National Health and Medical Research Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra, and Natural Resource Management Ministerial Council (NRMMC), Australian Government, Canberra; and
- NSW Agricultural/CMPS&F (1996) *Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes*. NSW Agricultural and CMPS&F Environmental, Canberra.

Other technical documents made by EPA include the following:
- DEC (July 2005) *Information for the assessment of gasworks sites*. NSW DEC, Sydney;
- Department of Environment, Climate Change and Water (DECCW) (August 2009) *Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008*, amended September 2009. NSW DECCW, Sydney;

- DECCW (2010) *Vapour Intrusion: Technical Practice Note.* (Ref. 2010/774). NSW DECCW, Sydney;
- EPA (October 2016) *Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste*;
- EPA (April 2014a) *Best Practice Note: Landfarming*. NSW EPA, Sydney;
- EPA (November 2016) *Designing Sampling Programs for Sites Potentially Contaminated by PFAS: Guidance Document*. NSW EPA, Sydney;
- EPA (November 2012) *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*. NSW EPA, Sydney;
- EPA (April 2014b) *Technical Note: Investigation of Service Station Sites*. NSW EPA, Sydney;
- EPA (August 2015) *Technical Note: Light Non-Aqueous Phase Liquid Assessment and Remediation*. NSW EPA, Sydney; and
- EPA (November 2014) *Waste Classification Guidelines – Part 1: Classifying Waste*. NSW EPA, Sydney, NSW.

Further technical documents referenced by EPA include the following:

- Beck, P & Mann, B (2010) *A technical guide for demonstrating monitored natural attenuation of petroleum hydrocarbons in groundwater*, CRC CARE Technical Report no. 15, CRC CARE, South Australia;
- Clements, L, Palaia, T & Davis, J (2009) *Characterisation of sites impacted by petroleum hydrocarbons: National guideline document*, CRC CARE Technical Report no. 11. CRC CARE, South Australia;
- CRC CARE (2015) Technical Report No. 34. *A practitioner's guide for the analysis, management and remediation of LNAPL*. CRC CARE, South Australia; and
- Johnston, CD (2010) *Selecting and assessing strategies for remediating LNAPL in soil and aquifers*, CRC CARE Technical Report no. 18, CRC CARE, South Australia.

2.0 Limitations

This site audit relates only to those matters relevant to the Contaminated Land Management Act 1997, which describes that "The general object of this Act is to establish a process for investigating and (where appropriate) remediating land areas where contamination presents a significant risk of harm to human health or some other aspect of the environment".

The SAS and SAR do not seek to provide an opinion regarding other aspects of the environment not related to site contamination, or to the suitability of the site in regard to:

- landuse planning and legal use of the land; and/or
- the occupational health and safety legislation; and/or
- the suitability of any engineering design.

By definition, site auditing involves the review and critique of consultants' and contractors' work, including, amongst others, site histories, site surveys, subsurface investigations, chemical and physical analyses, and risk assessments and modelling. Accordingly, Cavvanba relies on the experience, expertise and integrity of the relevant organisations. The information sources referenced have been used to determine site history and local subsurface conditions. While Cavvanba has used reasonable care to avoid reliance on data and information that is inaccurate or unsuitable, Cavvanba is not able to verify the accuracy or completeness of all information and data made available.

Sampling and chemical analysis of environmental media are based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Limited environmental sampling and laboratory analyses were undertaken as part of the investigations reviewed by Cavvanba, as described herein. Ground conditions between sampling locations may vary, and this should be considered when extrapolating between sampling points. Except at each sampling point, the nature, extent and concentration of contamination is inferred only. Furthermore, the test methods used to characterise the contamination at each sampling point are subject to limitations and provide only an approximation of the contaminant concentrations. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this site audit are based on the available information at the time of the investigations.

As environmental sampling is based on achieving suitable sampling densities, rather than sampling all media at all locations, and analysis is based on-site histories and likely contaminants of concern, rather than analysis of all media at all locations for all potential contaminants, the absence of any identified hazardous or toxic materials at the site should not be interpreted as a warranty or guarantee that such materials do not exist at the site. Therefore, future work at the site which involves subsurface excavation should be conducted based on appropriate management plans. These should include, inter alia, environmental management plans, including unexpected findings protocols, hazardous building materials management plans, and occupational health and safety plans.

3.0 Site audit details

3.1 Site audit statement

The SAR relates to SAS Number 1508-1904.

3.2 Site auditor

The EPA contaminated land accredited site auditor who conducted this site audit was [redacted] EPA Accreditation Number 1508.

3.3 Audit independence

As per Section 54 of the CLM Act, the site auditor is to avoid conflicts of interest. The site auditor confirms that:

- there is no relation to a person by whom any part of the land is owned or occupied; and
- there is no pecuniary interest in any part of the land or any activity carried out on any part of the land, or
- the site auditor is not reviewing any aspect of work carried out by, or a report written by, the site auditor or a person to whom the site auditor is related.

3.4 Technical support

Assistance with this audit was provided by Cavvanba personnel and the auditor assistant, [redacted]. There was no external technical support utilised for this audit.

3.5 Background to site audit

The site is located within the proposed road alignment for the Albion Park Rail Bypass project, Yallah NSW 2530.

The site is approximately 3.54 hectares in size, as shown on Site Audit Figure 1 and Consultants Figure 10 and consists of:

- Lot 99 DP 1076242;
- Lots 118 & 119 DP 1223046;
- Part of Lot 61 DP 1041353;
- Lot 63 DP 1041353; and
- Part of Lot 3 DP 881749.

The investigations and remediation resulted in the design and construction of a containment cell to encapsulate asbestos contaminated soil beneath the constructed road. The cell accommodated material from the site described above and from an additional portion of the road upgrade, known as Fill 1. Land use suitability of the residual land of Fill 1 is otherwise not included in this Audit.

3.6 Proposed development

The site is proposed to be developed as the Princes Motorway. The project is to build a 9.8 kilometre extension of the Princes Motorway between Yallah and Oak Flats that would bypass Albion Park Rail. Key features of the project include:

- two lanes in each direction divided by a median (with capacity to upgrade to three lanes in each direction in future);
- three interchanges provided at Yallah, Albion Park and Oak Flats would connect the local road network with the motorway;
- bridges to carry the motorway over Duck Creek, Macquarie Rivulet and Frazers Creek;
- bridges to carry the motorway over the Princes Highway and Tongarra Road;

- a bridge to carry the motorway over the South Coast Rail Line;
- improved pedestrian and cycle connections; and
- improvements to directly impacted sporting facilities at the Croom Regional Sporting Complex and changes to the southern access.

3.6.1 Type of site audit

The site audit is a statutory site audit under Section 47(1) of the CLM Act.

3.7 Purpose of site audit

In accordance with Section 4 (Definitions) of the CLM Act, an Audit is conducted for the purpose of determining the following matters:

i. the nature and extent of any contamination of the land;
ii. the nature and extent of any management of actual or possible contamination of the land;
iii. whether the land is suitable for any specified use or range of uses;
iv. what management remains necessary before the land is suitable for any specified use or range of uses;
v. the suitability and appropriateness of a plan of management, long-term management plan or a voluntary management proposal.

The purpose of this site audit was to determine if the site is suitable for the proposed development following the remediation works. The nature of the works resulted in the development of a passive environmental management plan (EMP) for encapsulated contaminated material.

Accordingly, Section A2 of the SAS has been addressed, and the EMP forms part of the SAS.

3.8 Documents reviewed

The following documents were reviewed as part of this site audit.

Subject site

- Hyder Cardno Joint Venture (HCJV, 2014) Phase 1 – *Preliminary Site Investigation Report, Albion Park Rail Bypass*.

- Hyder Cardno Joint Venture (HCJV, 2017) *Environmental site assessment – PAEC02: Industrial Estate, Albion Park Rail Bypass* (Ref. FK0004-APRB-R-02).

- Environment & Natural Resource Solutions (ENRS) (2019a) *Sampling, Analysis & Quality Control Plan (SAQP), Asbestos in Soil (ASBINS), Albion Park Bypass Project* (Ref. ENRS1153R1E1, April 2019).

- ENRS (2019b) *Stage 2 – Detailed Site Investigation (DSI), Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153_APRB_PAEC02 Cut#1_DSI, June 2019).

- ENRS (2019c) *Remediation Action Plan, Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153, June 2019).

  ENRS (2020a) *Stage 4 – Site Validation Report, PAEC02 – Cut No. 1, Albion Park Rail Bypass* (APRB) (Ref. ENRS1153).

- Cardno (2021) *Environmental Management Plan – Asbestos in Soils Encapsulation Cell – M1 Princes Motorway Chainages 18250 to 18490, Albion Park Rail Bypass* (Ref. 8201904701).

Additional encapsulated material from Fill 1

- ENRS (2019d) *Stage 2 – Detailed Site Investigation (DSI) The Island Fill No. 1, Albion Park Bypass (APRB) Project* (Ref. ENRS1153).

Where draft reports were reviewed and commented on by the auditor, these are documented in interim site audit advice (ISAA) correspondence, as outlined in Table 3.1. Draft documents have not been included above.

As part of this site audit, every reasonable effort has been made to identify and obtain all relevant data, reports and other information that provides evidence about the condition of the site, and that were held by the client and the client's consultants, or that were readily available.

3.9 Site audit meetings and site inspection

Site inspections and project meetings with the audit team and the project team were conducted over the course of the project, including various emails and telephone discussions with the client and consultant.

Site inspections and/or project meetings were conducted on the following dates:
- 3 May 2019 (initial site inspection – before investigation); and
- 5 September 2019 (during remediation).

3.10 Site audit correspondence

Site audit correspondence was issued to clarify information or to request additional information. All significant information that relates to the site and that is considered relevant to this site audit, has been provided and all issues are considered to be resolved.

The technical correspondence provided to the project in relation to this site audit during each stage of investigation, is detailed in Table 3.1 and included as Appendix A.

The interim site audit advice also includes checklists for the reports provided against the requirements of Environmental Protection Authority (EPA) (2020) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Land*. Whilst this reference has since been superseded it was relevant at the time of preparation of the interim site audit advice.

Table 3.1: Site audit correspondence summary

Correspondence	Relevance
Interim Site Audit Advice Letters	
Cavvanba (6 May 2019) *Interim Site Audit Advice ISAA01 – 1508-1904, Albion Park Rail Bypass, NSW.*	Preliminary review of HCJV (2017) and ENRS (2019a) draft SAQP.
Cavvanba (17 June 2019) *Interim Site Audit Advice ISAA02 – 1508-1904, Albion Park Rail Bypass, NSW.*	Preliminary review of ENRS (2019b) Detailed Site Investigation and ENRS (2019c) Remediation Action Plan.

Correspondence	Relevance
Cavvanba (21 June 2019) *Interim Site Audit Advice ISAA03 – 1508-1904, Albion Park Bypass, NSW*	Review of updated ENRS (2019b) and (2019c)
Cavvanba (9 August 2019) *Interim Site Audit Advice ISAA04 – 1508-1904, Albion Park Bypass, NSW*	Advice following site visit and for implementation of the RAP.
Cavvanba (13 May 2020) Interim Site Audit Advice ISAA05 – 1508-1904, Albion Park Bypass, NSW	Preliminary review of ENRS (2020) Validation.
Emails	
Fulton Hogan (12 June 2019) *Record of telecon re APRB Contamination immobilisation onsite*	Discussion of requirements for encapsulation on-site.
Fulton Hogan (13 June 2019) *Consent Authority under SEPP No 55 – Remediation of Land*	Discussion of SEPP 55 requirements.
ENRS (17 July 2019) *PSI Checklist response to ISAA02 and ISAA03 review.*	PSI checklist response for ENRS (2019b).
Cavvanba (9 November 2020) *RE: Albion Park*	Project reporting requirements update.
Fulton Hogan (18 February 2021) FW: Operational EMP – ACM cell	Confirmation of Transport for NSW review and acceptance of EMP.

3.11 Site audit report format

The report format for the remainder of the SAR is summarised.

Section 4 Site identification and surrounds – details the site identification and landuse, summarises the surrounding landuses and potentially sensitive human health and environmental receptors.

Section 5 Environmental setting – details the desktop study of the environment at and around the site, including published soils and geological information.

Section 6 Site history – summarises the site history.

Section 7 Site condition – details the site condition and infrastructure prior to remediation.

Section 8 Contaminants, media and environmental criteria – summarises the potential contaminants of concern, the relevant environmental media, based on-site history, and the environmental criteria used in the assessment of the site.

Section 9 Site assessment – summarises the investigations conducted at the site. Includes the objectives and scope, methodology and an assessment of the data usability based on the field and laboratory quality assurance and quality control (QA/QC).

Section 10 Assessment results – summarises the subsurface conditions and the analytical results from the investigations described in Section 9.

Section 11 Assessment conclusions – provides the consultants' and site auditor's conclusions.

Section 12 Remediation – summarises the remediation completed at the site.

Section 13 Additional encapsulation fill suitability assessment – summarises the supplementary investigation conducted by the consultant.

Section 14 Validation works – summarises the validation works completed following remediation.

Section 15 Validation discussion – provides the consultants' and site auditor's discussions

Section 16 Validation conclusions - provides the consultants' and site auditor's conclusions.

Section 17 Environmental management plan – provides a discussion of the environmental management plan.

Section 18 Conceptual Site Model – summarises the conceptual site model developed by the consultant including discussion from the auditor.

Section 19 Site suitability discussion – discusses the relevant regulatory issues, migration and risk of contaminants and landuse suitability, including discussions by the consultant and the site audit.

Section 20 Glossary and references.

Site audit correspondence is provided in Appendix A. The auditor's review of the consultants' data usability is provided in Appendix B including a background to data usability.

Attachments from consultants' reports are included as follows:
- maps, plans and figures in Attachment 1;
- test pit logs in Attachment 2; and
- analytical tables in Attachment 3.

4.0 Site identification and surrounds

The site identification and landuse, as well as surrounding landuses, potentially sensitive human health and environmental receptors are summarised in the following section. This information has been sourced from ENRS (2020) and the referenced published literature.

4.1 Site identification and landuse

The site location is shown on Consultant's Figure 10 as the bold black line, and consists of the following subsections within the project boundary:
- investigation area (including two subsections); and
- encapsulation area (EA).

The site identification and landuse details are:

Site Owner:	Transport for New South Wales;
Street address:	Princes Highway, Yallah NSW;
Investigation Area description:	Lot 99 DP 1076242; Lot 118 and Lot 119 DP 1223046; Part of Lot 61 DP 1041353; Lot 63 DP 1041353; and Part of Lot 3 DP 881749.
Encapsulation Area description:	Part of Lot 3 DP 881749.
Investigation Area - size:	2.85 hectares;
Encapsulation cell - size:	6,900 m^2;
Local government area:	Wollongong Council;
Landuse existing:	Undeveloped, adjacent to industrial properties;
Landuse proposed:	Albion Park Rail Bypass;
Zoning existing:	IN2 Light Industrial, SP2 Infrastructure;
Zoning proposed:	SP2 Infrastructure.

Site audit comment

There are four areas of the highway upgrade project referred to in this Audit report, which are referred to as follows:

- PAEC02 – an area of the highway upgrade project which was identified as potentially contaminated.
- Cut 1 – a portion of the highway which required bulk removal of earth, and encompasses PAEC 2.
- Fill 4 – an area to the south of Cut 1 and PAEC02 which required bulk filling with earth for construction purposes, and was subsequently selected for the location of the encapsulation cell.

- Fill 1 - a portion of the highway upgrade project which requires bulk filling, and from where soil was sourced for placement within the encapsulation cell.

4.2 Surrounding landuse

The remediation area is located within the proposed road alignment for the APRB project, with the surrounding landuses from the investigation area identified as:

North:	APRB Construction area, onto Yallah Road. An Endangered Ecological Community consisting of native bushland is also present to the north-west.
East:	Commercial and light industrial businesses, onto the Pacific Highway.
South:	APRB Construction area, including the ASBINS encapsulation cell area.
West:	E4 Environmental Living zoned residential dwellings.

4.3 Surrounding environment

The Albion Park Bypass Rail area includes multiple surface water bodies including creeks, rivers, tributaries and Lake Illawarra. Macquarie Rivulet is located approximately 400 m to the south of the remediation area. This is a tributary of Lake Illawarra, approximately 800 m to the east of the site.

Primary contact (e.g. swimming) and secondary contact (e.g. boating) recreational uses would be potential human receptors. The aquatic ecosystem and associated dependent species would be potential environmental receptors of the water bodies.

4.4 Site audit discussion

Site ownership information, as required by EPA made or approved guidelines was absent in the consultants reports and has been included by the auditor.

The information is otherwise consistent with the auditor's understanding of the site and the surrounding environment observed during the site inspections.

The site boundaries have been reported inconsistently throughout the project. Communications have resolved this, and the site description and associated plans have been confirmed as described in this Audit report.

5.0 Environmental setting

The desktop study of the environment at and around the site is summarised below, including published soils and geological information. The following sections are based on information from HCJV (2017), ENRS (2020) and the relevant published literature.

5.1 Local meteorology

Yallah's climate can be generally described as temperate. The temperatures are highest in January and coldest in June to July. The highest rainfall occurs in March and the driest months are July and September.

A summary of the climatic data for Albion Park (Shellharbour Airport) located approximately 3.7 km from the site is shown in Table 5.1.

Table 5.1: Climatic summary[1]

	Temperature ^{0}C		Rainfall mm		Mean number of rain days[2]
	Minimum	Maximum	Average monthly	Highest recorded	
January	17.1	27.1	74.3	178.4	7.9
February	17.2	26.4	145.5	356.0	8.6
March	15.6	25.3	120.7	422.2	8.2
April	12.2	23.3	71.5	261.2	7.0
May	8.8	20.7	53.1	398.6	4.6
June	7.2	18.1	90.6	340.4	6.4
July	6.3	17.8	54.2	191.8	4.8
August	6.5	18.8	58.5	281.8	4.4
September	8.5	21.4	41.8	112.0	5.1
October	10.8	23.1	67.9	218.8	6.8
November	13.3	24.1	80.2	222.0	8.0
December	15.3	25.7	63.0	171.8	7.7

Table notes:
1. Data from 1999 to 2020 from Albion Park (Shellharbour Airport), from Bureau of Meteorology climate averages website.
2. Number of days in a calendar month with at least 1 mm of precipitation.

5.2 Topography and drainage

HCJV (2017) described the site as follows:

> *The Site is approximately 26 m AHD and is relatively flat. The topography slopes steeply to the south in paddocks adjacent to the Site to the south. The Site is mostly vegetated, with two small areas of compacted soil and gravel within the commercial premises. Stormwater is likely to infiltrate into the soil and excess runoff would drain to the small dam within the paddocks to the south.*

5.3 Geology and soils

HCJV (2017) describes the geology of the site as follows:

Published geological information contained within the Wollongong-Port Hacking 1:250 000 Geological Series Sheet (Stroud et al, 1985) indicates the Albion Park Rail bypass area, including the subject Site, traverses two principal geological landscapes: the Permian era Berry Formation and Quaternary era alluvial and swamp deposits. The former geological landscape is present in the northern and southern parts of the Albion Park Rail bypass area (principally north of Duck Creek and south of Tongarra Road). Quaternary era alluvium and swamp deposits are largely situated within the central part of the site, mirroring the floodplains of the present day Duck Creek, Macquarie Rivulet and Frazers Creek.

The Berry Formation is locally comprised of red brown and grey volcanic sandstones north of Duck Creek and mid grey to grey siltstone and fine sandstone to the south of Duck Creek (Troedson and Hashimoto, 2013). Quaternary era alluvium associated with the Duck Creek floodplain is locally described as Holocene floodplain deposits, comprised of silts, fluvial sand and clay (Troedson and Hashimoto, 2013). Further south, near Macquarie Rivulet and Frazers Creek, the Quaternary era alluvial deposits form a complex of related units, including floodplain deposits (silt, fluvial sand, clay), levee deposits (fluvial sand, silt and clay) and alluvial paleo channel filling units (organic mud, peat, clay, silt, fluvial sand).

The Albion Park Rail bypass area includes multiple surface water bodies including creeks, rivers, tributaries, and Lake Illawarra. It is expected that local groundwater flow would be toward a vicinity surface water body with local gradients varying throughout the bypass area. The scope of this ESA did include an assessment of groundwater conditions and further details on the local groundwater flow or conditions are not known.

5.4 Hydrogeology

ENRS (2020) describes the following regarding hydrogeology:

A current search of the WaterNSW online groundwater bore database did NOT identify any registered water bores within one (1) kilometre radius of the Site.

Further site-specific groundwater data is documented in the project Geotechnical Interpretative and Design Report (SMEC & FH;2019). Table 42 of the design report documented the construction and elevation of existing monitoring bores at Cut No.1, with groundwater levels provided in Table 44.

Review of the available data set mentioned above, indicated the depth to groundwater across the Cut No.1 area was between 2.7-5.4 mbGL, which was assessed to be below the base of Fill encountered in test pits to a maximum depth of 1.8 mbGL (DSI, ENRS, 2019). No groundwater was intersected during the DSI (2019) scope of works. Hence, no further assessment of groundwater was conducted or considered necessary.

Site audit comment

As part of the site audit, a review was undertaken of the monitoring well data provided by ENRS (2020). Two of the monitoring wells were located either on-site or in close proximity. GW5 is located on-site in the eastern portion of the remediation area, and BH318 is located directly to the south of the remediation area (less than 25 m from the site boundary). A summary is included in Table 5.2 below.

Table 3: Summary of Existing Standpipes at Cut No.1

Bore ID	Total Depth	TOC RL	Screen (mbgl)	Standing water level (mAHD)	Standing water level (mBTOC)	Lithology
BH318	20.4	25.1	13.8 – 19.8	20.7 March 2018	4.4	Siltstone
GW5	10.0	24.13	6.0 – 9.0	19.8 March 2018	7.5	Siltstone

For confirmation purposes, a bore search was conducted as part of the site audit of Water NSW records. No bores were identified within 500 m of either the remediation or encapsulation site.

5.5 Site audit discussion

The information required by EPA made or approved guidelines, in regard to the desktop review of the environmental setting, has been adequately provided. The information has been checked and the auditor is satisfied with the consultant's understanding of the environment in the vicinity of the site.

6.0 Site history

A summary of site history is provided in Section 6.1, with more detail provided in the following sections. The information is taken from ENRS (2019b).

6.1 Site history summary

The following brief summary is included in ENRS (2019b), which states:

> *The PAEC02 ESA (HCJV;2017) documents a detailed assessment of the site history was included in the PSI (HCJV;2014). Table 6-1 documents the following summary of potentially contaminating historical landuse:*
> - *historical operations as a vehicle wrecking yard;*
> - *importation and stockpiling of fill materials; and*
> - *leaks and spills from vehicles when refuelling mobile plant and scaffolding warehousing and distribution.*

Site audit comment

The above description of site history is consistent with the auditor's understanding of the site.

The site history related to the encapsulation cell area is discussed in Section 6.7.

6.2 Landuse information

6.2.1 Land titles

No summary of historical title information was included in the reports prepared by ENRS.

Site audit comment

Based on the volume of other information available, and particularly the aerial photographs, this omission is not considered to be significant, and would not add any additional information of value or affect the outcome of the assessment of the site.

6.2.2 Council records

A Section 10.7 Certificate (Part 2 & 5) was obtained from Wollongong Council for inclusion in this project. The following summary is provided in ENRS (2019b):

> *A search of the Wollongong Council records relevant to potential ground contamination was undertaken including a review of the Council Section 10.7 Planning certificates. In general, the S10.7 (5) may provide information on potentially contaminated land.*
>
> *Searches were only available and completed for the following titles:*
> - *Lot 1 SP89821 – Council records show that because of previous uses the land may be contaminated. Councils records are incomplete and there is no certainty the land is so affected;*
> - *Lot 2 SP89821 – Council records show that because of previous uses the land may be contaminated. Councils records are incomplete and there is no certainty the land is so affected;*
> - *Lot 3 DP881749 – No advice provided;*
> - *Lot 3 SP89821 – Council records show that because of previous uses the land may be contaminated. Councils records are incomplete and there is no certainty the land is so affected;*

- *Lot 61 DP1041353 – Council records show that because of previous uses the land may be contaminated. Councils records are incomplete and there is no certainty the land is so affected; and*
- *Lot 99 DP1076242 – No advice provided.*

Review of Development Applications at the subject Site identify numerous records not related to contaminated lands. An initial application (DA-2005/1909) was made by the RTA to Wollongong Council for bioremediation of petroleum hydrocarbon impacted soils for Lot 4 DP59859, however the application was later cancelled which indicates the activity did not take place. The records indicate the RTO decided to proceed with direct disposal rather than land-farming.

Site audit comment

Section 10.7 certificates were not obtained for all Lots included in the remediation and encapsulation area, however this is not considered to be significant, and would not add any additional information of value or affect the outcome of the assessment of the site.

6.2.3 Aerial photograph review

ENRS (2019b) summarised available aerial photographs for the site dated from 1948 to 2016, which is detailed in Table 6.1 below.

Table 6.1: Summary of Historical aerial photography

Year	*Summary of site observations*
1948 - 1951	*The Site and surrounds are unbuilt. The Site is observed to comprise of mostly open grass land and paddocks with some trees in the north and an access road a single structure present at lot 10 immediately north of the Site. The Princes Highway and Avondale Road have been constructed. No significant disturbance of the ground is noted within the Site area.*
1963	*Central and southern portions of the Site are inbuilt with no tree shadows indicating grass cover. A dirt road is evident passing east-west through the northern portion of the Site. The northeast corner comprises rows of parked cars.*
1974	*The southern portion of the site remains unbuilt with grass cover and several potential drainage features trending southwest.* *The car lot in the north has expanded to cover the area north of the dirt road. Commercial buildings are present on the eastern boundary.*
1977	*Site remains largely unbuilt and covered with grass. Several dark shaded areas are present in the south, likely vegetation areas or stockpiles.* *Lot 63 in the north of the site contains scattered objects likely associated with the adjoining wrecking yard where numerous cars are visible in lines. An access tracks extends into the site from the yard.*
1980	*The car lot remains in the north of the site.* *Earth works are evident in the south of the site with three (3) east-west orientated rows across the slope.*
1984	*Resolution insufficient for ENRS to identify land use or specific activities. Table 0-6 of the PSI (HJCV;21015) (sic) Site Description: The northern section of the site is now defined by a freeway which follows the northern quarter of the site.*

Year	Summary of site observations
	Defined commercial and residential land uses are now located around the road. Southern portion of the imagery is not available.
1990	*The northern portion is brown with no grass cover and limited vehicles/stored items along the eastern boundary.* *Numerous and scattered items are present across the mid-portion of the site extending west from the neighbouring commercial properties. Items are white and coloured characteristic of vehicles, machinery or similar. The southern areas remains covered with grass.*
1993	*Resolution insufficient for ENRS to identify land use or specific activities. Table 0-6 of the PSI (HJCV;21015) (sic) Site Description: The Croom Sporting Complex is now clearly visible in the central section of the project site. Minimal changes in rural land uses across most of the site.*
2006	*Vehicles/machinery and large objects are evident in lot 63 with similar scattered items across the adjoining lots to the south.*
2010	*Resolution insufficient for ENRS to identify land use or specific activities. Table 0-6 of the PSI (HJCV;21015) (sic) Site Description: Road networks within the site are clear and well developed. Minimal visible changes to rural lands.*
2012	*The site has largely been cleared of previous vehicles and objects. Numerous trees have established.* *Sheds and/or anthropogenic items are noticeable on the eastern boundary in the south of the site.*
2014	*Site layout is generally consistent with the 2012 observations.*
2016	*Similar layout to previous 2014 conditions, with stockpiles evident in the north of the Site.*

6.3 Activities conducted

A summary of the activities conducted on-site is provided in the following sections.

6.3.1 Chemical usage and storage

The following discussion was provided by ENRS (2019b):

> *A register search of SafeWork NSW records for licences to keep dangerous goods was NOT undertaken for this report as the Site had previously been subject of a PSI which did not identify any dangerous goods for the Site (HCJC; 2017).*

Site audit comment

Based on the observations made on site, as well as the volume of other information available, this omission is not considered to be significant, and would not add any additional information of value or affect the outcome of the assessment of the site.

6.3.2 Incidents and spills

No records of incidents or spills were included in the previous reports.

6.3.3 Waste management

The following description is included in HCJV (2017):

> *Various automobile parts were observed on the soil surface throughout the paddocked area, with numerous stockpiles of presumably dumped materials present.*
>
> *Operations within the scaffolding yard were observed to consist of loading and unloading scaffold materials onto trucks. Scrap metal was observed on the soil surface throughout this area.*
>
> *The car dealership rear parking area consisted of numerous scrap cars, with slight hydrocarbon staining observed on the soil surface.*

Site audit comment

It should be noted the comments above regarding the scaffolding yard and car dealership were part of an investigation of a broader area, and represent the adjacent land to the east and potential off-site waste and sources of contamination.

6.3.4 Use of PFAS compounds

Contamination by per- and poly-fluoroalkyl substances (PFAS) was not considered to be applicable in the assessment of contamination. The following discussion was provided (ENRS, 2019b):

> *PFAS have been globally identified as chemicals of high concern to human health and the environment due to their persistence and bioaccumulation. PFAS in Australia, are mainly used as mist suppressants in the metal plating industry, hydraulic fluid in aircraft, surfactants in the photographic industry, and in some types of fire-fighting foams (Aqueous Film-Foaming Foams (AFFF). Appendix B of the PFAS National Environmental Management Plan (HEPA;2018) documents a range of activities and sources of PFAS. It is noted the batteries observed during the investigation comprised lead acid and not high-end lithium style batteries identified in Appendix B of the PFAS NEMP (2018).*
>
> *Based on the available Site history records reviewed during this assessment and the ground observations, PFAS is not identified as a significant CoPC, and not further assessment of PFAS is considered necessary.*

Site audit comment

The auditor agrees with the above discussion and does not consider that significant potential sources of PFAS are present.

6.4 Services

ENRS conducted an underground services search as part of ENRS, 2019b:

> *The location of underground services can provide conduits and preferential pathways for contaminant migration into or from a Site. In general, service excavations and trenches may also comprise historical Fill which may require management as waste.*
>
> *ENRS understand the Site proposal comprises extensive earthworks and re-construction. Dial Before You Dig (DBYD) plans reviewed in the Sample*

Analysis and Quality Plan (SAQP) did NOT identify any significant underground services in the assessment area.

6.5 Licenses, permits and notices

A review of the NSW EPA Contaminated Land Register was undertaken as part of ENRS (2019b). As the site is located near the local government area boundary, the search was undertaken for both Wollongong and Shellharbour local government areas.

For confirmation purposes, the auditor has checked the current status of a wider range of licenses, permits and notices and a summary is provided in Table 6.2 below.

Table 6.2: Online search results for licences, permits and notices

Search	Description	Result
Protection of the Environment Operations (POEO) Public register	Environment protection licences, applications and notices.	No POEO licensed activities are located within 1 km of the Site. A record exists for the Tallawarra Power Station in Yallah (apporixmately 5 km from the site).
Contaminated Land Management (CLM) Records.	Notices for: – Declaration of significantly Contaminated Land; – Approved Voluntary Management Proposals; Management orders; – Ongoing maintenance orders; – repeal, revocation or variation notices; – Site audit statements. Has the site been notified to the EPA?	No contaminated land records exist for the subject site or adjacent lands. The nearest address is the Tallawarra Power Station in Yallah which is located on the foreshore of Lake Illawarra, approximately 5 km from the site. The Tallawarra Power station in Yallah is included in the list of sites notified to NSW EPA (November 2020).
The Department of Defence	Unexploded ordinance risk.	No UXO results were found for the site.

6.6 Site audit discussion

The information required by EPA made or approved guidelines, regarding the desktop site history, has been adequately provided, and where data gaps in information are evident, these have been checked and adequately supplemented.

The information provided is consistent with the auditor's understanding of the site and observations made during the site inspection and is considered sufficient for the purposes of the site audit.

6.7 Encapsulation area, site history

ENRS 2020a discuss the site history related to the encapsulation area within Fill 4:

In the lead up to Project commencement, a Stage 1 Preliminary Site Inspection (PSI) was conducted by Hyder Cardno Joint Venture (HCJV) for the entire proposed Albion Park Rail Bypass Project works area. ENRS note the area occupied by the Fill No.4 road embankment and the ASBINS encapsulation cell was not identified as a potential Area of Environmental

Concern (AEC). Based on this information, the area proposed for the Fill No.4 road embankment and encapsulation cell was likely to present a low to negligible risk of existing ground contamination.

Site audit comment

The site history information is very limited, however there is no indication that the encapsulation area has been used for activities and land uses likely to have caused contamination which represents an ongoing risk. This is particularly the case for the proposed road construction, and further review of site history was considered unnecessary.

7.0 Pre-remediation site condition

The site condition prior to the commencement of remediation works is summarised below, taken from HCJC (2017):

> *The Site consists of a large paddocked area of approximately 1.15 ha, a scaffolding yard of approximately 0.2 ha and a rear parking area connected to an adjacent car dealership of approximately 0.05 ha. The paddocked area is mostly vegetated with grass, with areas of tall shrub located on a slight embankment adjacent to the western Site boundary. Areas of exposed soil are present within the centre portion of the paddocked area of the Site, as well as within the scaffolding yard and car dealership parking area. Hardstand areas were not observed during the Site inspection. The paddocked area is fenced with the exception of the northern and northwestern Site boundaries. Portions of the Site within the scaffold yard and car dealership are fenced by the wider businesses' fencing.*
>
> *The Site is predominantly undeveloped, with the paddocked area understood to be unused since operations as a wrecking yard ceased. Various automobile parts were observed on the soil surface throughout the paddocked area, with numerous stockpiles of presumably dumped materials present.*
>
> *Operations within the scaffolding yard were observed to consist of loading and unloading scaffold materials onto trucks. Scrap metal was observed on the soil surface throughout this area.*
>
> *The car dealership rear parking area consisted of numerous scrap cars, with slight hydrocarbon staining observed on the soil surface.*

The following summary table is also provided for the site description (HCJC, 2017):

Table 2-2: Site Description

Item	*Observations*
Current site use	*Predominantly unused. Loading and unloading of trucks and storage of scaffolding occurs within the scaffold yard.*
Weather conditions	*Fair, sunny and limited cloud coverage.*
Site surface coverings	*Grass and exposed soil within the paddocked area, compacted soil and gravel within the scaffold yard and car dealership parking area*
Surface soils	*Clayey sand and sandy clay*
Site cut and fill	*Fill is present to a maximum depth of 0.7 mBGL, however is generally observed to 0.2 mBGL across the Site.*
Buildings	*No buildings are present on the Site.*
Potential asbestos in building materials	*Asbestos cement debris was observed on the soil surface within the paddocked area of the Site.*
Manufacturing, industrial or chemical processes and infrastructure	*Not observed*
Fuel storage tanks (USTs/ASTs)	*Not observed*
Dangerous goods	*Not observed*

Item	*Observations*
Solid waste deposition	*Numerous stockpiles of soil materials were observed within the paddocked area of the Site.*
Liquid waste disposal features	*Not observed.*
Evidence of previous site investigations	*Groundwater monitoring well monuments were observed within the paddocked area of the Site.*
Evidence of land contamination (staining or odours)	*Not observed*
Evidence of groundwater contamination	*Not observed*
Groundwater use	*Not observed.*
Vegetation	*Long grass and shrubs are present within the paddocked area of the Site. An Endangered Ecological Community consisting of native bushland bounds the northern Site boundary.*
Site fencing	*The paddocked area is fenced with the exception of the northern and northwestern Site boundaries. Portions of the Site within the scaffold yard and car dealership are fenced by the wider businesses' fencing.*

7.1 Site audit discussion

It is understood that the scaffolding yard referred to was not ultimately included in the area to be remediated and validated for site suitability. The scaffolding yard is part of Lot 117, which is adjacent to the site in the north eastern corner.

The information required by EPA made or approved guidelines, regarding the description of the site condition, has been adequately provided. The information provided is consistent with the auditor's understanding of the site and observations made during the site inspections. It is therefore considered sufficient for the purposes of the site audit.

7.2 Encapsulation area condition

ENRS 2020a describe the area which was to be prepared for the containment cell:

> *Prior to the commencement of remediation works, inspections of the encapsulation area were carried out by representatives from Fulton Hogan, ENRS and the NSW EPA accredited Site Auditor to ensure the suitability of the Site for the proposed encapsulation cell. The Site was observed to comprise largely unoccupied grassed land adjacent to a large dam. Preliminary geotechnical investigations of the project area (SMEC, 2019) identified Holocene alluvium (very soft to soft clay, silty clay) overlying firm to very stiff clay and very firm to stiff gravelly clay within the Fill No.4 area. This was confirmed during excavation of the containment cell, where subsurface conditions were observed as primarily natural ground comprising brown silty clays. No visual or olfactory indicators of gross levels of ground contamination were observed within the proposed encapsulation cell Site during preliminary inspections or any stages of construction works.*

ENRS 2020a also describe the site preparation works for the containment cell:

The level of existing ground in the Fill No.4 area proposed for the encapsulation was situated at a level in excess of 2.0m above the groundwater table. In areas where this was not the case, Fulton Hogan placed and compacted general fill materials to provide a surface level greater than 2.0m above the groundwater table on which the encapsulation cell was constructed.

The containment cell was protected by lining and wrapping in geotextile fabric so that all material was enclosed within the cell. High visibility webbing was also installed as a warning layer outside to prevent any intrusion from future Site works. In addition to the installation of geofabric, the containment cell was protected from floodwaters by the placement and compaction of general fill materials to a minimum thickness of 3.0m from the edge of the embankment. This material was good quality general fill, compacted to 98% compaction, to ensure it was resistant to the infiltration of any floodwaters and not susceptible to any form of erosion.

Site audit comment

The proposed location of the containment cell was checked by the auditor, and no unacceptable risks were identified which would preclude the construction and placement of the asbestos contaminated materials. No further assessment such as soil and groundwater testing were considered necessary.

8.0 Contaminants, media and assessment criteria

8.1 Potential contaminants

The potential contaminants of concern (PCOC) associated with current and historical land use activities are detailed Table 8.1.

Table 8.1: Contaminants of concern and potential sources

PCOCs	Description and common relationship
TRHs	Total recoverable hydrocarbons including volatile fractions (C_6 – C_9 TRHs) and semi-volatile fractions (C_{10} – C_{36} TRHs). Fuels, oils and grease, fill material, solvents.
BTEXN	Benzene, toluene, ethyl benzene, xylenes and naphthalene. Volatile hydrocarbons. Fuel constituents, fill materials, solvents.
PAHs	Polycyclic aromatic hydrocarbons. Semi-volatile hydrocarbons. Constituents in bitumen, tar, asphalt, fuel constituents, oil, grease, ash.
Phenols	Fuel and waste oil constituent.
Heavy metals	arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni) and zinc (Zn). Fill, fuels/oils, pest control, fertilisers, metal working, buildings, fences, urban runoff, electrical components, etc.
OCPs, OPPs	Organochlorine and organophosphorus pesticides – not considered to be a primary contaminant of concern. Pest control/fertilisers. OPPs are broken down in an oxygenated environment, while OCPs are persistent in the environment.
Asbestos	Asbestos in the form of free fibres and asbestos containing materials (ACMs). Commonly used in pipework, buildings (fibro), etc.

8.2 Environmental media

The environmental media considered relevant for the investigation is limited to soil only.

8.2.1 Groundwater discussion

The following groundwater discussion is provided by ENRS (2019b):

> *Groundwater is assessed to be at depths greater than 5 mbgl at the subject Site and ~15 m below the proposed encapsulation area. No groundwater bores are present within 1,000 m of the Site, hence there is no complete pathways within the Site.*

Site audit comment

The auditor agrees that based on the nature of the contaminants identified, the risk of groundwater contamination associated with the site is considered to be low and not require investigation.

8.3 Environmental criteria

8.3.1 National Environment Protection Measure (NEPM)

ENRS (2019b) selected the following soil criteria:

> *Given the Site proposal for construction of a road the relevant SAC is **HIL D for commercial and Industrial land use**.*
>
> *In addition to the HILs the amended ASC NEPM (2013) provides the following Site Assessment Criteria (SAC):*
> - ***Management Limits** for petroleum hydrocarbon compounds (Table 1 B (7));*
> - ***Health Screening Levels** (**HSLs**) potential vapour intrusion (Table 1A [4]) should be selected based on the; land use; medium (sand, silt, clay); and depth;*
> - ***Groundwater Investigation Levels (GILs)** should be applied based on the receiving environment and groundwater resources. GILs are provided in NEPM Table 1C for; Fresh Waters; Marine Waters; and Drinking Water; and*
> - ***Ecological Investigation Levels (EILs)** and Ecological Screening Levels (ESLs) for common contaminants in the top 2 m of soil based on three (3) generic land use settings; areas of ecological significance; urban residential areas and public open space; and commercial and industrial land uses.*

The following discussion is provided in ENRS (2020) regarding EILs and ESLs for validation purposes:

> *Given the land disturbance of the APBP and the proposed and surrounding residential and commercial land uses, adoption of the EILs was not considered necessary for the purposes of this validation report. The aims of the RAP (ENRS, 2019) and remediation works were to appropriately remediate all* ground contamination not considered suitable for the proposed land use.

Site audit comment

It is noted that EILs were not derived for multiple metals. These have been included in the site audit review for comparison purposes. The values were derived using the Australian soil reference values outlined in the NEPM, 2013: pH = 6, Clay content = 10%, CEC = 10 cmol/kg, Organic carbon = 1% or equivalent organic matter.

In addition, it is noted that other reference criteria not mentioned above were included in the analytical tables (including Dutch intervention values). The relevance of this criteria is not discussed, and other Australian data is available for the majority of these analytes which have been included instead as part of the site audit.

It is also highlighted that the application of groundwater criteria was not required, given groundwater was not identified as a media of concern and there were no direct groundwater measurements taken during the investigation.

Management limits are typically applied to active petroleum storage sites, and it is unlikely that these could be applied to the site or the encapsulation area.

8.3.2 Aesthetic criteria

ENRS (2019b) provides the following discussion of aesthetics:

Given the Site proposal is to excavate all materials within the Cut No.1 zone subject of this assessment, the aesthetic criteria are not considered necessary. All material re-instated within the project will be placed at depth within an encapsulation cell, and will not be subject to further use.

Site audit comment

The auditor has checked and agrees with the consultant that aesthetics are not an issue requiring specific criteria for this project.

8.3.3 Asbestos in soil criteria

ENRS (2019b) provides the following discussion of asbestos in soil criteria:

The ASC NEPM (2013) Schedule B2 - Guideline on site characterisation documents Health Screening Levels (HSLs) for asbestos levels in soil adopted from the Western Australian Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites in Western Australia (WA Gov; 2009). The Guidelines only apply to asbestos materials in soils, they do not apply to asbestos or asbestos containing materials present in buildings, structures, functional pipelines etc. The NEPM guidelines define three (3) primary forms of asbestos in soil:

- ***Asbestos Containing Material** (**ACM)** – non-friable matrix material generally observed as stable fragments in soil unless subjected to aggressive disturbance, prolonged saturation or fire;*
- ***Fibrous Asbestos** (**FA)** – friable and fibrous material. Friable asbestos materials are those that can be crumbled, pulverised or reduced to powder by hand pressure when dry; and*
- ***Asbestos Fines** (**AF)** – sub-7 mm material including free fibre. Respirable asbestos fibres are generally greater than five micrometres long and no wider than 3 micrometres.*

Form of asbestos	*Health Screening Level (HSL) (w/w%)*			
	Residential A	*Residential B*	*Recreational C*	*Commercial/ Industrial D*
Bonded ACM	*0.01%*	*0.04%*	*0.02%*	*0.05%*
FA and AF (Friable asbestos)	*0.001%*			
All forms of asbestos	*No visible asbestos for surface soil*			

1. Residential A with garden/accessible soil also includes children's day care centres, preschools and primary
schools.
2. Residential B with minimal opportunities for soil access; includes dwellings with fully and permanently paved
yard space such as high-rise buildings and apartments.
3. Recreational C includes public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary
schools and unpaved footpaths.
4. Commercial/Industrial D includes premises such as shops, offices, factories and industrial sites.

Site audit comment

The auditor has checked that the correct criteria have been selected, being the commercial/industrial asbestos criteria.

8.4 Site audit discussion

Based on the site inspection completed and the site history information obtained, the auditor considers that the potential contaminants, environmental media and environmental criteria are appropriate and consistent with the NSW EPA made and approved guidelines.

9.0 Site assessments

The intrusive site investigation conducted on-site are detailed in the following reports:

- Hyder Cardno Joint Venture (HCJV, 2017) *Environmental site assessment – PAEC02: Industrial Estate, Albion Park Rail Bypass* (Ref. FK0004-APRB-R-02).

- ENRS (2019b) *Stage 2 – Detailed Site Investigation (DSI), Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153_APRB_PAEC02 Cut#1_DSI, June 2019).

9.1 HCJV (2017)

Hyder Cardno Joint Venture was engaged by Roads and Maritime (RMS) to prepare environmental site assessments (ESAs) for seven properties within the project footprint as part of the Albion Park Rail bypass project. Four of the sites were identified as Potential Areas of Environmental Concern (PAEC) in the Phase I Preliminary Site Investigation (PSI) prepared by HCJV in 2014 (HCJV, 2014).

This ESA was prepared for PAEC 02 Industrial Estate, Yallah Road, Yallah. Fieldworks were conducted on 19 – 20 June 2017.

Whilst the report covers a broader area within the Albion Park Rail bypass project, the site, being the remediation area, and encapsulation cell is the only area of concern that will be further discussed within this Site Audit Report.

The objective, scope and methodology of the investigation is discussed below. The investigation results are summarised in Section 10, and the contamination status is discussed in Section 11. A data usability assessment has been included in Appendix B.

9.1.1 Objectives and scope

The purpose was to provide Roads and Maritime with advice on the subsurface conditions at the Site relative to the intended land use as a road bypass and provide soil management options should they be required.

The objectives were stated to be (HCJV, 2017):

- *Identify areas of shallow soil impact at the PAEC through collection and analysis of soil samples;*
- *Identify potential areas of concern at the Site;*
- *Develop a preliminary Conceptual Site Model (CSM) including identification of potential sensitive receptors that may be exposed to identified subsurface impacts (if present); and*
- *Provide recommendations for additional assessment or management options if impacted soil is identified.*

The scope consisted of the following (HCJV, 2017)

- *Define the Site features and immediate surrounds based on review of the PSI and site observations during the assessment activities.*
- *Undertake an intrusive investigation which included:*
  - *Locating services in the assessment areas and complete non-destructive drilling (NDD) techniques to 1.0 metres below ground level (mbgl) at each sampling location;*
  - *The advancement of 25 soil borings utilising a track mount drilling rig with solid flight augers;*

- *Inspection and collection of soil samples from three stockpiles*
- *Submission of eighty-two primary soil samples to a NATA accredited laboratory for analysis;*
- *Soil samples were analysed for Total Recoverable Hydrocarbons (TRH) C6 to C40, benzene, toluene, ethylbenzene, total xylenes and naphthalene (BTEXN), heavy metals including arsenic, cadmium, total chromium, copper, lead, mercury, nickel and zinc (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn, respectively), polycyclic aromatic hydrocarbons (PAH), phenols, volatile organic compounds (VOCs), asbestos in soil (presence / absence) and asbestos identification (in building materials).*

- *Development of a preliminary CSM which evaluates potential risks to identified sensitive receptors; and*
- *Preparation of this ESA.*

9.1.2 Data quality objectives

The data quality objective process, a seven-step iterative planning approach as defined by Australian Standard AS4482.1 (2005), the Guidelines for the NSW Site Auditor Scheme (NSW EPA, 2017) and the ASC NEPM (2013) Schedule B2, was implemented and detailed in Appendix G of the report.

9.1.3 Sampling and analytical strategy

HCJV (2017) provide the following interpretation of the sampling and analytical strategy:

> *Locations sampled were selected based on the site inspection. Anecdotal information obtained during the site inspection indicated that vehicular dismantling and dumping of wastes may have occurred in the past. As such sampling points were situated across the Site, with larger stockpiles of potentially dumped materials also sampled for waste classification and assessment purposes.*

Table 9.1 below provided a summary of the sampling strategy in HCJV, 2017.

Table 9.1: HCJV, 2017 Sampling strategy

Location	*Date Collected*	*Site Area*	*Rationale*
BH01	*20/06/17*	*Car Dealership*	*Potential leaks and spills from operational and partially disassembled vehicles.*
BH02 – 23 and BH25	*19-20/06/17*	*Paddock*	*Historical operations as a vehicular wrecking yard, imported fill, illegal dumping and stockpiling of waste soils.*
BH24	*20/06/17*	*Scaffold Yard*	*Potential leaks of mobile plant and machinery, refuelling spills, imported fill and scaffold warehousing and distribution.*

Site audit comment

The analytical strategy is partially outlined in the report, but based on the scope consisted of the following for soil:

- TRH;

- BTEXN;
- heavy metals;
- PAHs;
- phenols;
- VOCs; and
- Asbestos (presence/absence in soil and identification in building materials).

9.1.4 Sampling and analytical methodology

HCJV (2017) provide the following discussion of the sampling and analytical methodology:

> *Fieldwork was undertaken by an experienced environmental scientist in accordance with the agreed scope of work, the legislation and guidelines listed in Section 1.4 and the HCJV Standard Operating Procedures (SOPs).*
>
> *All primary and duplicate samples were sent to ALS Laboratory for analysis of the contaminants of potential concern (CoPCs) included in Section 1.4. Interlaboratory triplicate samples were sent to Eurofins for analysis.*
>
> *Samples were placed in laboratory supplied containers and stored on ice in an ice box while on site and in transit to the laboratory under standard Chain of Custody documentation.*
>
> And:
>
> *Advancement of boreholes was completed under the supervision of an experienced environmental professional from HCJV using a combination of hand auger and solid stem auger techniques to collect soil samples for analysis. The maximum depth the boreholes were advanced was 2.0 mbgl. Due to shallow push tube refusal, solid flight augers were used to advance boreholes.*

9.1.5 Data usability

The following extract was reported by HCJV (2017) regarding the QA/QC program implemented:

> *The data validation procedure employed in the assessment of the field and laboratory QA/QC data indicated that the reported analytical results are representative of the conditions at the sample locations and that the analytical data can be relied upon for the purpose of these additional validation works. It is concluded that overall the quality of the analytical data produced is reliable for the purposes of validating this site for the intended land use.*

Site audit comment

The opportunity to observe asbestos in soil was very limited due to the use of boreholes for sample collection, which also limits the overall use of the conclusions made in regard to landuse suitability.

The auditor conducted a data usability assessment as part of the site audit. The findings of the data usability assessment determined that overall, and excluding the limitations on appraisal of soil for asbestos, the analytical data was of sufficient quality to support the project conclusions.

9.2 ENRS (2019b)

It is understood that during some minor earthworks at PAEC02, additional asbestos materials were identified, and ENRS were engaged to investigate the extent and magnitude of the issue.

ENRS was commissioned by Fulton Hogan to undertake a DSI which included an assessment of soil at the site. The fieldwork program was undertaken between the 6 – 8 May 2019.

The development of the sampling program was documented in the sampling analysis and quality plan (SAQP).

The objective, scope and methodology of the investigation is discussed below. The investigation results are summarised in Section 10, and the contamination status is discussed in Section 11. A data usability assessment has been included in Appendix B.

9.2.1 Objectives and scope

The objective is described as follows (2019b):

> *The aim of the DSI was to provide supplementary information on the Site history documented in preliminary investigations and further characterise the type, extent and level of contamination by conducting intrusive ground investigations. Where applicable, identify any potential off-site impacts, and review the project results to assess if the Site will pose no unacceptable risk to human health or to the environment. Compile the project results and prepare recommendations for the development of a Remediation Action Plan (RAP) to make the Site suitable for the proposed construction of a road comprising commercial and industrial land-use.*

The scope of work was described as follows (ENRS, 2019b):

> *The scope of work for the project comprised the following tasks:*
> - *Review available Site history records incorporating previous investigation reports, proposed development plans, Council records and publicly available data (including aerial photographs, geological maps, topographical maps, and registered groundwater bore database);*
> - *Test Pit investigations in fourty eight (48) locations;*
> - *Submit selected samples to a NATA accredited laboratory for analysis;*
> - *Conduct Tier 1 screening of NATA analysis results against NSW EPA endorsed Site Assessment Criteria (SAC); and*
> - *Document investigation results. Prepare a Stage 2 DSI report with recommendations for a Remediation Action Plan (RAP).*

9.2.2 Data quality objectives

The data quality objective process, a seven-step iterative planning approach as defined by Australian Standard AS4482.1 (2005), the Guidelines for the NSW Site Auditor Scheme (NSW EPA, 2017) and the ASC NEPM (2013) Schedule B2. This process was detailed in full as part of the sampling, analysis and quality plan (ENRS, 2019a), and reviewed and commented on in ISAA01.

9.2.3 Sampling and analytical strategy

The sampling strategy is described below, taken from ENRS, 2019b:

Soil sample locations were selected with consideration of the ASC NEPM (2013) Schedule B2 Section 6, guidelines on Sampling Design (NEPC;2013). Based on the Site area of ~3.5 hectares the relevant sample density guidelines provided in Table E1 AS4482.1 (2005) require a minimum of forty-five (45) sampling points (equivalent to 12.9 points per henctare (sic)) for site characterisation based on 95% confidence of detection of circular hotspots within a diameter of 32.9 m. A total of forty-eight (48) test pit locations were excavated during the investigation program, generally at distance less than 32.9 m between points, which is considered adequate to identify any potential hotspots or AECs. Additional soil stockpiles were sampled at a rate of 1 per 25m3 or a minimum of three (3) samples per stockpile. Six (6) stockpile samples were collected from two (2) soil stockpiles.

Sampling locations were limited to accessible areas at the time of this investigation based on Site infrastructure, hardstand thicknesses and plant movements. Test Pits were advanced using an excavator bucket.

Final soil samples locations were selected in the field with consideration of the following criteria and are illustrated in Figure 2:
- *Target AECs;*
- *Investigate areas of potential Fill;*
- *Down-gradient and up-gradient boundaries;*
- *Grid-based sample plan to provide a systematic assessment of Site area; and*
- *Accessible ground and safe standing conditions for ground works.*

The following analytical strategy was used during the investigation (ENRS, 2019b):

Samples were selected for analysis based on the stratigraphic conditions to identify any apparent contamination and define soil conditions vertically and laterally. Not all samples collected were analysed. Selected samples were analysed for the Contaminants of Potential Concern (CoPC) identified in Table 5.

Where applicable, if elevated concentrations were reported in a sample, additional samples from adjoining or underlying locations were analysed to further determine the extent of contamination. All other samples not selected for analysis were placed on hold in a refrigerated environment for subsequent analysis, if required.

A summary of the sample analysis program is provided in Table 13 with details of the investigation target or AECs assessed by each sample location and the analysis performed. The sample program was considered adequate to identify and characterise potential contamination at the Site.

9.2.4 Sampling and analytical methodology

The sampling methodology is described below, taken from ENRS, 2019b:

Samples were collected in general accordance with the principals described in AS4482.1- 2005: Guide to sampling and investigation of potentially contaminated soil (Part 1: Non-volatile and semi-volatile compounds) and AS4482.2-1999: Guide to sampling and investigation of potentially contaminated soil (Part 2: Volatile compounds).

Soil logging procedures followed a systematic and standardised format providing a classification of the soil group based on particle size and structure.

Field observations were conducted to detect potential soil contamination, if any, and to distinguish between soil composition, condition and structure.

Sample depths were selected with consideration of ground conditions observed during investigations. Samples were obtained near the surface, at 0.5 m and at 1 m intervals thereafter. Additional samples are collected at intervals defined by changes in ground conditions triggered by Site observations. Generally, Test Pits were advanced at least 0.5 m into natural ground where possible, which was considered a sufficient depth to assess conditions at the Site. A maximum investigation depth of 1.9 metres was reached based on the depth of Fill encountered.

Samples were collected in general accordance with industry standard QA/QC procedures. Discrete soil samples were collected with disposable sterile gloves and placed directly into laboratory supplied 250 mL jars and immediately stored on ice. Sample containers were individually labelled with sample identification clearly marked on the container and sealed lid.

Asbestos samples were double bagged in 200 micron sealed plastic and labelled for asbestos.

9.2.5 Data usability

The following extract was reported by HCJV (2017) regarding the QA/QC program implemented:

The data validation procedure employed in the assessment of the field and laboratory QA/QC data indicated that the reported analytical results are representative of the conditions at the sample locations and that the analytical data can be relied upon for the purpose of these additional validation works. It is concluded that overall the quality of the analytical data produced is reliable for the purposes of validating this site for the intended land use.

Site audit comment

The auditor conducted a data usability assessment as part of the site audit. The findings of the data usability assessment determined that overall, the data was of sufficient quality to support the project conclusions.

9.3 Site audit discussion

The combined investigations conducted as part of HCJV (2017) and ENRS (2019b) were considered to be appropriate to characterise the site. The selection of contaminants of concern, sampling methodologies and quality control, and the resultant characterisation, is adequately justified.

A summary of the investigation scope conducted is provided below in Table 9.3.

Table 9.3: Soil investigation scope and rationale

Areas of concern, investigation strategy, size	Sampling Method	Analysis	Number of Locations and IDs	Depth of investigation
PAEC02 – Industrial estate (includes car dealership,	Boreholes (HCJV 2017)	– Heavy metals; – Hydrocarbons: TRH, BTEXN,	HCJV (2017) 25 boreholes BH1 – BH25	Maximum explored depth of 1.9 m.

Areas of concern, investigation strategy, size	Sampling Method	Analysis	Number of Locations and IDs	Depth of investigation
scaffold yard, paddock and heritage area) Combination of systematic (grid) and targeted. ~2.36 hectares.	Test pits (ENRS, 2019b)	PAHs, phenols; – VOCs/SVOCs; – Asbestos in soil and identification for fragments.	ENRS (2019b) 30 test pits TP17 – TP47	
Paddocks (south of PAEC2) Combination of systematic (grid) and targeted. ~1.14 hectares.	Test pits (ENRS, 2019b)	– Heavy metals; – Hydrocarbons: TRH, BTEXN, PAHs, phenols; – VOCs/SVOCs; – Asbestos in soil and identification for fragments.	ENRS(2019b) 16 test pits TP01 – TP16	Maximum explored depth of 1.2 m.
Stockpiles (three stockpiles)	Boreholes (HCJV, 2017) Test pits (ENRS, 2019b)	– Heavy metals; – Hydrocarbons: TRH, BTEXN, PAHs, phenols; – VOCs/SVOCs; – Asbestos in soil and identification for fragments.	HCJV (2019b) 9 locations SB1 0.1 m, SB1 0.2 m, SB1 0.6 m, SP2/1_0.2; SP2/2_0.1; SP2/3_0.2; SP3/1_0.3, SP3/2_0.1, SP3/3_0.1 ENRS (2019b) 6 locations SP1/1 – SP2/3	Maximum explored depth of 0.6 m.

10.0 Assessment results

The results of the soil assessments described in Section 9 are summarised below.

10.1 Soil conditions

The following description of soil conditions is provided in ENRS, 2019b:

> *Ground investigations encountered Fill in the north of the Site with various car parts and foreign materials to depths of 1.8 m in the former southwest corner of the wrecking yard. Asbestos was observed at a maximum depth of 0.85 m in the north of the Site, however given the uncontrolled nature of Fill at the Site, it should be considered there is potential for asbestos in all area of Fill. The southern portion of the Site comprised primarily natural ground.*
>
> *The site walkover did not identify any surface evidence of vegetation distress likely associated with ground contamination. The northern portion was partially disturbed with patchy grass and ground cover, whilst the central and southern portions were extensively covered by grass.*
>
> *Test Pit investigations noted some areas of discolouring and staining with minor odours associated with Fill in the northern portion of the Site.*

10.2 Asbestos conditions

The following asbestos observations were provided in ENRS, 2019b:

> *Asbestos was observed on the ground surface across the northern portion of the site and at depths down to 0.85 m in Fill. Fragments from TP11 and TP12 were submitted to a NATA accredited laboratory for analysis which reported positive identification of Chrysotile and Amosite Asbestos. All other fragments were confirmed to comprise asbestos by visual inspection by the Asbestos Assessor, no further laboratory resting was required.*
>
> *The Asbestos was observed in fragments greater than 7 mm which did not crumble under hand pressure. Hence, the asbestos is considered suitable for management as non-friable asbestos in soil (ASBINS) in accordance with the Code of Practice (SafeWork;2016).*

A summary of the asbestos identified by ENRS is provided in Table 10.1 below.

Table 10.1: Asbestos identified

Test Pit	Depth of fill (m)	Asbestos observed depth
TP7	0.1	At surface and in shallow fill
TP11	0.5	At surface and in shallow fill
TP12	1.0	0.6 m
TP17	0.1	At surface and in shallow fill
TP22	0.1	At surface and in shallow fill
TP23	0.6	At surface and in shallow fill
TP25	0.1	At surface and in shallow fill
TP26	0.6	At surface and in shallow fill

Test Pit	Depth of fill (m)	Asbestos observed depth
TP27	0.5	At surface and in shallow fill
TP31	0.5	At surface and 0.4 m
TP34	0.3	At surface and in shallow fill
TP35	0.3	At surface and in shallow fill
TP41	0.1	At surface and in shallow fill
TP42	0.85	0.85 m
Soil Stockpile No. 1	-	On surface and throughout
Soil Stockpile No. 2	-	On surface and throughout
Demolition Waste Stockpile No. 3	-	On surface of stockpile

More details regarding asbestos are provided in Section 10.3 below.

10.3 Analytical results

The analytical results of the soil investigations, as described in Section 9 are summarised in Table 10.2, below. Sample locations are shown on the attached figures.

Table 10.2: Summary of soil analytical results (mg/kg)

Analyte	LORs	HSL/ HIL[1]	ESL/ EIL[2]	No. of exceed.	Range	Exceedances
Heavy Metals						
Arsenic	5	3,000	160	-	nd – 13	-
Cadmium	1	900	-	-	nd – 14	-
Chromium	2	3,600	-	-	10 - 644	-
Copper	5	240,000	300	13	8 – 594	HCJV (2017) Soil borings: PAECO2-BH06_0.0, PAECO2-BH07_0.0, PAECO2-BH07_0.5, PAECO2-BH14_0.0, PAECO2-BH14_0.5, ENRS (2019b) Stockpiles: SP1/1; SP1/2; SP1/3; SP2/2; SP2/3. Test pits: TP31/0.2; TP34/0.1; TP44/0.3.
Lead	5	**1,500**	1,800	1	9 – **5,800**	ENRS (2019b): Stockpiles: SP2/2
Mercury	0.1	730/180	-	-	nd – 0.7	-

Analyte	LORs	HSL/ HIL[1]	ESL/ EIL[2]	No. of exceed.	Range	Exceedances
Nickel	2	6,000	290	-	nd – 96	-
Zinc	5	400,000	700	6	19 – 1,870	HCJV (2017) Soil borings: PAECO2-BH07_0.5, PAECO2-BH17_0.5. ENRS (2019b) Stockpiles: SP1/1; SP1/2; Test pits: TP29/1.2; TP31/0.2;
BTEXN						
Benzene	0.2	3	75	-	nd	-
Toluene	0.5	NL	135	-	nd	-
Ethyl benzene	0.5	NL	165	-	nd	-
Total Xylene	0.5	NL	180	-	nd	-
Naphthalene	0.5	3	170	-	nd	-
TRH						
F1 TRH C_6 – C_{10}	10	260	180	-	nd	-
F2 TRH >C_{10} – C_{16}	50	**110**	**120**	1	nd - **460**	ENRS (2019b) Test pits: TP25/0.8
F3 TRH >C_{16} – C_{34}	100	NL	1,300	-	nd - 510	-
F4 TRH C_{34} – C_{40}	100	NL	5,600	-	nd - 170	-
PAHs						
Benzo(a)pyrene	0.5	-	1.4	-	nd	-
B(a)P TEQ	-	40	-	-	nd	-
Total PAHs	-	4,000	-	-	nd	-
Phenols						
Phenol	-	240,000	-	-	nd	-
OCPs, PCBs						
Heptachlor	0.2	50	-	-	nd	-
Chlordane	0.1	530	-	-	nd	-
Endrin	0.05	100	-	-	nd	-
Endosulfan	0.05	2,000	-	-	nd	-
Methoxychlor	0.2	2,500	-	-	nd	-
Aldrin + Dieldrin	0.05	45	-	-	nd	-
4-DDT	0.05	-	640	-	nd	-
DDD + DDE + DDT	0.05	3,600	-	-	nd	-

Analyte	LORs	HSL/ HIL[1]	ESL/ EIL[2]	No. of exceed.	Range	Exceedances
Sum of OCPs	-	50[4]		-	nd	-
PCBs	0.1	1	-	-	nd – 0.6	-
VOCs						
Total Phthaltes (Plasticiers)	-	-	-	-	nd – 24.1	-
Asbestos						
Asbestos	-	Presence of ACM		22	N-Y	HCJV (2017) Soil borings: PAEC02_ACM01, PAEC02_SB2/ASM ENRS, 2019b Stockpiles: SP1/1; SP1/2; SP1/3; SP2/1; SP2/2; SP2/3. Test pits: TP07/0.5; TP11/0.3; TP12/0.6; TP17/0.5; TP22/0.4; TP23/0.4; TP25/0.8; TP26/0.5; TP27/0.3; TP31/0.2; TP34/0.1; TP35/0.4; TP37/0.5; TP42/0.3;

Table notes:
[1] Health investigation levels for commercial industrial land use (ASC NEPM, 2013);
[2] Ecological investigations levels – commercial/industrial for aged contamination using Australian reference soil characteristics – pH = 6, Clay content = 10%, CEC = 10 cmol/kg, Organic carbon = 1% or equivalent OM;
[3] DDT only;
Underline – Samples that exceeded underlined criteria;
LOR = laboratory limit of reporting;
nd = not detected, concentrations less than the LOR;
- = no criteria, not analysed, no exceedances.

Site criteria were exceeded in samples listed below:

Heavy metals, consisting of copper, lead, nickel and zinc:
- copper – above EILs in a total of thirteen locations including soil borings, test pits and also samples collected from stockpiles;
- lead – above HILs and EIL in one sample collected from a stockpile; and
- zinc – above EILs in 6 samples collected from soil borings, test pits and also stockpiles;

TRH F2 exceeded HSL and EIL in one sample collected from a test pit.

Asbestos was identified in 22 samples collected from soil borings, test pits and samples collected from stockpiles.

10.4 Site audit discussion

The auditor is required to provide a clear statement regarding the site investigations conducted. With consideration given to the data collected as part of the site investigations completed, there is sufficient coverage to facilitate the development of a remediation strategy for contamination identified on the site.

Overall, the auditor considers that the site investigations were appropriate and conducted according to EPA guidelines. The sampling meets requirements and appropriate analytes were selected.

The contamination identified is associated with the fill material and was limited to minor exceedances of lead and hydrocarbons, with frequent inclusions of asbestos. Further investigation of the asbestos in soil to determine concentrations was not considered necessary, as re-use of soil with any asbestos was deemed inappropriate for the highway upgrade without appropriate encapsulation and management.

11.0 Assessment conclusions

11.1 Conclusions

ENRS (2019b) provide the following conclusions based on both HCJV, 2017 and ENRS 2019b:

> *Review of the available Site history records indicates the northern portion of the Site has a history of use as a car lot and wrecking yard since circa 1960's with associated uncontrolled stockpiling, filling and levelling extending into the central portion of the Site. Previous ESA investigations in this northern (1.4 Ha) portion of the Site by HCJV (2017) comprised 25 boreholes which reported Fill to a maximum depth of 0.7 m in BH20. Sampling methods and QAQC results for soil chemistry documented in the HCJV (2017) are satisfactory, hence the previous results are considered valid for consideration in this DSI.*
>
> *The 2017 ESA soil chemistry results reported no COPCs were detected at concentrations above the applicable NEPM 'D' Tier I Screening Guidelines with the exception of heavy metals copper, nickel and zinc above the EILs. Asbestos containing material were observed by HCJV (2017) within stockpiles and across the soil surface, although no asbestos was reported in any of the 44 soil samples submitted for analysis. These results support characterisation of bonded asbestos in soil (ASBINS) on the basis no loose fibres (LF) or asbestos fines (AF) were detected in analysed soil samples. In addition the HCJV (2017) investigation did NOT identify any elevated levels of lead or VOCs in soil and Fill.*
>
> *During the scope of work for this DSI, 48 Test Pit investigations and soil sampling was undertaken across an area of 3.5 Ha comprising the previously identified PAEC02 and the adjoining paddocks to the south. The extent of the assessment area was informed by the proposed APRB project Cut No.1 and a review of historical records and site inspections to identify potential Areas of Environmental Concern for ground contamination.*
>
> *Test Pits intercepted the deepest Fill at 1.8 m in the area between TP29, TP33 and TP26. This area was previously the southwest corner of the car lot and wrecking yard. Test pits in this area uncovered foreign materials including assorted car parts, tyres, and several lead acid batteries (less than 5). The batteries (sic) There is potential that final excavations may uncover additional bury pits which may need to be managed as waste.*
>
> *Soil samples were analysed by a NATA accredited laboratory for a broad range of Chemicals of Potential Concern (CoPC) based on the CSM and the Site history of uncontrolled Fill, including; TRH; BTEX; PAHs; Heavy Metals; OCPs, OPPs, PCBs, and VOCs. Selected samples were also subject to leachate analysis applying both TCLP and ASLP methods to assess the potential mobility of chemicals, if any.*
>
> *In general, the majority of soil samples reported concentrations below the LOR and the SAC or at levels unlikely to represent gross ground contamination which may inhibit management of soil on Site. The investigation comprising 3.5 Ha has been subject to soil testing in 25 boreholes and 48 test pits which far exceeds the EPA (1995) sampling density guidelines, and provides confidence that the ground conditions have been adequately characterised.*

The following points summarise the key exceedances of the SAC and elevated levels to be considered during preparation of a Remediation Action Plan (RAP):

- *Soil Stockpile #1: Asbestos observed in soil with CoPC reported below NEPM D. The material may be considered suitable for management on Site, or classified as GSW if required to be disposed offsite;*

- *Soil Stockpile #2; Asbestos observed in soil. Single exceedance for lead in SP2/2 (5800mg/kg) which exceeds the NEPM D SAC of 1,500 mg/Kg. Quantity of soil associated with SP2/2 surveyed to be less than 7 m3. Given the minor quantity of material originating from the Site, the SP2 material be considered suitable for management on Site supported by placement of the material above the water table in a dry zone not susceptible to surface water infiltration;*

- *Stockpile #3 located in the southeast of the Site is comprised primarily of demolition materials with very little fines/soil. The material may be considered suitable for classification as Demolition waste with asbestos and no further soil testing is required;*

- *Lead in soil test pit samples was reported below the NEPM HIL 'D' of 1,500 mg/Kg. Concentrations above the LOR were reported in the area between TP27-TP31 in the former southwest corner of the former car lot and wrecking yard. The highest result was 633 mg/Kg in TP29/1.2 m. Leachate results were all below the TCLP1 waste criteria which indicates a low risk for mobilisation of lead in leachate. The results indicate the material may be suitable for management onsite.*

- *A minor exceedance for hydrocarbons TRH C10-C16 was reported in TP25/0.8 m (460 mg/Kg) above the NEPM (2013) ESL of 170 mg/Kg. The material may be considered suitable for onsite encapsulation given the Site proposal for encapsulation under a road construction, where the material will not be accessible to ecological receptors (ie deeper than 2 m and placed above the groundwater table. It should also be noted the ESL is referenced as 'moderate reliability' in ASC NEPM Table 1B(6), and there is potential for TRH concentrations to continue to decrease through natural attenuation once encapsulated.*

- *Soil screening for VOCs reported zero (0) ppm PID readings and laboratory concentrations below the LOR for the majority of samples. Positive detections were reported for Phthalates in TP26/0.5 m (0.9 mg/Kg) and TP29/1.2m (24.1mg/kg) above the laboratory LOR (detection limit 0.5 mg/kg). In the absence of any HILs or HSLs in the ASC NEPM (2013) the results have been compared against the Dutch intervention level (60 mg/kg) which indicates the materials may considered suitable for management on Site. Further review of the US EPA (2012) Phthalate Action Plan also indicates the potential for vapours to be generated due to the presence of phthalates may be considered low.*

11.2 Site audit discussion

The auditor agreed that remediation was required on-site, following the results of the investigations.

The auditor's interpretation of the assessment results is provided below:

- non-friable asbestos identified on-site in multiple locations associated with the fill material;

- exceedances of ecological criteria for metals including copper, nickel and zinc and TRH;
- exceedance of lead HIL in a stockpile on-site, estimated to be less than 7 m^3; and
- detections of phthalates, but below criteria used.

Exceedances of ecological criteria were identified in soil, however they are not considered to be significant based on the following:

- exceedances of EILs were localised;
- the site will be covered by an active road corridor therefore minimising the risks associated with these small scale and low risk exceedances; and
- no indication of stressed vegetation was observed at the time of sampling.

Based on the above discussion, the only contaminant which requires management is therefore considered to be the presence of non-friable asbestos in soil.

The auditor also agreed with the consultant's conclusion that a groundwater assessment was not required, based on the nature of contaminants and the soil conditions as discussed further in Section 8.2.1.

12.0 Remediation

The following reports were reviewed as part of this site audit with respect to the remediation strategy and implementation:

- ENRS (2019c) Remediation Action Plan, Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project (Ref. ENRS1153, June 2019); and
- ENRS (2020a) Stage 4 – Site Validation Report, PAEC02 – Cut No. 1, Albion Park Rail Bypass (APRB) (Ref. ENRS1153).

12.1 Remediation goal

ENRS (2019c) state:

> *ENRS understand the remediation goals for this project are to:*
> - *Make the site 'safe' by removing ALL contaminated materials from work areas and ensuring reinstated material is suitable for the proposed landuse;*
> - *Monitor remediation works and site conditions to ensure appropriate asbestos handling protocols are maintained and the works present no risk to personnel and the environment;*
> - *Safely transport the material from the removal area and encapsulate within an engineered capping layer; and*
> - *Validate the removal works supported by laboratory soil testing and visual clearance certificates.*

12.2 Extent of remediation required

ENRS (2019c) state:

> *The extent of ASBINS and Fill at the remediation Site/s was documented in the DSI report/s as delineated in **Figure 3** and **Figure 4**. High Risk Soil and Fill areas are delineated in PINK based on Test Pit observations. For the purposes of this RAP, Low risk areas may be defined as natural or slightly disturbed soils with no significant foreign materials, no visible asbestos, no odours, and no staining.*
>
> *No other works may be conducted in remediation areas until the Sites have been validated and approved by the project Site Auditor.*

The extent of remediation consists of:

- the subject site (Cut No. 1 – PAEC02);
- stockpiles on the subject site (Cut No. 1 – PAEC02); and
- an additional site - Fill No. 1 – The Island. Material will be removed from this site and placed within the proposed encapsulation in Fill 4. Section 13 discusses this site and the associated material.

12.3 Remediation option analysis

The following remediation option analysis discussion is provided in ENRS (2019c):

> *In assessing and determining the optimal remedial options available to the project, the following factors have been considered:*
> - *The source, types and level of contamination present;*
> - *The vertical and lateral extent of ground contamination;*
> - *The soil conditions and clay content suitability for asbestos screening;*
> - *The physical and chemical composition of contaminants;*

- *Hydrogeological conditions (depth to groundwater, permeability, soil heterogeneity);*
- *The site location, layout, adjacent landuse and nearby sensitive receptors;*
- *The future landuse/s proposed for the remediation area/s;*
- *Proven remediation technologies for the Contaminants of Potential Concern (CoPC);*
- *Time, budgetary, engineering, environmental constraints; and*
- *Regulatory requirements.*

In general, there are three (3) primary methods for remediation of asbestos in soils. Selection of the preferred remediation method is determined by site specific conditions and project requirements. Table 7 provides an overview of these options and an evaluation of their suitability for the project Site/s.

Option 1 – Remediation by manual picking to remove fragments is labour and time intensive and there is a residual risk that ACM may not be completely removed dur to the high clay content which may make the asbestos difficult to detect. This option is Not Acceptable due to the residual risk of asbestos in soil which may be missed during removal.

Option 2 – Offsite disposal is Not Acceptable for this project due to the large quantity of waste which would be generated and financial limitations for disposal of greater than 17,000 tonnes of Special Waste (asbestos) which would be required to be disposed at a Sydney Landfill as there is no local facilities which will accept asbestos in soil in bulk quantities.

Option 3 – On Site encapsulation presents a valid method as the asbestos on soil material has been characterised as bonded fragments in soil and Fill with average chemical levels below the relevant site assessment criteria for commercial and industrial landuse.

Site audit comment

On-site encapsulation is a viable, proven remediation technology, dependent on the type of contamination present. Based on the proposed land use as a road (commercial/industrial land use), encapsulation is considered to be appropriate. Maintenance of the encapsulation cell would naturally occur with normal maintenance of the constructed road, and therefore require minimal additional work.

12.4 Remediation strategy

The strategy for the implementation of the preferred remediation option is detailed below (ENRS, 2019c):

Review of the site investigation results for the area/s impacted by asbestos in soil and evaluation of remediation options identifies the preferred remediation strategy is Excavation and On-Site Encapsulation with the Project Area:

1. Asbestos in Soil (ASBINS) and Fill - Excavate and remove ALL ASBINS and accessible Fill material for encapsulation, regardless of whether ACM has been previously observed, to manage future risk and liability for the project. This is considered an appropriately conservative method given the frequent observations of asbestos made during the DSI. Ensure the removal areas for all impacted soils and Fill are validated upon completion of works; and

2. Minor finds and ACM materials in Demolition Waste – Excavate and remove ACM impacted materials such as pipe/pits and building debris and dispose offsite at suitably licensed waste facility. Foreign material (such as batteries) and oversize debris (such as vehicle parts) shall also be separated and managed as waste as they may impact the integrity of the encapsulation cell. Ensure all impacted materials are removed and validated during works.

The selection of this methodology is based on the following objectives:
- *The asbestos in Fill is positioned at shallow depths less than 2 m suitable for excavation;*
- *Complete removal of contaminated soil is required to facilitate the proposed future landuse and meet RMS project objectives; and*
- *The project area provides a suitable encapsulation area immediately adjacent the removal Site/s.*

12.5 Encapsulation discussion

The RAP included the following discussion regarding encapsulation and its suitability for encapsulation (ENRS, 2019c)):

The proposed ASBINS containment cell area lies within the Fill No.4 road embankment from approximately chainage 18250 through to the SB06 bridge treatments at chainage 18500. This provides an area of approximately 10,000 m2. Based on a thickness of 1 m of placed asbestos impacted soils, this will result in a 10,000 m3 containment area. Survey of the DSI Test Pits and test locations conducted by Fulton Hogan during the SWQP provides the following survey volumes:
- *Cut No.1 calculated volume of 8,100 m3 of ASBINS;*
- *Fill No.1 calculated volume of 1,800 m3 ASBINS comprising 1,300m3 of Fill and an additional approximately 500 m3 of contaminated topsoil.*

Information regarding the additional encapsulation site (Fill No. 1 – The Island) is included in Section 13.

12.6 Suitability of encapsulated material

As the soil was proposed to be encapsulated, an assessment was conducted with respect to leachability as part of the DSI. The following summary is provided by ENRS (2019b):

Selected soil samples were submitted for leachate analysis applying both TCLP and ASLP methods to provide an assessment of potential contaminant mobility. […] with a comparison against the relevant Site Assessment Criteria for leachate and the receiving water quality guidelines.

The results for Test Pit samples report concentrations of heavy metals including Arsenic, Cadmium, Total Chromium, Chromium VI, Copper, Lead, Mercury, Nickel and Zinc below the relevant SAC, including the GILs, ADWG, and TCLP1.

A single exceedance of the TCLP2 guidelines was reported for lead in SP02/2. Stockpiles SP1 and SP2 are not evident on the latest historical imagery reviewed from 2016. Based on site observations the Fill contained in Stockpiles SP1 and SP2 is comprised of similar grey-brown residual soils to the immediate site area, with evidence of car parts and it is unlikely the material has originated from offsite. Survey by Fulton Hogan reports the volume of Stockpile 2 and ~21 m3. No exceedances were reported for two (2) out of the three (2) stockpile samples, the quantity of materials associated with sample SP2/2 is assessed to be ~7 m3 which is relatively

minor in context of the overall volume of Fill assessed during this investigation. Given the minor quantity of material originating from the Site, the SP2 material be considered suitable for management on Site supported by placement of the material above the water table in a dry zone not susceptible to surface water infiltration.

All other results are considered satisfactory which indicates the soil and Fill identified during this DSI may be considered suitable for management in Site.

Site audit comment

The auditor agrees with the consultant's comment. The exceedance of TCLP2 criteria in one sample from a small volume stockpile does not represent an unacceptable risk within the cell and the associated material is considered suitable for encapsulation.

12.7 Summary of remediation works

Remediation works were managed by JBG Contractors between July – October 2019. The following information is provided regarding the role of ENRS during the remediation (2019c):

ENRS contaminated land professions (sic) were on Site full time during the completion of remediation works. The role of ENRS during remediation works included;

- *Daily air monitoring;*
- *Remediation oversight, including the identification and separation of items not suitable for encapsulation;*
- *Progressive clearance inspections; and*
- *Validation sampling (where required).*

The following remediation methodology summary is provided (ENRS, 2019c):

Removal and on-site encapsulation was the chosen method of remediation for AEC02 (Cut 1). The following points outline the asbestos remediation methodology.

- Pre-start tool box induction – all personnel undertook a toolbox induction including *review of ARCP, and ESWMS, ESCP, SWMS;*

- *Establish Site Controls – Removal Contractor established site controls in accordance with the Code of Practice, including but not limited to; fencing with suitable exclusion zone (minimum 10 m setback or 1.8 metre high fencing with barrier material), warning signage at points of entry, decontamination area, erosion sediment control, stockpile controls, plastic sheeting and water for dust suppression at all times;*

- *PPE – P2 respirator, disposable type 5 coveralls, disposable boot covers, disposable gloves, steel cap boots, hard hat & safety glasses;*

- *Decontamination – Designated decontamination area/s at point of entry/exit were established, all equipment to be disposed as waste or decontaminated using both wet and dry methods in accordance with the Code of Practice;*

- *Airborne Asbestos Fibre Monitoring - conducted daily during removal works;*

- *Delineate Asbestos Zones – Asbestos Assessor (AA):*

1. All surface soil and fill material removed to expose natural soil
2. AA to issue surface clearance of areas where no ACM observed.
3. Tine/rip areas where no ACM is observed to support ground inspection by AA to simulate (sic) raking to a depth of at least 10 cm.

- *Excavate Contaminated Material – Areas identified to contain asbestos and Fill were excavated by scaping in layers (e.g. 50-100 mm). Scraping was repeated until all high risk Soil/Fill had been removed. Works were supervised by an experienced contaminated land professional to identify and separate Fill/items not suitable for encapsulation. All groundworks in Fill and asbestos contaminated soil were conducted under asbestos removal control conditions with PPE and dust suppression. Asbestos materials were loaded directly into the encapsulation area;*

- *Excavate and Encapsulate Stockpile No.2. – Stockpile No.2 was loaded under asbestos controls which were also suitable for management of lead in soil. Any sources of lead identified during loading, such as car batteries, were separated and removed. These items were managed as waste. SP2 material was placed near the upper centre of the receiving Cell to ensure maximum buffer and ensure incomplete exposure pathways;*

- *Waste transport and Disposal – Bulk contaminated soil was placed in sealed vessels for transport to a suitably licensed waste facility in accordance with Section 29 of the POEO (Waste) Regulation. Trucks had sealed waterproof covers for offsite transport or the soil is to be wet down and moved within the Site in sealed trucks. Transport and disposal dockets were provided to the Asbestos Assessor and appended to the clearance certificate for record of disposal;*

- *Clearance Inspection & Certification - All areas where asbestos materials had been removed were inspected by the Asbestos Assessor and issued with a clearance certificate supported by NATA laboratory testing prior to backfilling or reinstatement;*

- *Plant Decontamination - All equipment and plant was decontaminated and certified as clear for asbestos prior to leaving the site; and*

- *Validation Sampling – Soil validation sampling across the removal site/s was conducted in accordance with Section 8.0 of this report, to screen for potential residual ground contamination both laterally and vertically. Final soil sample density and locations were selected based on the footprint of the remediation area and visual observations of ground conditions. Samples were obtained with consideration of the ASC NEPM (2013) and WA (2009) guidelines for remediation of asbestos in soil and analysed for CoPC.*

- *Reporting – Submit validation report to Site Auditor for final sign off. Provide final reports to RMS for preparation of an EMP.*

12.8 Soil observations

ENRS (2020) provide the following soil description regarding the soil observations in Cut 1 (PAEC02):

Excavations during removal works encountered relatively uniform conditions with shallow topsoil overlaying brown clay. Where bury pits were not encountered, weathered sandstone was located between depths of 0.5 mbGL and 1.0 mbGL. Some areas of imported fill, primarily red clay, were

encountered throughout removal works. Stratigraphic conditions encountered during remediation works were consistent with those encountered during the DSI (ENRS, 2019).

In addition to the above stratigraphic conditions, multiple small localised bury pits containing non-putrescible waste were encountered during the removal works. Bury pits comprised silty sands and clays with a variety of foreign materials including metal, plastic, rubber, concrete and car parts. Once excavated, depths of bury pits varied from 1.0 – 4.0mbgl, with excavations terminating in weathered sandstone and bedrock with primarily vertical excavation walls.

The final validation surface was observed to comprise virgin weathered shale and bedrock with no visual indicators of contamination such as foreign materials, staining or odours. The remediation works were limited to the previously identified area of environmental concern (AEC02) delineated in the RAP as depicted in Figure 2. Validation sampling of bury pits was limited to the base of excavation trenches.

12.9 Unexpected finds

As described above in the soil observations sections, multiple uncontrolled historical burial pits were identified.

Site audit comment

The content of the burial pits was consistent with the other fill observed on-site, and the only unexpected element was the depth they extended to. They occupied an area of approximately 4,000 m^2 and varied in size and depth from approximately 50 – 900 m^2 and 1.0 – 4.0 m below ground surface. It is not considered necessary to treat each burial pit as a separate issue, particularly given the material was to be removed and encapsulated.

12.10 Off-site disposal of waste

Off-site disposal of waste from the site is summarised in the following subsections. The auditor has checked that the consultant has provided the following:

- the estimated volume of waste taken off-site;
- receipts verifying the facility has received that volume and class of waste from the waste generator (or its representative), which may include a valid consignment authorisation; and
- reconciliation documents demonstrating the total volume of waste taken off-site is consistent with the total volume of waste generated from the site.

Where this information was not initially provided, it was requested by the auditor.

ENRS (2020) describe:

Material unsuitable for on-Site encapsulation was identified to exist on-Site during ENRS Site investigations (ENRS DSI, 2019). Throughout remediation works larger quantities of unsuitable material were discovered than expected, primarily in the form of uncontrolled historical bury pits.

Within these bury pits, high concentrations of non-putrescible waste including tyres, car parts, demolition waste and asbestos were encountered and excavated. Such material may have impacted the integrity of the cell if encapsulated on Site, and, as result, was required to be managed as waste and disposed off-site at a suitably licenced waste facility. ENRS understand that 1,947.14 tonnes of unsuitable material was disposed off-Site supported

by waste classification certificates in accordance with the RAP (ENRS, 2019). Final quantities of waste disposed off-Site, equate to 1,947.14 tonnes.

A summary of the waste disposed of off-site is summarised in Table 12.1 below.

Table 12.1: Waste streams

Waste Stream	Facility	Tonnage
General Solid Waste (Asbestos)	Hi-Quality Waste Management Pty Ltd, Minda Landfill, Oallen Ford Road, Windellama, NSW 2580 EPL: 10398	1,927.56
General Solid Waste	Kembla Grange Recycling, Wollongong Recycling, 50 Wyllie Road, Kembla Grange, NSW 2526 EPL: 20601	16.94
Special Waste (Tyres)	Tyrecycle Pty Ltd, 81-85 Christie Street, St Marys, NSW 2760 EPL: 13217	2.64
Total		*1,947.14*

Site audit comment

Waste classification documentation provided does not appear to discuss the TCLP results, however the resultant waste classification would not have changed, and the TCLP results are included in other parts of the assessment reports.

12.11 On-site encapsulation

The material was encapsulated onsite, as discussed in Section 14 below.

Site audit comment

The encapsulation cell included additional material from Fill 1. Characterisation of this material is discussed separately in Section 13, below.

12.12 Imported material

No material was imported into the project boundary for the construction of the containment cell cap.

The capping material for the encapsulation cell consisted of general fill material, sourced from the site, and is not imported material. Therefore no documentation for excavated natural material (ENM) or virgin excavated natural material (VENM) has been included/reviewed.

12.13 Site audit discussion

Remediation strategy

The remediation strategy discussed in the RAP was considered to be suitable for the contamination present on-site. Table 13.3 below outlines the requirements of Section 4.3.1 of the *Guidelines for the NSW Site Auditor Scheme*.

Table 13.3: Requirements for remediation

Requirement	Audit discussion
Technically feasible	Encapsulation of soil contamination is a proven technically feasible strategy of remediation. This strategy is appropriate for asbestos and heavy metal contaminated soil.
Environmentally justifiable	The strategy reduces disposal of large volumes of low contaminant concentrations in soil to landfill, and limits future clean-up actions through effective management. This is therefore considered to be environmentally justifiable.
Consistent with relevant laws, policies and guidelines, including: – national and NSW remediation policies; – the *Protection of the Environment Operations Act 1997* (POEO Act) and Regulations; – other legislation such as the *Environmentally Hazardous Chemicals Act 1985* (EHC Act) and the *Environmental Planning and Assessment Act*; and – relevant technical guidance documents issued by the EPA.	Yes, the remedial strategy is consistent with the relevant listed laws, policies and guidelines.

Waste requirements

As part of the Audit, the auditor has checked that:

- Waste classification in accordance with NSW EPA waste classification guidelines was conducted.
- The waste receiver was suitably licenced to receive the waste, and transport was in compliance with the waste tracking requirements.

13.0 Additional encapsulation fill suitability investigation

Additional asbestos contaminated soil was encountered within the broader project boundary, which was to be encapsulated along with the material from the source site – Fill no. 1 - The Island.

The following report was prepared by ENRS to investigate the asbestos contaminated soil:

- ENRS (2019d) *Stage 2 – Detailed Site Investigation (DSI) The Island Fill No. 1, Albion Park Bypass (APRB) Project* (Ref. ENRS1153).

13.1 Objective

ENRS (2019d) state the follows:

> *The aim of the DSI was to provide supplementary information on the Site history documented in preliminary investigations and further characterise the type, extent and level of contamination by conducting intrusive ground investigations. Where applicable, identify any potential off-site impacts, and review the project results to assess if the Site will pose no unacceptable risk to human health or to the environment. Compile the project results and prepare recommendations for the development of a Remediation Action Plan (RAP) to make the Site suitable for the proposed construction of a road comprising commercial and industrial land-use.*

Site audit comment

In the context of the site audit, the objective of the investigation was to:
- delineate the extent of contamination; and
- determine the suitability of the contaminated material for placement in the proposed encapsulation cell.

13.2 Scope

The scope is described as follows (ENRS, 2019d):

- *Review available Site history records incorporating previous investigation reports, proposed development plans, Council records and publicly available data (including aerial photographs, geological maps, topographical maps, and registered groundwater bore database);*
- *Test Pit investigations in thirty (30) locations;*
- *Submit selected samples to a NATA accredited laboratory for analysis;*
- *Conduct Tier 1 screening of NATA analysis results against NSW EPA endorsed Site Assessment Criteria (SAC); and*
- *Document investigation results. Prepare a Stage 2 DSI report with recommendations for a Remediation Action Plan (RAP).*

13.3 Site history summary

A review of previous reports and historical records was conducted for the site. The site comprised rural land until approximately 1990 when the Princes Highway was upgraded and the site became an island road reserve between the lanes of the highway. Aerial imagery since 1990 suggests the site was likely the subject of uncontrolled filling, stockpiling and potentially illegal dumping. There are no records of industrial use.

13.4 Sampling and analytical strategy

The sampling strategy is described as follows (ENRS, 2019d):

> *Soil sample locations were selected with consideration of the ASC NEPM (2013) Schedule B2 Section 6, guidelines on Sampling Design (NEPC;2013). Based on the Site area of ~1.5 hectares the relevant sample density guidelines provided in Table E1 AS4482.1 (2005) require a minimum of twenty five (25) sampling points (equivalent to 16.7 points per hectare) for site characterisation based on 95% confidence of detection of circular hotspots within a diameter of 28.9 m. A total of thirty (30) test pit locations were excavated during the investigation program, generally at distance less than 28.9 m between points, which is considered adequate to identify any potential hotspots or AECs.*
>
> *No stockpiles were observed to trigger any additional targeted sampling.*
>
> *Test Pits were advanced using an excavator bucket. Final soil samples locations were selected in the field with consideration of the following criteria:*
> - *Target AECs;*
> - *Investigate areas of potential Fill identified in Site history reviews;*
> - *Down-gradient and up-gradient boundaries;*
> - *Grid-based sample plan to provide a systematic assessment of Site area;*
> - *Accessible ground and safe standing conditions for ground works; and*
> - *Safe working distance from services and utilities.*
>
> *Samples were selected for analysis based on the stratigraphic conditions to identify any apparent contamination and define soil conditions vertically and laterally. Not all samples collected were analysed.*

Site audit comment

Overall, the test pit sampling strategy appears to be a combination of systematic and targeted sample locations.

13.5 Sampling and analytical methodology

ENRS detail the sampling methodology during the Fill No. 1 – The island investigation as follows (ENRS, 2019d):

> *Samples were collected in general accordance with the principals described in AS4482.1- 2005: Guide to sampling and investigation of potentially contaminated soil (Part 1: Non-volatile and semi-volatile compounds) and AS4482.2-1999: Guide to sampling and investigation of potentially contaminated soil (Part 2: Volatile compounds). Soil logging procedures followed a systematic and standardised format providing a classification of the soil group based on particle size and structure. Field observations were conducted to detect potential soil contamination, if any, and to distinguish between soil composition, conditionand structure.*
>
> *Sample depths were selected with consideration of ground conditions observed during investigations. Samples were obtained near the surface, at 0.5 m and at 1 m intervals thereafter. Additional samples are collected at intervals defined by changes in ground conditions triggered by Site observations. Generally, Test Pits were advanced at least 0.5 m into natural ground where possible, which was considered a sufficient depth to assess conditions at the Site. A maximum investigation depth of 2.9 metres was*

reached based on excavation into natural materials below the base of Fill encountered.

Samples were collected in general accordance with industry standard QA/QC procedures. Discrete soil samples were collected with disposable sterile gloves and placed directly into laboratory supplied 250 mL jars and immediately stored on ice. Sample containers were individually labelled with sample identification clearly marked on the container and sealed lid. Asbestos samples were double bagged in 200 micron sealed plastic and labelled for asbestos.

13.6 Asbestos conditions

Asbestos observations are provided in Table 13.1, below. To summarise, asbestos was observed at multiple locations in the ground surface as well as in fill material to depths of 1.8 m

Table 10.1: Asbestos identified

Test Pit	Depth of fill (m)	Asbestos observed depth
TP04	1.8	ACM in fill to depth of 1.8 m
TP07	1.4	At surface adjacent to test pit
TP13	0.4	At surface adjacent to test pit
TP18	1.8	ACM in fill to depth of 1.8 m
TP21	0.2	At surface adjacent to test pit
TP27	0.2	At surface adjacent to test pit
TP29	0.2	At surface adjacent to test pit

The following description is provided by ENRS regarding asbestos observations, and condition (ENRS, 2019d):

Asbestos was observed at a maximum depth of 1.8 m through the Fill layers associated with building rubble including bricks, concrete, tile and concrete. Given the uncontrolled nature of Fill at the Site, it should be considered there is potential for asbestos in all areas of Fill.

The Asbestos was observed in fragments greater than 7 mm which did not crumble under hand pressure. Hence, the asbestos is considered suitable for management as non-friable asbestos in soil (ASBINS) in accordance with the Code of Practice (SafeWork;2016).

13.7 Analytical results

The analytical results of the assessment of the additional encapsulated material, as described above are summarised in Table 13.2, below. Sample locations are shown on Consultants Figure 7.

Table 13.2: Summary of soil analytical results (mg/kg)

Analyte	LORs	HSL/ HIL[1]	ESL/ EIL[2]	No. of exceed.	Range	Exceedances
Heavy Metals						
Arsenic	5	3,000	160	-	nd – 8	-

Analyte	LORs	HSL/ HIL[1]	ESL/ EIL[2]	No. of exceed.	Range	Exceedances
Cadmium	1	900	-	-	nd – 1	-
Chromium	2	3,600	-	-	10 - 123	-
Copper	5	240,000	300	1	8 – 171,000	TP4/0.2
Lead	5	1,500	1,800	-	7 - 280	-
Mercury	0.1	730/180	-	-	nd	-
Nickel	2	6,000	290	-	nd – 14	-
Zinc	5	400,000	700	1	19 – 876	TP4/0.8
BTEXN						
Benzene	0.2	3	75	-	nd	-
Toluene	0.5	NL	135	-	nd	-
Ethyl benzene	0.5	NL	165	-	nd	-
Total Xylene	0.5	NL	180	-	nd	-
Naphthalene	0.5	3	170	-	nd	-
TRH						
F1 TRH C_6 – C_{10}	10	260	180	-	nd	-
F2 TRH >C_{10} – C_{16}	50	110	120	-	nd - 60	-
F3 TRH >C_{16} – C_{34}	100	NL	1,300	-	nd - 950	-
F4 TRH C_{34} – C_{40}	100	NL	5,600	-	nd – 1,120	-
PAHs						
Benzo(a)pyrene	0.5	-	1.4	-	nd	-
B(a)P TEQ	-	40	-	-	nd	-
Total PAHs	-	4,000	-	-	nd - 2	-
Phenols						
Phenol	-	240,000	-	-	nd	-
OCPs, PCBs						
Heptachlor	0.2	50	-	-	nd	-
Chlordane	0.1	530	-	-	nd	-
Endrin	0.05	100	-	-	nd	-
Endosulfan	0.05	2,000	-	-	nd	-
Methoxychlor	0.2	2,500	-	-	nd	-
Aldrin + Dieldrin	0.05	45	-	-	nd	-
4-DDT	0.05	-	640	-	nd	-
DDD + DDE + DDT	0.05	3,600	-	-	nd	-
Sum of OCPs	-	50[4]		-	nd	-
PCBs	0.1	1	-	-	nd	-

Analyte	LORs	HSL/ HIL[1]	ESL/ EIL[2]	No. of exceed.	Range	Exceedances
Asbestos						
Asbestos	-	**Presence of ACM**	**-**	**7**	N-Y	TP04/1.8; TP07/1.4; TP13/0.4; TP18/1.8; TP21/0.2; TP27/0.2; TP29/0.2

Table notes:
[1] Health investigation levels for commercial industrial land use (ASC NEPM, 2013);
[2] Ecological investigations levels – commercial/industrial for aged contamination using Australian reference soil characteristics – pH = 6, Clay content = 10%, CEC = 10 cmol/kg, Organic carbon = 1% or equivalent OM;
[3] DDT only;
Underline – Samples that exceeded underlined criteria;
LOR = laboratory limit of reporting;
nd = not detected, concentrations less than the LOR;
- = no criteria, not analysed, no exceedances.

EILs for copper and zinc were exceeded in one sample (TP4/0.2 and TP4/0.8 respectively).

Asbestos was identified in a total of seven locations across the site, either on the ground surface or at depth in fill material.

13.8 Site audit discussion

Based on the results of the investigation, it was determined that this material is suitable to be placed within the designated asbestos encapsulation cell, as discussed in more detail in Section 12.

14.0 Encapsulation cell

ENRS provide the following discussion regarding on-site encapsulation (ENRS, 2020)

> *The ASBINS material from the Site was excavated and re-instated in an engineered capping cell in accordance with the RAP (ENRS;2019). The ASBINS containment cell was constructed within the Fill 4 road embankment, extending from Chainage CH18250 to the SB06 Bridge Treatment at CH18500. Initial cell construction provided an area of approximately 10,000 m^2, with ASBINS estimated to be placed to a final thickness of 1m. The cell was constructed at an elevation greater than 2.0 m above the groundwater table and further protected by wrapping all re-instated ASBINS in geo-fabric, thus enclosing all materials within the cell. The cell was protected from flood waters by the placement and compaction of a capping layer comprising general fill materials to a minimum of 3.0 m from the edge of the embankment. ENRS understand the capping material was characterised as 'good quality' general fill compacted to 98 % compaction and was competent to resist infiltration of any flood waters and stable so as not to be susceptible to any form of erosion. Further details on cell design and construction can be found in the project RAP (ENRS, 2019). ENRS understand that all suitable material excavated from the Site was placed into the cell as outlined in the RAP (ENRS; 2019). The ASBINS encapsulation cell was surveyed by Fulton Hogan to establish final quantities. The total quality of ASBINS within the cell was surveyed at 10,290 tonnes. Refer to Appendix C for the final cell location and encapsulation details. As-build construction drawings for the encapsulation cell are provided in Figure 6, with geotechnical compaction testing reports for the cell walls, base and capping material provided in Appendix G.*

Cardno (2021) summarise the encapsulation cell in the EMP as:

> *Approximately 8,725 m3 of asbestos impacted soil sourced from Cut 1 and Fill 1 located north of the encapsulation area.*
>
> *In addition to the asbestos impacted soil, approximately 7m3 of lead impacted soil sourced from SP02 within Cut 1 [was also included].*
>
> *There was no information identified during site investigations to suggest that other significant contaminants of concern are present on Site.*
>
> *The encapsulation cell is located beneath a dual carriageway motorway.*
>
> *The encapsulation is overlain by between approximately 2.1 m and 6.25 m of geotechnical suitable un-impacted, road construction material followed by the road pavement materials and asphaltic concrete wearing surface. Cap thickness at various chainages is indicated on the as-built cross sections.*
>
> *High visibility webbing was placed as a marker layer above the geofabric encapsulated asbestos impacted material*
>
> *APRb as well as related stormwater infrastructure will be emplaced over the encapsulation cell, including within the overlying road construction material. Larger diameter stormwater infrastructure is also present under the northern end of the encapsulation cell. Infrastructure is noted in as-built surveys.*

The lateral and vertical extent of the encapsulation area (including depth of encapsulation and location coordinates X, Y) is shown in the as-built survey drawings within the EMP, and the lateral extent is summarised below:

- North-east, X 296550.128, Y 6175369.841
- South-east, X 296858.352, Y 6175149.525
- South-west, X 296562.390, Y 6175141.614
- North-west 1, X 296527.899, Y 6175335.928
- North-west 2, X 296527.648, Y 6175370.401

14.1 Site audit discussion

The encapsulation cell location and as-built drawings have been checked by the auditor and are considered to adequately detail the construction of the encapsulation cell.

15.0 Validation work

Validation activities were conducted throughout the remediation works and are summarised below.

The following report was reviewed as part of this site audit:
- ENRS (2020a*) Stage 4 – Site Validation Report, PAEC02 – Cut No. 1, Albion Park Rail Bypass (APRB)* (Ref. ENRS1153).

15.1 Objectives and scope

The information in this section is taken from ENRS (2000). ENRS describe the objective of the validation report as to:

> *The aim of the project was to conduct intrusive ground investigations, including soil sampling, and compare analytical results against EPA endorsed Site Assessment Criteria (SAC) to evaluate ground conditions and prepare a validation report to support the removal of asbestos contaminated soil (ASBINS). This validation report provides an independent assessment, using objective and measurable criteria, to determine if the site is free of unacceptable levels of contamination, all necessary remediation works have been successfully carried out, and the Site area is suitable for the proposed commercial/industrial land use.*

The scope of work included:

> *The scope of work for the project comprised the following tasks:*
> - *Date of removal works between 15th of August and the 26th of November 2019;*
> - *Air monitoring during asbestos removal works, comprising scraping surface soils and excavating isolated historical bury pits;*
> - *Visual clearance inspections for asbestos removal areas supported by soil validation sampling and analysis in accordance with Section 11 of the Remediation Action Plan (RAP) (ENRS;2019); Dates 2nd of September, 20th of September, 27th of September, 3rd of October 2019 and 25th of November 2019*
> - *Compare NATA laboratory validation results against NSW EPA endorsed Site Assessment Criteria (SAC) referenced in Section 6.0 of the RAP (ENRS;2019); and*
> - *Document the remediation results and prepare this validation report with a statement that the Site is considered suitable for the proposed land use, and recommendations for ongoing site management, if required.*

15.2 Data quality objectives

The data quality objective process, a seven-step iterative planning approach as defined by Australian Standard AS4482.1 (2005), the Guidelines for the NSW Site Auditor Scheme (NSW EPA, 2017) and the NEPM Schedule B2 was mentioned briefing in Section 9.1 of ENRS, 2020. The seven-step process was not outlined in full, and so it is hard for the auditor to review the content.

15.3 Soil sampling and analytical strategy

As the principal contaminant of concern was the presence of bonded asbestos in fill material, the validation strategy was generally described as:
- removal of fill material; and
- providing a clearance of the final surface for potential ACM fragments.

To confirm the condition of the burials, and that they were consistent with the fill material encountered on-site, samples were collected for ACM and chemical analysis.

The soil sampling and analytical strategy for the limited sampling conducted is described below for asbestos and other analytes.

15.3.1 Asbestos soil sampling and analytical strategy

The sampling and analytical strategy for the site is described below (ENRS, 2020):

> *Validation sampling was undertaken with consideration of Section 11 of the RAP (ENRS;2019) which referenced the ASC NEPM (2013) and Table 8 of the Western Australia Department of Health: Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia (WA DOH, 2009) sample density guidelines.*
>
> *Validation sampling was conducted for both asbestos and chemical contaminants summarised in Table 5. In general, sampling requirements outlined in the RAP were achieved during the validation program.*
>
> *Validation sampling for asbestos was also supported by visual clearance inspections. Where excavations were terminated within natural soils, a visual clearance inspection for asbestos was undertaken by a licenced asbestos assessor. The ground surface was validated as comprising natural soils by inspection of test pit profiles and/or raking of the surface to a depth of ~100mm. If no suspected ACMs were observed, the remediation was considered successfully.*
>
> *Sampling for asbestos in soil (ASBINS) was undertaken with consideration of Section 11 of the RAP (ENRS;2019) and in general accordance with Section 4 of the ASC NEPM (2013) and Table 8 of the Western Australia Department of Health: Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia (WA DOH, 2009), as summarised below:*
>
> - *Visually inspect the base and walls of the excavation to confirm absence of ACM;*
> - *Validation sampling for boundary conditions carried out every 5-10 m along the excavation walls (or per 1 m depth). Increasing to 10-20 m interval at discretion of the Asbestos Assessor for uniform conditions with no evidence of Fill or ACM;*
> - *Collection of one (1) base sample per 25 m2, or for larger areas the base may be sampled at twice the minimum density documented in AS4482.1-2005 Table E1;*
> - *Per sample location, 10 litres of soil shall be screened through a 7 mm sieve and the coarse non passing material spread out for inspection on an impermeable layer of contrasting colour material. Any identified ACM shall be removed, double bagged and labelled for later weighing and calculation of w/w% concentration;*
> - *One (1) wetted 500 ml sub sample collected from the fines passing the 7 mm sieve and submitted for laboratory analysis for asbestos identification (AS4964-2004); and*
> - *Where asbestos is detected in any sample, the concentration of asbestos as fragments (ACM) and as loose fibres (FA or AF) will be compared with the relevant Site Assessment Criteria for validation.*
>
> *Should none of the samples reveal the presence of asbestos fibres and airborne asbestos concentrations are acceptable, a clearance certificate is*

issued and the area may be deemed safe for re-entry without asbestos specific PPE.

The validation strategy provided by ENRS is detailed in Table 14.1 below.

Table 15.1: Validation sampling strategy (ENRS, 2020)

Feature	*Sample frequency*	*Action*	*Analysis*
Excavation wall	*1 per 10 m of wall (or per 1 m depth)*	*10 L sample collected from walls/base and sieved to 7 mm. Composite laboratory analysis conducted.*	*Asbestos fibres in soil (NEPM level screening)*
Excavation base	*1 per 25m2 or twice AS4482.1-2005*		

Site audit comment

The validation sampling frequency is very poorly described in the report and is not considered to meet the validation criteria outlined by ENRS (refer to Table 14.1). However this is not considered to be significant, as ACM associated with fill material was the main contaminant and visual clearances were provided as the primary line of evidence of validation. Sampling was conducted as an additional line of evidence, to support the clearance.

15.3.2 Soil sampling (other analytes)

ENRS (2020) describe the sampling strategy for validation as follows:

Soil sample locations were selected with consideration of the NEPM Schedule B2 Section 6, guidelines on Sampling Design (NEPC 2013). Following the completion of remediation works, twelve (12) bury bits were located and excavated from the northern portion of the Site. Bury bits were located within an area of ~4000m2. Bury pits varied in size and depth from approximately 50m2 – 900m2 and 1.0 – 4.0 mbgl. ENRS note the excavation of all bury pits was terminated in natural ground and, once fully excavated, formed a larger percentage of the 4000m2 area. The sample plan for the validation of bury pits is summarised below in Table 10.

Location	*No. of samples*	*Action*	*Analyte*
Bury Pit 1	*1*	*Discrete sample from base of excavation*	*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP, VOCs and SVOCs.*
Bury Pit 2	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP.*
Bury Pit 3	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP, VOCs and SVOCs.*
Bury Pit 4	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP.*

Bury Pit 5	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP, VOCs and SVOCs.*
Bury Pit 6	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP*
Bury Pit 7	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP, VOCs and SVOCs*
Bury Pit 8	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP*
Bury Pit 9	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP, VOCs and SVOCs*
Bury Pit 10	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP*
Bury Pit 11	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP, VOCs and SVOCs*
Bury Pit 12	*1*		*TRH, BTEX, Heavy metals (8), PAH's, Total Phenols, OCP, OPP*

Site audit comment

The validation sampling frequency is very poorly described in the report and is not considered to meet the validation criteria outlined by ENRS (refer to Table 14.1). The resultant depth is recorded as 0.1 m, whereas a depth relative to a pre-excavation benchmark would be more useful, providing an indication of the final depth of each of the burials.

These deficiencies are not considered to be significant however, as ACM associated with fill material was the main contaminant and visual clearances were provided as the primary line of evidence of validation following removal of fill material. Sampling was conducted as an additional line of evidence, to support the clearance.

15.4 Soil sampling and analytical methodology

15.4.1 Asbestos soil sampling

ENRS (2020) describe the sampling methodology for the asbestos validation as follows. It is noted that visual validation is the primary method, supported by additional sampling. Validation sampling for asbestos is described as follows:

- *Per sample location, 10 litres of soil shall be screened through a 7 mm sieve and the coarse non passing material spread out for inspection on an impermeable layer of contrasting colour material. Any identified ACM*

shall be removed, double bagged and labelled for later weighing and calculation of w/w% concentration;
- *One (1) wetted 500 ml sub sample collected from the fines passing the 7 mm sieve and submitted for laboratory analysis for asbestos identification (AS4964-2004); and*
- *Where asbestos is detected in any sample, the concentration of asbestos as fragments (ACM) and as loose fibres (FA or AF) will be compared with the relevant Site Assessment Criteria for validation.*

15.4.2 Soil sampling (other analytes)

ENRS (2020) describe the sampling methodology for validation as follows:

Soil sampling depths

Samples were obtained from the fresh excavation surface or approximately 0.1 m below the exposed soil surface. Final depths were selected with consideration of ground conditions observed during investigations.

Soil sample method

Samples were collected in general accordance with the principals described in AS4482.1-2005: Guide to sampling and investigation of potentially contaminated soil (Part 1: Non-volatile and semi volatile compounds) and AS4482.2-1999: Guide to sampling and investigation of potentially contaminated soil (Part 2: Volatile compounds).

Soil logging procedures followed a systematic and standardised format providing for classification of the soil group based on particle size and. Field observations were conducted to detect potential soil contamination, if any and to distinguish between soil composition, condition and structure.

Sample preservation

All samples were collected in accordance with industry standard QA/QC procedures. Discrete soil samples for UST validation were collected with disposable sterile gloves and placed directly in laboratory supplied 250 mL jars with Teflon lined lids and immediately stored on ice. Sample containers were individually labelled with sample identification clearly marked on the container and sealed lid.

Volatile compound losses were kept to a minimum by employing the following sampling techniques:
- *Minimal disturbance of soil during sampling;*
- *Sample material placed in sampling jars as soon as possible;*
- *Sampling containers containing zero headspace;*
- *Samples placed directly on ice and transported to the laboratory as soon as possible; and*
- *Employing the most appropriate analytical method to minimise volatile losses at a NATA accredited laboratory.*

15.5 Data usability

ENRS (2020) conducted field and laboratory QA/QC based on their QA/QC programme and a set of data quality indicators (DQIs):

DQO	Evaluation Criteria	Status
Documentation completeness	*Completion of field records, chain of custody documentation, equipment calibration, NATA registered laboratory certificates of analysis.*	☑
Data comparability	*Use of appropriate sampling techniques, storage and transportation of samples. Use of NATA certified laboratory using NEPM procedures. Comparison with previous site information, if any.*	☑
Representative Data	*Sampling coverage of all areas of environmental concern at the Site, and selection of representative samples from each sampling location. Sampling coverage of all Areas of Environmental Concern (AEC), selection of representative samples.*	☑
Sampling precision & accuracy	*Use properly trained and qualified field personnel. Appropriate sampling and field techniques. Achieve laboratory QC criteria.*	☑

The laboratory was NATA accredited and the Practical Quantitation Limits (PQL) were within the acceptable levels for the investigation criteria. Laboratory certificates of analysis provided in Appendix A and Appendix B indicate that for the samples collected during the scope of works, sampling techniques, transport procedures and laboratory analysis were satisfactory. The QA/QC indicators either all complied with the required standards or showed variations that would have no significant effect on the quality of the data or the conclusions of this assessment. It is therefore concluded that, for the purposes of this study, the QA/QC results are valid, and the quality of the data is acceptable for use in this assessment.

Site audit comment

The site audit data usability assessment is provided in full in Appendix B.

The validation results are summarised in the following section.

15.6 Asbestos clearances

The first line of evidence of validation was the asbestos clearances issued for the site. ENRS (2020) provide the following discussion:

The visual clearance inspections upon completion of removal works did not identify any remaining asbestos within the remediation area. The visual observations during the clearance inspection supported by the NATA laboratory Certificates of Analysis indicate the area is clear for asbestos and may be considered safe to access without the use of asbestos personal protective equipment (PPE). Removal equipment and plant was observed to be free of asbestos. If any other asbestos containing materials are uncovered or required to be removed from the site, the removal of such should be carried out in accordance with the Code of Practice on How to Safely Remove Asbestos (SafeWork NSW;2019).

ENRS note that asbestos containing materials identified to remain on the north-western boundary of the Site in Clearance Certificate 02 have since been determined to be outside the construction footprint of the Albion Park

Bypass Project. ENRS understand that Fulton Hogan have notified the appropriate person/s regarding the remaining asbestos in soil.

Site audit comment

The auditor reviewed the clearance certificates issued for the site. The asbestos remaining is noted, and the data usability assessment is provided in full in Appendix B.

The validation results are summarised in the following section.

15.7 Soil validation results

The analytical results of the soil validation are summarised in Table 15.2 below. This summary includes the results of the excavation.

Table 15.2: Summary of soil analytical results (mg/kg)

Analyte	LORs	HSL/ HIL[1]	ESL/ EIL[2]	No. of exceed.	Range	Exceedances
Heavy Metals						
Arsenic	5	3,000	160	-	nd – 10	-
Cadmium	1	900	-	-	nd – 5	-
Chromium	2	3,600	-	-	9 - 48	-
Copper	5	240,000	300	1	8 – 285	-
Lead	5	1,500	1,800	-	nd - 574	-
Mercury	0.1	730/180	-	-	nd	-
Nickel	2	6,000	290	-	nd – 76	-
Zinc	5	400,000	700	1	19 – 1,070	Cut 1/V7
BTEXN						
Benzene	0.2	3	75	-	nd	-
Toluene	0.5	NL	135	-	nd	-
Ethyl benzene	0.5	NL	165	-	nd	-
Total Xylene	0.5	NL	180	-	nd	-
Naphthalene	0.5	3	170	-	nd	-
TRH						
F1 TRH C_6 – C_{10}	10	260	180	-	nd	-
F2 TRH >C_{10} – C_{16}	50	110	120	-	nd	-
F3 TRH >C_{16} – C_{34}	100	NL	1,300	-	nd - 210	-
F4 TRH C_{34} – C_{40}	100	NL	5,600	-	nd	-
PAHs						
Benzo(a)pyrene	0.5	-	1.4	-	nd	-
B(a)P TEQ (LOR)	0.05	40	-	-	1.2	-
Total PAHs	0.05	4,000	-	-	nd	-
Phenols						

Analyte	LORs	HSL/ HIL[1]	ESL/ EIL[2]	No. of exceed.	Range	Exceedances
Phenol	0.5	240,000	-	-	nd	-
OCPs, PCBs						
Heptachlor	0.05	50	-	-	nd	-
Chlordane	0.05	530	-	-	nd	-
Endrin	0.05	100	-	-	nd	-
Endosulfan	0.05	2,000	-	-	nd	-
Methoxychlor	0.2	2,500	-	-	nd	-
Aldrin + Dieldrin	0.05	45	-	-	nd	-
4,4'-DDT	0.05	-	640	-	nd	-
DDD + DDE + DDT	0.05	3,600	-	-	nd	-
Sum of OCPs	-	50[4]		-	nd	-
PCBs	0.1	1	-	-	nd	-
Asbestos						
Asbestos	-	Presence of ACM	-	-	N	-

Table notes:
[1] Health investigation levels for commercial industrial land use (ASC NEPM, 2013);
[2] Ecological investigations levels – commercial/industrial for aged contamination using Australian reference soil characteristics – pH = 6, Clay content = 10%, CEC = 10 cmol/kg, Organic carbon = 1% or equivalent OM;
[3] DDT only;
Underline – Samples that exceeded underlined criteria;
LOR = laboratory limit of reporting;
nd = not detected, concentrations less than the LOR;
- = no criteria, not analysed, no exceedances.

Following completion of remedial works, an exceedance of the EIL for zinc remained at one location on-site at the base of a burial (Cut 1/V-7).

15.8 Site audit discussion

The validation report is poorly described the sampling strategy and methodology, which lead to confusions in interpretation. Whilst the information was insufficiently presented in the report, it has been checked by the Auditor, summarised above, and found to be sufficient for the purposes of decision making.

The rationale used to select samples to be used for validation purposes is considered to be acceptable.

The auditor visited the site during the remediation works and can confirm that soil was removed systematically and appropriately.

16.0 Validation discussion

16.1 Stratigraphic conditions discussion

ENRS (2020) provide the following stratigraphic conditions discussion:

> *Excavations during removal works encountered relatively uniform conditions with shallow topsoil overlaying brown clay. Where bury pits were not encountered, weathered sandstone was located between depths of 0.5 mbGL and 1.0 mbGL. Some areas of imported fill, primarily red clay, were encountered throughout removal works. Stratigraphic conditions encountered during remediation works were consistent with those encountered during the DSI (ENRS, 2019).*
>
> *In addition to the above stratigraphic conditions, multiple small localised bury pits containing non-putrescible waste were encountered during the removal works. Bury pits comprised silty sands and clays with a variety of foreign materials including metal, plastic, rubber, concrete and car parts. Once excavated, depths of bury pits varied from 1.0 – 4.0mbgl, with excavations terminating in weathered sandstone and bedrock with primarily vertical excavation walls.*
>
> *The final validation surface was observed to comprise virgin weathered shale and bedrock with no visual indicators of contamination such as foreign materials, staining or odours. The remediation works were limited to the previously identified area of environmental concern (AEC02) delineated in the RAP as depicted in* ***Figure 2****. Validation sampling of bury pits was limited to the base of excavation trenches.*

16.2 Analytical discussion

ENRS (2020) provide the following analytical discussion of the validation:

> ***Asbestos in soil***
> *Upon completion of works the asbestos removal areas were subject to a walk over and visual clearance inspection. No asbestos was observed on the ground surface at the Site. Final NATA accredited laboratory results did not identify any asbestos fibres in validation sample/s, which is below the lowest NEPM Health Screening Levels (HIL's) of 0.01% for bonded ACM and 0.001% for friable asbestos. The results are considered satisfactory and do not trigger any further investigation or remediation.*
>
> ***Benzene Toluene Ethylbenzene Xylene (BTEX)***
> *BTEX compounds are volatile compounds commonly found in petroleum products and are typically found together at contaminated sites. Investigation results for BTEX in soil reported results below the laboratory Practical Quantitation Limit (PQL) and the adopted Guidelines. Hence, the results are considered satisfactory.*
>
> ***Total Recoverable Hydrocarbons (TRH)***
> *Laboratory testing was conducted for light fraction (C6-10) and heavy fraction (C10-40) Total Recoverable Hydrocarbons (TRH). Light fractions are generally associated with Mineral Spirits and Petrol whilst middle to heavy fractions are an indicator for Diesel or Kerosene. Investigation results for light fraction (TRH C6-C10) and heavy fraction (TRH C10-C40) hydrocarbons reported results below the adopted assessment criteria or the Laboratory*

Practical Quantitation Limit (PQL). Hence, the results are considered satisfactory.

Heavy Metals and Metalloids (Lead)
Laboratory testing was conducted for eight (8) heavy metals and metalloids. Concentrations of arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc were all reported below the relevant SAC. Hence, the results are satisfactory.

Polycyclic Aromatic Hydrocarbons (PAHs)
Polycyclic Aromatic Hydrocarbons (PAHs) are formed by the incomplete combustion of coal, oil, petrol, wood, or other organic materials. Major sources of PAHs include asphalt roads, road tar, coal, coal tar, oil, fuels and fires of all types. Results for PAHs were reported at concentrations below the laboratory LOR and relevant SAC. Hence, the results are considered satisfactory.

Organochlorine Pesticides (OCP)
OCPs are characteristically very stable. They degrade slowly and accumulate in the food chain. Since they were first introduced into Australia in the mid 1940s, OCPs have been used in many commercial products. Commonly used OCP insecticides were DDT, lindane, chlordane, dieldrin, aldrin and heptachlor. Results for OCPs were reported at concentrations below the laboratory LOR and the SAC. Hence, the results are considered satisfactory.

Organophosphorus Pesticides (OPP)
OPPS are synthetic, more water soluble and have higher degradation rates than OCPs. OPPS may interfere with the nervous system and cause development or reproductive harm, and endocrine disruption. Results for OPPS were reported at concentrations below the LOR or SAC. The results are considered satisfactory.

Phenols
Phenols are present in a range of industrial and household products including disinfectants, fertilisers, explosives, paints and pain removers, drugs, pharmaceuticals, textiles and charcoal. Phenol may be found at petroleum storage sites associated with waste oil, kerosene and diesel. However, phenols do not tend to bio-accumulate and have a relatively short half-life of between 2 and 20 days.

Results for Phenols were reported at concentrations below the laboratory LOR and the SAC. Hence, the results are considered satisfactory.

Volatile Organic Compounds (VOCs)
Soil analysis was undertaken for a broad range of Volatile Organic Compounds (VOCs), including;
- *Monocyclic Aromatic Hydrocarbons;*
- *Oxygenated Compounds;*
- *Halogenated Aliphatic Compounds;*
- *Halogenated Aromatic Compounds;*
- *Trihalomethanes;*
- *Phthalates (Plasticisers);*
- *Nitrosamines;*
- *Nitroaromatics and Ketones;*
- *Haloethers;*
- *Chlorinated Hydrocarbons; and*
- *Anilines and Benzidines.*

Results were reported below the LOR for all compounds and adopted SAC. Hence, the results are considered satisfactory.

16.3 Site audit discussion

The consultant applied EILs incorrectly during the works and did not highlight the exceedance of the zinc EIL at the base of one of the burials. Following completion of remedial works, an exceedance of the EIL for zinc remained at one location on-site at the base of a burial (Cut 1/V-7). This exceedance is considered to be limited in extent, and following validation, imported material was placed on top of this area as part of the road construction further limiting ecological access to this material.

17.0 Validation conclusions

The following validation conclusions are provided by ENRS (2020):

> *Based on the findings outlined during the scope of works the following conclusions and recommendations are provided:*
>
> - *This validation report documents the results of clearance inspections, soil sampling and NATA accredited laboratory analysis following the removal and onsite encapsulation of asbestos in soil (ASBINS) for Lot 99 DP1076242, Lot 118 & 119 DP1223046, Lot 3 DP881749 and Lots 61 & 63 DP1041353, Princes Highway, Yallah, NSW 2530;*
>
> - *At completion of remediation works, 10,290 tonnes of ASBINS was successfully excavated and encapsulated on-Site within an engineered containment cell with a minimum 3 m thickness capping layer;*
>
> - *Upon the completion of remediation works, a total of 1947.14 tonnes of material unsuitable for on-Site encapsulation was excavated and disposed of off-Site at appropriately licenced waste facilities, comprising;*
>   - *1,927.56 tonnes of Special Waste (asbestos) disposed off-Site at Hi-Quality Group;*
>   - *16.94 tonnes of non-putrescible General Solid Waste disposed of at Kembla Grange Recycling; and*
>   - *2.64 tonnes of Special Waste (waste tyres) disposed of at Tyrecycle.*
>
> - *Soil validation sample locations were selected with consideration of the NEPM Schedule B2 Section 6, guidelines on Sampling Design (NEPC 2013). Soil samples were analysed by ALS and ASET, both NATA accredited laboratories for the selected analysis. QA/QC results indicate that sampling techniques, transport procedures and laboratory analysis were satisfactory and the quality of the data is acceptable for use in this assessment;*
>
> - *NATA laboratory results for TRH, BTEX, PAHs, Heavy Metals, OPPs, OCPs, VOCs, SVOCs and asbestos in soil were all reported below the EPA endorsed Site Assessment Criteria (SAC). The results of remediation works are considered satisfactory;*
>
> - *Visual clearance inspections identified no visible asbestos residue from asbestos removal work in the area, or in the vicinity of the area, where the work was carried out;*
>
> - *Final NATA accredited laboratory results for all samples reported a No Asbestos Detected, which is below the lowest NEPM Health Screening Levels of 0.01% for bonded ACM and 0.001% for friable asbestos for Commercial/Industrial land use;*
>
> - *These results indicate the primary remediation objectives have been met and the Site may be considered suitable for commercial/industrial land use and the proposed road corridor;*
>
> - *It is recommended the ASBINS containment Cell be appended to the RMS asbestos register and managed in accordance with RMS requirements, including regular inspections for cell integrity, a no dig*

policy without asbestos controls, and the area should remain void of any deep rooted plants which may penetrate the capping layer.

- *ENRS recommend Fulton Hogan consider the development of an Environmental Management Plan (EMP) for the Site to document the protocols for ongoing Site management and help ensure the longevity of the remedial solution.*

- *This report should be submitted to the NSW EPA accredited Site auditor for final endorsement.*

- *Should any change in Site conditions or incident occur which causes a potential environmental impact, ENRS or a Licenced Asbestos Assessor with contaminated land experience should be notified to further assess the site and consider requirements for any additional site controls or assessment.*

17.1 Site audit discussion

The auditor agrees with the conclusions of ENRS (2020) and that an environmental management plan is required to manage the encapsulation cell present at the site.

18.0 Environmental management plan

An environmental management plan was prepared by Cardno for the encapsulation cell:

- Cardno (2021) *Environmental Management Plan – Asbestos in Soils Encapsulation Cell – M1 Princes Motorway Chainages 18250 to 18490, Albion Park Rail Bypass (Ref. 8201904701).*

18.1 Objective

Cardno (2021) describe the objective of the EMP as follows:

> *The purpose of this EMP is to provide guidance on the ongoing future management of the encapsulated material and assist any future site workers in developing project specific environmental controls.*
>
> *The objectives of this EMP are to:*
> - *Identify the nature and location of contaminated material within the site; and*
> - *Manage ongoing risks, during and post road construction, associated with this contaminated material for current and future site users.*

18.2 Contamination to be managed

The contamination to be managed consists of the following (Cardno, 2021):

> *Approximately 8,725 m3 of asbestos impacted soil sourced from Cut 1 and Fill 1 located north of the encapsulation area.*
>
> *In addition to the asbestos impacted soil, approximately 7m3 of lead impacted soil sourced from SP02 within Cut 1.*
>
> *There was no information identified during site investigations to suggest that other significant contaminants of concern are present on Site.*

18.3 Stakeholders and responsibilities

The responsibilities of key stakeholders are summarised in Table 17.1, from Cardno, 2021.

Table 17.1: Key stakeholders and responsibilities

Role	*Entity*	*Responsibilities*
Site owner	*TfNSW*	– *Ensuring this EMP is included in the TfNSW contaminated land management database and/or the property information management system (PIMS).* – *The assignment of individual responsibilities for implementing, maintaining, monitoring, and reporting each environmental requirement as discussed in this EMP.* – *Ensuring that all works are conducted in compliance with the EMP and regulatory requirements.* – *Ensuring appropriate monitoring, corrective actions and reporting of the environmental requirements.* – *Ensuring that all maintenance workers, contractors, subcontractors, employees and visitors conduct their work in accordance with the requirements of the EMP and the relevant Work Health and Safety (WH&S) requirements. Ensuring provision of updated information to the Environment Protection Authority (EPA), when significant changes to the contamination status of the site are detected.*

Role	*Entity*	*Responsibilities*
		Information requirements to the EPA are to be conducted in accordance with the Section 60 reporting requirements of the Contaminated Land Management (CLM) Act 1997.
Person/s conducting work	*Various including contractors and subcontractors to TfNSW*	– *Ensuring that the information within this EMP is incorporated into their environmental and WHS systems of work.* – *Ensuring that procedures exist within their systems of work to inform all employees, contractors or subcontractors of this and the associated requirements.* – *Ensuring that all persons physically conducting work on-site understand and comply with the requirements of this EMP and their associated systems of work, including training and inductions as required.* *Ensuring that their environmental and WH&S systems of work include a 'stop work' procedure, such that if conditions are encountered which differ significantly from those described in this EMP or the referenced relevant documents, all persons physically conducting the works can appropriately stop work in a controlled manner.*
Site workers	*All*	– *Complying with the requirements of this EMP, as detailed in the systems of work under which they are operating.* – *To actively engage in inductions, JSAs, tool box meetings and the like as specified in the systems of work under which they operate.* – *To seek clarification from their supervisor if they are unsure of the requirements or their environmental / WH&S responsibilities.* – *To stop work and notify their supervisor if they know or suspect that works are being conducted in a manner which may result in environmental or WH&S incidents or accidents.*

18.4 EMP Checklist

The EMP has been reviewed, based on the checklist included in NSW EPA, 2020 which is provided in Appendix A. A summary of the checklist is provided in Table 17.2 below developed from Appendix A, *Environmental Management Plan Review Checklist*, from NSW Government *Environmental Management Systems Guidelines, Edition 3* (2013) and *Draft Contaminated Land Planning Guidelines* (2018). A checklist review of the final EMP is provided in Table 15.2.

Table 17.2: EMP checklist

Requirement	Provided?
Objectives of the EMP.	Complete.
Include a list, and advice on how to access, any relevant site investigations, assessments of site contamination, remediation plans, site audit statements or validations.	Complete.
Describe the remediation work that has been completed.	Complete.
Describe the nature and extent of residual contamination.	Complete.
Specify performance criteria for residual contamination, ensuring the criteria are specific and measurable, with clear timeframes.	Complete.

Requirement	Provided?
Include information on how residual contamination will be managed.	Complete.
Include information on how residual contamination will be monitored and reported on.	Complete.
Describe the actions that will be undertaken if the criteria are exceeded.	Complete.
Include information on who is responsible for the implementation of the plan and how, when and by who it will be reviewed.	Complete.

18.5 EMP legal enforceability and public notification

The EMP can be made legally enforceable as it is a requirement of compliance with the conditions of approval E57 to E58 of NSW Infrastructure Approval SSI 6878 for the ARPb project (i.e. requirements for site contamination reports and a site audit statement/site audit report).

Email correspondence was received from [redacted] of Transport for New South Wales on 17 February 2021, accepting the EMP:

> *Note this updated version of the EMP has been reviewed and accepted by the TfNSW regional maintenance manager.*

18.6 Public notification

As the containment cell is located wholly within the kerb to kerb road alignment of a major arterial roadway, the likelihood of future purchasers or interested parties being associated with the site is considered to be negligible. However, future purchasers and/or interested parties should be made aware of the managed residual contamination. Public notification of the EMP to any authorities or interested public members would be made through appropriate notations on the land title and to be issued under Section 10.7 (2) & (5) of the EP&A Act 1979.

18.7 Site audit discussion

In accordance with Section 3.4.6 of the NSW EPA Site Auditor Guidelines, the auditor confirms that the following has been conducted:

- The EMP has been reviewed by the auditor and is considered to be acceptable.
- The EMP can reasonably be made legally enforceable, because compliance with the conditions of approval E57 to E58 of NSW Infrastructure Approval SSI 6878 for the ARPb project, is a requirement of the development consent condition issued by the relevant consent authority.
- There will be appropriate public notification of any restrictions applying to the land to ensure that potential purchasers or other interested individuals are aware of the restrictions. Appropriate notations on a planning certificate issued under 10.7 of the Environmental Planning and Assessment Act or a covenant registered on the title to land under s.88B of the Conveyancing Act 1919 is a requirement of the EMP.
- Off-site migration of contamination from the site does not present an unacceptable risk to either the on-site or off-site environments.

19.0 Conceptual site model

The conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. As part of the validation, ENRS developed a CSM.

19.1 Consultant's interpretation

19.1.1 Sources of contamination

ENRS provided the following discussion regarding potential sources of contamination:

Area of Environmental Concern	*Historical Activities*	*CoPC*
AEC02	*Former vehicle wrecking yard, illegal dumping, uncontrolled filling, leaks and spills from vehicles when refuelling mobile plant and scaffolding warehousing and distribution.*	*- Asbestos in Soil* *- Heavy metals* *- Hydrocarbons (TRH – total recoverable hydrocarbons)* *- Benzene, toluene ethylbenzene, xylenes (BTEX)* *- Polycyclic Aromatic Hydrocarbons (PAH)* *- Phenols; and* *- SVOCs/VOCs.*

19.1.2 Pathways

ENRS (2020) provided the following discussion regarding potential pathways for contaminant migration:

> *Given the top down placement of potential asbestos in Fill and soil, the primary contaminant migration and exposure pathways include:*
> - *Inhalation and or ingestion of dust or air bound contaminants primarily during high wind or disturbing activities; and*
> - *Mixing of contaminated soils with non-contaminated material during excavations works.*

19.1.3 Receptors

ENRS (2020) provided the following discussion regarding potential pathways for contaminant migration:

> *The nearest receptors include:*
> - *Site users & human health – dermal / ingestion / inhalation (excavations, dust, fibres and soil);*
> - *Neighbouring properties and downwind lands; and*
> - *Shallow soil, stormwater runoff – vertical and lateral migration of contaminants (if any) and connectivity with drainage waterways (if any).*

19.2 Site audit discussion

The auditor's interpretation of the CSM is summarised in Table 19.1 on the following page, following the validation works.

Table 19.1: CSM discussion

Element	Site specific information
The physical and built environment, including former, existing and proposed structures.	The site was an undeveloped property adjacent to an industrial estate which had large quantities of non-putrescible waste burials. Pre-remediation the soil profile generally consisted of: – fill material comprising of silty sands and clays with a variety of foreign materials including metal, plastic, rubber, concrete and car parts to depths 0.5 – 1.0m. In the location of burials, this extended to depths of 1.0 – 4.0; and – followed by natural clays and weathered sandstone. The site is now a constructed motorway, including an encapsulation cell managed by an EMP.
Known and potential sources of contamination and contaminants of concern, including chemical storage, use and disposal.	Contamination was limited to the presence of asbestos in fill material. Following remedial works on-site, no contamination has been identified in excess of site criteria on-site outside of the encapsulation cell.
Potentially affected media, such as soil, groundwater, surface water and air, including extent and magnitude, and potential variations, e.g. preferential pathways etc.	The impacted soil has been encapsulated in the cell constructed on-site.
Human and ecological receptors.	Given the contaminants of concern are less than the human health and ecological criteria following validation works, no receptors are considered to be present.
Potential and complete exposure pathway to human and/or environmental receptors.	Given the lack of sources following encapsulation, potential exposure pathways are not present.
Data gaps	No significant data gaps remain following these works. The encapsulation cell will be maintained by the environmental management plan (EMP) developed for the site.

20.0 Site suitability discussion

20.1 Regulatory issues

EPA (2017) states that "regulatory consent, licenses, notifications and other requirements may apply for some aspects of contaminated site investigation, remediation and validation work". A summary of the regulatory requirements applicable to the site are described in Table 20.1.

20.2 Risk and migration

The residual risk posed by contamination on this site consists of the presence of asbestos within the encapsulation cell.

The environmental management plan was developed to address the risk.

20.3 Landuse suitability

EPA (2017) describes that in assessing the suitability of a site for an existing or proposed landuse in an urban context, the decision process for assessing urban redevelopment sites should be followed. For sites that are residential land use, the following should be assessed in determining landuse suitability:

All site assessment, remediation and validation reports follow applicable guidelines.

- The auditor considers that site assessment reports developed for the site sufficiently comply with EPA made and approved guidelines to allow certification of landuse suitability. Where they do not, sufficient justification has been provided in the SAR.

Any aesthetic issues relating to site soils have been adequately addressed.

- The auditor considers that any aesthetic issues relating to site soils have been adequately addressed by the encapsulation process.

Soils have been assessed against relevant health-based investigation levels and the potential for migration of contamination from soils to groundwater has been considered.

- The auditor considers that soils have been assessed in accordance with EPA made and approved guidelines including NEPM, 1999, amended 2013. The health investigation levels for commercial/industrial land use (HIL D) have been applied.

  The potential for migration of contamination from soils to groundwater has been considered.

Groundwater (where relevant) has been assessed against relevant health-based investigation levels and, if required, any potential impacts to buildings and structures from the presence of contaminants considered.

- Groundwater was not considered to require investigation based on the nature of the contaminants and geology. There are no relevant potential impacts to buildings and structures from the presence of contaminants.

Hazardous ground gases (where relevant) have been assessed against relevant health-based investigation levels and screening values.

- Not relevant – no issues with hazardous ground gases have been identified.

Any issues relating to local area background soil concentrations that exceed relevant investigation levels have been adequately addressed in the site assessment report(s).

- The auditor does not consider that local soil concentration issues are relevant, based on the PCOCs.

The impacts of chemical mixtures have been assessed.

- The auditor does not consider that any issues with chemical mixtures have arisen at this site.

Any potential ecological risks have been assessed.

- The auditor has checked that soils have been assessed in accordance with EILs and ESLs.

Any evidence of, or potential for, migration of contaminants from the site has been appropriately addressed, including potential risks to off-site receptors, and reported to the site owner or occupier.

- The auditor has checked that potential of off-site migration of contaminants has been addressed, and there is low risk to off-site receptors.

The site management strategy (where relevant) is appropriate including post-remediation environmental plans.

- The site auditor considers that no further management is required for the contamination identified at this site.

The auditor agrees that the site is suitable for the proposed landuse, being commercial/industrial, specifically the road corridor in accordance with the environmental management plan prepared for the site by Cardno.

Table 20.1: Summary of regulatory requirements

Act, regulation, policy, etc.	Relevant requirements	Project specific application
Environmental Planning & Assessment (EP&A) Act 1979 All development proposals in NSW must be assessed to ensure they comply with relevant planning controls and, according to nature and scale, that they are environmentally and socially sustainable. State, regional and local plans and policies indicate what level of assessment is required, and who is responsible for assessment. Planning and development is carried out under the EP&A Act and the *Environmental Planning and Assessment (EP&A) Regulation* 2000. Under S. 79C of the EP&A Act, the consent authority has to consider the suitability of the site for the proposed land use, which includes whether the site is contaminated.		
Development application approval Development applications are made under the EP&A Act for developments that are legal under the planning scheme. In determining an application, the consent authority must consider statutory requirements (acts and regulations, state environmental planning policies, and regional and local environmental plans) and non-statutory requirements (development control plans (DCPs) and council and state policies and guidelines).	Notices of determinations are issued, which may be subject to conditions. These will generally include requirements for appropriate environmental management as part of the development works. For sites where contamination has been identified, submittal of appropriate assessment and management documents are generally required. A statutory site audit may be required if conditioned by the consent authority.	A site audit was requested as a condition by the consent authority and therefore the audit is considered to be statutory.
Designated development Designated development includes development that has a high potential to have adverse impacts because of their scale or nature or because of their location near sensitive environmental areas, such as wetlands. Designated developments are listed in Schedule 3 of the EP&A Regulation, or in planning instruments such as *SEPP 14.*	Including contaminated soil treatment works that treat soil exclusively from the site and: – incinerate more than 1,000 m3 a year of contaminated soil, or – treat otherwise than by incineration and store more than 30,000 m3 of contaminated soil, or – disturb more than an aggregate area of 3 ha of contaminated soil.	The remedial works are not considered to be designated development.
State Environmental Planning Policy No. 55 Provides for a State-wide planning approach to the remediation of contaminated land and aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to	Specifies Category 1 and or 2 remediation, i.e. where consent is required for the remedial works, and includes prior notice for Category 2, requirements for compliance with guidelines,	Remediation of the site was completed under the EPL for the project.

Act, regulation, policy, etc.	Relevant requirements	Project specific application
human health or any other aspect of the environment.	notices of completion for Category 1 works, and various planning considerations. SEPP 55 also requires that all remediation work must be carried out in accordance with DUAP/EPA 1998 and the guidelines made or approved by the EPA in accordance with the CLM Act.	The auditor considers that sufficient compliance with EPA made and approved guidelines were achieved to allow landuse certification.
Contaminated lands policy or development control plans (DCPs) Under SEPP 55 councils can make a contaminated land policy. DCPs provide specific, more comprehensive guidelines for certain types of development. The detailed guidelines contained within a DCP are in addition to the provisions of the legal planning instrument.	Varies based on local government area. Policies and/or DCPs provide specific guidance as to what the consent authority requires for remediation, including site management requirements. Under SEPP 55, remedial work which does not comply with the policy is classified as Category 1. The Ballina Shire Council Management of Contaminated Land (Policy Ref. C12) policy provides information on management of contaminated land in the Shire.	N/A.
Contaminated Land Management (CLM) Act 1997 The CLM Act establishes a legal framework that gives EPA powers to require the assessment and remediation of site where contamination is significant enough to warrant regulation. Under the ACT, EPA can agree to voluntary investigation and management of sites, or impose orders for investigation or management.		
Duty to report There is a duty for landowners and persons who have responsibility for contamination to notify EPA under Section 60 of the CLM Act.	Reporting to EPA if required based on the considerations and criteria described in DECC (2015) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*.	Reporting contaminated land issues to EPA is not considered necessary. It is understood that EPA were made aware of the contamination as part of normal communications during the construction project.
Orders or voluntary agreements EPA can declare land to be an investigation or remediation area, or to be significantly	Determine if any orders under Part 3 of the CLM Act or approved voluntary management	No orders or agreements exist for the site.

Act, regulation, policy, etc.	Relevant requirements	Project specific application
contaminated. Management of investigation and remedial works can be by an order or a voluntary management proposal.	proposals under the CLM Act exist or are in preparation.	
Protection of the Environment Operations (POEO) Act 1997 The objectives of the Act include to protect, restore and enhance the quality of the environment in NSW, having regard to the need to maintain ecologically sustainable development. The requirements of the POEO Act and associated schedules and regulations, are relevant to the assessment and management of contaminated land.		
Air, noise, water General provisions in regard to requirements not to pollute waters, to prevent or minimise air pollution, to maintain and operate plant in a proper and efficient condition/manner and to deal with materials in a proper and efficient manner to minimise noise impacts.	Development of appropriate management plans, e.g. environmental management plan (EMP), having regard to specific approvals and relevant guidance. The Act also requires notification when a pollution incident occurs that causes or threatens material harm to the environment.	An environmental management plan has been developed for the site.
Environment protection licences For scheduled development work and scheduled activities, and non-scheduled activities for water pollution (e.g. S. 43, 47, 48, 55, and 122).	Schedule 1 of the POEO Act defines contaminated soil treatment as a scheduled activity as for designated developments, and contaminated groundwater treatment with the capacity to treat more than 100 mega litres per year.	No licences were required as part of the remediation works.
The Act defines 'waste' for regulatory purposes and establishes management and licensing requirements.	Includes waste classification, resource recovery exemptions, general immobilisation approvals, requirements for immobilisation, and licensing requirements.	Waste classification and off-site disposal was conducted appropriately, in accordance with NSW EPA Waste Classification Guidelines.
Underground Petroleum Storage Systems (UPSS) Regulation 2008 Best practice in the design, installation and on-going operation of a UPSS, which applies to all UPSSs in NSW.	Specific requirements include: – loss monitoring and detection; – incident management (response); – groundwater monitoring wells; – site validation following decommissioning/ – removal/replacement;	N/A – no UPSS present on-site.

Act, regulation, policy, etc.	Relevant requirements	Project specific application
	– environmental protection plan (EPP).	
Environmentally Hazardous Chemicals (EHC) Act 1985 The main provisions of the EHC Act relate to a statutory chemical assessment function, and the regulation and control of chemicals via Chemical Control Orders (CCOs), licences and regulations. The EHC Act regulations set general requirements for fees, provision of information, exemptions and penalties while the CCOs set controls for specific chemicals both through generic requirements and by requiring that certain processes be subject to particular licence conditions.		
Chemical Control Orders Chemical control orders in force in NSW: – aluminium smelter wastes; – dioxin-contaminated wastes; – scheduled chemical wastes (SCW); – organotin waste materials; and – polychlorinated biphenyls (PCBs) and wastes.	A CCO provides set requirements for a broad range of activities, including the manufacture, processing, distribution, use, sale, transportation, storage and disposal of chemicals and chemical wastes. In regard to the assessment and management of contaminated land, CCOs can be applicable to on-site use or to off-site disposal.	N/A
Water Management Act (WMA) 2000 The object of the WMA and the *Water Management (General) Regulation* 2004 is the sustainable and integrated management of the State's water for the benefit of both present and future generations. It includes the establishment of water sharing plans, and various approvals and licenses to protect and maintain surface and ground waters.		
Controlled activity approval A controlled activity approval (CAA) under Part 3, Chapter 3 of the WMA is required for controlled activities carried out in, on or under waterfront land.	Waterfront land includes the bed and banks of a river, lake or estuary, including land to within 40 metres of the highest bank or the mean high water mark (also check NSW Fisheries).	N/A
Licensing of groundwater wells Licenses are required under Part 5 for water bores, including monitoring wells.	A licence is required to establish a groundwater bore for any purpose. This however does not include bores installed for the purpose of groundwater monitoring.	No groundwater monitoring wells were required for the site works.

Act, regulation, policy, etc.	Relevant requirements	Project specific application
Heritage Act 1977		
A relic is any deposit, object or material evidence which relates to the settlement of NSW, not being Aboriginal settlement, and which is 50 or more years old.	If any relics or suspected relics are discovered, they should not be removed or disturbed, as an archaeological investigation may be required and a permit under the Act may be required.	No specific heritage issues were identified.
National Parks and Wildlife Act 1974		
Aboriginal object means any deposit, object or material evidence relating to the Aboriginal habitation of NSW, being habitation before and/or concurrent with the occupation of non-Aboriginal persons, and includes Aboriginal remains.	If any Aboriginal or suspected Aboriginal objects are detected, they should not be removed or disturb as an archaeological investigation may be required and a permit under the Act may be required.	N/A

21.0 Glossary and references

21.1 Glossary

AST	Aboveground storage tank
BTEXN	Benzene, toluene, ethyl benzene, xylenes and naphthalene
CSM	Conceptual site model
EIL	Environmental Investigation Level
ESL	Environmental Screening Level
EMP	Environmental Management Plan
ESA	Environmental site assessment
GME	Groundwater monitoring event
HHRA	Human health risk assessment
HIL	Health Investigation Level
HSL	Health Screening Level
LOR	Limit of reporting
Metals	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), and zinc (Zn)
NATA	National Association of Testing Authorities
NEPM/C	National Environmental Protection Measure/Council
OCPs	Organochlorine pesticides
OH&S	Occupational health and safety
OPPs	Organophosphorus pesticides
PAHs	Polycyclic aromatic hydrocarbons, including the USEPA 16 priority pollutants: naphthalene; acenaphthylene; acenaphthene; fluorine; phenanthrene; anthracene; fluoranthene; pyrene; benzo(a) anthracene; chrysene; benzo(b)fluoranthene; benzo(k) fluoranthene; benzo(a)pyrene; indeno(1.2.3.cd)pyrene; dibenz (a.h)anthracene; and benzo(g.h.i)perylene
PCBs	Polychlorinated biphenyls
PID	Photo-ionisation detector
PSH	Phase separated hydrocarbons
QA/QC	Quality assurance/quality control
RAP	Remediation action plan

RPD	Relative Percentage Difference
SWL	Standing water level
TPHs	Total petroleum hydrocarbons, including volatile C6 – C9 fraction and semi- and non-volatile C10 – C36 fractions
UCL	Upper confidence limit
UST	Underground storage tank
VRP	Voluntary remediation proposal
VOCs	Volatile organic compounds

21.2 References

Consultant reports

Cardno (2021) *Environmental Management Plan – Asbestos in Soils Encapsulation Cell – M1 Princes Motorway Chainages 18250 to 18490, Albion Park Rail Bypass (Ref. 8201904701).*

Environment & Natural Resource Solutions (ENRS) (2019a) *Sampling, Analysis & Quality Control Plan (SAQP), Asbestos in Soil (ASBINS), Albion Park Bypass Project* (Ref. ENRS1153R1E1, April 2019).

ENRS (2019b) *Stage 2 – Detailed Site Investigation (DSI), Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153_APRB_PAEC02 Cut#1_DSI, June 2019).

ENRS (2019c) *Remediation Action Plan, Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153, June 2019).

ENRS (2020a) *Stage 4 – Site Validation Report, PAEC02 – Cut No. 1, Albion Park Rail Bypass* (APRB) (Ref. ENRS1153).

Hyder Cardno Joint Venture (HCJV, 2014) Phase 1 – *Preliminary Site Investigation Report, Albion Park Rail Bypass*.

Hyder Cardno Joint Venture (HCJV, 2017) *Environmental site assessment – PAEC02: Industrial Estate, Albion Park Rail Bypass* (Ref. FK0004-APRB-R-02).

Guidelines made by EPA

Department of Environment and Conservation NSW (DEC) (March 2007) *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination*. NSW EPA, Sydney.

Environment Protection Authority (EPA) (May 2020) *Contaminated Land Guidelines Assessment and management of hazardous ground gases*. NSW EPA, Parramatta.

EPA (September 1995) *Contaminated Sites: Sampling Design Guidelines*. NSW EPA, Sydney.

EPA (October 1997) *Contaminated Sites: Guidelines for Assessing Banana Plantation Sites*, amended August 2003. NSW EPA, Sydney.

EPA (May 2020) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Land*. NSW EPA, Parramatta.

EPA (June 2003) *Contaminated Sites: Guidelines for the Vertical Mixing of Soil on Former Broad-acre Agricultural Land*. NSW EPA, Sydney.

EPA (June 2005) *Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens*. NSW EPA, Sydney.

EPA (October 2017) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)*. EPA, Sydney.

EPA (September 2015) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*. NSW EPA, Sydney.

Guidelines approved by the EPA

ANZECC/ARMCANZ (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4, Canberra. *Limited to the water quality for primary industries component only.*

Australian and New Zealand Governments and Australian State and Territory Governments (ANZAST) (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. ANZAST (2018).

Department of Health and Ageing and EnHealth Council (2012) *Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards*. Commonwealth of Australia, Canberra.

Lock, W. H., (1996) *"Composite Sampling", National Environmental Health Forum Monographs, Soil Series No. 3*. SA Health Commission, Adelaide.

NEPC (1999) *National Environment Protection (Assessment of Site Contamination) Measure, Schedule A and Schedules B(1)-B(10)*, amended April 2013. National Environment Protection Council, Adelaide.

Other documents

NHMRC/ NRMMC (2011) *Australian Drinking Water Guidelines*. National Health and Medical Research Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra, and Natural Resource Management Ministerial Council (NRMMC), Australian Government, Canberra.

NSW Agricultural/CMPS&F (1996) *Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes*. NSW Agricultural and CMPS&F Environmental, Canberra.

Other technical documents made by EPA

DEC (July 2005) *Information for the assessment of gasworks sites*. NSW DEC, Sydney;

Department of Environment, Climate Change and Water (DECCW) (August 2009) *Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008*, amended September 2009. NSW DECCW, Sydney.

DECCW (2010) *Vapour Intrusion: Technical Practice Note.* (Ref. 2010/774). NSW DECCW, Sydney.

EPA (October 2016) *Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste*.

EPA (April 2014a) *Best Practice Note: Landfarming*. NSW EPA, Sydney.

EPA (November 2016) *Designing Sampling Programs for Sites Potentially Contaminated by PFAS: Guidance Document*. NSW EPA, Sydney.

EPA (April 2014b) *Technical Note: Investigation of Service Station Sites*. NSW EPA, Sydney.

EPA (August 2015) *Technical Note: Light Non-Aqueous Phase Liquid Assessment and Remediation*. NSW EPA, Sydney.

EPA (November 2014) *Waste Classification Guidelines – Part 1: Classifying Waste*. NSW EPA, Sydney, NSW.

Additional technical documents referenced by EPA

Beck, P & Mann, B (2010) *A technical guide for demonstrating monitored natural attenuation of petroleum hydrocarbons in groundwater*, CRC CARE Technical Report no. 15, CRC CARE, South Australia.

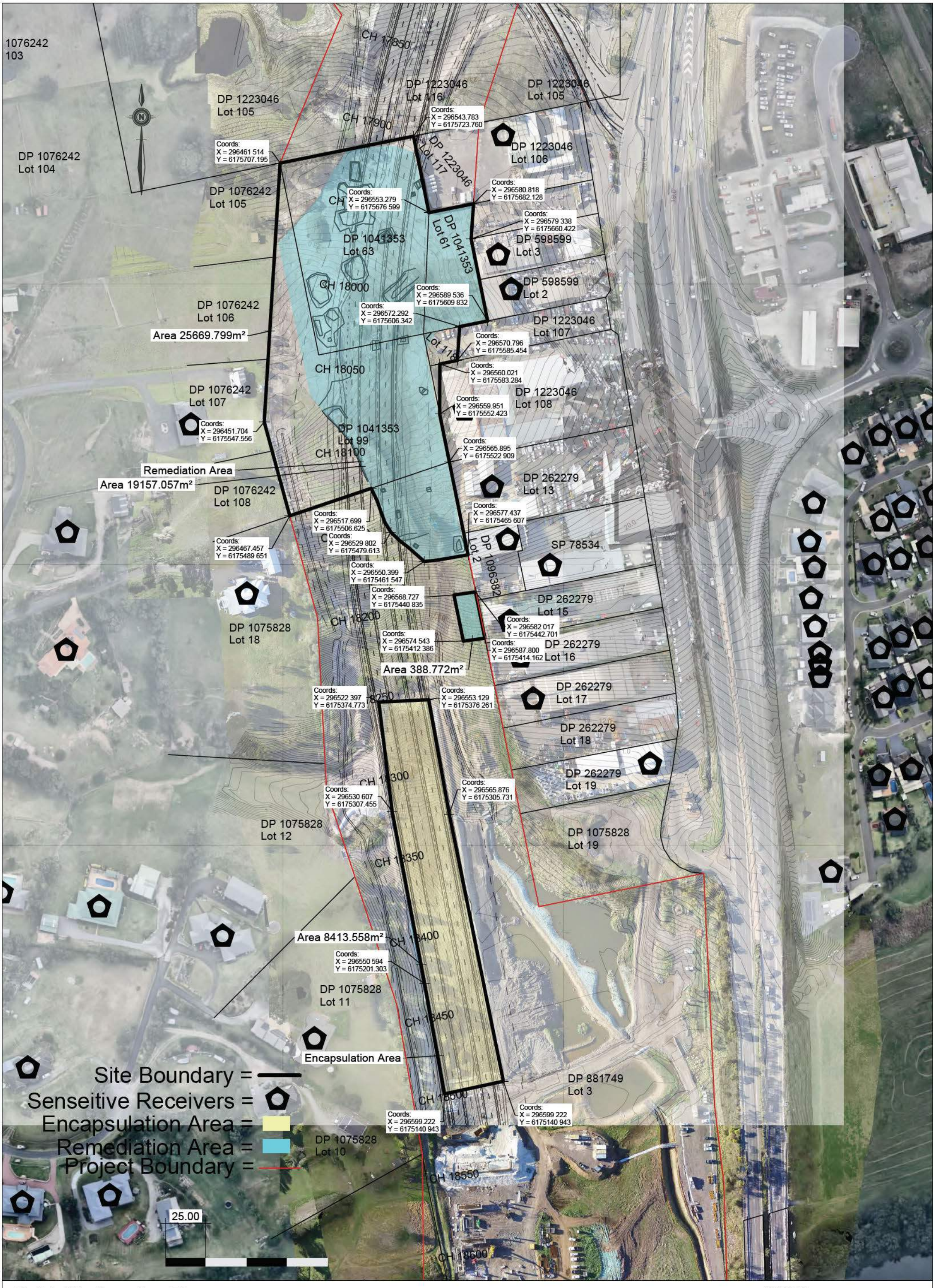
Clements, L, Palaia, T & Davis, J (2009) *Characterisation of sites impacted by petroleum hydrocarbons: National guideline document*, CRC CARE Technical Report no. 11. CRC CARE, South Australia.

CRC CARE (2015) Technical Report No. 34. *A practitioner's guide for the analysis, management and remediation of LNAPL*. CRC CARE, South Australia.

Johnston, CD (2010) *Selecting and assessing strategies for remediating LNAPL in soil and aquifers*, CRC CARE Technical Report no. 18, CRC CARE, South Australia.

Figures

Figure 1 – Site audit area



Cut 1 Site Location Plan

12d Model
Scale 1:2000
Fri Dec 18 10:27:43 2020

Appendix A

Audit Correspondence – Interim Site Audit Advice Letters

1 / 66 Centennial Circuit
PO Box 2191
Byron Bay NSW 2481

t (02) 6685 7811
f (02) 6685 5083

[redacted]
Fulton Hogan Construction Pty Ltd
Albion Park Rail Bypass

Ref. 1508-1904-ISAA01 6 May 2019

Dear [redacted],

Interim Site Audit Advice – 1508-1904
Albion Park Rail Bypass, NSW

1.0 Nature of interim advice

To act as site auditor for this project, Fulton Hogan Construction Pty Ltd has engaged [redacted], a New South Wales Environment Protection Authority (EPA) accredited Site Auditor, employed by Cavvanba Consulting. The final outcome of this engagement is to deliver a site audit statement (SAS) and associated site audit report (SAR), based on the objectives of the site audit.

This interim audit advice does not constitute a SAS or a SAR. It is provided to assist Fulton Hogan in the assessment and management of contamination issues at the site. The information provided herein should not be considered pre-emptive of the final site audit conclusions, but rather represents the site audits opinion based on the current review of available site information.

Refer to Attachment 1 for information regarding the scope of site audits and associated limitations. Attachment 1 forms part of this interim site audit advice.

2.0 Scope of audits

This interim audit advice is provided as an independent review to assist in the assessment and management of contamination issues at the site. The interim audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

In NSW, the site assessment and audit process consists of:

(i) the contaminated land consultant, or other relevant party, *designs and implements* the site assessment and, where required, all remediation and validation activities to achieve the stated objectives; and

(ii) the site auditor *independently reviews* the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

3.0 Interim Site Audit Advice – 1508-1904-ISAA01

As part of the site audit, a preliminary review has been conducted of:

- Hyder Cardno Joint Venture (HCJV, 2017) *Environmental site assessment – PAEC02: Industrial Estate, Albion Park Rail Bypass* (Ref. FK0004-APRB-R-02).

- Environment & Natural Resource Solutions (ENRS, 2019) *Sampling, Analysis & Quality Control Plan (SAQP), Asbestos in Soil (ASBINS), Albion Park Bypass Project* (Ref. ENRS1153R1E1, April 2019).

The following advice is based on the review of the reports listed above.

1. The SAQP refers to a preliminary site investigation (HCJV 2014) and a groundwater impact assessment (HCJV 2015). However, these have not been provided, and based on the description below they should be sourced for inclusion in this audit.

   Section 3.1 of the NSW EPA *Guidelines for the NSW Site Auditor Scheme (2nd edition)*, details the obligations of site auditors, and states that the site auditor must meet the following particular requirements regardless of whether the audit is statutory or non-statutory:

   > *"(h) make every reasonable effort to identify and review all relevant data, reports and other information held by the person who commissioned the site audit, or which is readily available from other sources, that provides evidence about conditions at the site which is relevant to the audit."*

2. The site area and boundary is not clearly identified. It is important that a clear plan is provided for the purposes of the Audit.

3. Aerial photography in the SAQP was limited, and there are significant data gaps of 20 and 30 years in the timeline of imagery. Further to this, typical historical information has not been reviewed, such as Council records, historical titles, dangerous good licence searches. It is unclear whether this information is contained within the HCJV PSI (2014).

4. Underground service plans should be sourced and evaluated. Service trenches can act as preferential pathways for contaminant migration.

5. The auditor disagrees with the integrity assessment and believes that data gaps are present regarding site history.

6. The current data set should be supplemented and also include a range of contaminants consistent with the use of the site for vehicle wrecking, including volatile and semi-volatile organic compounds.

7. The use of minimum sampling density should be reconsidered given the previous observations have included wastes and asbestos. For the purposes of characterisation and delineation of wastes, a higher density of physical investigation is recommended than that proposed.

8. The purpose of testing asbestos in soil, rather than visual appraisal for ACM should be further considered and/or justified. The nature of asbestos, i.e. friable or bonded, should be considered.

9. A more detailed review of the potential for groundwater contamination should be included, with justification as to why groundwater is not being investigated. Any source-pathway-receptor linkages must be investigated.

10. The methodology for backfilling of testpits should include assurances that no ACM remains at the surface following backfilling.

11. There appears to be sections of the report which are not relevant to the SAQP, such as stockpile management which describes movement of stockpiles and soils. However, it is the auditors understanding that this is not part of the works being proposed for this SAQP.

The following advice is based on the site inspection and meeting with the consultant.

12. The stockpiles referred to in the SAQP appear to be a result of recent clearing and scraping, which triggered the additional investigations upon identification of wastes and ACM. It is understood that the potential for illegal dumping has been reported to EPA by Fulton Hogan, and it is expected that this issue will be resolved within the timeframe of this audit.

13. Historical aerial imagery has been sourced and provided, including images from each decade. These are currently being evaluated to inform the sampling plan.

14. Given the current data gaps in site history, it is recommended that the intrusive investigations are undertaken at a higher density to increase physical and chemical information to compensate for data gaps in the historical information. It is understood that the fieldwork commenced today (6 May 2019) and that the points above, which were discussed during the meeting, have generally been addressed. It is not ideal to undertake field investigations prior to completing the site history, however based on the current information, discussions and site inspection, the Auditor agrees that it is unlikely to substantially change the investigation scope (including additions described herein).

15. It is understood that the material is to be relocated and encapsulated/contained. Therefore, the data collected should also aim to establish leaching characteristics. The Auditor refers the consultant to the CRC Care containment guideline (2018) for additional information and a discussion on feasibility assessment for consideration: (https://www.crccare.com/files/dmfile/ATechguide_Containment_Rev0.pdf)

16. Once confirmed, the precise location of the encapsulation/containment should be reported to the auditor. The ongoing management requirements will require written acceptance of the management plan by the site owner, and evidence that the plan can reasonably be made to be legally enforceable.

Closing remarks

17. It is understood that there are three areas requiring contaminated land works, being two sites where soil contamination has been identified, and one area where the material from those sites is to be relocated for encapsulation. As discussed in the meeting, there are certain aspects of the site audit process which require open discussion with stakeholders and regulators, namely:

    - The nature of the find and whether a recent, enforceable illegal activity has occurred requiring investigation by the relevant authority.

    - The feasibility of long-term management of the encapsulated material, including public notation and legal enforceability of the management plan.

- Whilst the intrusive stages of the investigation have been commenced, it is important that the relevant background information is compiled and that data gaps are closed appropriately, to ensure a defensible outcome, and reduce the potential for extended timelines for sign-off.

✧ ✧ ✧ ✧

Thank you for your time in regard to this matter. Please do not hesitate to contact the undersigned on (02) 6685-7811 if you require additional information or clarification.

Yours sincerely
Cavvanba Consulting Pty Ltd

[redacted]
Accredited Site Auditor (1508)

Attachment 1 – Scope and limitations to site audits

Scope of audits

In NSW, the site assessment and audit process consists of:

(i) the contaminated land consultant, or other relevant party, *designs and conducts* the site assessment and, where required, all remediation and validation activities to achieve the stated objectives; and

(ii) the site auditor *independently and at arm's length reviews* the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

Whereas interim site audit advice is provided to assist in the assessment and management of contamination issues at a site, the interim site audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, or any assessment reports, management plans and the like, or actions proposed therein. 'Approval' is inconsistent with the concept of a site audit, that is an independent third party review, and as such approval is beyond the scope of a site audit.

Rather, where interim site audit advices describe such documents as appropriate or similar, this means that the site audit is in general agreement that the document fulfils the intended purpose, consistent with the scope of site audits described above. 'Approval' of reports or plans is by definition a statutory function, and the *Contaminated Land Management (CLM) Act* 1997 does not provide accredited site auditors authorisation for statutory functions.

Limitations to site audits

This site audit relates only to those matters relevant to the CLM Act, which describes that "The general object of this Act is to establish a process for investigating and (where appropriate) remediating land areas where contamination presents a significant risk of harm to human health or some other aspect of the environment".

Contaminated land site audits do not seek to provide an opinion regarding:
- other aspects of the environment not related to site contamination; or
- hazardous building materials in buildings or structures; or
- to the suitability of the site in regard to landuse planning and legal use of the land; or
- the occupational health and safety legislation; or
- the suitability of any engineering design.

Accordingly, reviews of such information are only in relation to the contaminated land aspects of any projects or sites. If specialist technical review of such documents is required, these should be obtained by appropriate specialist.

By definition, site auditing involves the review and critique of consultants' and contractors' work, including, amongst others, site histories, site surveys, subsurface investigations, chemical and physical analyses, and risk assessments and modelling. Accordingly, Cavvanba relies on the experience, expertise and integrity of the relevant organisations. The information sources referenced have been used to determine site history and local subsurface conditions. While Cavvanba takes reasonable care to avoid reliance on data and information that is inaccurate or unsuitable, Cavvanba is not able to verify the accuracy or completeness of all information and data made available.

Sampling and chemical analysis of environmental media are based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Limited environmental sampling and laboratory analyses were undertaken as part of the investigations reviewed by Cavvanba, as described herein. Ground conditions between sampling locations may vary, and this should be considered when extrapolating between sampling points. Except at each sampling point, the nature, extent and concentration of contamination is inferred only. Furthermore, the test methods used to characterise the contamination at each sampling point are subject to limitations and provide only an approximation of the contaminant concentrations.

Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this site audit are based on the available information at the time of the investigations.

As environmental sampling is based on achieving suitable sampling densities, rather than sampling all media at all locations, and analysis is based on site histories and likely contaminants of concern, rather than analysis of all media at all locations for all potential contaminants, the absence of any identified hazardous or toxic materials at the site should not be interpreted as a warranty or guarantee that such materials do not exist at the site. Therefore, future work at the site which involves subsurface excavation should be conducted based on appropriate management plans. These should include, *inter alia*, environmental management plans, including unexpected findings protocols, hazardous building materials management plans, and occupational health and safety plans.

If additional certainty is required in addition to the requirements of the site audit, then additional site history information should be obtained, or additional exploration and sampling and analysis should be conducted. This decision should be made by the user of this information based on an appropriate risk management process, and the user should commission additional services if required.

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[redacted]
Fulton Hogan Construction Pty Ltd
Albion Park Rail Bypass

Ref. 1508-1904-ISAA02 17 June 2019

Dear [redacted],

Interim Site Audit Advice No. 2 – 1508-1904
Albion Park Rail Bypass, NSW

1.0 Nature of interim advice

To act as site auditor for this project, Fulton Hogan Construction Pty Ltd has engaged [redacted] a New South Wales Environment Protection Authority (EPA) accredited Site Auditor, employed by Cavvanba Consulting. The final outcome of this engagement is to deliver a site audit statement (SAS) and associated site audit report (SAR), based on the objectives of the site audit.

This interim audit advice does not constitute a SAS or a SAR. It is provided to assist Fulton Hogan in the assessment and management of contamination issues at the site. The information provided herein should not be considered pre-emptive of the final site audit conclusions, but rather represents the site audits opinion based on the current review of available site information.

Refer to Attachment 1 for information regarding the scope of site audits and associated limitations. Attachment 1 forms part of this interim site audit advice.

2.0 Scope of audits

This interim audit advice is provided as an independent review to assist in the assessment and management of contamination issues at the site. The interim audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

In NSW, the site assessment and audit process consists of:

(i) the contaminated land consultant, or other relevant party, *designs and implements* the site assessment and, where required, all remediation and validation activities to achieve the stated objectives; and

(ii) the site auditor *independently reviews* the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

3.0 Interim Site Audit Advice – 1508-1904-ISAA02

As part of the site audit, a preliminary review has been conducted of:

- Environment & Natural Resource Solutions (ENRS) *Stage 2 – Detailed Site Investigation (DSI), Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153_APRB_PAEC02 Cut#1_DSI, June 2019).

- Environment & Natural Resource Solutions (ENRS) *Remediation Action Plan, Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153, June 2019).

The following advice is based on the review of the reports listed above.

Table 1: PSI checklist

Requirement	Provided	Comment
Executive Summary		
Background, objectives, scope of works, a summary of sampling results, conclusions and recommendations.	Yes	The reference to RMS asbestos procedure is not a document the auditor is familiar with.
Scope of work		
A clear statement of the scope of work.	Yes	Section 1.3
Site Identification		
Street number, street name and suburb.	Yes	Street number not relevant. All other information is provided.
Lot number and deposited plan number.	Yes	Portions of a number of lots is described.
Geographic co-ordinates related to a nearby cadastral corner of a state survey control mark.	No	The site location is otherwise clear, however these should be included.
Locality map (ideally based on topographic map not street directory).	Yes	Site location is clear.
Current site plan with scale bar, showing north, local water drainage and other local environmentally significant features.	Yes	A site plan clearly showing sensitive receptors and other features should be included.
Other relevant information?	partial	The containment cell location is yet to be fully described.
Site condition		
Topography.	Yes	Adequately detailed.
Conditions at site boundary such as type and condition of fencing, soil stability and erosion.	Yes	Generally complete. Whilst not stated, the site is fenced for the proposed construction purposes.
Visible signs of contamination such as discolouration or staining of soil, bare soil patches.	Yes	Adequately detailed.
Visible signs of plant stress.	No	Not mentioned, however no bearing on the current condition of the site at this stage.
Presence of drums, wastes and fill materials.	Yes	Stockpiles and wastes are well documented.

Requirement	Provided	Comment
Odours.	No	Not specifically mentioned, however it is discussed as an aesthetic criteria to be evaluated during the investigation.
Condition of buildings and roads.	n/a	No roads or builders
Quality of surface water.	n/a	No surface water
Flood potential.	No	Minimal comment, it is included in the 10.7 planning certificate that there are development controls related to flood. The sites elevation is unlikely to be affected.
Other relevant information.	-	
Surrounding environment		
Topography.	Yes	Adequate for the assessment undertaken.
Visible signs of contamination such as discolouration or staining of soil, bare soil patches – offsite adjacent to site boundary.	Partial	Adequate for the assessment undertaken.
Details of any relevant local sensitive environment – e.g. rivers, lakes, creeks, wetlands, local habitats areas, endangered flora and fauna.	Yes	Adequate for the assessment undertaken.
Other relevant information.	-	-
Geology and hydrogeology (NEPM, 2013)		
Soil stratigraphy using recognised classification methods, e.g. Australian Standard 1726, Unified Soil Classification Table.	Partial	Not specifically described. The testpit logs would benefit from the clear application of the USCS.
Location and extent of imported and locally derived fill.	Yes	This has been mapped based on field observations during field works.
Site bore logs or test pit logs showing stratigraphy.	Yes	Tespit logs provided. Typically, hand written logs are not an acceptable form of reporting.
Detailed description of the location, design and construction of onsite wells.	n/a	-
Description and location of springs and wells in the vicinity.	Yes.	Licenced bore details have been reviewed.
Direction and rate of groundwater flow (and depth to).	Yes	Groundwater has been reviewed from the project technical paper and geotechnical report.
Direction of surface water runoff.	Yes	Adequate for the assessment.
Background water quality.	Yes	As per the groundwater technical paper.
Preferential water courses.	Yes	As per the groundwater technical paper.
Summary of local meteorology.	No	-

Requirement	Provided	Comment
Other relevant information.	-	-
Assessment of groundwater		
Permeability of the strata on the site.	Yes	Based on the groundwater technical paper.
Known or expected depth to groundwater.		As above.
Ambient groundwater quality.		As above.
Potential receptors.		As above.
Onsite sources (type of sources).		Onsite sources of contamination are reportedly limited.
Whether source(s) have been removed.		n/a
Contaminant sources unrelated to the site.		n/a
quantity of contaminant and its mobility characteristics; and		A detailed assessment has been provided based on TCLP and ASLP.
any other site specific issues?		Asbestos in soil.
Site history		
zoning – previous, present and proposed;	Partial	Not explicitly stated.
land use – previous, present and proposed;	Yes	Adequate for the assessment.
summary of council rezoning, relevant development and building approvals records;	No	Adequate for the assessment.
chronological list of site uses, indicating information gaps and unoccupied periods;	Partial	Whilst there is no specific chronological list of site uses, the review is adequate to identify any information gaps.
review of aerial photographs;	Yes	Some poor resolution makes deciphering the visible features difficult.
site photographs (with date and locations indicated on site maps);	Yes	Adequate for the assessment.
inventory of chemicals and wastes associated with site use and their onsite storage locations;	N/A	Not available
possible contaminant sources and potential offsite effects;	Yes	Adequate for the assessment.
site layout plans showing present and past industrial processes;	Partial	Primary source is the aerial photographs.
sewer and service plans;	Yes	Adequate for the assessment.
description of manufacturing processes;	N/A	-
details and locations of current and former underground and aboveground storage tanks;	N/A	-
product spill and loss history;	N/A	-

Requirement	Provided	Comment
discharges to land, water and air;	N/A	-
disposal locations;	Partial	Limited to the waste observed on the surface.
relevant complaints history;	N/A	-
local site knowledge of residents and staff (present and former);	N/A	-
summary of local literature about site, including newspaper articles;	N/A	-
details of building and related permits, licences, approvals and trade waste agreements;	Partial	Council records were reportedly incomplete.
historical use of adjacent sites;	Partial	Primarily based on aerial photographs
local usage of ground/surface waters, and location of bores/pumps;	Yes	Based on the groundwater technical paper.
integrity assessment (assessment of accuracy of information); and	Yes	ENRS have reviewed the integrity and potential data gaps in site history, as summarised in section 3.10
any other site specific issues?	-	-

Table 2: DSI checklist

Requirement	Provided	Comment
Sampling and analysis plan and sampling methodology		
Sampling, analysis and data quality objectives (DQOs).	Yes	A detailed DQOs and SAQP was prepared prior to the works.
Rationale for the selection of: – sampling pattern, – sampling density including an estimated size of the residual hot spots that may remain undetected, – sampling locations including locations shown on a site map, – sampling depths, – samples for analysis and samples not analysed, – analytical methods, and – analytes for samples.	Yes	The sampling pattern was based on the SAQP, and onsite discussions, being based on a grid pattern. Section 6.1.1 should include a discussion regarding the size of hotspots able to be detected. Sample analysis was broad and appropriate. Sampling depths were based on characterising the fill material to be removed for encapsulation.

Requirement	Provided	Comment
Detailed description of the sampling methods including: – sample containers and type of seal used, – sampling devices and equipment e.g. auger type, – equipment decontamination procedures, – sample handling procedures, and – sample preservation methods and reference to recognised protocols, e.g. APHA or USEPA SW846.	Yes	Adequately detailed. 1. Section 8.1 suggests boreholes was the investigation methodology employed, however this is not case. PID calibration records should be provided.
Detailed description of field screening protocols.	Yes	Adequately detailed.
Contaminants of concern (NEPM, 2013)		
NEPC (1999) *Schedule B(2) Guideline on Data Collection, Sample Design and Reporting*, describes that analyte choice will be principally governed by site history. Appendix 1 of Schedule B(2) provides groups of contaminants and the analytes required for 'general purpose screens'. It also notes that, depending on the available site history, potentially contaminated fill may require a more extensive series of analytes and that appearance, odour, etc. of samples may influence the choice of analytes. The audit's interpretation is that, unless determined by site history, a precautionary approach should be adopted for the development of the analyte list, including both the contaminant type and the elements and compounds within the contaminant type.	Yes	The broad analysis was adequately precautionary. Section 4.2.7 of the Auditor guidelines requires that *The auditor must check that contamination by per- and polyfluoroalkyl substances (PFAS) has been considered in the assessment of contamination*. Therefore, following the description in Section 10.0 of the report of buried assorted carparts and several batteries the consultant should evaluate and comment on whether PFAS is a potential contaminant of concern. The NEMP for PFAS describes *Used in batteries, particularly for high-end use such as lithium-style batteries.*
Results		
Summary of previous results, if appropriate.	Partial	The previous investigation results have been discussed, however, unless ENRS consider the data to be unusable, it should be included in the summary tables to assist with overall soil characterisation.
Summary of all results, in tables that: – shows all essential details such as sample numbers and sampling depths, – shows assessment criteria, and – highlights all results exceeding the assessment criteria;	Partial	The data collected by ENRS is succinctly compiled. However as highlighted above, the summary should include all previous data from previous consultants. Segregation of natural and fill soils would further assist characterisation and data evaluation.
Site plan showing all sample locations, sample identification numbers and sampling depths.	Partial	As above. Current data is well documented. A site plan showing all data including previous investigations would be beneficial to site characterisation.

Requirement	Provided	Comment
Site plan showing the extent of soil and groundwater contamination exceeding selected assessment criteria for each sampling depth.	Partial	As above.
Site characterisation		
Assessment of type of all environmental contamination, particularly soil and groundwater.	Partial	Soil, primarily the fill material. Groundwater not a media of concern. The conceptual site model should be updated based on the information obtained during this investigation. Section 8.2.5. The consultant should ensure fill material, stockpiles and natural soils are evaluated separately when undertaking statistical assessments (i.e. 95% UCL). It is inappropriate to bundle different media. Phthalates - consultant should provide further discussion regarding the potential for vapors to be generated due to the presence of phthalates. Ensure the PID is capable of detecting these compounds (i.e. check nature of the compounds are detectable by the ionisation potential of the lamp in the PID)
Assessment of extent of soil and groundwater contamination, including offsite effects.	Yes	Fill material and stockpiles have been adequately assessed for the purposes of the investigation.
Assessment of chemical degradation products.	n/a	-
Assessment of possible exposure routes and exposed populations (human, ecological).	Yes	-
Conclusions and recommendations		
Brief summary of all findings.	Yes	Adequate for the investigation undertaken.
Assumptions used in reaching the conclusions.	Yes	Generally adequate for the investigation undertaken. Previous data should be included in overall site characterisation.
Extent of uncertainties in the results.	Yes	Uncertainties are partly alleviated by the proposed broad scale remediation and encapsulation.
Where remedial actions have been undertaken, a list summarising the activities and physical changes to the site.	N/A	-
A clear statement that the consultant considers the subject site to be suitable for the proposed use (where applicable).	N/A	-

Requirement	Provided	Comment
A statement detailing all limitations and constraints on the use of the site (where applicable); and	N/A	-
Recommendations for further work, if appropriate.	Yes	Remediation recommendations have been made.

Table 3: RAP checklist

Requirement	Provided?	Comment
Remediation goal	Yes	Section 8.4 outlines the remediation goal.
Discussion of the extent of remediation required.	Yes	Section 8.5 describes the extent. However, it refers to Figure 4, which outlines a portion of land not subject to this Audit. Therefore, data associated with Fill No .1 should be included or provided. Figures 3 and 4 would benefit from a clear outline of the remediation area. It is the Auditors understanding that <u>all</u> fill material will be removed for encapsulation, regardless of whether ACM has been previously observed. This is considered appropriately conservative given the frequent observations made during the DSI, and supported by Section 8.2 that residual risk of asbestos in soil following emu-picking is not acceptable. This should also be considered in the Validation Section 11.0. Unless there is a strong evidence to justify a more selective method, removal of all fill material and surface soils is likely to be the most efficient and reliable methods of ensuring the goal is met. This strategy has not been made clear by statements such as "until no fill with asbestos and/or foreign materials is visible". The consultant is encouraged to check the wording throughout the RAP to ensure the extent of remediation required is clearly described. Based on the above, the volumes of material described should be re-evaluated to ensure the volumes are consistent with this strategy. The statement in Section 8.5 regarding "excavation of uncontaminated materials" suggests that other works not related to the remediation will be undertaken concurrently. It is strongly recommended that no works outside the controls of this RAP are conducted until validation is complete. Section 8.6 (5) placement of the marker layer must be a requirement, rather than an option "where practical". Section 8.6 (6) should refer to the reporting requirements in section 13, as it could be

Requirement	Provided?	Comment
		misinterpreted that a clearance certificate is all that is required to support the EMP.
Discussion of possible remedial options and how risk can be reduced.	Yes	The review of remedial options is considered appropriate.
Rationale for the selection of recommended remedial option.	Yes	Section 8.2 outlines the rationale for selection. The Auditor accepts this rationale. The consultant and contractor should consider whether the inclusion of the grass into the encapsulation will impact the successful containment of the material. The Auditor suggests that a method of supervision and segregation of high risk soils and low risk soils may be beneficial. Given all fill material will be removed, low risk soils could be described as (a) fill materials with little or no visible ACM or other wastes; or (b) High risk soil be described as known contaminated areas (Lead, TRH, phthalates, and observed ACM). The resultant separate encapsulation locations should be recorded.
Proposed testing to validate the site after remediation.	Yes.	Section 6 describes site criteria. This could be simplified if can be demonstrated that the assessment has adequately characterised the site, and therefore may focus only on the contaminants requiring remediation. It is the auditors understanding that the contamination is limited to the fill and surface soils. Therefore, the Auditor does not consider that fill material should remain following remedial works. There is a risk that fill material and surface soils contain ACM. Given the presence of asbestos will nullify the uncontrolled usability of the soil, and an encapsulation area is being prepared, it is inappropriate to propose a method and criteria other than presence or absence. That is, it is more appropriate to determine that natural soil is free of asbestos. Therefore, the criteria should be "natural soil observed at the surface". Section 11 outlines the sampling plan for validation.

Requirement	Provided?	Comment
Contingency plan if the selected remedial strategy fails.	Yes	Offsite disposal or extension of the encapsulation area is a suitable contingency. Section 8.9 suggests that ACM fill may be disposed offsite. It is the auditors understanding that only non-soil wastes which can be segregated will be disposed offsite. Section 8.9 the description in *delineate asbestos zones* and *excavate contaminated material* suggests that the extent of excavation will be based on the observations of ACM, rather than the complete removal of fill material and associated residual risk (as per Section 8.2 and Table 7). This could be simplified to "all surface soil and fill material removed to expose natural soil". Furthermore, *Validation sampling* should refer directly to the relevant section of this RAP.
Interim site management plan (before remediation), including e.g. fencing, warning signs, stormwater management.	No	Not described, however the Auditor understands that fencing and administrative controls are currently in place by FH.
Site management plan (operational phase): - site stormwater management plan, - soil management plan, - noise control plan, - dust control plan, including wheel wash, - odour control plan, and - occupational health & safety plan.	Yes	Control air monitoring is described in Section 9.6. It is suggested that a minimum frequency/data set is described. Section 9.8 suggests that bulk soil contaminated with ACM may be disposed offsite, and could be mis-interpreted as an option for this current scope of work.
Remediation schedule.	Yes	Section 8.8. No further detail is required.
Hours of operation.	Yes	This is limited to the construction hours in the CEMP.
Contingency plans to respond to site incidents, to obviate potential effects on surrounding environment and community.	Yes	Primary reference plan is the CEMP.
Identification of regulatory compliance requirements such as licences and approvals.	Yes	Limited to asbestos removal works. The other project specific approvals are related to the CEMP.
Names and phone numbers of appropriate personnel to contact during remediation.	No	-
Community relations plans, where applicable.	N/A	It is understood that this is being undertaken as part of the CEMP.

Requirement	Provided?	Comment
Staged progress reporting, where appropriate.	Yes	Clearance certificates ad validation reports.
Long-term site management plan.	Yes	Briefly discussed. Will require development of a stand alone EMP.

✧ ✧ ✧ ✧

Thank you for your time in regard to this matter. Please do not hesitate to contact the undersigned on (02) 6685-7811 if you require additional information or clarification.

Yours sincerely
Cavvanba Consulting Pty Ltd

[redacted]
Accredited Site Auditor (1508)

Attachment 1 – Scope and limitations to site audits

Scope of audits

In NSW, the site assessment and audit process consists of:

(i) the contaminated land consultant, or other relevant party, *designs and conducts* the site assessment and, where required, all remediation and validation activities to achieve the stated objectives; and

(ii) the site auditor *independently and at arm's length reviews* the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

Whereas interim site audit advice is provided to assist in the assessment and management of contamination issues at a site, the interim site audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, or any assessment reports, management plans and the like, or actions proposed therein. 'Approval' is inconsistent with the concept of a site audit, that is an independent third party review, and as such approval is beyond the scope of a site audit.

Rather, where interim site audit advices describe such documents as appropriate or similar, this means that the site audit is in general agreement that the document fulfils the intended purpose, consistent with the scope of site audits described above. 'Approval' of reports or plans is by definition a statutory function, and the *Contaminated Land Management (CLM) Act* 1997 does not provide accredited site auditors authorisation for statutory functions.

Limitations to site audits

This site audit relates only to those matters relevant to the CLM Act, which describes that "The general object of this Act is to establish a process for investigating and (where appropriate) remediating land areas where contamination presents a significant risk of harm to human health or some other aspect of the environment".

Contaminated land site audits do not seek to provide an opinion regarding:
- other aspects of the environment not related to site contamination; or
- hazardous building materials in buildings or structures; or
- to the suitability of the site in regard to landuse planning and legal use of the land; or
- the occupational health and safety legislation; or
- the suitability of any engineering design.

Accordingly, reviews of such information are only in relation to the contaminated land aspects of any projects or sites. If specialist technical review of such documents is required, these should be obtained by appropriate specialist.

By definition, site auditing involves the review and critique of consultants' and contractors' work, including, amongst others, site histories, site surveys, subsurface investigations, chemical and physical analyses, and risk assessments and modelling. Accordingly, Cavvanba relies on the experience, expertise and integrity of the relevant organisations. The information sources referenced have been used to determine site history and local subsurface conditions. While Cavvanba takes reasonable care to avoid reliance on data and information that is inaccurate or unsuitable, Cavvanba is not able to verify the accuracy or completeness of all information and data made available.

Sampling and chemical analysis of environmental media are based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Limited environmental sampling and laboratory analyses were undertaken as part of the investigations reviewed by Cavvanba, as described herein. Ground conditions between sampling locations may vary, and this should be considered when extrapolating between sampling points. Except at each sampling point, the nature, extent and concentration of contamination is inferred only. Furthermore, the test methods used to characterise the contamination at each sampling point are subject to limitations and provide only an approximation of the contaminant concentrations.

Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this site audit are based on the available information at the time of the investigations.

As environmental sampling is based on achieving suitable sampling densities, rather than sampling all media at all locations, and analysis is based on site histories and likely contaminants of concern, rather than analysis of all media at all locations for all potential contaminants, the absence of any identified hazardous or toxic materials at the site should not be interpreted as a warranty or guarantee that such materials do not exist at the site. Therefore, future work at the site which involves subsurface excavation should be conducted based on appropriate management plans. These should include, *inter alia*, environmental management plans, including unexpected findings protocols, hazardous building materials management plans, and occupational health and safety plans.

If additional certainty is required in addition to the requirements of the site audit, then additional site history information should be obtained, or additional exploration and sampling and analysis should be conducted. This decision should be made by the user of this information based on an appropriate risk management process, and the user should commission additional services if required.

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[redacted]
Fulton Hogan Construction Pty Ltd
Albion Park Rail Bypass

Ref. 1508-1904-ISAA03 21 June 2019

Dear [redacted],

Interim Site Audit Advice No. 3 – 1508-1904
Albion Park Rail Bypass, NSW

1.0 Nature of interim advice

To act as site auditor for this project, Fulton Hogan Construction Pty Ltd has engaged [redacted] a New South Wales Environment Protection Authority (EPA) accredited Site Auditor, employed by Cavvanba Consulting. The final outcome of this engagement is to deliver a site audit statement (SAS) and associated site audit report (SAR), based on the objectives of the site audit.

This interim audit advice does not constitute a SAS or a SAR. It is provided to assist Fulton Hogan in the assessment and management of contamination issues at the site. The information provided herein should not be considered pre-emptive of the final site audit conclusions, but rather represents the site audits opinion based on the current review of available site information.

Refer to Attachment 1 for information regarding the scope of site audits and associated limitations. Attachment 1 forms part of this interim site audit advice.

2.0 Scope of audits

This interim audit advice is provided as an independent review to assist in the assessment and management of contamination issues at the site. The interim audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

In NSW, the site assessment and audit process consists of:

(i) the contaminated land consultant, or other relevant party, *designs and implements* the site assessment and, where required, all remediation and validation activities to achieve the stated objectives; and

(ii) the site auditor *independently reviews* the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

3.0 Interim Site Audit Advice – 1508-1904-ISAA03

As part of the site audit, a review was conducted of the following documents and was summarised in previous interim advice 1508-1904-ISAA02, provided on 17 June 2019:

- Environment & Natural Resource Solutions (ENRS) *Stage 2 – Detailed Site Investigation (DSI), Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153_APRB_PAEC02 Cut#1_DSI, June 2019).
- Environment & Natural Resource Solutions (ENRS) *Remediation Action Plan, Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153, June 2019).

Based on ISAA02, the documents have been updated and specific responses were provided and reviewed by the Auditor. The updated documents are dated 20 June 2019.

The auditor considers that the updates are acceptable and is satisfied that the proposed remediation is technically feasible, environmentally justifiable and consistent with relevant laws, policies and guidelines. That is:

- The soil material to be contained has been appropriately assessed for contamination.
- The wastes will be appropriately segregated and tracked, minimising the need for offsite disposal and maximising the containment cell use.
- Movement of material is minimal and within the project boundary, thereby minimising the use of available resources.
- No higher order resource recovery opportunities exist on-site. The physical and chemical properties of the material are appropriate for containment, subject to some additional geotechnical evaluation.
- The construction project requires the importation of material to meet the required levels. Containment onsite replaces the need to import virgin material.
- The presence of asbestos is being treated with an appropriate level of precaution and information transfer.
- An appropriately detailed report has been prepared which meets the relevant contaminated guidelines.

It is highlighted that the complete report for Fill #1 has not been provided to the Auditor, however based on the information provided to date, it is unlikely to change the discussion above.

✧ ✧ ✧ ✧

Thank you for your time in regard to this matter. Please do not hesitate to contact the undersigned on (02) 6685-7811 if you require additional information or clarification.

Yours sincerely
Cavvanba Consulting Pty Ltd



Accredited Site Auditor (1508)

Attachment 1 – Scope and limitations to site audits

Scope of audits

In NSW, the site assessment and audit process consists of:

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(ii) the site auditor *independently and at arm's length reviews* the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

Whereas interim site audit advice is provided to assist in the assessment and management of contamination issues at a site, the interim site audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, or any assessment reports, management plans and the like, or actions proposed therein. 'Approval' is inconsistent with the concept of a site audit, that is an independent third party review, and as such approval is beyond the scope of a site audit.

Rather, where interim site audit advices describe such documents as appropriate or similar, this means that the site audit is in general agreement that the document fulfils the intended purpose, consistent with the scope of site audits described above. 'Approval' of reports or plans is by definition a statutory function, and the *Contaminated Land Management (CLM) Act* 1997 does not provide accredited site auditors authorisation for statutory functions.

Limitations to site audits

This site audit relates only to those matters relevant to the CLM Act, which describes that "The general object of this Act is to establish a process for investigating and (where appropriate) remediating land areas where contamination presents a significant risk of harm to human health or some other aspect of the environment".

Contaminated land site audits do not seek to provide an opinion regarding:
- other aspects of the environment not related to site contamination; or
- hazardous building materials in buildings or structures; or
- to the suitability of the site in regard to landuse planning and legal use of the land; or
- the occupational health and safety legislation; or
- the suitability of any engineering design.

Accordingly, reviews of such information are only in relation to the contaminated land aspects of any projects or sites. If specialist technical review of such documents is required, these should be obtained by appropriate specialist.

By definition, site auditing involves the review and critique of consultants' and contractors' work, including, amongst others, site histories, site surveys, subsurface investigations, chemical and physical analyses, and risk assessments and modelling. Accordingly, Cavvanba relies on the experience, expertise and integrity of the relevant organisations. The information sources referenced have been used to determine site history and local subsurface conditions. While Cavvanba takes reasonable care to avoid reliance on data and information that is inaccurate or unsuitable, Cavvanba is not able to verify the accuracy or completeness of all information and data made available.

Sampling and chemical analysis of environmental media are based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Limited environmental sampling and laboratory analyses were undertaken as part of the investigations reviewed by Cavvanba, as described herein. Ground conditions between sampling locations may vary, and this should be considered when extrapolating between sampling points. Except at each sampling point, the nature, extent and concentration of contamination is inferred only. Furthermore, the test methods used to characterise the contamination at each sampling point are subject to limitations and provide only an approximation of the contaminant concentrations.

Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this site audit are based on the available information at the time of the investigations.

As environmental sampling is based on achieving suitable sampling densities, rather than sampling all media at all locations, and analysis is based on site histories and likely contaminants of concern, rather than analysis of all media at all locations for all potential contaminants, the absence of any identified hazardous or toxic materials at the site should not be interpreted as a warranty or guarantee that such materials do not exist at the site. Therefore, future work at the site which involves subsurface excavation should be conducted based on appropriate management plans. These should include, *inter alia*, environmental management plans, including unexpected findings protocols, hazardous building materials management plans, and occupational health and safety plans.

If additional certainty is required in addition to the requirements of the site audit, then additional site history information should be obtained, or additional exploration and sampling and analysis should be conducted. This decision should be made by the user of this information based on an appropriate risk management process, and the user should commission additional services if required.

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[redacted]
Fulton Hogan Construction Pty Ltd
Albion Park Rail Bypass

Ref. 1508-1904-ISAA04

9 August 2019

Dear [redacted],

Interim Site Audit Advice No. 4 – 1508-1904
Albion Park Rail Bypass, NSW

1.0 Nature of interim advice

To act as site auditor for this project, Fulton Hogan Construction Pty Ltd has engaged [redacted] a New South Wales Environment Protection Authority (EPA) accredited Site Auditor, employed by Cavvanba Consulting. The final outcome of this engagement is to deliver a site audit statement (SAS) and associated site audit report (SAR), based on the objectives of the site audit.

This interim audit advice does not constitute a SAS or a SAR. It is provided to assist Fulton Hogan in the assessment and management of contamination issues at the site. The information provided herein should not be considered pre-emptive of the final site audit conclusions, but rather represents the site auditors opinion based on the current review of available site information.

Refer to Attachment 1 for information regarding the scope of site audits and associated limitations. Attachment 1 forms part of this interim site audit advice.

2.0 Scope of audits

This interim audit advice is provided as an independent review to assist in the assessment and management of contamination issues at the site. The interim audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

In NSW, the site assessment and audit process consists of:

(i) the contaminated land consultant, or other relevant party, *designs and implements* the site assessment and, where required, all remediation and validation activities to achieve the stated objectives; and

(ii) the site auditor *independently reviews* the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

3.0 Interim Site Audit Advice – 1508-1904-ISAA04

As part of the site audit, a site inspection was conducted during remediation works on 5 September 2019. Observations and understanding of the of the current works are:

- Fill 1 removal of soil is nearing completion. The objective of the audit is not to provide site suitability of Fill 1, but rather verify the material is suitable for inclusion in the encapsulation cell.
- The containment cell placement was therefore partially complete.
- No visible dust was observed within the work area of the containment cell, Cut 1 or Fill 1.
- Cut 1 works appeared to have uncovered a burial of mechanical wastes. The consultant is reminded to ensure validation is undertaken on excavation walls.
- Presence of asbestos in Cut 1 has been shown to likely extend to the north, beyond the current fence line. The fill batter is the likely extent of impacted fill.
- The capacity of the containment cell is unlikely to be a limiting factor for the removal of soils from Cut 1 and Fill 1.

The Site Auditor did not identify any operations or circumstances which required modification or additional controls.

Whilst no issues have arisen to date, the project is reminded to ensure sufficient time and documentation for satisfying the following relevant issues for waste and ongoing management:

Waste documentation

It is understood that some geotechnically unsuitable materials will be disposed of off-site, rather than encapsulated in the containment cell. For those materials, Section 4.3.7 of the Auditor Guidelines must be satisfied, particularly *waste classification*, and record keeping as per *waste disposal and recycling*. Typically, the items which may delay projects are where reconciliation of materials, volumes, dockets and receipts has not been adequately documented.

Environmental Management Plan

Given the simple encapsulation of soil, it is expected that the Environmental Management Plan (EMP) will describe passive management. The EMP was mentioned in ISAA02.

Section 3.4.6 of the Auditor Guidelines must be satisfied, particularly the four conditions which describe: a) auditor review; b) legal enforceability; c) public notification; and d) any off-site migration has been addressed.

Items 16 and 17 of ISAA01 were provided to prompt the project to address Section 3.4.6 of the Auditor Guidelines. Given the progression of the works, it is requested that the project provides specific advice to the Site Auditor regarding the following conditions:

> *3.4.6 (b): The EMP can reasonably be made to be legally enforceable, for example because compliance with it is a requirement of a notice under the CLM Act or of development consent conditions issued by the relevant consent authority. The relevant authority (the EPA or the local authority in these cases, respectively) should be asked their view on the legality of the draft EMP. How implementation of an EMP can reasonably be made to be legally enforceable*

should take into account exempt and complying development which may occur at the site.

Site Auditor comment: In responding, the project should consider that the requirement for a Site Auditor under Condition E58 will result in a Site Audit Statement, and the EMP must be attached to the SAS.

3.4.6 (c): There will be appropriate public notification of any restrictions applying to the land to ensure that potential purchasers or other interested individuals are aware of the restrictions, for example appropriate notations on the planning certificate issued under s. 149(2) of the Environment Planning and Assessment Act or a covenant registered on the title to land under s.88B of the Conveyancing Act 1919.

Site Auditor comment: It is understood that the land will be retained by RMS and RMS have an internal management system for contaminated land.

✧ ✧ ✧ ✧

Thank you for your time in regard to this matter. Please do not hesitate to contact the undersigned on (02) 6685-7811 if you require additional information or clarification.

Yours sincerely

[redacted]

[redacted]

Accredited Site Auditor (1508)

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[redacted]
Fulton Hogan Construction Pty Ltd
Albion Park Rail Bypass

Ref. 1508-1904-ISAA05 13 May 2020

Dear [redacted],

Interim Site Audit Advice No. 5 – 1508-1904
Albion Park Rail Bypass, NSW

1.0 Nature of interim advice

To act as site auditor for this project, Fulton Hogan Construction Pty Ltd has engaged [redacted], a New South Wales Environment Protection Authority (EPA) accredited Site Auditor, employed by Cavvanba Consulting. The final outcome of this engagement is to deliver a site audit statement (SAS) and associated site audit report (SAR), based on the objectives of the site audit.

This interim audit advice does not constitute a SAS or a SAR. It is provided to assist Fulton Hogan in the assessment and management of contamination issues at the site. The information provided herein should not be considered pre-emptive of the final site audit conclusions, but rather represents the site auditors opinion based on the current review of available site information.

Refer to Attachment 1 for information regarding the scope of site audits and associated limitations. Attachment 1 forms part of this interim site audit advice.

2.0 Scope of audits

This interim audit advice is provided as an independent review to assist in the assessment and management of contamination issues at the site. The interim audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

In NSW, the site assessment and audit process consists of:

(i) the contaminated land consultant, or other relevant party, *designs and implements* the site assessment and, where required, all remediation and validation activities to achieve the stated objectives; and

(ii) the site auditor *independently reviews* the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

3.0 Interim Site Audit Advice – 1508-1904-ISAA05

As part of the site audit, a preliminary review has been conducted of:

- Environment & Natural Resource Solutions (ENRS) (2020) *Stage 4 – Site Validation Report, PAEC02 – Cut No. 1, Albion Park Rail Bypass (APRB)* (Ref. ENRS1153).

A review has been conducted of the above-listed report in comparison to the requirements of validation reports as included in the following guidance:
- NSW EPA (April 2020) *Consultants reporting on contaminated land, Contaminated land guidelines*. NSW EPA, Sydney.

This review includes the following comments in addition to the attached Table A checklist:

1. *Overall comment:* This report is limited to the section of the bypass known as Cut 1. This report does not include the area of the bypass where the containment cell has been constructed.

2. *Figures:* Location map Figure 1 does not include important information such as orientation, scale, sensitive receptors, slope, drainage, relationship to the containment cell etc.

3. *Section 2.3:* Site discussion should include site condition. The presence of stockpiles and wastes on-site prior to remediation should be made clear. This description should be able to be compared to the site condition post remediation.

4. *Section 2.4:* Knowing that there have been several investigations undertaken, it is important that the geology section should include site specific information from previous investigations to confirm the geology present on-site.

5. *Section 2.6:* A figure showing the location of groundwater monitoring bores would be beneficial, with an emphasis on the distance from the site.

6. *Section 3.0:* The context of the previous investigations should be limited to the current validation undertaken – i.e. Cut No. 1 - PAEC02. Also, it appears that ENRS Stage 2 – Detailed Site Investigation (2019) has not been included. The nature and extent of contamination prior to remediation is an important aspect of validation reporting and should be included.

7. *Section 3.4:* Including additional details regarding the construction proposed (and now undertaken) would provide the reader with important conceptual information.

8. *Section 3:* More detail from the RAP is required. A summary of the contamination identified which requires remediation should be provided.

9. *Section 4:* ENRS's role in the project and remediation should be defined. Was ENRS on-site during the entirety of the remediation scope – i.e. July – October 2019 or at strategic points?

   The tense of the report also requires review and consistency, as it currently varies between past and future tense.

10. *Section 6.1:* No discussion has been provided regarding the applicability of ecological criteria. Criteria has been limited to HILs, HSLs and management limits.

11. *Section 6.4.1:* What is the relevance of the ENM waste exemption discussion, did any ENM leave the site?

12. *Section 6.4.2:* What is the relevance of the VENM waste exemption discussion, did any VENM leave the site?

13. *Section 7.0:* More detailed information should be provided regarding the validation conducted, in accordance with NSW EPA (1995) *Sampling Design Guidelines*. Were the proposed sampling densities outlined in the RAP attained?

    What was the perimeter length (m) of the excavation? What was the base area (m^2) of the excavation? What are the diameters of the hot spots that can be detected with 95% confidence based on the validation conducted?

14. *Section 7.2.1:* Bury Pit 1 – 12 locations are not shown on the figures. What were the sizes of these individual pits? What were the sample densities associated with the excavation walls and bases? Appears to be one base sample per pit, described in Table 9.

15. *Section 9.*1: Were the stratigraphic conditions encountered during the validation the same as during the ENSR DSI? A statement should be added to this effect.

    The bury pits mentioned here should be shown on a plan as per the above comment. The depths of the bury pits are described to vary from 1.0 – 4.0 m. It is mentioned that the bury pits terminated in weathered sandstone and bedrock, but the soil type of these pits should be described, as well as the specific testing conducted. Were the excavation walls vertical, or were they battered sides?

16. *Section 11.1:* Waste disposal documentation has not been provided. Section 4.3.7 of the *NSW EPA Guidelines for the NSW Site Auditor Scheme (3rd edition)*, states that the auditor must check the consultant or waste generator (or their representative) has provided the following:

    - *the estimated volume of waste taken off site;*
    - *receipts verifying the facility has received that volume and class of waste from the waste generator (or its representative). This may include a valid consignment authorisation;*
    - *reconciliation documents demonstrating the total volume of waste taken off site is consistent with the total volume of waste generated from the site;*

    Where the above information has not been provided by the consultant or waste generator (or their representative), auditors must request this information.

    Where an auditor is not satisfied the waste has been taken to a lawful facility, the auditor must note this in the site audit report and notify the EPA in accordance with the EPA notification policy for waste, outlined below.

17. *Section 12.3:* The significance of the presence of the remaining uncontrolled fill (with ACM) in the north-western area of the site, from the clearance dated 24/09/19, should be discussed within the report.

✧ ✧ ✧ ✧

Thank you for your time in regard to this matter. Please do not hesitate to contact the undersigned on (02) 6685-7811 if you require additional information or clarification.

Yours sincerely

[redacted]



[redacted]
Accredited Site Auditor (1508)

Table A: Requirements for Site remediation and validation report*

As part of the site audit review, a preliminary review of the requirements of environmental management plan reports was conducted on:

- Environment & Natural Resource Solutions (April 2020) *Stage 4 – Site Validation Report, PAEC02 – Cut No. 1 – Albion Park Rail Bypass (APRB) Project* (ENRS1153).

Required information	Provided?	Discussion if required.
Document control		
Date, version number, author and reviewer (including certification details) and who commissioned the report.	Yes	-
Executive summary		
Background.	Yes	-
Objectives of the investigation.	Yes	-
Scope of works.	Yes	-
Where appropriate, a summary of key findings, observations and sampling results (if applicable).	Yes	-
Summary of conclusions and recommendations.	Yes	-
Objectives		
Objectives of the remediation and validation.	No	Section 1.1 is titled objectives, but these are not considered to be objectives. A validation report should have specific objectives.
Scope of work		
A summary of the scope of work.	Yes	Included in Section 1.2.
Site identification		
Site identification and detail items from ASC NEPM Field Checklist 'Site information' sheet.	Partial	Further information required. Refer to: http://www.nepc.gov.au/nepms/assessment-site-contamination/toolbox This reference is also applicable for the next two sections.
Site history		
Site history items from ASC NEPM Field Checklist 'Site information' sheet. A summary is enough if detailed information was included in an available referenced previous report.	Partial	Detailed information provided in Section 3.0, but ensure it meets the items in the checklist.

Required information	Provided?	Discussion if required.
Site condition and surrounding environment		
Site condition and surrounding environment items from ASC NEPM Field Checklist 'Site information' sheet. A summary is enough if detailed information was included in an available referenced previous report; however, changes to the site condition due to remediation should be summarised here.	Partial	Included in Section 2.0, but ensure it meets the items in the checklist.
Previous results		
Brief summary of previous results.	No	No summary of analytical results is provided.
Conceptual Site model		
See Table 2(a).	Partial	Included as Section 5.0. No visual CSM included. Amend with further information from: Table 2(a) Conceptual site model, NSW EPA (2020) *Consultants reporting on contaminated land: Contaminated land guidelines.*
Implementation of remediation action plan		
A summary of the remediation plan.	Yes	Briefly.
Remediation objectives and criteria including a table listing all selected remediation criteria and references.	Partial	Objective of commercial/industrial use included. Criteria included in tables appendix - Table 13, but not detailed in full in report.
Description of remedial activities with any deviations from the remedial action plan (e.g. volumes and characteristics of material treated or disposed, design of permanent treatment installations, etc.)	Partial	Included in Section 4.5 but limited to asbestos. Deviation from the RAP not clearly outlined.
Plans showing areas remediated and areas of residual contamination or subsurface structures.	Partial	Bury Pits are missing.
Summary and evidence (for example documentation) of compliance with regulatory requirements set by the regulatory authority and local government.	Partial	Reference to regulatory requirements included in Section 4.4. Further evidence of compliance required.
Contractor reports.	Yes	Laboratory reports included.

Required information	Provided?	Discussion if required.
Field inspection checklists and photolog (as appropriate).	Yes	Photolog provided.
Dates of operations.	Yes	-
Quantity of material treated and/or disposed.	Yes	Quantity of volume encapsulated, as well as disposal volumes included.
Sampling and analysis plan and sampling methodology		
See Table 2.2.	Partial	Amend with further information from: Table 2.2 sampling and analysis quality plan, NSW EPA (2020) *Consultants reporting on contaminated land: Contaminated land guidelines*
Validation Results and Discussion		
Summary of all results, in a table that:		
shows all essential details such as sample identification numbers and sampling depth.	Partial	Identification and sample depths included. Ideally the validation results should be combined with the DSI data to demonstrate site wide site suitability.
shows remediation criteria.	Yes	Criteria included at the top of the table but includes a wide range of criteria.
highlights all results exceeding remediation criteria (not just the highest).	Partial	Tables include other criteria which is not referred to, such as OPPs Dutch criteria.
Sample descriptions for all media where applicable (e.g. soil, sediment, surface water, groundwater, biota).	Yes	Limited to soil only.
Test pit or bore logs (well construction details where appropriate, for example groundwater level expressed in Australian height datum).	N/A	No test pit or bore logs included due to nature of remediation.
Site plans or excavation logs showing all sample locations, photoionisation detector results, lithology changes and field observations, if appropriate.	Partial	Limited information is provided on the figure 2.
Site plan(s) showing the extent of soil and groundwater contamination exceeding remediation criteria for each sampling depth, including identification numbers and depths of all samples analysed (clearly mark concentrations of contaminants remaining on site).	Yes	Extent of soil contamination shown on Figure 2.

Required information	Provided?	Discussion if required.
Follow appropriate statistical procedures when comparing site data with the investigation and screening levels. Refer to in ASC NEPM Schedule B1 sections 2, 3 and 4.	Partial	Need to consider criteria in tables and discuss exceedances.
Quality assurance/quality control data evaluation		
Assessment of the implementation of the validation plan from the remedial action plan, with justification for departures (if necessary).	No	Deviations from the RAP require further discussion.
Details of a statistical analysis of validation results and evaluation against the remediation criteria.	N/A	
Verification of compliance with regulatory requirements set by EPA, SafeWork NSW and consent authority.	Partial	EPA and NEPM requirements are referred to in report. It is appreciated that the guideline for reporting was released mid report preparation and there is variation in the degree of detail required.
Identify and discuss ongoing management or monitoring (if required).	No	The on-site encapsulation cell will require ongoing management and monitoring (EMP). No discussion is included regarding an EMP.
See Table 2(c).	Partial	Amend with further information from: Table 2c quality assurance and control, NSW EPA (2020) *Consultants reporting on contaminated land: Contaminated land guidelines*
Waste management (if applicable)		
Waste classification reports in accordance with EPA Waste Classification Guidelines (see Table 2(d)).	No	Waste Classification disposal documentation is absent from Appendix D. Waste Classification summary needs to be provided in the report.

Required information	Provided?	Discussion if required.
Summary of material handling and tracking and reconciliation of volumes or weight of soil removed from site and disposed off-site.	No	Not provided. No NSW EPA Waste Transport Certificates (TCs) have been provided. Asbestos is considered to be a trackable waste when transported interstate in accordance with Schedule 1 of the Protection of the Environment (Waste) Regulation 2014 (Code N220): *It is a requirement that a printed TC accompany the transport of all trackable waste. A TC must be specific to the individual waste load. It does not matter who prints the TC as long as it is available to accompany the waste during transport. The consignor, transporter and receiving facility must certify relevant parts of the paper TC as correct and sign it. The receiving facility should also retain the signed TC for 4 years from receipt of the waste.*
Statements regarding materials being disposed via appropriately licenced facility or re-used under an order or exemption.	No	Not provided.
Confirmation that waste imported on to the site is lawful. Note: materials transported onto site will either need to meet the definition of virgin excavated natural material, or a resource recovery order and resource recovery exemption. In addition, materials imported onto the site should be adequately assessed as being appropriate for the final use of the site, including QA/QC evaluation of any sampling and analysis for material brought to site'.	No	No details of any material imported onto the site is included.
Waste disposal dockets or other waste documentation for any disposed waste.	No	Absent. Required.
Conclusions and recommendations		
Summary of all findings.	Yes	
Conclusions addressing the stated objectives.	Yes	
Assumptions used in reaching the conclusions.	Yes	
Extent of uncertainties in the results.	No	No mention of residual ACM in wall during clearance.

Required information	Provided?	Discussion if required.
A clear-cut statement that the consultant considers the site to be suitable for the proposed use (where applicable).	Yes	Statement provided.
A clear-cut statement of proposed limitations and constraints on the use of the site post remediation and proposed environmental management plan for long-term management of residual contamination at the site (where applicable).	No	Details of limitations required.
Recommendations for further work, if appropriate.	Partial	Recommendations provided but need to discuss encapsulation and associated monitoring.
Clearly state any ongoing management or monitoring (if required).	No	No discussions are included regarding the "on-site encapsulation", and associated monitoring. No construction details of the encapsulation are provided. An Environmental Management Plan is required. The term "on-site encapsulation" is used but no figures are provided of the location. Is the encapsulation really on-site?

1. Taken from Table 2.6 Site remediation and validation, NSW EPA (2020) *Consultants reporting on contaminated land: Contaminated land guidelines*

Attachment 1 – Scope and limitations to site audits

Scope of audits

In NSW, the site assessment and audit process consists of:

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Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

Whereas interim site audit advice is provided to assist in the assessment and management of contamination issues at a site, the interim site audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, or any assessment reports, management plans and the like, or actions proposed therein. 'Approval' is inconsistent with the concept of a site audit, that is an independent third party review, and as such approval is beyond the scope of a site audit.

Rather, where interim site audit advices describe such documents as appropriate or similar, this means that the site audit is in general agreement that the document fulfils the intended purpose, consistent with the scope of site audits described above. 'Approval' of reports or plans is by definition a statutory function, and the *Contaminated Land Management (CLM) Act* 1997 does not provide accredited site auditors authorisation for statutory functions.

Limitations to site audits

This site audit relates only to those matters relevant to the CLM Act, which describes that "The general object of this Act is to establish a process for investigating and (where appropriate) remediating land areas where contamination presents a significant risk of harm to human health or some other aspect of the environment".

Contaminated land site audits do not seek to provide an opinion regarding:
- other aspects of the environment not related to site contamination; or
- hazardous building materials in buildings or structures; or
- to the suitability of the site in regard to landuse planning and legal use of the land; or
- the occupational health and safety legislation; or
- the suitability of any engineering design.

Accordingly, reviews of such information are only in relation to the contaminated land aspects of any projects or sites. If specialist technical review of such documents is required, these should be obtained by appropriate specialist.

By definition, site auditing involves the review and critique of consultants' and contractors' work, including, amongst others, site histories, site surveys, subsurface investigations, chemical and physical analyses, and risk assessments and modelling. Accordingly, Cavvanba relies on the experience, expertise and integrity of the relevant organisations. The information sources referenced have been used to determine site history and local subsurface conditions. While Cavvanba takes reasonable care to avoid reliance on data and information that is inaccurate or unsuitable, Cavvanba is not able to verify the accuracy or completeness of all information and data made available.

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As environmental sampling is based on achieving suitable sampling densities, rather than sampling all media at all locations, and analysis is based on site histories and likely contaminants of concern, rather than analysis of all media at all locations for all potential contaminants, the absence of any identified hazardous or toxic materials at the site should not be interpreted as a warranty or guarantee that such materials do not exist at the site. Therefore, future work at the site which involves subsurface excavation should be conducted based on appropriate management plans. These should include, *inter alia*, environmental management plans, including unexpected findings protocols, hazardous building materials management plans, and occupational health and safety plans.

If additional certainty is required in addition to the requirements of the site audit, then additional site history information should be obtained, or additional exploration and sampling and analysis should be conducted. This decision should be made by the user of this information based on an appropriate risk management process, and the user should commission additional services if required.

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[redacted]
Fulton Hogan Construction Pty Ltd
Albion Park Rail Bypass

Ref. 1508-1904-ISAA06

21 January 2021

Dear [redacted],

Interim Site Audit Advice No. 6 – 1508-1904
Albion Park Rail Bypass, NSW

1.0 Nature of interim advice

To act as site auditor for this project, Fulton Hogan Construction Pty Ltd has engaged [redacted] a New South Wales Environment Protection Authority (EPA) accredited Site Auditor, employed by Cavvanba Consulting. The final outcome of this engagement is to deliver a site audit statement (SAS) and associated site audit report (SAR), based on the objectives of the site audit.

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(ii) the site auditor *independently reviews* the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

3.0 Interim Site Audit Advice – 1508-1904-ISAA06

As part of the site audit, a preliminary review has been conducted of:

- Cardno (14 January 2021) Environmental Management Plan - Asbestos in Soils Encapsulation Cell - M1 Princes Motorway Chainages 18250 to 18490 (Ref. 8201904701).

A review has been conducted of the above-listed report in comparison to the requirements of validation reports as included in the following guidance:

- NSW EPA (April 2020) Consultants reporting on contaminated land, Contaminated land guidelines. NSW EPA, Sydney.

This review includes the comments attached in Table A checklist, which can be summarised as:

1. The report appears to have addressed the overarching matters for consideration by the auditor, being;
   - the EMP can reasonably be made to be legally enforceable;
   - there will be appropriate public notification;
   - there is no off-site migration; and
   - contamination within the site is managed so that it does not present an unacceptable risk.

2. There are certain matters such as nominating measurable timeframes for inspection schedules and review, which do not meet the reporting guidelines. It is suggested that any inspection schedule is consistent with normal road and landscaping maintenance requirements. The matters discussed in Attachment A should therefore be addressed to ensure the document is complete.

✧ ✧ ✧ ✧

Thank you for your time in regard to this matter. Please do not hesitate to contact the undersigned on (02) 6685-7811 if you require additional information or clarification.

Yours sincerely
Cavvanba Consulting Pty Ltd

[redacted]
Accredited Site Auditor (1508)

Table A: Requirements for EMP Report [1]

As part of the site audit review, a preliminary review of the requirements of environmental management plan reports was conducted on:

- Cardno (14 January 2021) *Environmental Management Plan – Asbestos in Soils Encapsulation Cell – M1 Princes Motorway Chainages 18250 to 18490* (Ref. 8201904701).

Matters which are not considered relevant have been formatted with ~~strike through~~.

Required information	Provided?	Discussion if required.
Document status		
Including date, version control, author and reviewer names (including certification details where applicable) and who commissioned the report.	Y	-
Title		
Use 'environmental management plan' not 'site management plan' or other alternative wording.	Y	-
Purpose		
Reason for, and purpose of, the plan and time period.	Y	-
How the plan will be made enforceable.	Y	Section 5.3
Whether the environmental management plan is active or passive.	N	A brief statement should be included.
Parties responsible for implementation and review/maintenance of the plan and their tasks.	Y	Table 5.1
Where the plan will be recorded.	Y	Referred to in Section 5
Background		
Site identification (including street number, street name and suburb, lot and Deposited Plan number, coordinates, locality map, site survey plan), site owner, local government area, consent authority and site zoning (current and future).	Y	-
Summary of site history as it relates to the existing site contamination which requires management.	Y	-
Current/future site use and layout (relevant to the environmental management plan).	Y	-
Description of existing /residual contamination		
Identify the contaminants of concern, contaminated media, concentrations and location(s) of the contaminants. Use a site plan to show location(s). Details of migration of contamination, if relevant.	Y	Migration of contaminants is not relevant.

Required information	Provided?	Discussion if required.
Summary of the geology and hydrogeology (relevant to the environmental management plan).	Y	Limited to soil landscapes, however this is acceptable.
Management activities		
Outline the activity(s), and detail procedures that are to be applied.	Y	-
Management structure and responsibilities.	Partial	Table 5.1 should include responsibilities for public notification described in Section 5.4.
How the plan sits within an existing environmental management system (EMS) (if applicable).	Y	The TfNSW property management system is expected to manage this. Please confirm.
Monitoring of site conditions and site management measures.	Partial	The introduction of Section 6 explains the scenario, however it should be made clear that the normal maintenance of the road surface will also result in suitable maintenance of the integrity of the cell.
Approval and licensing requirements (if applicable).	Y	TfNSW have stated that they agree to the EMP, email 18/1/2021 Robyn Lyster, Area Maintenance Manager Infrastructure Services, Southern Region, TfNSW.
How the environmental management plan is consistent with conditions of consent under a planning instrument (if applicable).	Y	Section 5.3.
Reporting requirements for environmental management plan implementation. Include list of people responsible for preparing the reports, who receives the reports and by when.	N	This aspect should be specifically mentioned in Table 5.1.
Communications protocols (if applicable).	N	Given the ultimate owner and responsibilities is TfNSW, it is important to provide some information regarding how communications are managed.
Emergency contacts and response, including 24-hour emergency phone number (if applicable).	N	It is unlikely that the failure of the containment cell could lead to an emergency situation. However, for completeness, associated contacts should be included, or at least a recognition of this requirement.
~~Operating hours (if applicable).~~	N	N/A

Required information	Provided?	Discussion if required.
~~Contingency plans (if applicable).~~	N	N/A
Inspection, maintenance, environmental sampling, analysis and reporting (if applicable)		
~~Relevant sections from sampling and analysis quality plan (See Table 2.2), including:~~	N	N/A
~~Data quality objectives (see Table 2(b)).~~	N	N/A
~~Basis for assessment criteria.~~	N	N/A
~~Sampling and analysis plan and sampling methodology, identifying sampling locations and media.~~	N	N/A
~~Quality assurance/quality control (see Table 2(c)).~~	N	N/A
~~Frequency of monitoring.~~	N	N/A
~~Outline triggers for responses or reassessment arising from the environmental sampling, analysis and reporting, and required actions.~~	N	N/A
~~Outline provision for maintenance of existing sampling points and their replacement if necessary.~~	N	N/A
Integrity inspection or testing or maintenance inspection program and frequency (if applicable) (for example where capping exists).	N	The inspection schedule stated in Table 6.1 is limited to "on a regular basis" which is not an acceptable measurable frequency. It is recognised that if the road is maintained in a trafficable condition then the cell will naturally be protected. Therefore, it is acceptable that the frequency of inspections are consistent with any maintenance requirements for the roadway. An inspection checklist which recognises the aspects discussed in Table 6.1 would assist in record keeping.
Monitor and review of environmental management plan		
Schedule for environmental management plan review.	Partial	It is discussed in Section 5.2 however there are no timeframes provided. Typically 5 years is a reasonable timeframe for review of EMPs. Please update.
~~Monitoring checklist.~~	N	N/A

Required information	Provided?	Discussion if required.
Description of corrective actions and triggers for these actions.	Y	Acceptable. Associated with repair of the roadway and any associated verge or batter.
~~Notification to the regulator and/or consent authority with request to amend or end management activities (if applicable).~~	N	N/A. The cell will be present for the life of the road.
Communications and notifications		
List of stakeholders.	N	These should be specifically mentioned.
Outline details for how affected stakeholders including potential purchasers will be notified of the existing/residual contamination and the environmental management plan.	N	The TfNSW property management system is expected to manage this. Please confirm.
How the environmental management plan is communicated and made enforceable, including any financial assurance requirements.	Y	As discussed in Section 5. The risks posed by the contamination are unlikely to require financial assurance.
Outline details for informing stakeholders of changes to activities and/or responsible parties.	N	The TfNSW property management system is expected to manage this. Please confirm.

1. Taken from Table 2.7 Environmental management plan, NSW EPA (2020) *Consultants reporting on contaminated land: Contaminated land guidelines*

Attachment 1 – Scope and limitations to site audits

Scope of audits

In NSW, the site assessment and audit process consists of:

(i) the contaminated land consultant, or other relevant party, *designs and conducts* the site assessment and, where required, all remediation and validation activities to achieve the stated objectives; and

(ii) the site auditor *independently and at arm's length reviews* the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed landuse.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

Whereas interim site audit advice is provided to assist in the assessment and management of contamination issues at a site, the interim site audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, or any assessment reports, management plans and the like, or actions proposed therein. 'Approval' is inconsistent with the concept of a site audit, that is an independent third party review, and as such approval is beyond the scope of a site audit.

Rather, where interim site audit advices describe such documents as appropriate or similar, this means that the site audit is in general agreement that the document fulfils the intended purpose, consistent with the scope of site audits described above. 'Approval' of reports or plans is by definition a statutory function, and the *Contaminated Land Management (CLM) Act* 1997 does not provide accredited site auditors authorisation for statutory functions.

Limitations to site audits

This site audit relates only to those matters relevant to the CLM Act, which describes that "The general object of this Act is to establish a process for investigating and (where appropriate) remediating land areas where contamination presents a significant risk of harm to human health or some other aspect of the environment".

Contaminated land site audits do not seek to provide an opinion regarding:
- other aspects of the environment not related to site contamination; or
- hazardous building materials in buildings or structures; or
- to the suitability of the site in regard to landuse planning and legal use of the land; or
- the occupational health and safety legislation; or
- the suitability of any engineering design.

Accordingly, reviews of such information are only in relation to the contaminated land aspects of any projects or sites. If specialist technical review of such documents is required, these should be obtained by appropriate specialist.

By definition, site auditing involves the review and critique of consultants' and contractors' work, including, amongst others, site histories, site surveys, subsurface investigations, chemical and physical analyses, and risk assessments and modelling. Accordingly, Cavvanba relies on the experience, expertise and integrity of the relevant organisations. The information sources referenced have been used to determine site history and local subsurface conditions. While Cavvanba takes reasonable care to avoid reliance on data and information that is inaccurate or unsuitable, Cavvanba is not able to verify the accuracy or completeness of all information and data made available.

Sampling and chemical analysis of environmental media are based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Limited environmental sampling and laboratory analyses were undertaken as part of the investigations reviewed by Cavvanba, as described herein. Ground conditions between sampling locations may vary, and this should be considered when extrapolating between sampling points. Except at each sampling point, the nature, extent and concentration of contamination is inferred only. Furthermore, the test methods used to characterise the contamination at each sampling point are subject to limitations and provide only an approximation of the contaminant concentrations.

Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this site audit are based on the available information at the time of the investigations.

As environmental sampling is based on achieving suitable sampling densities, rather than sampling all media at all locations, and analysis is based on site histories and likely contaminants of concern, rather than analysis of all media at all locations for all potential contaminants, the absence of any identified hazardous or toxic materials at the site should not be interpreted as a warranty or guarantee that such materials do not exist at the site. Therefore, future work at the site which involves subsurface excavation should be conducted based on appropriate management plans. These should include, *inter alia*, environmental management plans, including unexpected findings protocols, hazardous building materials management plans, and occupational health and safety plans.

If additional certainty is required in addition to the requirements of the site audit, then additional site history information should be obtained, or additional exploration and sampling and analysis should be conducted. This decision should be made by the user of this information based on an appropriate risk management process, and the user should commission additional services if required.

Appendix A

Audit Correspondence – Emails

[redacted]

From: [redacted]
Sent: Wednesday, 12 June 2019 6:04 PM
To: [redacted]
Subject: Record of telecon re APRb Contamination immobilisation on site

Gents – Thanks for your time today,

Just a quick email to cover off our telecom today.

- [redacted] discussed the intent & content of the Detailed Site Assessment (DSI) inclusive of lab results.
- Discussion around minor elevated hydrocarbon levels that are expected to either biodegrade or volatilise during earth movement & ongoing containment in the cell.
- [redacted] queried the stockpile containing lead & discussion centred around this could have been a fairly recent stockpile made from general clean up of the site – a result of scraping some of the surface debris up.
- [redacted] stated that if the intent is to create an encapsulation cell, then the lead impacted material could be immobilised within the cell. It could be surveyed properly so that there is a clear trail to where in the cell it has been placed. Generally the approach should be about bioavailiability and reducing risk.
- [redacted] indicated nothing in the results was giving him an indication that the material can't be encapsulated.
- [redacted] stated that there would need to be more effort in managing the placement of the material in the fill.
- Discussion around Phthalates and the potential source of resins & fibreglass used historically with car parts & previous land use. These levels are below Dutch guidelines.
- [redacted] said that he doesn't see that they pose a risk for vapour within the cell
- [redacted] discussed the importance of ensuring no leachate issues, & that the cell design should prevent runoff & be well above the ground water level (which it appears to be, so no real leachability issues).
- [redacted] said that there is a guideline around cement stabilisation / immobilisation, but that may be overkill in this case.
- [redacted] requested [redacted] incorporate his advice / discussion point into the DSI so it could be formally completed & the RAP can be progressed.
- [redacted] explained that the removal and placement activity would be implemented like a asbestos removal job with a certified B class contractor minimum.
- [redacted] said he believes someone with contamination experience should be on site during the works.
- [redacted] committed to completing the DSI & RAP tomorrow (13/6/19)
- [redacted] committed to completing his work within 1 week.

- [redacted] discussed SEPP 55 may require 30 days notification to Council, but [redacted] said this should be confirmed as it is a SSI project approved by DP&E & Council are kept in the loop as a courtesy / important stakeholder.

- Otherwise standard Safe Work Notifications would be lodged by the successful contractor.

- It was generally agreed that FH could start their procurement with an aim to commence works around the start of July.

- [redacted] requested additional gPS location point for the containment cell as it's not presently in the EPA notification / preferable DP & Lot no as well – [redacted] to follow up.

- [redacted] will issue Interim advice after reviewing the RAP & whilst he can't pre-empt the final audit outcome, is comfortable verbally giving the green light to the containment cell proposal.

- [redacted] asked about potential ongoing monitoring for ground water / lead issues & [redacted] responded that leachate monitoring would not be required (unnecessary) if infiltration is prevented, & reinforced that it is very important that there is no contact with groundwater or for erosion to impact the cell.

- The management plan will just be a standard road maintenance check to ensure that everything is ok.

Pls let me know if any of the above is incorrect.

I look forward to seeing the completed document tomorrow [redacted] & will flick them straight to you when I get them [redacted]

Kind Regards

[redacted]

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[redacted]

From: [redacted]
Sent: Thursday, 13 June 2019 11:50 AM
To: [redacted]
Subject: Consent Authority under SEPP No 55 - Remediation of Land
Attachments: RE: Albion Park Rail bypass - Update on Cut 1 Unexpected Contaminated La... (77.9 KB)

Hi guys – Just confirming our discussion yesterday around the requirements of SEPP 55 & previous correspondence between FH, RMS and the ER / DP&E (below and attached).

The project is not obliged to provide Council with 30 days notice regarding the proposed land remediation associated with the project, but will provide advice to Council as a courtesy.

The consent authority in this case is NSW DP&E, who are aware of the matter. My interpretation is that under SEPP 55 Cl 14(b), the APRb project is not required to comply with Cl 16-2(a) as the project is subject to the approval conditions of "*another state environmental planning policy*", which is: **State Environmental Planning Policy (State and Regional Development) 2011 Schedule 4 State Significant infrastructure – Specified development on specified land, Part 2 Other Development – 4. Albion Park Rail bypass.** Ref: https://www.legislation.nsw.gov.au/#/view/EPI/2011/511/sch4.

As previously discussed with [redacted] (the ER) who has been in liaison with DP&E, the provisions of approval listed under conditions E57 – E61 "Contaminated Land" (listed in attached email) are very clear and well understood by all stakeholders (FH, RMS & ER).

My intent is that once received, FH would issue the Auditors Interim Statement to RMS & the ER as evidence of progress, with a commitment that the Site Audit Statement and Site Audit Report will be forthcoming following completion of the works and at least 1 month before operation of the infrastructure (as previously agreed).
In the meantime we are proceeding in accordance with ongoing discussions and guidance from the hygienist, the Contaminated Sites Auditor and RMS, with preparation to proceed with works following endorsement of the RAP which is to be submitted today. Site preparation / housekeeping works will commence sooner.

Noting that the terms of the Ministers Conditions of approval under Section 115ZB of the Environmental Planning & Assessment Act 1979 (State Significant Infrastructure no: SSI 6678) take precedence over the provisions of other SEPPs (55 in this case), relevant excerpts from SEPP 55 (https://www.legislation.nsw.gov.au/#/view/EPI/1998/520/cl8) are below FYI.

State Environmental Planning Policy No 55—Remediation of Land

Current version for 31 August 2018 to date (accessed 13 June 2019 at 11:03)
Clause 8

8 Remediation work permissible

(1) A person may carry out a remediation work in accordance with this Policy, despite any provision to the contrary in an environmental planning in

(2) A person must not carry out a category 1 remediation work except with the consent of the consent authority.

(3) A person may carry out a category 2 remediation work without the consent of the consent authority.

(4) A person who carries out a remediation work must ensure that clause 16 (if it applies) and clauses 17 and 18 are complied with in relation to the

Note. See clause 19 for the relationship of this Policy to other environmental planning instruments.

State Environmental Planning Policy No 55—Remediation of Land

Current version for 31 August 2018 to date (accessed 13 June 2019 at 10:34)

Clause 10

10 Consent authority in relation to remediation works

(1) The consent authority in relation to a development application for consent to carry out a remediation work is:

(a) the person or authority that, in accordance with a provision made by an environmental planning instrument that applies to the land, is the cons

(b) in default of any such provision:

(i) the council for the local government area in which the land is situated, or

(ii) the Western Lands Commissioner, if the land is within the unincorporated area.

(2) (Repealed)

State Environmental Planning Policy No 55—Remediation of Land

Current version for 31 August 2018 to date (accessed 13 June 2019 at 11:07)

Clause 14

14 Category 2 remediation work: work not needing consent

For the purposes of this Policy, a category 2 remediation work is:

(a) a remediation work that is not a work of a kind described in clause 9 (a)–(f), or

(b) a remediation work (whether or not it is a work of a kind described in clause 9 (a)–(f)) that:

(i) by the terms of a remediation order, is required to be commenced before the expiry of the usual period under the *Contaminated Land Manag*

Note. The usual period for lodgment of an appeal is 21 days or a period prescribed instead by regulations made under the *Contaminated Land Management A*

(ii) may be carried out without consent under another State environmental planning policy or a regional environmental plan (as referred to in cl

(iii) is carried out or to be carried out by or on behalf of the Director-General of the Department of Agriculture on land contaminated by the use under Part 2 of the *Stock Diseases Act 1923*, or

(iv) is carried out or to be carried out under the Public Land Remediation Program administered by the Broken Hill Environmental Lead Centre

State Environmental Planning Policy No 55—Remediation of Land

Current version for 31 August 2018 to date (accessed 13 June 2019 at 11:07)

Clause 16

16 Prior notice of category 2 remediation work

(1) A person who proposes to carry out a category 2 remediation work on any land must give notice of the proposed work to the council for the loca Commissioner).

(2) The notice must be given:

(a) at least 30 days before the commencement of the work, except in the case of a work referred to in clause 14 (b), and

(b) in the case of a work referred to in clause 14 (b)—no later than the day before the commencement of the work.

(3) The notice must:

(a) be in writing, and

(b) provide the name, address and telephone number of the person who has the duty of ensuring that the notice is given, and

(c) briefly describe the remediation work, and

(d) show why the person considers that the work is category 2 remediation work by reference to clauses 9, 14 and (if it applies) 15 (1), and

(e) specify, by reference to its property description and street address (if any), the land on which the work is to be carried out, and

(f) provide a map of the location of the land, and

(g) provide estimates of the dates for the commencement and completion of the work.

State Environmental Planning Policy No 55—Remediation of Land

Current version for 31 August 2018 to date (accessed 13 June 2019 at 11:10)
Clause 17

17 Guidelines and notices: all remediation work

(1) All remediation work must, in addition to complying with any requirement under the Act or any other law, be carried out in accordance with:

(a) the contaminated land planning guidelines, and

(b) the guidelines (if any) in force under the *Contaminated Land Management Act 1997*, and

(c) in the case of a category 1 remediation work—a plan of remediation, as approved by the consent authority, prepared in accordance with the cont

(2) A notice of completion of remediation work on any land must be given to the council for the local government area in which the land is situated (or,

(3) The notice is to be given within 30 days after the completion of the work.

(4) A copy of the notice must also be given within the same period to the consent authority, if consent was required for the remediation work and the co

State Environmental Planning Policy No 55—Remediation of Land

Current version for 31 August 2018 to date (accessed 13 June 2019 at 11:15)
Clause 18

18 Notice of completion of remediation work

The notice required by clause 17 (2) must:

(a) be in writing prepared and signed by the person who carried out the work, and

(b) provide the person's name, address and business telephone number, and

(c) provide details of the person's qualifications to carry out the work, and

(d) specify, by reference to its property description and street address (if any), the land on which the work was carried out, and

(e) provide a map of the location of the land, and

(f) state when the work was completed, and

(g) specify the uses of the land, and the substances, that contaminated it in such a way as to present a risk of harm to human health or some other asp

(h) specify the uses of the land immediately before the work started, and

(i) briefly describe the method of remediation used in the work, and

(j) specify the guidelines that were complied with in the work, and

(k) specify the standard of remediation achieved (in the light of the use proposed for the land), and

(l) show in what manner the work (if a category 1 remediation work) complied with the conditions of the relevant development consent, and

(m) state what action must be maintained in relation to the land after the completion of the remediation work if the standard of remediation achieved

Note. A site audit statement (within the meaning of Part 4 of the *Contaminated Land Management Act 1997*) may be given in partial compliance with this requirement.

Kind Regards

[redacted]

From: [redacted]
Sent: Tuesday, 30 April 2019 11:13 AM
To: [redacted]
Subject: Albion Park Rail Bypass Stage 2 - Conditions E58 and E59

All,

I just wanted to confirm I've discussed the interpretation of Condition E58 (management of potential contamination issues during construction) with DP&E.

[redacted] has confirmed it is acceptable and the intent of Condition E58 that construction activities can continue once remedial works associated with a Site Contamination Report occur at a given location occur. However, contaminated land should not be used for the purpose approved under the terms of the approval (i.e. **operation** of the project) until the Site Audit Statement is obtained and any associated conditions have been complied with.

In addition, [redacted] reiterated that the Site Audit Statement and Site Audit Report need to be submitted to the Secretary and Relevant Council(s) for information no later than one (1) month before the commencement of operation as per Condition E59.

So all in all I think the above is consistent with our earlier interpretation of the Conditions and therefore delay's won't occur with construction due to the length of time it takes to receive the actual Site Audit Statement.

Regards,

[redacted]

[redacted]

Vantage Environmental Management Pty Ltd
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PSI Checklist

Requirement	Provided	Comment	ENRS Response 17/6
Executive Summary			
Background, objectives, scope of works, a summary of sampling results, conclusions and recommendations.	Yes	The reference to RMS asbestos procedure is not a document the auditor is familiar with.	
Scope of work			
A clear statement of the scope of work.	Yes	Section 1.3	
Site Identification			
Street number, street name and suburb.	Yes	Street number not relevant. All other information is provided.	
Lot number and deposited plan number.	Yes	Portions of a number of lots is described.	
Geographic co-ordinates related to a nearby cadastral corner of a state survey control mark.	**No**	The site location is otherwise clear, however these should be included.	Geographic coordinates added to Table 1 for the corners of the Site.
Locality map (ideally based on topographic map not street directory).	Yes	Site location is clear.	
Current site plan with scale bar, showing north, local water drainage and other local environmentally significant features.	Yes	A site plan clearly showing sensitive receptors and other features should be included.	
Other relevant information?	partial	The containment cell location is yet to be fully described.	
Site condition			
Topography.	Yes	Adequately detailed.	
Conditions at site boundary such as type and condition of fencing, soil stability and erosion.	Yes	Generally complete. Whilst not stated, the site is fenced for the proposed construction purposes.	
Visible signs of contamination such as discolouration or staining of soil, bare soil patches.	Yes	Adequately detailed.	
Visible signs of plant stress.	**No**	Not mentioned, however no bearing on the current condition of the site at this stage.	New Section added to 8.1.1: 8.1.1 Visual & Olfactory Indicators The site walkover did not identify any surface evidence of vegetation distress likely associated with ground contamination. The northern portion was partially disturbed with patchy grass and ground cover, whilst the central and southern portions were extensively covered by grass. Test Pit investigations noted some areas of discolouring and staining with minor odours associated with Fill in the northern portion of the Site. Details of test pit observations are

			documented in the test pit logs provided in Error! Reference source not found.. Samples were collocted from areas of highest staining and odour for laborartory analysis to screen for CoPC.
Presence of drums, wastes and fill materials.	Yes	Stockpiles and wastes are well documented.	
Requirement	Provided	Comment	
Odours.	**No**	Not specifically mentioned, however it is discussed as an aesthetic criteria to be evaluated during the investigation.	As above, new Section added to 8.1.1.
Condition of buildings and roads.	n/a	No roads or builders	
Quality of surface water.	n/a	No surface water	
Flood potential.	**No**	Minimal comment, it is included in the 10.7 planning certificate that there are development controls related to flood. The sites elevation is unlikely to be affected.	Section 2.2 amended to note: The Site is situated on a localised hill which divides drainage to the north and south, in an area unlikely to be affected by flood.
Other relevant information.	-		
Surrounding environment			
Topography.	Yes	Adequate for the assessment undertaken.	
Visible signs of contamination such as discolouration or staining of soil, bare soil patches – offsite adjacent to site boundary.	Partial	Adequate for the assessment undertaken.	Adequate – no further changes required.
Details of any relevant local sensitive environment – e.g. rivers, lakes, creeks, wetlands, local habitats areas, endangered flora and fauna.	Yes	Adequate for the assessment undertaken.	Adequate – no further changes required.
Other relevant information.	-	-	
Geology and hydrogeology (NEPM, 2013)			
Soil stratigraphy using recognised classification methods, e.g. Australian Standard 1726, Unified Soil Classification Table.	Partial	Not specifically described. The testpit logs would benefit from the clear application of the USCS.	Adequate – no further changes required.
Location and extent of imported and locally derived fill.	Yes	This has been mapped based on field observations during field works.	
Site bore logs or test pit logs showing stratigraphy.	Yes	Tespit logs provided. Typically, hand written logs are not an acceptable form of reporting.	
Detailed description of the location, design	n/a	-	

and construction of onsite wells.			
Description and location of springs and wells in the vicinity.	Yes.	Licenced bore details have been reviewed.	
Direction and rate of groundwater flow (and depth to).	Yes	Groundwater has been reviewed from the project technical paper and geotechnical report.	
Direction of surface water runoff.	Yes	Adequate for the assessment.	
Background water quality.	Yes	As per the groundwater technical paper.	
Preferential water courses.	Yes	As per the groundwater technical paper.	
Summary of local meteorology.	**No**	-	ENRS understand no comment is provided to trigger any amendments or addition information.
Requirement	Provided	Comment	
Other relevant information.	-	-	
Assessment of groundwater			
Permeability of the strata on the site.	Yes	Based on the groundwater technical paper.	
Known or expected depth to groundwater.		As above.	
Ambient groundwater quality.		As above.	
Potential receptors.		As above.	
Onsite sources (type of sources).		Onsite sources of contamination are reportedly limited.	
Whether source(s) have been removed.		n/a	
Contaminant sources unrelated to the site.		n/a	
quantity of contaminant and its mobility characteristics; and		A detailed assessment has been provided based on TCLP and ASLP.	
any other site specific issues?		Asbestos in soil.	
Site history			
zoning – previous, present and proposed;	Partial	Not explicitly stated.	Zoning added to Table 1: Special Purpose (SP2) and part Light Industrial (IN2)
land use – previous, present and proposed;	Yes	Adequate for the assessment.	
summary of council rezoning, relevant development and building approvals records;	**No**	Adequate for the assessment.	Adequate – no further changes required.
chronological list of site uses, indicating information gaps and unoccupied periods;	Partial	Whilst there is no specific chronological list of site uses, the review is adequate to identify any information gaps.	Adequate – no further changes required.
review of aerial photographs;	Yes	Some poor resolution makes deciphering the visible features difficult.	
site photographs (with date and locations	Yes	Adequate for the assessment.	

indicated on site maps);			
inventory of chemicals and wastes associated with site use and their onsite storage locations;	N/A	Not available	
possible contaminant sources and potential offsite effects;	Yes	Adequate for the assessment.	
site layout plans showing present and past industrial processes;	Partial	Primary source is the aerial photographs.	Adequate – no further changes required.
sewer and service plans;	Yes	Adequate for the assessment.	
description of manufacturing processes;	N/A	-	
details and locations of current and former underground and aboveground storage tanks;	N/A	-	
product spill and loss history;	N/A	-	
Requirement	Provided	Comment	
discharges to land, water and air;	N/A	-	
disposal locations;	Partial	Limited to the waste observed on the surface.	Adequate – no further changes required.
relevant complaints history;	N/A	-	
local site knowledge of residents and staff (present and former);	N/A	-	
summary of local literature about site, including newspaper articles;	N/A	-	
details of building and related permits, licences, approvals and trade waste agreements;	Partial	Council records were reportedly incomplete.	Adequate – no further changes required.
historical use of adjacent sites;	Partial	Primarily based on aerial photographs	Adequate – no further changes required.
local usage of ground/surface waters, and location of bores/pumps;	Yes	Based on the groundwater technical paper.	
integrity assessment (assessment of accuracy of information); and	Yes	ENRS have reviewed the integrity and potential data gaps in site history, as summarised in section 3.10	
any other site specific issues?	-	-	

DSI CUT1 – Checklist

Requirement	Provided	Comment	ENRS Response 17/6
Sampling and analysis plan and sampling methodology			
Sampling, analysis and data quality objectives (DQOs).	Yes	A detailed DQOs and SAQP was prepared prior to the works.	
Rationale for the selection of: – sampling pattern, – sampling density including an estimated size of the residual hot spots that may remain undetected, – sampling locations including locations shown on a site map, – sampling depths, – samples for analysis and samples not analysed, – analytical methods, and – analytes for samples.	Yes	The sampling pattern was based on the SAQP, and onsite discussions, being based on a grid pattern. Section 6.1.1 should include a discussion regarding the size of hotspots able to be detected. Sample analysis was broad and appropriate. Sampling depths were based on characterising the fill material to be removed for encapsulation.	
Requirement	Provided	Comment	
Detailed description of the sampling methods including: – sample containers and type of seal used, – sampling devices and equipment e.g. auger type, – equipment decontamination procedures, – sample handling procedures, and – sample preservation methods and reference to recognised protocols, e.g. APHA or USEPA SW846.	Yes	Adequately detailed. 1. Section 8.1 suggests boreholes was the investigation methodology employed, however this is not case. PID calibration records should be provided.	
Detailed description of field screening protocols.	Yes	Adequately detailed.	
Contaminants of concern (NEPM, 2013)			
NEPC (1999) *Schedule B(2) Guideline on Data Collection, Sample Design and Reporting*, describes that analyte choice will be principally governed by site history. Appendix 1 of Schedule B(2) provides groups of contaminants and the analytes required for 'general purpose screens'. It also notes that, depending on the available site history,	Yes	The broad analysis was adequately precautionary. Section 4.2.7 of the Auditor guidelines requires that *The auditor must check that contamination by per- and polyfluoroalkyl substances (PFAS) has been considered in the*	

potentially contaminated fill may require a more extensive series of analytes and that appearance, odour, etc. of samples may influence the choice of analytes. The audit's interpretation is that, unless determined by site history, a precautionary approach should be adopted for the development of the analyte list, including both the contaminant type and the elements and compounds within the contaminant type.		*assessment of contamination*. Therefore, following the description in Section 10.0 of the report of buried assorted carparts and several batteries the consultant should evaluate and comment on whether PFAS is a potential contaminant of concern. The NEMP for PFAS describes *Used in batteries, particularly for high-end use such as lithium-style batteries.*	
Results			
Summary of previous results, if appropriate.	Partial	The previous investigation results have been discussed, however, unless ENRS consider the data to be unusable, it should be included in the summary tables to assist with overall soil characterisation.	Results from previous report to be added as an Appendix.
Summary of all results, in tables that: – shows all essential details such as sample numbers and sampling depths, – shows assessment criteria, and – highlights all results exceeding the assessment criteria;	Partial	The data collected by ENRS is succinctly compiled. However as highlighted above, the summary should include all previous data from previous consultants. Segregation of natural and fill soils would further assist characterisation and data evaluation.	Adequate – no further changes required.
Site plan showing all sample locations, sample identification numbers and sampling depths.	Partial	As above. Current data is well documented. A site plan showing all data including previous investigations would be beneficial to site characterisation.	An additional site plan shall be inserted into the Figures Section to illustrate the location of previous boreholes.
Requirement	Provided	Comment	
Site plan showing the extent of soil and groundwater contamination exceeding selected assessment criteria for each sampling depth.	Partial	As above.	Additional site plan shall be annotated with exceedances of the SAC.
Site characterisation			
Assessment of type of all environmental contamination, particularly soil and groundwater.	**Partial**	Soil, primarily the fill material. Groundwater not a media of concern. The conceptual site model should be updated based on the information obtained during this investigation.	CSM to be updated.

	Partial	Section 8.2.5. The consultant should ensure fill material, stockpiles and natural soils are evaluated separately when undertaking statistical assessments (i.e. 95% UCL). It is inappropriate to bundle different media.	Lab summary table to be amended to provide separate 95%UCL calcs for each material type.
	Partial	Phthalates - consultant should provide further discussion regarding the potential for vapors to be generated due to the presence of phthalates. Ensure the PID is capable of detecting these compounds (i.e. check nature of the compounds are detectable by the ionisation potential of the lamp in the PID)	Further discussion on Phthalates to be provided including potential sources and the potential to generate vapour
Assessment of extent of soil and groundwater contamination, including offsite effects.	Yes	Fill material and stockpiles have been adequately assessed for the purposes of the investigation.	
Assessment of chemical degradation products.	n/a	-	
Assessment of possible exposure routes and exposed populations (human, ecological).	Yes	-	
Conclusions and recommendations			
Brief summary of all findings.	Yes	Adequate for the investigation undertaken.	
Assumptions used in reaching the conclusions.	Yes	Generally adequate for the investigation undertaken. Previous data should be included in overall site characterisation.	
Extent of uncertainties in the results.	Yes	Uncertainties are partly alleviated by the proposed broad scale remediation and encapsulation.	
Where remedial actions have been undertaken, a list summarising the activities and physical changes to the site.	N/A	-	
A clear statement that the consultant considers the subject site to be suitable for the proposed use (where applicable).	N/A	-	
Requirement	Provided	Comment	
A statement detailing all limitations and constraints on the use of the site (where applicable); and	N/A	-	

Recommendations for further work, if appropriate.	Yes	Remediation recommendations have been made.	

[redacted]

From: [redacted]
Sent: Monday, 9 November 2020 2:15 PM
To: [redacted]
Subject: RE: albion park

Hi [redacted],

I thought I'd share updated comments (**in bold**) to the list of the items in my previous email:

- The validation report from ENRS **(received on Friday 6 November);**
- Information from FH stating that there were no unexpected finds during construction in the encapsulation area. This would add strength to the existing *Phase 1 - Preliminary Site investigation* by Hyder/Cardno (2015) **(this has now been addressed in Section 3.0 of the ENRS Validation report)**; and
- As-built information and verification regarding the encapsulation cell **(now included in the validation report in Section 11.0)**. The design was included in the RAP, but there is no verification such as Construction Quality Assurance (CQA) sign off or the like **(is anything like this available?)**; and
- An appropriate EMP, as we have previously discussed. With a statement from RMS that it can be legally enforceable **(yet to be provided)**.

Soooooo.... the EMP... Any update on timing?

Cheers

[redacted]

NSW Site Auditor
QLD Contaminated Land Auditor
Licensed Asbestos Assessor

Cavvanba Consulting Pty Ltd

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From: [redacted]
Sent: Thursday, 24 September 2020 2:58 PM
To: [redacted]
Subject: RE: albion park

Hi [redacted],

Thanks for the catch-up. Upon reflection, I think I can work with:

- The validation report from ENRS **(received);**

- Information from FH stating that there were no unexpected finds during construction in the encapsulation area **(yet to be provided)**. This would add strength to the existing *Phase 1 - Preliminary Site investigation* by Hyder/Cardno (2015); and
- As-built information and verification regarding the encapsulation cell **(yet to be provided)**. The design was included in the RAP, but there is no verification such as Construction Quality Assurance (CQA) sign off or the like; and
- An appropriate EMP, as we have previously discussed. With a statement from RMS that it can be legally enforceable **(yet to be provided)**.

The outcome would therefore be a single SAS (Section A2) that would encompass both Cut 1 and the encapsulation area. An A2 SAS is for site suitability with the implementation of an EMP.

Please let me know if you need any further clarification.

Cheers

[redacted]

NSW Site Auditor
QLD Contaminated Land Auditor
Licensed Asbestos Assessor

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From: [redacted]
Sent: Wednesday, 23 September 2020 4:18 PM
To: [redacted]
Subject: RE: albion park

Hi [redacted].

Tomorrow arvo or Friday morning is fine for me.

I believe we are looking at option 2 as you've listed below.

I have to admit I'm not familiar with the intricacies around the SAS and why either option would be preferable? Perhaps I can refresh myself on the content of the Validation Report and historic reports (DSI, RAP) by ENRS before we talk, so maybe Friday is best?

I recall we covered the design of the cell and location / height & suitability previously and understand the management plan you haven't seen is forthcoming from TfNSW via Cardno v soon – like this week hopefully.

Thanks [redacted]

Kind Regards

[redacted]

Living Safely
People at the heart of everything

From: [redacted]
Sent: Wednesday, 23 September 2020 3:41 PM
To: [redacted]
Subject: RE: albion park

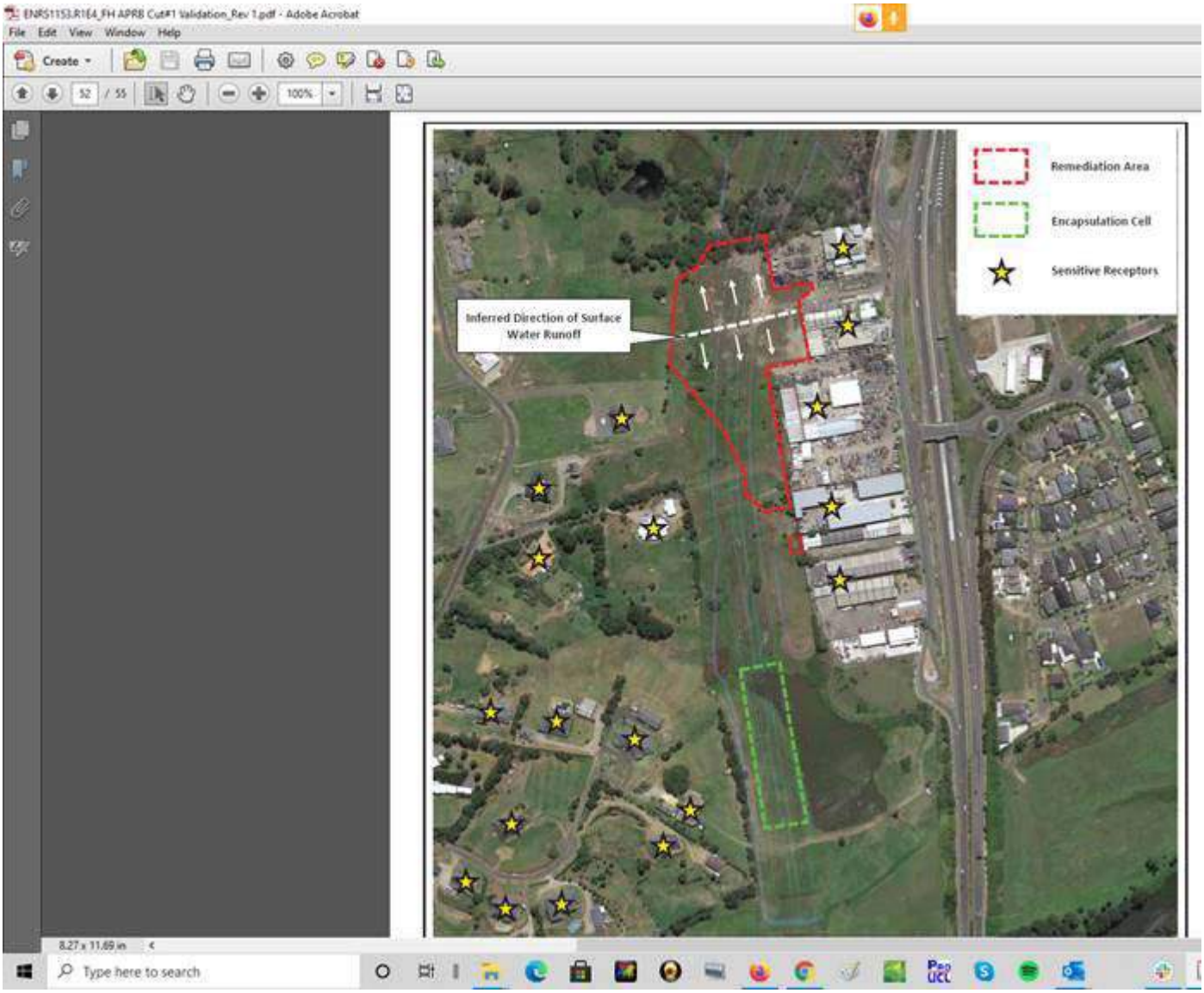
HI [redacted],

Have you got time this week to catch up to discuss this?

From: [redacted]>
Sent: Friday, 18 September 2020 10:45 AM
To: [redacted]
Subject: RE: albion park

I'm in a virtual conference today, so I have the opportunity to jump in and out... looking through the report.

I have a validation report for Cut 1. Therefore I can prepare a site audit statement (SAS) for that part of the bypass (pending review etc) referred to in the validation report. I would say that the "site boundary" is not clear whether it is limited to the "remediation area" with or without the "encapsulation cell". [redacted]



Does the approval require the encapsulation cell to have an individual SAS?

I think I have two options, which I will follow up:

1. Prepare a SAS for Cut 1 excluding the encapsulation cell area, which can include commentary on where the material ended up (i.e. the encapsulation cell). This would still need to look at the consent approval of the encapsulation cell.
2. Prepare a SAS for Cut 1 including encapsulation cell which would require a report which makes explicit statement on site suitability for the cell, and must include a management plan (not yet provided).

Can we discuss?

From: [redacted]
Sent: Friday, 18 September 2020 10:00 AM
To: [redacted]
Subject: Re: albion park

Sounds scarey! Glad to hear to youre on the mend - Some 2020 eh??

From: [redacted]

Appendix B

Data Usability Assessments, including Background to Data Usability

Data Usability Summary Assessment

As part of this site audit review, a data usability summary assessment was conducted on:

- Hyder Cardno Joint Venture (HCJV, 2017) *Environmental site assessment – PAEC02: Industrial Estate, Albion Park Rail Bypass* (Ref. FK0004-APRB-R-02).

Hyder Cardno Joint Venture (HCJV) conducted field and laboratory quality assurance and quality control (QA/QC) based on HCJV's QA/QC programme and a set of DQIs. Based on the assessment of the soil data collected, HCJV concluded that:

> *The data validation procedure employed in the assessment of the field and laboratory QA/QC data indicated that the reported analytical results are representative of the conditions at the sample locations and that the analytical data can be relied upon for the purpose of these additional validation works. It is concluded that overall the quality of the analytical data produced is reliable for the purposes of validating this site for the intended land use.*

Site audit comments

Precision

The frequency of field and interlaboratory duplicates was outside the acceptable range (≥ 5%) for BTEXN, TRHs, PAHs, 8 metals, chlorinated hydrocarbons, halogenated hydrocarbons, phenols, halogenated phenols and solvents. This is considered acceptable as recoveries for the three field and three inter laboratory duplicates were generally within the RPD limits for all analytes listed above. Some minor RPD exceedances were reported, as discussed below.

Outliers were reported for field and interlaboratory duplicate RPD recoveries with respect to chromium, TPHs C_{10} – C_{36} and CRC Care TPH fractions C_{16} – C_{34}. The chromium outlier is likely due to the inherent variability associated with metal concentrations in the soil matrix and is not considered to significantly detract from the data sets precision.

The RPD exceedances for TPHs are not considered to significantly detract from the data sets precision as interlaboratory duplicate concentrations are low level and orders of magnitude below the adopted site criteria.

Laboratory duplicate RPDs outliers have been reported for copper, lead, zinc and mercury. RPDs were reported between 24.7% for zinc and up to 182% for mercury, outside the acceptable range of 0% - 20%. This is likely due to the inherent variability associated with metal concentrations in the soil matrix and is not considered to significantly detract from the data sets precision.

Accuracy

The accuracy of the analysis is confirmed by the laboratory control sample recoveries within the acceptance criteria. Phenolic compounds and PAH surrogate outliers were reported outside the acceptable RPD range. This is not considered to affect the outcome of the investigation, as an acceptable recovery was obtained for the laboratory control sample which indicates sample matrix interference. This is considered by the laboratory to be a more appropriate indicator.

Representativeness

No outliers have been reported for QC samples collected to assist in the qualification of representativeness.

Trip spike recoveries were within the specified RPDs and trip blank recoveries were below the laboratory LORs. HCJV did not include trip spike and trip blank results within the soil analytical tables.

No rinsate samples were collected during the investigation. This is considered acceptable because single use sampling equipment was used.

Comparability

The data is considered to be acceptable, with experienced sampling staff used, NATA accredited laboratories used and all LORs below the relevant criteria.

Completeness

Laboratory and field documentation is considered to be complete.

Site audit discussion

Cavvanba has conducted a detailed data usability assessment as part of the site audit. Overall, the data usability assessment shows that the data is of suitable quality to support the conclusions made in this report.

Detailed data usability assessment

The HCJV 2017 data are summarised in the following tables:
- Table 1.1, field QC samples summary,
- Table 1.2, summary of field QA/QC, and
- Table 1.3, summary of laboratory QA/QC.

Table 1.1: Field QC samples summary

	Total samples	Field duplicates [1]	Inter-lab duplicates [1]	Trip spike	Trip blank
BTEXN	86	3 (3.48%)	3 (3.48%)	1	1
TRHs C_6 – C_{10}	62	3 (4.83%)	3 (4.83%)	1	1
TRHs C_{10} – C_{40}	62	3 (4.83%)	3 (4.83%)	-	-
PAHs	62	3 (4.83%)	3 (4.83%)	-	-
8 metals	62	3 (4.83%)	3 (4.83%)	-	-
VOCs	60	3 (5%)	3 (5%)	-	-
Chlorinated hydrocarbons	63	3 (4.76%)	3 (4.76%)	-	-
Halogenated hydrocarbons	60	3 (5.00%)	3 (5.00%)	-	-
Phenols	62	3 (4.83%)	3 (4.83%)	-	-
Halogenated phenols	62	3 (4.83%)	3 (4.83%)	-	-
Solvents	63	3 (4.76%)	3 (4.76%)	-	-
Asbestos	46	0 (0.00%)	0 (0.00%)	-	-

Notes:
1. Shows number of duplicate samples collected and the percentage of total samples analysed.
2. Arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury.
   – = not applicable, as trip spike/blank analysed for volatile compounds only.

Table 1.2: Summary of field QA/QC

Parameter	Complies	Comments [1]
Precision		
Standard operating procedures (SOPs) appropriate and complied with	Yes	Sampling was conducted in accordance with HCJV's standard field operating procedures. The sampling methods generally complied with industry standards and guidelines.
Field duplicates	Partial	RPD[2] criteria < 30% – 50%, frequency ≥ 5%. RPD exceedances were reported for chromium (III+VI). The frequency of field duplicates was outside the acceptable range (≥ 5%) for BTEXN, TRHs, PAHs, 8 metals, chlorinated hydrocarbons, halogenated hydrocarbons, phenols, halogenated phenols and solvents.
Inter-laboratory duplicates	Partial	RPD[2] criteria < 30% – 50%, frequency ≥ 5%. RPD exceedances were reported for TPHs C_{10} – C_{36} and TPHs C_{14} – C_{34}. The frequency of inter-laboratory duplicates was outside the acceptable range (≥ 5%) for BTEXN, TRHs, PAHs, 8 metals, chlorinated hydrocarbons, halogenated hydrocarbons, phenols, halogenated phenols and solvents.
Accuracy		
Matrix spikes samples appropriate	Partial	≥ 1/media type. Some matrix spikes were conducted on anonymous samples.
Representativeness		
Sample collection - preservation	Yes	HCJV stated the following regarding sample collection - preservation: *Samples were collected using disposable nitrile gloves and placed directly into Teflon lined sample jars provided by the laboratory. A clean pair of gloves was used for each new sample being collected to limit the possibility of cross-contamination.*
Sample collection - sample splitting	Yes	-
Field equipment calibrated	Yes	Calibration certificates are presented in Appendix E of the report.

Parameter	Complies	Comments [1]
Decontamination procedures	Yes	HCJV stated the following regarding the decontamination procedures: *Decontamination of sampling equipment (hand auger) was undertaken by washing with phosphate free detergent (Decon 90) followed by a rinse with potable water.*
Rinsate samples	No	Required ≥ 1/field batch, < LORs. No rinsate samples were collected/analysed as part of the investigation.
Trip blanks	Yes	≥ 1/field batch (volatiles), < LORs. One trip blank was collected/analysed for the soil samples, and analytical results were below the LORs.
Trip spikes	Yes	≥ 1/field batch (volatiles), 70 - 130%, (recovery) or ≤ 30 - 50% (RPDs). One trip spike was collected/analysed as part of the investigation and the analytical results were within the acceptable RPD range.
Comparability		
Consistent sampling staff	Yes	All fieldwork was completed by Dave Satyen and Steven Drysdale of HCJV.
Consistent weather/field conditions	Yes	HCJV reported the following weather conditions: *Fair, sunny and limited cloud coverage.*
Completeness		
Sample logs and field data	Yes	Standard field sampling sheets were used during the investigation.
Chain of Custody	Yes	-

Notes:
1. For QC samples, specified frequency and acceptance criteria shown.
2. RPD = relative percentage difference.

Table 1.3: Summary of laboratory QA/QC

Parameter	Complies	Notes [1]
Precision		
Laboratory duplicates	Partial	Laboratory specified RPD range, frequency ≥ 10%. Laboratory duplicate recoveries were reported outside the acceptable range for copper, lead, zinc and mercury. The frequency of laboratory duplicates was within the acceptable range.
Accuracy		
Surrogate spikes	Partial	Organics by GC, RPD criteria of 70% - 130%. Phenolic compounds and PAH surrogate outliers were reported outside the acceptable RPD range. The frequency of surrogate spikes was within the acceptable range.
Matrix spikes analysis appropriate	Yes	RPD criteria of ≥ 70% - 130%. No matrix spike outliers occurred. The frequency of matrix spike analysis was within the acceptable range.
Laboratory control samples (LCSs)	Yes	RPD criteria of 70% - 130%, frequency of ≥ 1/lab batch Laboratory control sample recoveries were within the laboratory specified global acceptance criteria. The frequency of laboratory control samples was within the acceptable range.
Certified reference material (CRM)	n/a	-
Representativeness		
Sample condition	No	The sample receipt notification (SRN) from the primary laboratory was not included within the report. No information was provided regarding the sample condition.
Holding times	Yes	No holding time exceedances were reported.
Laboratory blanks	Yes	≥ 1/lab batch, < LORs.
Comparability		

Parameter	Complies	Notes [1]
NATA accredited laboratory	Yes	ALS is a NATA accredited laboratory (825). The secondary laboratory is Eurofins mgt, which is also NATA accredited (1261).
NEPM methods or similar	Yes	ALS and Eurofins mgt follow methods in accordance with the requirements of NEPC (amended 2013).
Limits of reporting (LORs) consistent and appropriate	Yes	-
Completeness		
Sample receipt	No	The SRN from ALS laboratory had not been included within the report.
Laboratory Reports	Yes	-

Notes:
1. For QC samples, acceptance criteria shown. Acceptance criteria can vary based on analyte, statistical data and laboratory specific methods. Laboratory specified relates to detected concentrations based on LORs, e.g. result < 10 x LOR = no limit, 10 – 20 x LOR = 0 - 50%, > 20 x LOR = 0 - 20%. See laboratory reports for specific details.

Data Usability Summary Assessment

As part of this site audit review, a data usability summary assessment was conducted on:

- ENRS (2019b) *Stage 2 – Detailed Site Investigation (DSI), Asbestos in Soil (ASBINS RAP), Albion Park Bypass Project* (Ref. ENRS1153_APRB_PAEC02 Cut#1_DSI, June 2019).

Environmental and Natural Resource Solutions (ENRS) conducted field and laboratory quality assurance and quality control (QA/QC) based on ENRS's QA/QC programme and a set of DQIs. Based on the assessment of the soil data collected, ENRS concluded that:

> *In summary, the QA/QC indicators either all complied with the required standards or showed variations that would have no significant effect on the quality of the data or the conclusions of this assessment. It is therefore concluded that, for the purposes of this study, the QA/QC results are valid, and the quality of the data is acceptable for use in this assessment.*

Site audit comments

Precision

No field or interlaboratory duplicates were collected for VOCs, phenols, OCPs, PCBs, OPPs and a range TCLP metals. This is considered acceptable as all primary concentrations of the above-mentioned analytes were either reported below the laboratory limit of reporting or orders of magnitude below commercial/industrial land use criteria.

Outliers were reported for field and interlaboratory duplicate RPD recoveries with respect to lead, arsenic and nickel. Additionally, laboratory duplicate RPDs outliers have been reported for copper This is likely due to the inherent variability associated with metal concentrations in the soil matrix and is not considered to significantly detract from the data sets precision.

Accuracy

Phenolic compounds and PAH surrogate outliers were reported outside the acceptable RPD range. Additionally, laboratory control sample recoveries were reported outside the acceptable range for phenolic compounds. This This is not considered to affect the outcome of the investigation, as concentrations of total phenols were reported below the laboratory limit of reporting in all samples collected/analysed as part of the investigation.

Representativeness

Trip spike recoveries were within the specified RPDs and trip blank recoveries were below the laboratory LORs. ENRS did not include trip spike and trip blank data within the soil analytical tables.

One rinsate sample was collected each day of field work. A copper concentration of 16 ug/L was reported in rinsate sample R1, collected on 6 May 2019. Additionally, a copper concentration of 12 ug/L and zinc concentration of 7 ug/L was reported in rinsate sample R2, collected on 7 May 2019. Detections of zinc are copper are commonly associated with potable water. It is possible that this water was used rather than the specific laboratory supplied rinsate.

These detections are not considered significant as concentrations of copper and zinc were reported orders of magnitude below the HILs for commercial/industrial land use in all samples collected/analysed as part of the investigation.

Comparability

The data is considered to be acceptable, with experienced sampling staff used, NATA accredited laboratories used and all LORs below the relevant criteria.

Completeness

Laboratory and field documentation is considered to be complete.

Site audit discussion

Cavvanba has conducted a detailed data usability assessment as part of the site audit. Overall, the data usability assessment shows that the data is of suitable quality to support the conclusions made in this report.

Detailed data usability assessment

The ENRS 2019 data are summarised in the following tables:
- Table 1.1, field QC samples summary,
- Table 1.2, summary of field QA/QC, and
- Table 1.3, summary of laboratory QA/QC.

Table 1.1: Field QC samples summary

	Total samples	Field duplicates [1]	Inter-lab duplicates [1]	Trip spike	Trip blank	Rinsate (water)
BTEX	53	5 (9.43%)	5 (9.43%)	1	1	3
TRHs C_6 – C_{10}	53	5 (9.43%)	5 (9.43%)	1	1	3
TRHs C_{10} – C_{40}	53	5 (9.43%)	5 (9.43%)	-	-	-
PAHs	53	5 (9.43%)	5 (9.43%)	-	-	-
8 metals[2]	53	5 (9.43%)	5 (9.43%)	-	-	3
VOCs	9	0 (0.00%)	0 (0.00%)	-	-	-
Phenols	26	0 (0.00%)	0 (0.00%)	-	-	-
OCPs	26	0 (0.00%)	0 (0.00%)	-	-	-
PCBs	26	0 (0.00%)	0 (0.00%)	-	-	-
OPPs	26	0 (0.00%)	0 (0.00%)	-	-	-
TCLP arsenic, copper, lead, mercury, nickel and zinc	50	0 (0.00%)	0 (0.00%)	-	-	-
TCLP chromium	56	0 (0.00%)	0 (0.00%)	-	-	-

Notes:
1. Shows number of duplicate samples collected and the percentage of total samples analysed.
2. Arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury.
   – = not applicable, as trip spike/blank analysed for volatile compounds only.

Table 1.2: Summary of field QA/QC

Parameter	Complies	Comments [1]
Precision		
Standard operating procedures (SOPs) appropriate and complied with	Yes	Sampling was conducted in accordance with ENRS's standard field operating procedures. The sampling methods generally complied with industry standards and guidelines.
Field duplicates	Partial	RPD[2] criteria < 30% – 50%, frequency ≥ 5%. RPD exceedances were reported for lead. The frequency of field duplicates was outside the acceptable range (≥ 5%) for VOCs, phenols, OCPs, PCBs, OPPs and a range TCLP metals.
Inter-laboratory duplicates	Partial	RPD[2] criteria < 30% – 50%, frequency ≥ 5%. RPD exceedances were reported for lead, arsenic and nickel. The frequency of field duplicates was outside the acceptable range (≥ 5%) for VOCs, phenols, OCPs, PCBs, OPPs and a range TCLP metals.
Accuracy		
Matrix spikes samples appropriate	Partial	≥ 1/media type. Some matrix spikes were conducted on anonymous samples.
Representativeness		
Sample collection - preservation	Yes	ENRS state the following regarding sample collection – preservation: *Samples were collected in general accordance with industry standard QA/QC procedures. Discrete soil samples were collected with disposable sterile gloves and placed directly into laboratory supplied 250 mL jars and immediately stored on ice. Sample containers were individually labelled with sample identification clearly marked on the container and sealed lid. Asbestos samples were double bagged in 200 micron sealed plastic and labelled for asbestos.*
Sample collection - sample splitting	Yes	-
Field equipment calibrated	Yes	Gas monitor (MultiRAE Lite) calibration certificates are included as Appendix E of the DSI report.

Parameter	Complies	Comments [1]
Decontamination procedures	Yes	ENRS stated the following regarding the decontamination procedures: *All sample equipment disposed or decontaminated between sample sites.*
Rinsate samples	Partial	Required ≥ 1/field batch, < LORs. A total of three rinsate samples (one per day) were collected as part of the soil investigation. Copper and zinc were detected in two of the rinsate samples.
Trip blanks	Yes	≥ 1/field batch (volatiles), < LORs. One trip blank was collected/analysed for the soil samples, and analytical results were below the LORs.
Trip spikes	Yes	≥ 1/field batch (volatiles), 70 - 130%, (recovery) or ≤ 30 - 50% (RPDs). One trip spike was collected/analysed as part of the investigation and the analytical results were within the acceptable RPD range.
Comparability		
Consistent sampling staff	No	All fieldwork was completed by Matt Lemcke and Chris Allan of ENRS.
Consistent weather/field conditions	No	No information was provided regarding weather conditions.
Completeness		
Sample logs and field data	Yes	Standard field sampling sheets were used during the investigation. Test pit logs are included as Appendix D within the report.
Chain of Custody	Yes	-

Notes:
1. For QC samples, specified frequency and acceptance criteria shown.
2. RPD = relative percentage difference.

Table 1.3: Summary of laboratory QA/QC

Parameter	Complies	Notes [1]
Precision		
Laboratory duplicates	Partial	Laboratory specified RPD range, frequency ≥ 10%. Laboratory duplicate recoveries were reported for copper. The frequency of laboratory duplicates was within the acceptable range.

Parameter	Complies	Notes [1]
Accuracy		
Surrogate spikes	Partial	Organics by GC, RPD criteria of 70% - 130%. Phenolic compounds and PAH surrogate outliers were reported outside the acceptable RPD range. The frequency of surrogate spikes was within the acceptable range.
Matrix spikes analysis appropriate	Yes	RPD criteria of ≥ 70% - 130%. No matrix spike outliers occurred. The frequency of matrix spike analysis was within the acceptable range.
Laboratory control samples (LCSs)	Partial	RPD criteria of 70% - 130%, frequency of ≥ 1/lab batch Laboratory control sample recoveries were reported outside the acceptable range for phenolic compounds. The frequency of laboratory control samples was within the acceptable range.
Certified reference material (CRM)	n/a	-
Representativeness		
Sample condition	No	The sample receipt notification (SRN) from the primary laboratory was not included within the report. No information was provided regarding the sample condition.
Holding times	Yes	No holding time exceedances were reported.
Laboratory blanks	Yes	≥ 1/lab batch, < LORs.
Comparability		
NATA accredited laboratory	Yes	ALS is a NATA accredited laboratory (825). The secondary laboratory is Envirolab, which is also NATA accredited (2901).
NEPM methods or similar	Yes	ALS and Envirolab follow methods in accordance with the requirements of NEPC (amended 2013).
Limits of reporting (LORs) consistent and appropriate	Yes	-
Completeness		
Sample receipt	Yes	No holding time exceedances were reported.
Laboratory Reports	Yes	Laboratory analytical reports have been included as Appendix A of the DSI report.

Notes:

1. For QC samples, acceptance criteria shown. Acceptance criteria can vary based on analyte, statistical data and laboratory specific methods. Laboratory specified relates to detected concentrations based on LORs, e.g. result < 10 x LOR = no limit, 10 – 20 x LOR = 0 - 50%, > 20 x LOR = 0 - 20%. See laboratory reports for specific details.

Data Usability Summary Assessment

As part of this site audit review, a data usability summary assessment was conducted on:

- ENRS (2020a) *Stage 4 – Site Validation Report, PAEC02 – Cut No. 1, Albion Park Rail Bypass (APRB)* (Ref. ENRS1153).

Environmental and Natural Resource Solutions (ENRS) conducted field and laboratory quality assurance and quality control (QA/QC) based on ENRS's QA/QC programme and a set of DQIs. Based on the assessment of the soil data collected, ENRS concluded that:

> *The QA/QC indicators either all complied with the required standards or showed variations that would have no significant effect on the quality of the data or the conclusions of this assessment. It is therefore concluded that, for the purposes of this study, the QA/QC results are valid, and the quality of the data is acceptable for use in this assessment.*

Site audit comments

Precision

Field duplicate RPD exceedances were reported for copper and lead. This is likely due to the inherent variability associated with metal concentrations in the soil matrix and is not considered to significantly detract from the data sets precision.

No field duplicate samples were analysed for VOCs, phenols, OCPs, PCBs and OPPs. This is considered acceptable as these analytes were not primary contaminants of concern and all primary sample concentrations were reported below the laboratory limit of reporting (LOR).

No interlaboratory duplicates samples were collected as part of the investigation. This is considered acceptable as intralaboratory duplicate recoveries were generally within the RPD limit and all primary samples were either reported as 'non detect' i.e. below the laboratory LOR or an order of magnitude below commercial/industrial land use criteria.

Accuracy

VOC surrogate outliers were reported outside the acceptable RPD range. Additionally, laboratory control sample recoveries were reported outside the acceptable range for organophosphorus pesticides (OCPs). This This is not considered to affect the outcome of the investigation as all primary concentrations of VOCs and OCPs were reported below the laboratory LORs.

Representativeness

No trip spike or blank samples were collected/analysed as part of the investigation. ENRS made the following statement:

> *All samples were delivered to the laboratory in appropriately preserved containers, with preservation consisting of packing samples in eskies with ice.*

If these procedures were conducted, the loss of any volatiles would be limited. Furthermore, volatile analytes were not a primary contaminant of concern associated with the site.

No rinsate samples were collected during the investigation. This is considered acceptable because single use sampling equipment was used.

Comparability

The data is considered to be acceptable, with experienced sampling staff used, NATA accredited laboratories used and all LORs below the relevant criteria.

Completeness

Laboratory and field documentation is considered to be complete.

Site audit discussion

Cavvanba has conducted a detailed data usability assessment as part of the site audit. Overall, the data usability assessment shows that the data is of suitable quality to support the conclusions made in this report.

Detailed data usability assessment

The ENRS 2020a data are summarised in the following tables:
- Table 1.1, field QC samples summary,
- Table 1.2, summary of field QA/QC, and
- Table 1.3, summary of laboratory QA/QC.

Table 1.1: Field QC samples summary

	Total samples	Field duplicates [1]	Inter-lab duplicates [1]	Trip spike	Trip blank	Rinsate (water)
BTEX	14	2 (14.28%)	0 (0.00%)	-	-	-
TRHs $C_6 - C_{10}$	14	2 (14.28%)	0 (0.00%)	-	-	-
TRHs $C_{10} - C_{40}$	14	2 (14.28%)	0 (0.00%)	-	-	-
PAHs	14	2 (14.28%)	0 (0.00%)	-	-	-
8 metals	14	2 (14.28%)	0 (0.00%)	-	-	-
VOCs	7	0 (0.00%)	0 (0.00%)	-	-	-
Phenols	12	0 (0.00%)	0 (0.00%)	-	-	-
OCPs	12	0 (0.00%)	0 (0.00%)	-	-	-
PCBs	12	0 (0.00%)	0 (0.00%)	-	-	-
OPPs	12	0 (0.00%)	0 (0.00%)	-	-	-

Notes:
1. Shows number of duplicate samples collected and the percentage of total samples analysed.
2. Arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury.
   – = not applicable, as trip spike/blank analysed for volatile compounds only.

Table 1.2: Summary of field QA/QC

Parameter	Complies	Comments [1]
Precision		
Standard operating procedures (SOPs) appropriate and complied with	Yes	Sampling was conducted in accordance with ENRS's standard field operating procedures. The sampling methods generally complied with industry standards and guidelines.

Parameter	Complies	Comments [1]
Field duplicates	Partial	RPD[2] criteria < 30% – 50%, frequency ≥ 5%. RPD exceedances were reported for copper and lead. The frequency of field duplicates was outside the acceptable range for VOCs, phenols, OCPs, PCBs and OPPs.
Inter-laboratory duplicates	No	RPD[2] criteria < 30% – 50%, frequency ≥ 5%. No inter-laboratory duplicates were collected/analysed as part of the investigation.
Accuracy		
Matrix spikes samples appropriate	Partial	≥ 1/media type. Some matrix spikes were conducted on anonymous samples.
Representativeness		
Sample collection - preservation	Yes	ENRS state the following regarding sample collection – preservation: *Samples were collected in general accordance with industry standard QA/QC procedures. Discrete soil samples were collected with disposable sterile gloves and placed directly into laboratory supplied 250 mL jars and immediately stored on ice. Sample containers were individually labelled with sample identification clearly marked on the container and sealed lid.*
Sample collection - sample splitting	Yes	-
Field equipment calibrated	No	A photoionization detector (PID) was used however no calibration certificates were provided by ENRS.
Decontamination procedures	Yes	ENRS stated the following regarding the decontamination procedures: *All sample and investigation equipment decontaminated between sample sites. Disposable equipment including gloves changed between each sample.*
Rinsate samples	No	Required ≥ 1/field batch, < LORs. No rinsate samples were collected/analysed as part of the investigation.
Trip blanks	No	≥ 1/field batch (volatiles), < LORs. No trip blanks were collected/analysed as part of investigation.

Parameter	Complies	Comments [1]
Trip spikes	No	≥ 1/field batch (volatiles), 70 - 130%, (recovery) or ≤ 30 - 50% (RPDs). No trip spikes were collected/analysed as part of investigation.
Comparability		
Consistent sampling staff	Yes	All fieldwork was completed by Chris Allen of ENRS.
Consistent weather/field conditions	No	No information was provided by ENRS regarding the weather conditions.
Completeness		
Sample logs and field data	Yes	Standard field sampling sheets were used during the investigation. Test pit logs are included as Appendix D within the report.
Chain of Custody	Yes	-

Notes:
1. For QC samples, specified frequency and acceptance criteria shown.
2. RPD = relative percentage difference.

Table 1.3: Summary of laboratory QA/QC

Parameter	Complies	Notes [1]
Precision		
Laboratory duplicates	Yes	Laboratory specified RPD range, frequency ≥ 10%. No RPD exceedances were reported for laboratory duplicate samples. The frequency of field duplicates was within the acceptable range.
Accuracy		
Surrogate spikes	Partial	Organics by GC, RPD criteria of 70% - 130%. Surrogate outliers were reported for VOCs. The frequency of surrogate spikes was within the acceptable range.
Matrix spikes analysis appropriate	Yes	RPD criteria of ≥ 70% - 130%. No matrix spike outliers occurred. The frequency of matrix spike analysis was within the acceptable range.

Parameter	Complies	Notes [1]
Laboratory control samples (LCSs)	Partial	RPD criteria of 70% - 130%, frequency of ≥ 1/lab batch Laboratory control sample recoveries were reported outside the acceptable range for organophosphorus pesticides. The frequency of laboratory control samples was within the acceptable range.
Certified reference material (CRM)	n/a	-
Representativeness		
Sample condition	Yes	-
Holding times	Yes	No holding time exceedances were reported.
Laboratory blanks	Yes	≥ 1/lab batch, < LORs.
Comparability		
NATA accredited laboratory	Yes	ALS is a NATA accredited laboratory (825).
NEPM methods or similar	Yes	ALS follow methods in accordance with the requirements of NEPC (amended 2013).
Limits of reporting (LORs) consistent and appropriate	Yes	-
Completeness		
Sample receipt	Yes	-
Laboratory Reports	Yes	Laboratory analytical reports have been included as Appendix A of the validation report.

Notes:
1. For QC samples, acceptance criteria shown. Acceptance criteria can vary based on analyte, statistical data and laboratory specific methods. Laboratory specified relates to detected concentrations based on LORs, e.g. result < 10 x LOR = no limit, 10 – 20 x LOR = 0 - 50%, > 20 x LOR = 0 - 20%. See laboratory reports for specific details.

Background to Data Usability

1.0 Introduction

Information generated from environmental investigations requires some statement in regard to the usability of the data[1], and therefore quality assurance (QA) and quality control (QC) are an integral part of the analysis and interpretation of environmental data. QA/QC used in contaminated sites investigations is briefly reviewed in this section.

Quality assurance involves all of the actions, procedures, checks and decisions undertaken to ensure the representativeness and integrity of samples, and accuracy and reliability of analytical results (NEPC as amended 2013). Quality control is the component of QA which monitors and measures the effectiveness of other procedures by the comparison of these measures to previously decided objectives.

There are various components of QA/QC which address the operation of the laboratories and the routine procedures conducted to achieve a minimum level of quality. Examples of QA components include sample control, data transfer, instrument calibration, staff training, etc. Examples of QC components include the measurement of samples to access the quality of reagents and standards, cleanliness of apparatus, accuracy and precision of methods and instruments, etc. Generally, the management of laboratory QA issues is addressed through accreditation by the National Association of Testing Authorities (NATA), or similar, and monitoring of these issues is not addressed on a project by project basis.

On a project specific basis, those involved in collecting, assessing or reviewing the relevant data should ensure the minimum level of QA is conducted. Appropriate numbers and types of QC samples should be collected and analysed, both field QC samples and laboratory QC samples. While minimum levels of QA/QC are specified in some guidelines, e.g. NSW EPA 1994, AS 4482.1-1997, NEPC as amended 2013, the minimum level required may vary between projects, based on site and project specific aspects. This means that the minimum specified requirements may not be sufficient for a particular project. As described in the NEPM (NEPC 1999):

> *As a general rule, the level of required QC is that which adequately measures the effects of all possible influences upon sample integrity, accuracy and precision, and is capable of predicting their variation with a high degree of confidence.*

2.0 PARCC parameters

Following receipt of laboratory analytical results, data validation is conducted to determine if the specified acceptance criteria have been met. This is conducted to ensure that all data, and subsequent decisions based on that data, are technically sound. Data quality is typically discussed in terms of precision, accuracy, representativeness, comparability and completeness. These are referred to as the PARCC parameters[2]. Field QA/QC and laboratory QC is described below within the PARCC framework.

[1] To avoid confusion with the data quality objectives (DQOs) process, the term data usability is used rather than data quality.

[2] The PARCC parameters are sometimes referred to as data quality indicators (DQIs).

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2.1 Precision

2.1.1 Duplicates

Precision is a measure of the reproducibility of results under a given set of conditions and is assessed on the basis of agreement between a set of duplicate results obtained from duplicate analyses. The precision of a duplicate determination is measured by comparing the difference between the two samples to the average of the two samples, expressed as a relative percentage difference (RPD).

The determination is:

$$RPD = (P-D)/(P+D/2) \times 100$$

P = primary sample

D = duplicate sample

Three types of duplicates are commonly used:
- field duplicates are used to measure the precision of the sampling and analytical process;
- inter-laboratory duplicates are used to check on the analytical performance of the primary laboratory; and
- laboratory duplicates are used to measure the precision of the analytical process.

2.1.2 Field Duplicates

Field duplicates (or blind replicates) are collected from the same location and submitted to the laboratory for analyses, as a primary sample. The sample nomenclature is such that the laboratory is not aware which sample is a duplicate. The RPD is calculated to determine the degree of repeatability (precision) of results obtained from the duplicate analysis. Where results are below the practical quantification limit (PQLs) or limits of reporting (LORs), i.e. non-detects, RPDs cannot be calculated. Where one result is detected, the results are considered to conform when the detected result is less than five times the PQL/LOR.

The PQL/LOR is the lowest concentration of an analyte that can be determined with acceptable precision (repeatability) and accuracy under the test conditions. The PQL/LOR is usually calculated as five times the lower limit of detection (or method detection limit). However, adjustments in PQLs/LORs may be required due to interference from high contaminant concentrations.

As environmental samples can exhibit a high degree of heterogeneity, field duplicates often exceed the acceptance criterion, particularly if the samples are co-collected, for example, because of the potential for losing volatiles during sample splitting. It is generally accepted that before results which fail the acceptance criterion are described as due to low concentrations or sample heterogeneity, the sample should be re-analysed. This may not be necessary when the analytical results are significantly less than the landuse criteria.

2.1.3 Inter-laboratory duplicates

Inter-laboratory duplicates (or split samples) are field duplicates which are sent to a second laboratory and analysed for the same analytes and, as far as possible, by the same methods. These provide a check on the analytical performance of the primary laboratory.

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2.1.4 Laboratory Duplicates

Laboratory duplicates (or check samples) are field samples which are split by the laboratory and thereafter treated as separate samples. The RPD is calculated to determine the degree of repeatability (precision) of results obtained from the duplicate analysis.

USEPA (1994) specifies that for inorganics, if the results for laboratory duplicates fall outside of the recommended control limits for a particular analyte, all results for that analyte, in all associated samples of the same matrix, should be qualified as an estimated quantity. For organics, USEPA (1999) does not specify recommended actions for laboratory duplicates.

2.2 Accuracy

Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. Inasmuch as the true sample concentrations are not known, the determination of accuracy is achieved through the analysis of known reference materials or assessed by the analysis of matrix spikes. Spiking of reference material into the actual sample matrix is the preferred technique because it provides a measure of the matrix effects on the analytical recovery.

Accuracy is measured in terms of percentage recovery as defined by:

$$\%R = ((SSR - SR) / SA) \times 100$$

%R = percentage recovery spike
SSR = spiked sample result
SR = sample result
SA = spike added

2.2.1 Matrix spikes/matrix spike duplicates

These are samples prepared in the laboratory by dividing a sample into two aliquots and then spiking each with identical concentrations of specific analytes. The matrix spike (MS) and matrix spike duplicate (MSD) are then analysed separately and the results compared to determine the accuracy and precision of the analytes.

2.2.2 Surrogate spikes

Surrogate spikes provide an indication of analytical accuracy. They are used only for analyses which use gas chromatography and are compounds which are similar to the organic analytes of interest in chemical composition, extraction and chromatography, but which are not normally found in field samples. Surrogates are generally spiked into all sample aliquots prior to preparation and analysis. If the surrogate spike recovery does not meet the prescribed acceptance criteria, the samples should be re-analysed.

2.2.3 Laboratory control samples

Laboratory control samples (quality control check samples) are laboratory prepared samples of an appropriate clean matrix (i.e. sand or distilled water) which are spiked with known concentrations of specific analytes. The laboratory control sample (LCS) is then analysed and the results are used to assess sample preparation and analytical accuracy, free of matrix effects. Certified reference material (CRM) is another form of LCS, and involves the analysis of a known standard as part of the laboratory batch, e.g. British Columbia sediment samples for analysis of metals.

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2.3 Representativeness

Representativeness refers to the degree to which the samples reflect the site specific conditions. It is primarily dependent on the design and implementation of the sampling program, with representativeness of the data being partially ensured by the avoidance of cross-contamination, adherence to sample handling and analytical methods, use of field duplicates, ensuring that samples do not exceed holding times prior to analysis, use of chain-of-custody forms and other appropriate documentation.

There are a number of QC samples which can be collected to assist in the qualification of representativeness, including:

2.3.1 Rinsate blanks

Used to determine if sampling equipment has been adequately decontaminated to ensure that cross-contamination between samples has not occurred. The frequency for rinsate blanks is one per piece of equipment per day (AS 4482.1-1997), however it should be noted that cross-contamination will bias samples upwards, and the frequency should therefore be at the investigators discretion.

2.3.2 Trip blanks

Used only when volatile organics are sampled to determine if transport in motor vehicles or similar has resulted in contamination of the samples. For trip blanks, a sufficient number should be analysed to allow the representativeness of the sampling to be determined. However, it should be noted that cross-contamination will bias samples upwards, and the frequency should therefore be at the investigators discretion.

2.3.3 Trip spikes

Used only when volatile organics are sampled to attempt to quantify loss of volatiles during the analytical process. For trip spikes, a sufficient number of samples should be analysed to allow qualification of the likely loss of volatiles during the field sampling.

2.3.4 Laboratory blanks

Laboratory blanks (or method blanks, or analysis blanks) are used to verify that contaminants are not introduced into the samples during sample preparation and analysis. The NEPM (NEPC 1999) specifies that laboratory blanks should be conducted at a frequency of "at least one per process batch". The acceptance criterion for laboratory blanks is non-detect at the PQL/LOR.

2.4 Comparability

Comparability is a qualitative parameter designed to express the confidence with which one data set may be compared with another, including established criteria. Comparability is maintained by using consistent methods and ensuring that PQLs/LORs are below the relevant criteria.

2.5 Completeness

Quality control sample completeness is defined as the number of QC samples which should have been analysed, compared to the actual number analysed. If the appropriate number of QC samples are not analysed with each matrix or sample batch, then the data reviewer should use professional judgement to determine if the associated sample data should be qualified.

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Completeness also refers to the complete and correct inclusion of field/sample documentation and laboratory documentation.

2.5.1 QC sample frequency and criteria

Based on EPA made or approved guidelines, the following QC samples are required for all contaminated site investigations, unless otherwise specified as part of the data quality objectives (DQOs) process review. All data to be used for validation should conform as a minimum to the requirements specified, regardless of minimum sample size.

Quality control sample	Frequency	Results [1]
Precision		
Field duplicates.	≥ 5%	≤ 30 - 50% [2]
Inter-laboratory duplicates.	≥ 5%	≤ 30 - 50% [2]
Laboratory duplicates.	≥ 10%	Lab specified [3]
Accuracy		
Surrogate spikes.	Organics by GC	70 – 130% [4]
Matrix spikes (MSs).	≥ 1/media type	70 - 130% [5]
Laboratory control samples (LCSs).	≥ 1/lab batch	70 - 130% [6]
Certified reference material (CRM).	LCS for metals	Lab specified [7]
Representativeness		
Rinsate samples.	≥ 1/field batch	< LOR
Trip blanks.	≥ 1/field batch (volatiles)	< LOR
Trip spikes.	≥ 1/field batch (volatiles)	70 - 130%, ≤ 30 - 50% [8]
Laboratory blanks.	≥ 1/lab batch	< LOR

Notes:
1. Where results are laboratory specified, the laboratory analytical reports should be consulted for specific information.
2. Relative percentage differences (RPDs) for field duplicates from AS 4482.1 (1997).
3. RPDs for laboratory duplicates specified by the laboratory. Based on the magnitude of the results compared to the level of reporting (LOR), e.g. ALS: result < 10 x LOR = no limit, 10 – 20 x LOR = 0-50%, > 20 x LOR = 0-20%. LabMark: < 5 x LOR = 0-100%, 5 – 10 x LOR = 0-75%, > 10 x LOR = 0-50% or 0-30% for metals.
4. Surrogate recoveries specified by laboratory based on global acceptance criteria or dynamic recovery limits based on statistical evaluation of actual laboratory data.
5. MS recoveries specified by laboratory based on global acceptance criteria.
6. LCS recoveries specified by laboratory based on global acceptance criteria or dynamic recovery limits based on statistical evaluation of actual laboratory data.
7. CRM recoveries specified by laboratory based on global acceptance criteria.
8. Trip spike results are specified as either recoveries or RPDs.

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3.0 References

Australian New Zealand Environment and Conservation Council (1996) *Guidelines for the laboratory analysis of contaminated soils*. ANZECC, Canberra, ACT.

Australian Standard AS 4482.1 (2005) *Guide to the sampling and investigation of potentially contaminated soil, Part 1: Non-volatile and Semi-volatile compounds.* Standards Australia, Homebush, NSW.

National Environment Protection Council (NEPC) (1999) *National Environmental Protection (Assessment of Site Contamination) Measure 1999* (as amended April 2013). National Environment Protection Council, Canberra.

NSW Environment Protection Authority (1994) *Contaminated Sites: Guidelines for Assessing Service Station Sites.* NSW EPA, Chatswood, NSW.

NSW Environment Protection Authority (1997) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.* NSW EPA, Chatswood, NSW.

United States Environmental Protection Agency, Contract Laboratory Program (1994) *National Functional Guidelines for Inorganic Data Review.* USEPA, Washington, DC.

United States Environment Protection Agency, Contract Laboratory Program (1999) *National Functional Guidelines for Organic Data Review.* USEPA, Washington, DC.

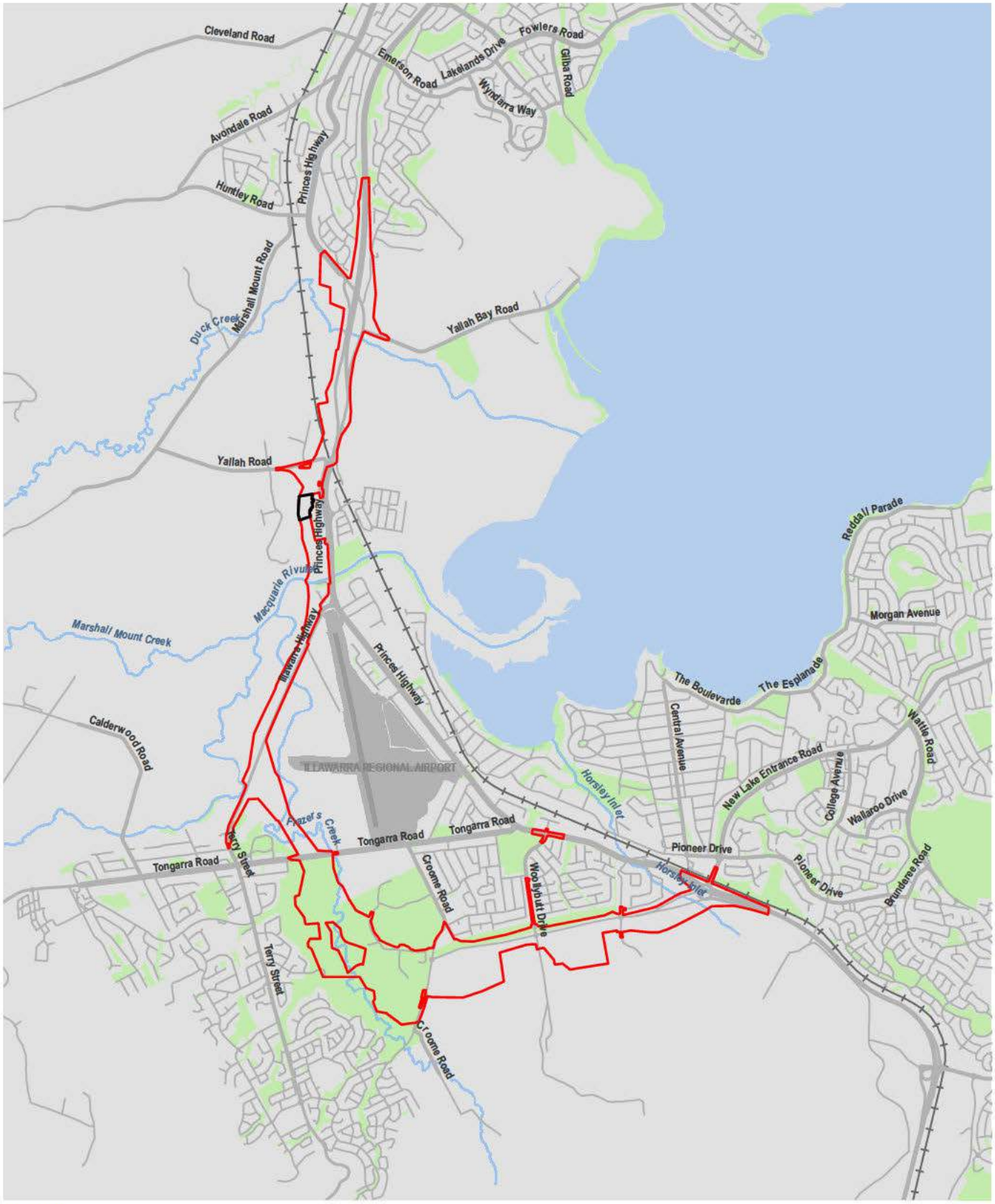
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Attachment 1

Consultants' Figures

Consultants' Figures Table of Contents

Site Audit Figure	Title
1	PAEC02 – Industrial Estate – Location Plan (HCJV, 2017)
2	PAEC02 – Industrial Estate – Site Plan (HCJV, 2017)
3	PAEC02 – Industrial Estate – Test Location Plan (HCJV, 2017)
4	Figure 3 – Project Location Map (ENRS, 2019a)
5	HCJV Sample Plan with Depth to Fill (ENRS, 2019a)
6	Figure 4: Visually Identified Asbestos Areas (ENRS, 2019b)
7	Figure 2: Asbestos In Soil Location Plan (ENRS, 2019b)
8	Figure 23: Soil Exceedances and Elevated Results (ENRS, 2019b)
9	Figure 4 – Depth of Fill Based on 2017 bores and 2019 test pits (ENRS, 2019b)
10	Cut 1 Site Location Plan (ENRS, 2020)
11	Cut 1 Site Sample Plan (ENRS, 2020)
11	Fill 4 ACM Cell FINAL WAE Rev 1 Plan View – APRB Fill 4 (ENRS, 2020)
12	Cut 1 Sampling Plan (ENRS, 2020)
13	Work-as-executed Cross-sections (ENRS, 2020)
14	Site Plan, Environmental Management Plan – Asbestos Cell (Cardno, 2021)
15	ACM Cell Source Areas, Environmental Management Plan – Asbestos Cell (Cardno, 2021)



LEGEND

- Project Footprint
- PAEC02 Industrial Estate Site Boundary
- Major Existing Roads
- Local Roads

1:50,000 Scale at A4

0 0.25 0.5 1
Kilometers

PAEC02 - INDUSTRIAL ESTATE - LOCALITY PLAN

ALBION PARK RAIL BYPASS

NSW ROADS AND MARITIME SERVICES

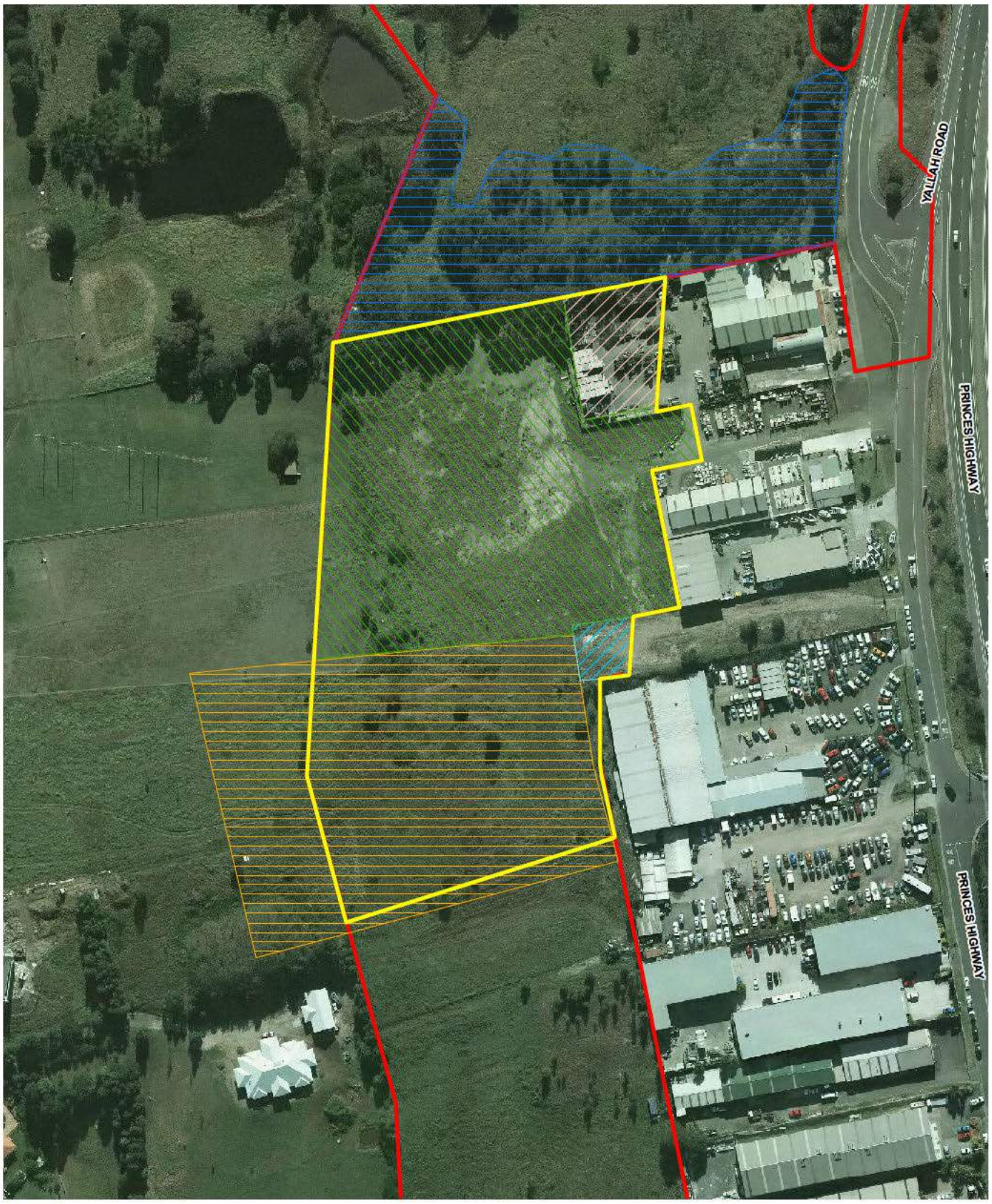
COORDINATE SYSTEM
GDA 1994 MGA ZONE 56

REVISION NUMBER 01
AUTHOR CL

DATE AUGUST 3 2017

Hyder Cardno JOINT VENTURE

Aerial imagery supplied by nearmap (May 2017)



LEGEND

- Project Footprint
- PAEC02 - Industrial Estate - Site Boundary

Site Features

- Car Dealership
- Paddock
- Scaffold Yard
- Heritage Area
- EEC

1:2,000 Scale at A4

0 12.5 25 50
Metres

PAEC02 - INDUSTRIAL ESTATE - SITE PLAN
ALBION PARK RAIL BYPASS
NSW ROADS AND MARITIME SERVICES

COORDINATE SYSTEM
GDA 1994 MGA ZONE 56

REVISION NUMBER 01
AUTHOR CL

DATE AUGUST 4 2017

Hyder Cardno JOINT VENTURE



LEGEND

- Project Footprint
- PAEC02 - Industrial Estate - Site Boundary
- Borehole Location

Site Features

- Car Dealership
- Paddock
- Scaffold Yard
- Heritage Area
- EEC

1:1,500 Scale at A4

0 10 20 0
Metres

PAEC02 - INDUSTRIAL ESTATE - TEST LOCATION PLAN

ALBION PARK RAIL BYPASS

NSW ROADS AND MARITIME SERVICES

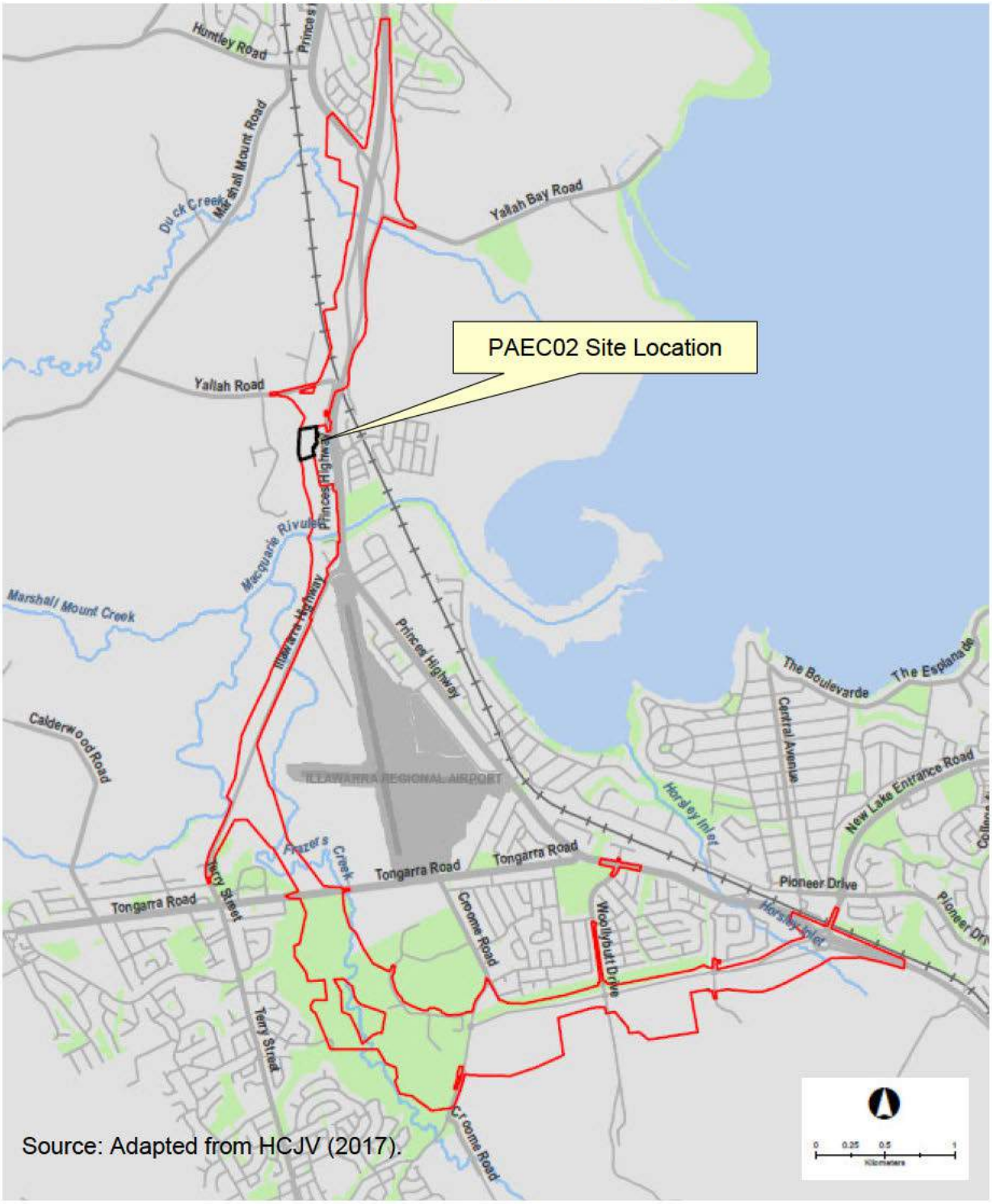
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GDA 1994 MGA ZONE 56

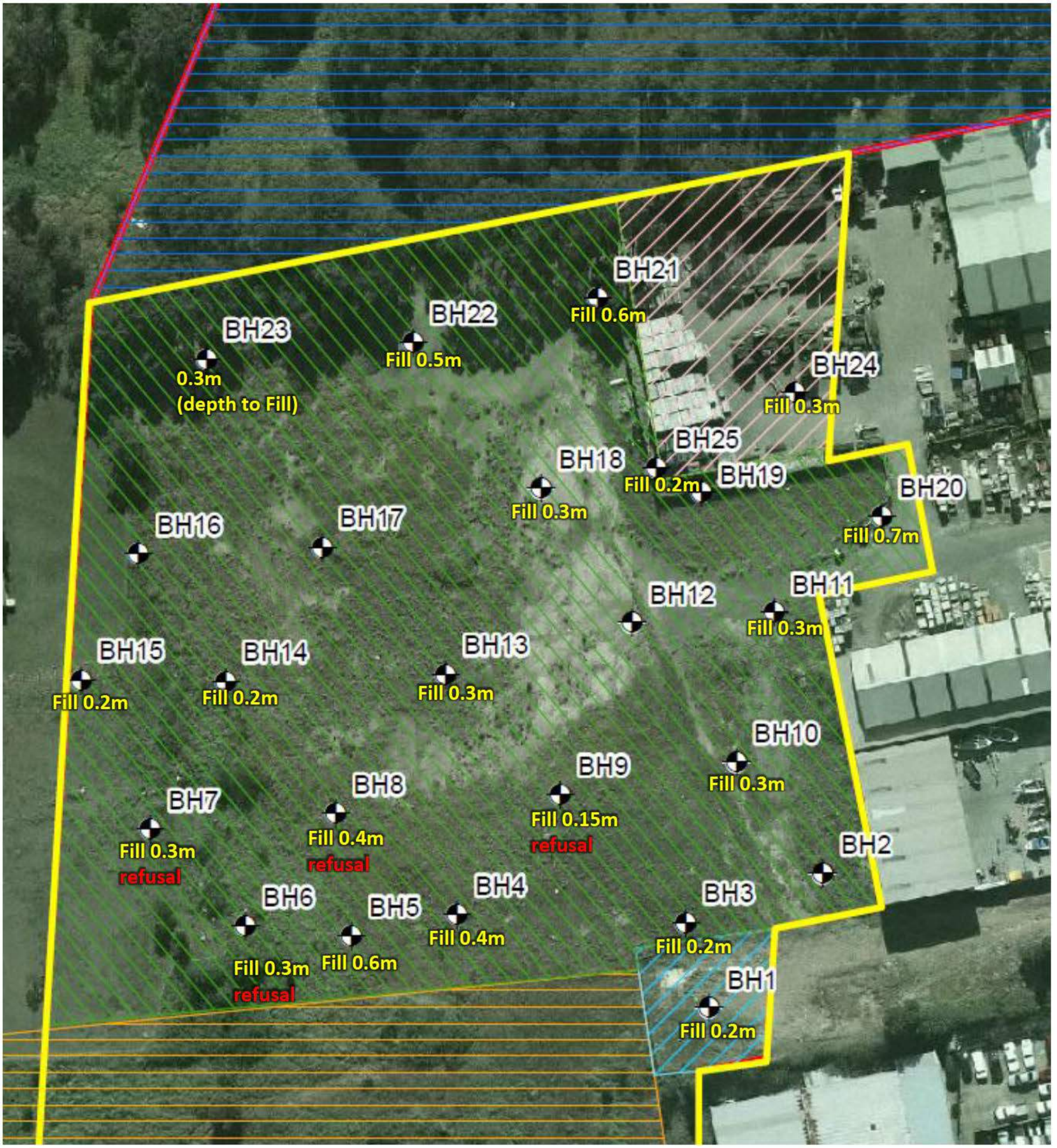
REVISION NUMBER 01
AUTHOR CL

DATE AUGUST 4 2017

Hyder Cardno JOINT VENTURE

Figure 1: Project Location Map





LEGEND

- Project Footprint
- PAEC02 - Industrial Estate - Site Boundary
- Borehole Location

Site Features

- Car Dealership
- Paddock
- Scaffold Yard
- Heritage Area
- EEC

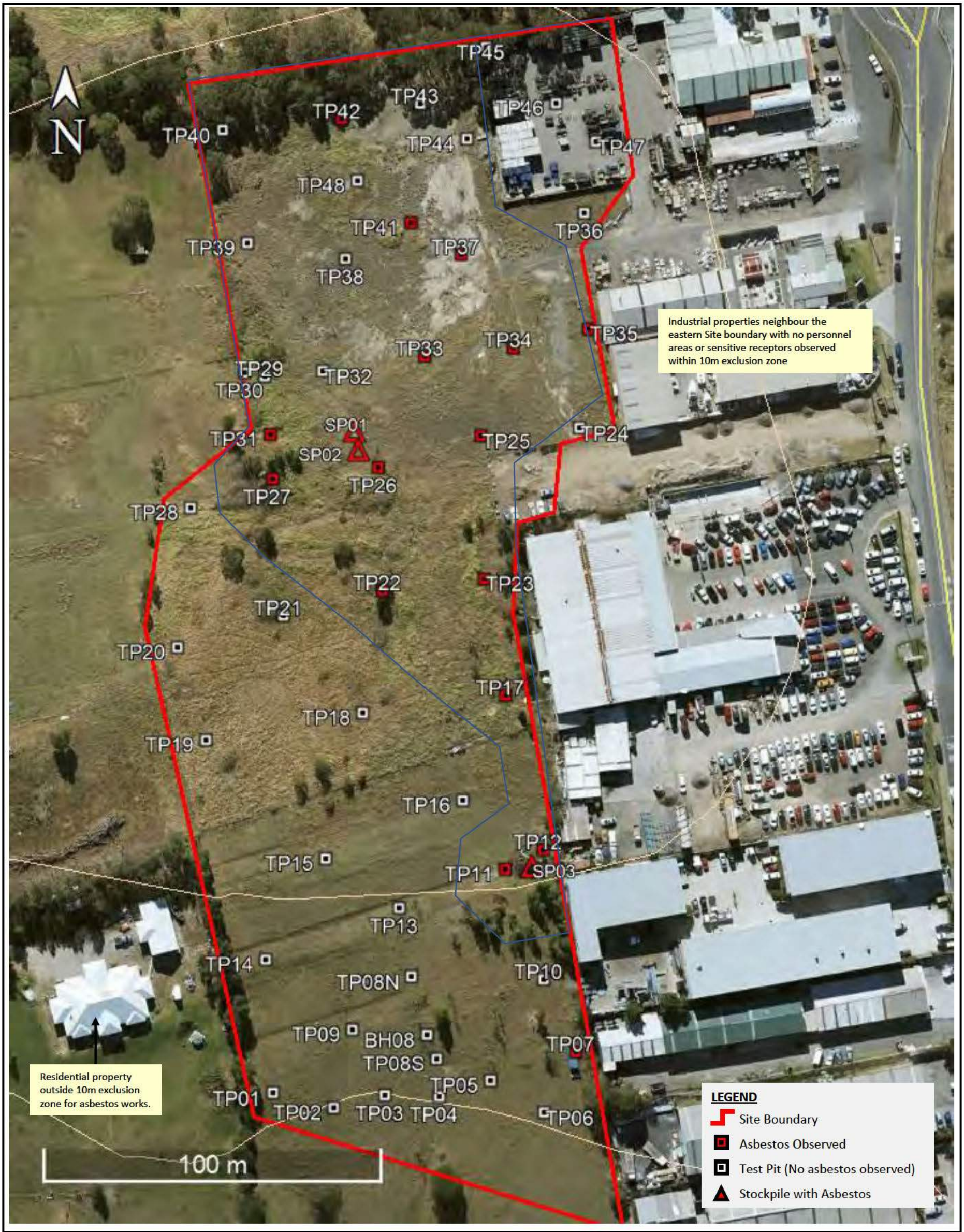
ENRS
Environment & Natural Resource Solutions
108 Jerry Bailey Road, Shoalhaven Heads, NSW, 2535
Tel 02 4448 5490 Fax 02 90374708
projects@enrs.com.au www.enrs.com.au

Client:	FH	Drawn:	RL	Figure:	3
Project:	ENRS1153	Source:	HCJV 2017	Date:	08/04/2019
Location:	Yallah Industrial Area	Scale:	bar	Title:	HCJV Sample Plan with Depth to Fill
		Status:	Rev 1		



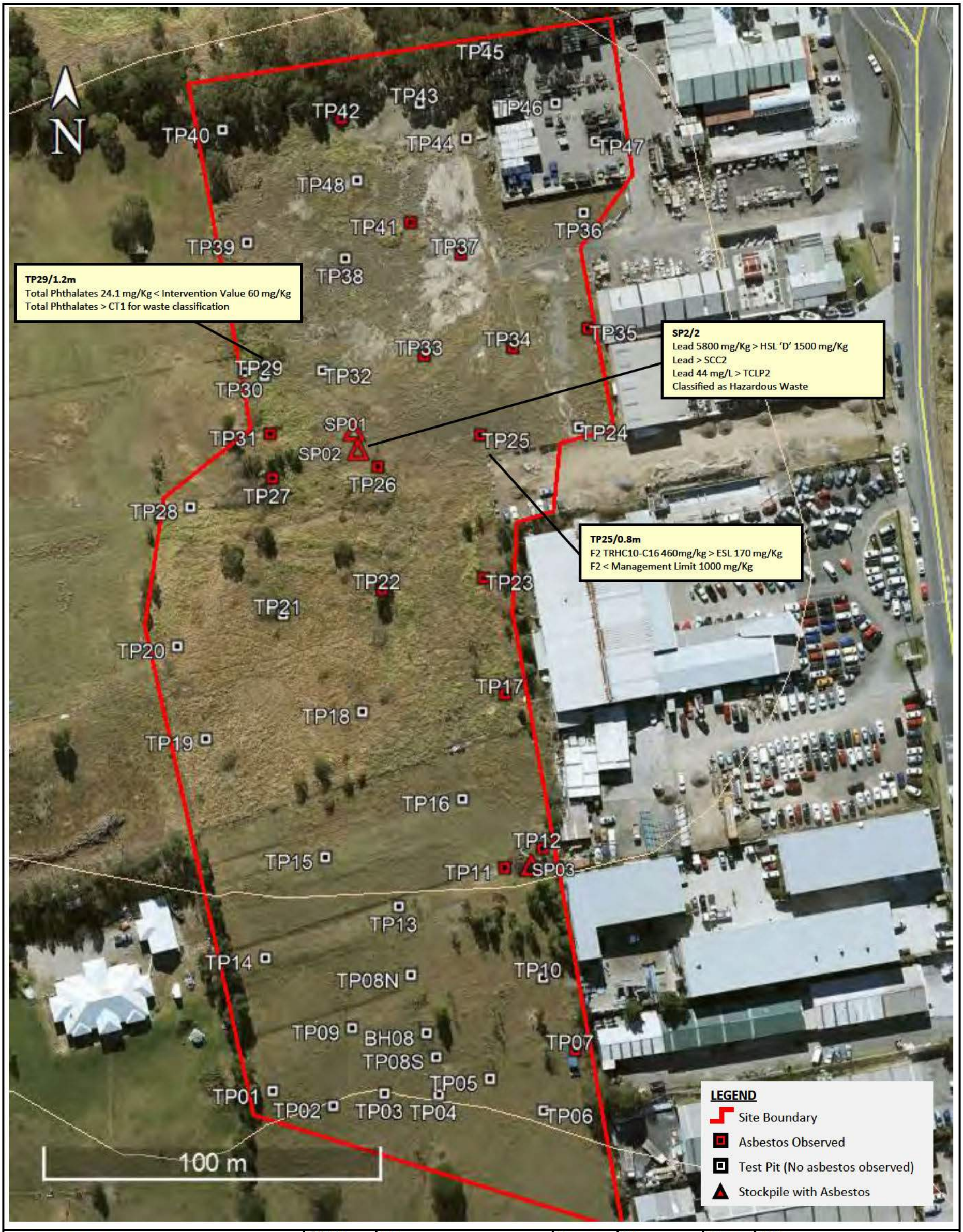
Survey of Cut 1 Asbestos Areas
Surveyed by [redacted] and Drafted by [redacted]

12d Model
Scale 1:1000
Thu Mar 21 07:36:03 2019



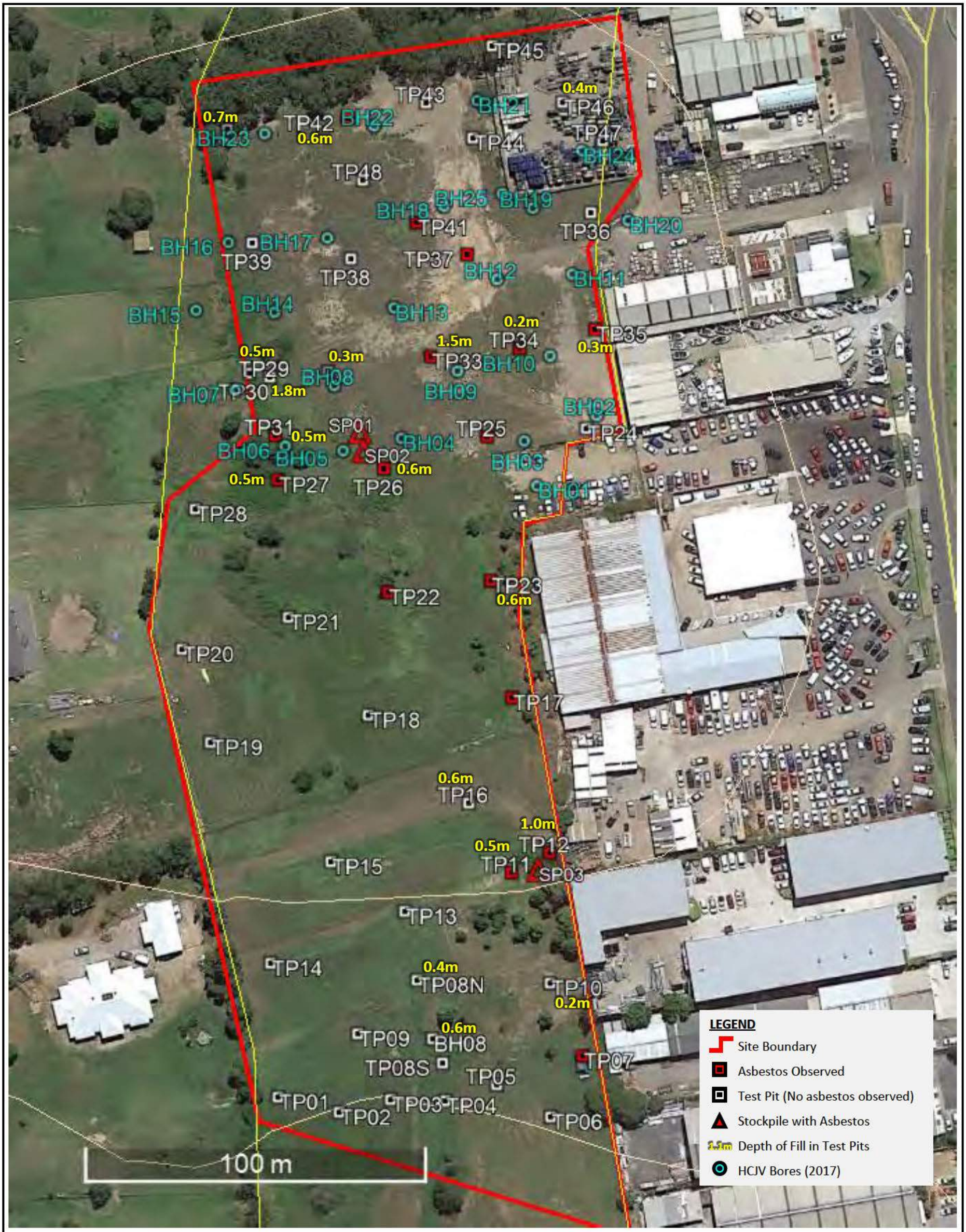
ENRS
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Tel 02 4448 5490 Fax 02 90374708
projects@enrs.com.au www.enrs.com.au

Client:	FH	Drawn:	RL	Figure:	2
Project:	ENRS1153	Source:	Sixviewer	Date:	23/05/2019
Location:	Cut#1 (PAEC02) – Yallah Industrial Area	Scale:	NA	Title:	**Asbestos In Soil Location Plan**
		Status:	Rev 2		



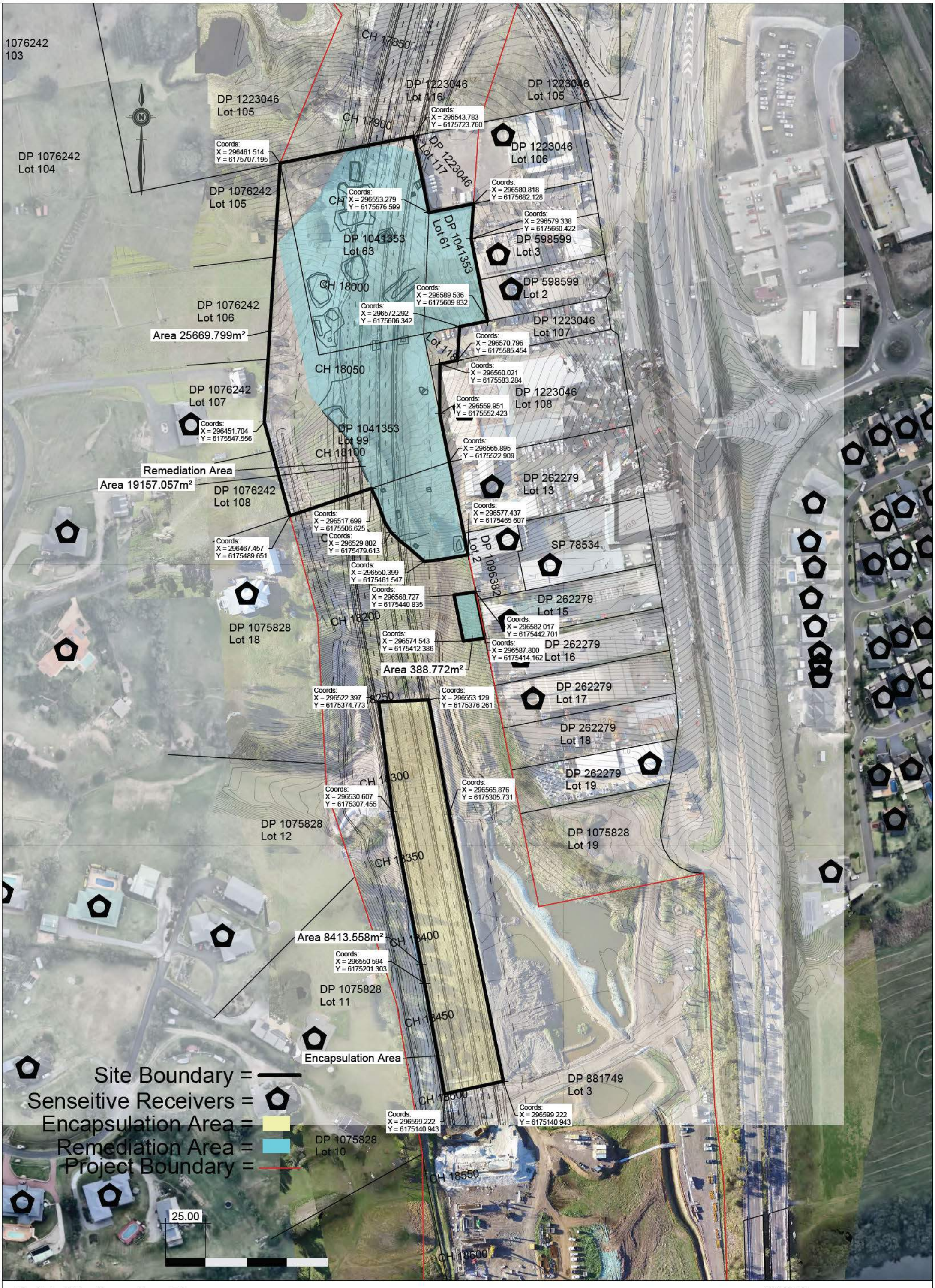
ENRS
Environment & Natural Resource Solutions
108 Jerry Bailey Road, Shoalhaven Heads, NSW, 2535
Tel 02 4448 5490 Fax 02 90374708
projects@enrs.com.au www.enrs.com.au

Client:	FH	Drawn:	RL	Figure:	23
Project:	ENRS1153	Source:	Sixviewer	Date:	23/05/2019
Location:	Cut#1 (PAEC02) – Yallah Industrial Area	Scale:	NA	Title:	Soil Exceedances and Elevated Results
		Status:	Rev 1		



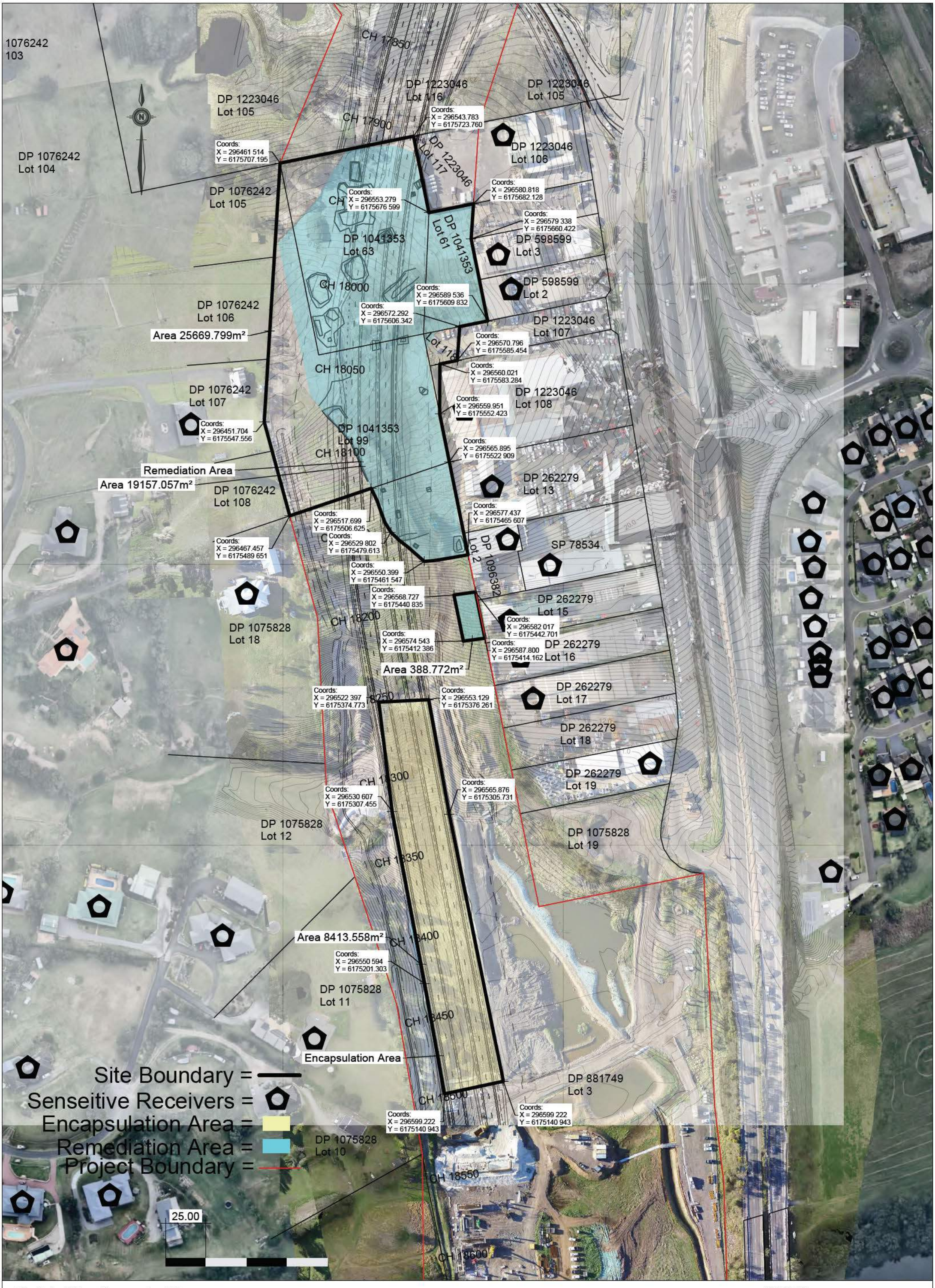
ENRS
Environment & Natural Resource Solutions
108 Jerry Bailey Road, Shoalhaven Heads, NSW, 2535
Tel 02 4448 5490 Fax 02 90374708
projects@enrs.com.au www.enrs.com.au

Client:	FH	Drawn:	RL	Figure:	4
Project:	ENRS1153	Source:	Sixviewer	Date:	19/06/2019
Location:	Cut#1 (PAEC02) – Yallah Industrial Area	Scale:	NA	Title:	**Depth of Fill Based on 2017 bores and 2019 test pits.**
		Status:	Rev 1		



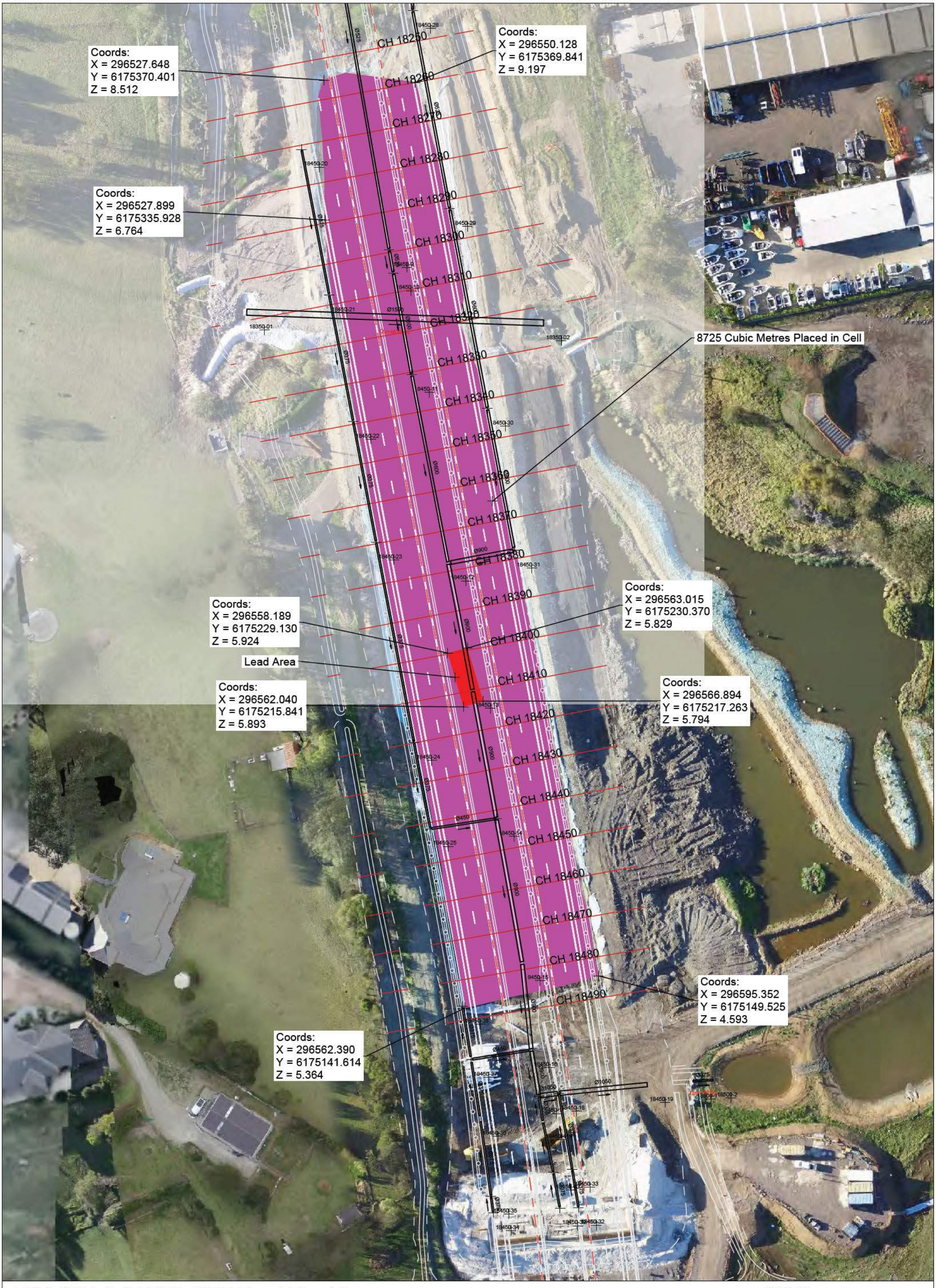
Cut 1 Site Location Plan

12d Model
Scale 1:2000
Fri Dec 18 10:27:43 2020



Cut 1 Site Sample Plan

12d Model
Scale 1:2000
Fri Dec 18 10:27:43 2020



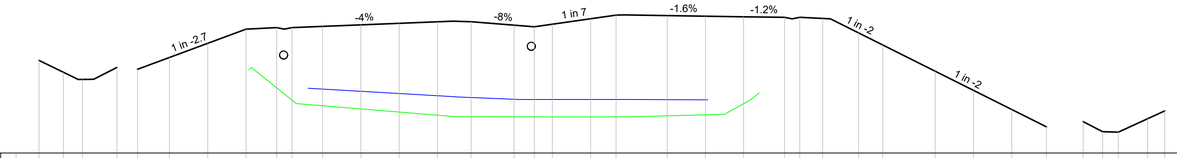
Fill 4 ACM Cell FINAL WAE Rev 1 Plan View

APRB Fill 4

12d Model

Scale 1:800

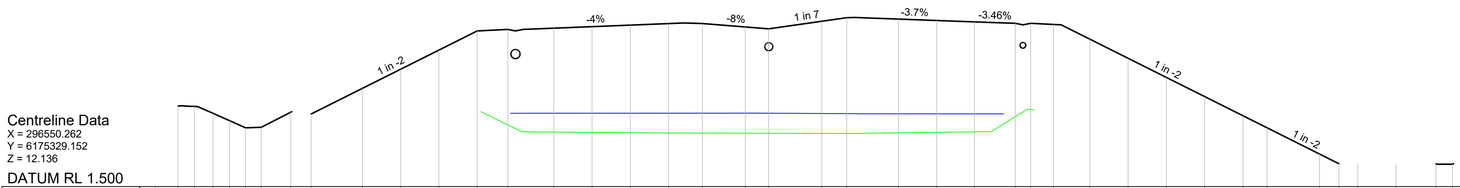
Fri Oct 11 11:21:33 2019



Centreline Data
X = 296544.700
Y = 6175358.632
Z = 13.065

DATUM RL 4.500

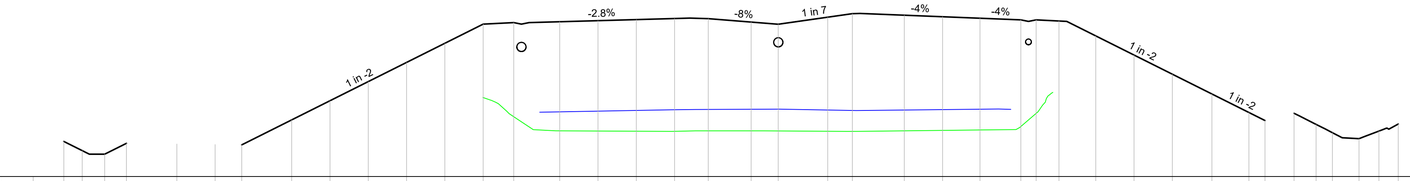
| | | |



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DATUM RL 1.500

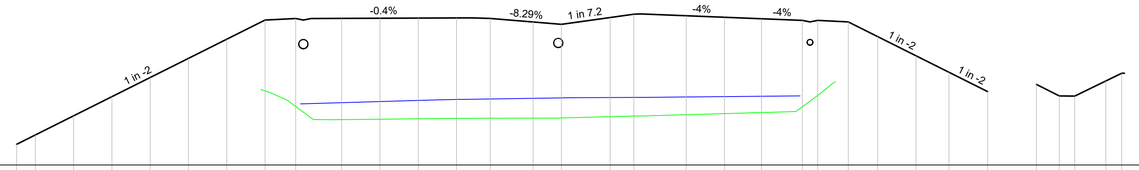
| | | |



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Y = 6175299.672
Z = 11.313

DATUM RL 1.000

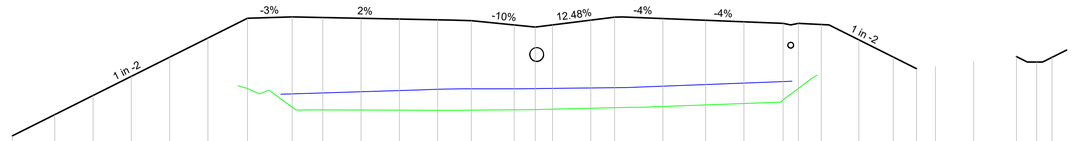
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Centreline Data
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Y = 6175270.192
Z = 10.597

DATUM RL 1.000

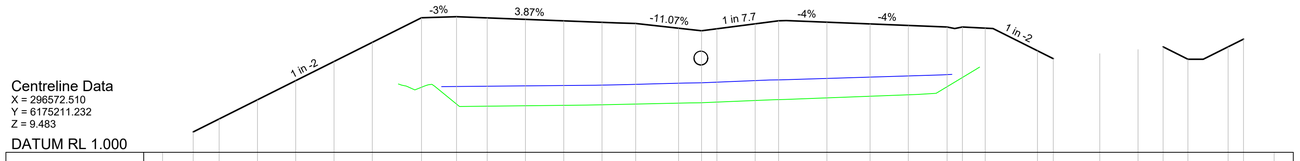
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Z = 9.987

DATUM RL 1.000

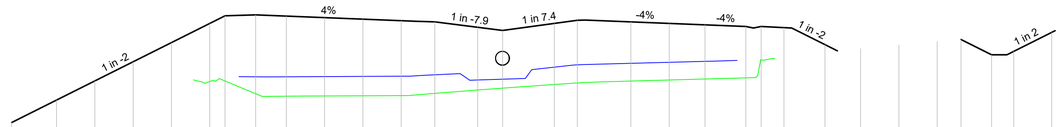
| | | |



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Y = 6175211.232
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DATUM RL 1.000

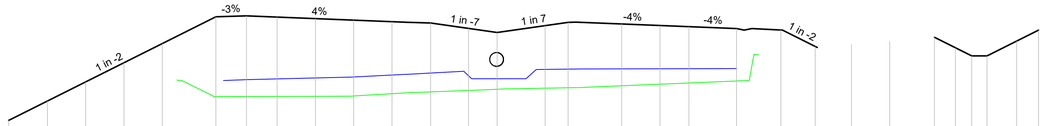
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Centreline Data
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Y = 6175181.752
Z = 9.086

DATUM RL 1.000

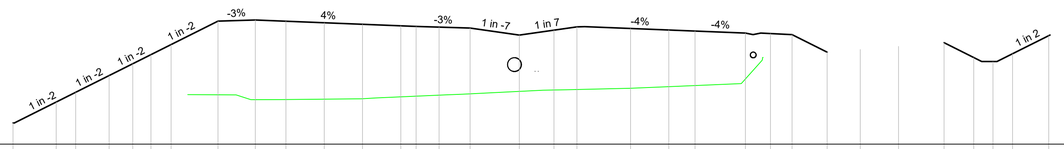
| | | |



Centreline Data
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Y = 6175152.231
Z = 8.795

DATUM RL 1.000

| | | |



Centreline Data
X = 296585.060
Y = 6175142.368
Z = 8.722

DATUM RL 1.000

| | | |

Site Plan

ENVIRONMENTAL MANAGEMENT PLAN - ASBESTOS CELL

Legend

- Project Footprint
- Watercourse (NSW SS)
- 1m Contours (LPI LiDAR, 2011)
- ACM Impacted Soil Containment Cell
- Lead Impacted Soil
- Cadastre (NSW SS, 2019)

PRINCES HIGHWAY

LARKINS LANE

FIGURE 2

1:1,500 Scale at A3

m
0 20 40 60 80

N

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (NW&E)
Date: 2020-09-15 | Project: 82019047
Coordinate System: GDA 1994 MGA Zone 56
Map: 82019047-GS-013-ACMContCell_SitePlan.mxd 01
Aerial imagery supplied by nearmap (June, 2020)

ACM Cell Source Areas

ENVIRONMENTAL MANAGEMENT PLAN - ASBESTOS CELL

Fill No.1 Investigation Area (Approx 1.5 ha)

Cut No.1 Investigation Area (Approx 3.5 ha)

MARSHALL MOUNT ROAD
PRINCES MOTORWAY
DUCK CREEK
YALLAH ROAD
PRINCES HIGHWAY
CONDON PLACE
LARKINS LANE
MACQUARIE PLACE
YALLAWARRA CRESCENT
WOLLINGURRY STREET
GERONGARR CRESCENT
RIVERSIDE CRESCENT
JOHNSTON AVENUE
WATERVIEW AVENUE
ATHANLIN AVENUE
SANDY BAY AVENUE
SHORELINE AVENUE
BAYVIEW AVENUE
ESTUARY AVENUE
PENINSULA AVENUE
DELTAVIEW AVENUE
EASTPOINT AVENUE
HAYWARDS BAY DRIVE
WOLLINGURRY CREEK
MACQUARIE RIVULET

Legend

- Project Footprint
- Watercourse (NSW SS)
- ACM Impacted Soil Containment Cell
- ACM Cell Source Area
- Cadastre (NSW SS, 2019)

FIGURE 3

1:7,000 Scale at A3

m
0 100 200 300 400

N

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (NW&E)
Date: 2020-09-15 | Project: 82019047
Coordinate System: GDA 1994 MGA Zone 56
Map: 82019047-GS-014-ACMContCell_Source.mxd 01
Aerial imagery supplied by nearmap (June, 2020)

Attachment 2

Consultants' Test pit logs

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH01
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 20/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 0.3 PPM	0.0			FILL: sandy clay, firm, low to medium plasticity, dark brown			ceramic materials noted
					0.20m clayey sand, loose, fine to medium, light brown with clay peds and gravel			
	0.50m r=OA 1.1 PPM	0.5						
	1.00m r=OA 1.6 PPM	1.0				D		
					1.20m clayey sand, loose, fine grained, dark brown with finer clay peds			
		1.5						
	2.00m r=OA 0.7 PPM	2.0			2.00m Test hole PAEC02_BH01 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ⧗ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH02
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger
DATE EXCAVATED : 20/7/17 | LOGGED BY : SD | CHECKED BY : MB
LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 0.5 PPM	0.0			clayey SAND, loose to medium dense, medium particles, dark brown	M		roots observed
					0.30m SAND, loose, fine to medium grained, light brown with clay and gravel			
	0.50m r=OA 1.1 PPM	0.5						
	1.00m r=OA 1.9 PPM	1.0				D		
		1.5			1.50m SAND, loose, fine grained, light brown with clay. Clay content increases and gravel decreasing.			
	2.00m r=OA 2.7 PPM	2.0			2.00m Test hole PAEC02_BH02 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH03
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger
DATE EXCAVATED : 20/7/17 | LOGGED BY : SD | CHECKED BY : MB
LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 1.4 PPM	0.0			FILL: clayey sand, loose to medium dense, medium grained, dark brown	M		roots and gravel observed
					0.20m clayey SAND, loose, fine to medium grained, light brown			with gravel
	0.50m r=OA 2.5 PPM	0.5						
	1.00m r=OA 3.4 PPM	1.0				D		
		1.5			1.60m clayey SAND, loose, fine grained, lighter brown			with gravel
	2.00m r=OA 4.1 PPM	2.0			2.00m Test hole PAEC02_BH03 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH04
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 20/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 2.5 PPM	0.0			FILL: clayey sand, loose, medium grained, dark brown with gravel	W		
					0.20m FILL/NATURAL: clay, soft, medium plasticity, orange to brown with gravel			
					0.40m clayey SAND, light brown to grey with increasing fineness as profile deepens			
	0.50m r=OA 4.3 PPM	0.5						
	1.00m r=OA 5.6 PPM	1.0				M		
		1.5						
	2.00m r=OA 5.8 PPM	2.0			2.00m Test hole PAEC02_BH04 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ⧗ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH05
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 20/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 3.1 PPM	0.0			FILL: sandy clay, firm, low to medium plasticity, dark brown with gravel			
					0.20m FILL: clay, stiff, medium plasticity, orange with sand			
	0.50m r=OA 2.8 PPM	0.5			0.60m clayey SAND, loose, fine to medium grained, light brown with gravel			
	1.00m r=OA 4.7 PPM	1.0						
		1.5						
	2.00m r=OA 4.0 PPM	2.0			2.00m Test hole PAEC02_BH05 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH06
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 20/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	F=OA 2.2 PPM	0.0			FILL:clayey sand, loose to medium dense, medium plasticity, dark brown			with glass and plastic
					0.30m Test hole PAEC02_BH06 terminated at 0.30 m Refusal due to car parts/metal			
		0.5						
		1.0						
		1.5						
		2.0						

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH07
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 2.3 PPM	0.0			FILL: clayey sand, medium dense, fine to medium grained, dark brown			matress and glass observed
					0.30m Test hole PAEC02_BH07 terminated at 0.30 m Refusal due to mattress			
	0.50m r=OA 2.1 PPM	0.5						
		1.0						
		1.5						
		2.0						

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH08
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	F=OA 0.8 PPM	0.0			FILL: sandy clay, soft, medium plasticity, dark brown	M		roots observed
					0.40m Test hole PAEC02_BH08 terminated at 0.40 m Refusal			
		0.5						
		1.0						
		1.5						
		2.0						

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH09
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	F=OA 0.8 PPM	0.0			FILL: sandy clay, soft, low to medium plasticity, dark brown	M		
					0.15m Test hole PAEC02_BH09 terminated at 0.15 m Refusal due to metal sheeting			
		0.5						
		1.0						
		1.5						
		2.0						

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH10
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger
DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB
LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	F=0A 1.3 PPM	0.0			FILL: gravelly sand, loose, fine to medium, dark brown	M		roots and glass observed
					0.30m clayey sand, medium dense, fine to medium, light brown/ grey.	D		
		0.5			0.80m S LTSTONE & SANDSTONE			
	1.00m	1.0			1.00m Test hole PAEC02_BH10 terminated at 1.00 m Refusal due to siltstone			
		1.5						
		2.0						

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH11
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 0.2 PPM	0.0			FILL: sandy clay, firm, low plasticity, dark brown	M		
					0.30m gravelly sand, loose, fine to medium grained, light brown with gravel			
	0.50m r=OA 0.1 PPM	0.5						
	1.00m r=OA 1.2 PPM	1.0				D		
		1.5			1.60m sand, loose, fine grained light brown with trace clay.			
	2.00m r=OA 1.4 PPM	2.0			2.00m Test hole PAEC02_BH11 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH12
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 1.4 PPM	0.0			clayey sand, loose, medium grained, dark brown	M		
					0.20m SAND, loose, fine to medium, light brown with clay and gravel			
	0.50m r=OA 1.5 PPM	0.5						
	1.00m r=OA 1.5 PPM	1.0				D		
	1.20m r=OA 0.8 PPM							
		1.5			1.60m SAND, loose, fine to medium, lighter brown			
		2.0			2.00m Test hole PAEC02_BH12 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH13
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 0.4 PPM	0.0			FILL: sandy clay, firm, low to medium plasticity, dark borwn.			
					0.30m SAND, loose, fine to medium coarseness, light brown with clay and gravel			
	0.80m r=OA 0.4 PPM	0.5						
	1.00m r=OA 1.1 PPM	1.0						
	1.40m r=OA 1.4 PPM	1.5			1.60m Sandy CLAY, loose, fine to medium, light brown			
		2.0			2.00m Test hole PAEC02_BH13 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH14
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
		0.0			FILL: clayey sand, medium dense to dense, fine to medium grained, dark brown with gravel	M		
					0.20m CLAY, firm, medium plasticity, brown to orange	M		
					0.30m SAND, loose, fine to medium grained, light brown with clay and gravel.			
	0.50m	0.5						
	1.00m	1.0				D		
	1.40m	1.5						
					1.70m clayey SAND, loose, fine to medium grained, light brown.	D		
		2.0			2.00m Test hole PAEC02_BH14 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH15
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 0.8 PPM	0.0			FILL: clayey SAND, firm, medium coarseness, dark brown	M		
					0.20m SAND, loose, fine, light brown with clay and gravel			
	0.50m r=OA 1.1 PPM	0.5						
	1.00m r=OA 0.9 PPM	1.0						
	1.80m r=OA 1.0 PPM	1.5						
		2.0			2.00m Test hole PAEC02_BH15 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH16
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger
DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB
LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 0.9 PPM	0.0			clayey SAND, loose, fine to medium grained, dark brown	M		
					0.30m SAND, loose, fine to medium grained, light brown with clay and gravel			
	0.50m r=OA 0.7 PPM	0.5				D / M		
	1.00m r=OA 1.1 PPM	1.0						
		1.5			1.50m Clayey SAND, loose, fine to medium grained, light brown	D		
		2.0			2.00m Test hole PAEC02_BH16 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH17
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 0.6 PPM	0.0			clayey SAND, loose to medium dense, fine to medium coarseness, dark brown with gravel			roots observed
					0.40m			
					sandy CLAY, soft to firm, medium plasticity, dark brown with gravel			glass observed
	0.50m r=OA 0.7 PPM	0.5				M		ground water observed at 0 5M
					0.70m			
					CLAY, firm, medium plasticity, brown (saturated).			
		1.0						
						SAT		
	1.40m r=OA 2.4 PPM	1.5						
		2.0			2.00m Test hole PAEC02_BH17 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH18
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger
DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB
LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 0.6 PPM	0.0			FILL: clayey SAND, loose, fine to medium grained, light brown/grey with gravel.			
					0.30m SAND, loose, fine to medium grained, light brown with gravel			
	0.50m r=OA 1.0 PPM	0.5						
	1.00m r=OA 1.0 PPM	1.0			1.00m SAND, loose, fine to medium grained, light brown with trace gravel	D		
		1.5						
	2.00m r=OA 1.6 PPM	2.0			2.00m Test hole PAEC02_BH18 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

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St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
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L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH19
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 0.7 PPM	0.0			clayey SAND, loose to medium dense, medium coarseness, dark brown with roots	M		
					0.30m SAND, loose, medium coarseness, light brown with gravel.			
	0.50m r=OA 1.5 PPM	0.5						
	1.00m r=OA 0.6 PPM	1.0				D		
		1.5			1.70m clayey SAND, brown			
	2.00m r=OA 1.4 PPM	2.0			2.00m Test hole PAEC02_BH19 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ⧗ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

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Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH20
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 20/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 3.1 PPM	0.0			FILL: sand, very loose, fine to medium, grey/brown with clay, gravel and ballast.			
					0.30m FILL: sand, very loose, fine to medium, light brown with gravel.			
	0.50m r=OA 3.1 PPM	0.5			0.70m clayey SAND, very loose, fine, brown			
	1.00m r=OA 2.3 PPM	1.0				D		
					1.30m clayey SAND, loose, fine, brown with gravel, increasing fineness as profile deepens			
		1.5						
	2.00m r=OA 3.2 PPM	2.0			2.00m Test hole PAEC02_BH20 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

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Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH21
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Push Tube

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	0.30m r=OA 0.6 PPM	0.0			FILL: clayey sand, medium dense, fine to medium, brown with gravel.			
	0.50m r=OA 1.1 PPM	0.5			0.40m FILL: sand, medium dense, fine to medium, brown trace gravel.	D		
	1.00m r=OA 0.7 PPM	1.0			0.60m clayey SAND, loose, fine, light brown 0.80m gravelly SAND, loose, fine, brown to light brown 1.20m Test hole PAEC02_BH21 terminated at 1.20 m Refusal due to bedrock			
		1.5						
		2.0						

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
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B - Bulk Disturbed Sample
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HP - Hand/Pocket Penetrometer

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ROCK STRENGTH
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ROCK WEATHERING
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Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH22
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Push Tube

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
		0.0			FILL: clayey sand, loose, fine to medium coarseness, brown with concrete			
	0.50m r=OA 0.6 PPM	0.5			0.50m SAND, loose, fine to medium, brown with clay	D		
	1.00m r=OA 1.1 PPM	1.0			1.20m			
		1.5			Test hole PAEC02_BH22 terminated at 1.20 m Refusal due to rock			
		2.0						

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
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ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
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RELATIVE DENSITY
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ROCK WEATHERING
RS - Residual soil
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Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH23
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 19/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 0.6 PPM	0.0			FILL: sandy clay, soft, low to medium plasticity, brown with gravel and roots	M		
					0.30m clayey SAND, loose, fine to medium grained, light brown			
	0.50m r=OA 1.1 PPM	0.5						
	1.00m r=OA 1.3 PPM	1.0			1.20m sandy CLAY, low plasticity, very light brown/grey			
		1.5						
		2.0			2.00m Test hole PAEC02_BH23 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
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- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
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- M - Medium
- H - High
- VH - Very high
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ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

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Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH24
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 20/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	r=OA 1.3 PPM	0.0			FILL: sandy gravel, loose, fine to medium grained, brown/black	M		
					0.30m clayey SAND, loose, fine, grey/brown			
	0.50m r=OA 1.6 PPM	0.5				D		
	1.00m r=OA 2.8 PPM	1.0			1.00m SAND, loose, fine grained, brown with clay			
		1.5				D		
	2.00m r=OA 3.1 PPM	2.0			2.00m Test hole PAEC02_BH24 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
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- PL - Plastic Limit
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- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
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- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
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CONSISTENCY
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ROCK STRENGTH
- EL - Extremely low
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ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
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Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

CLIENT : Roads & Maritime Services NSW
PROJECT : Albion Park Rail Bypass
LOCATION : Industrial Estate

HOLE NO : PAEC02_BH25
PROJECT REF : 89914064
SHEET : 1 OF 1

EQUIPMENT TYPE : Geoprobe | METHOD : Auger

DATE EXCAVATED : 20/7/17 | LOGGED BY : SD | CHECKED BY : MB

LOCATION : See Drawing for location

GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
	- 0.70M r=OA 0.5 PPM	0.0			FILL: sandy clay, firm, medium plasticity, dark brown with roots			
					0.20m clayey SAND, loose, fine to medium, light brown/orange with gravel			
	0.50m - 0.70M r=OA 1.8 PPM	0.5						
					0.80m clayey SAND, loose, fine, light brown with trace gravel			
	1.00m - 0.70M r=OA 1.0 PPM	1.0						
					1.30m clayey SAND, loose, very fine, light brown			
		1.5						
	2.00m - 0.70M r=OA 0.8 PPM	2.0			2.00m Test hole PAEC02_BH25 terminated at 2.00 m Reached Target Depth			

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
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- D - Disturbed Sample
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CONSISTENCY
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RELATIVE DENSITY
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- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

Hyder Cardno Joint Venture 2017

GEOTECH.GLB Log CARDNO_ENVIRO_TESTHOLE 89914064 - PAEC02 INDUSTRIAL ESTATE.GPJ 13/07/2017 17:42 10.0.000

ENRS
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(02) 4448 5490 (02) 6037 4708

ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP1

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296493	WIDTH:	1.2 x 1.2
NORTHING:	6175415	DEPTH:	0.6

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.22: Silt w/some V.fine sand, Rootlets					
0.10	0.22-0.6: Clay (yellow), soft (60%) &					
0.20	Shale (40%), weak					
0.30	Increasing shale content w depth					
0.40						
0.50	End TP1 @ 0.6m in natural shale	-	0.5	0	-	-
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP2

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296511	WIDTH:	1.8m x 1.8m
NORTHING:	6175416	DEPTH:	0.78m

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.18: Silty clay, Soft, Rootlets present					
0.10						
0.20	0.18-0.65: Mottled clay (red/grey), soft					
0.30						
0.40	0.65-0.78: As above w/ some shale,	-	TP2/0.65	0	-	-
0.50	increasing w/ depth					
0.60	End TP2 @ 0.78m in natural shale					
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP3

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296525	WIDTH:	2.2, 2.2
NORTHING:	6175415	DEPTH:	0.54

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.42. Silty clay, loose. Rootlets present					
0.10	light brown					
0.20	0.42-0.54 Clay (light brown), friable w/					
0.30	some large gravel (shale)	-	TP3/0.5	0	-	-
0.40						
0.50	End TP3 @ 0.54 in natural shale					
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP4

PROJECT No:	ENRS1153	DATE:	/ / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296542	WIDTH:	1.8, 1.8
NORTHING:	6175415	DEPTH:	1.2

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.18: Silty clay (grey/brown) Rootlets					
0.10	Present					
0.20	0.18-0.95: Mottled clay (red/brown) st.ff w/					
0.30	some large gravel (shale)					
0.40						
0.50			TP4/0.5	0		
0.60						
0.70						
0.80						
0.90	0.95-1.2 Shale (weak) w/ trace clay		TP4/0.9	0		
1.00	End TP4 @ 1.2m in natural					
1.10	shale					
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP5

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296556	WIDTH:	2.1 x 2.1
NORTHING:	6175420	DEPTH:	0.55

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.21: Silty clay (grey/brown), loose. Rootlets present					
0.10						
0.20	0.21-0.5: Mottled clay (red/brown), stiff					
0.30						
0.40	0.5-0.55: Shale (weak)					
0.50	End TP5 @ 0.55 in natural shale		TP5/0.4	0		
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP6

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296573	WIDTH:	2.1 x 2.1
NORTHING:	6175410	DEPTH:	0.65

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.18. Silty clay (grey/brown), loose. Rootlets present.					
0.10						
0.20	0.18-0.62: Mottled clay (grey/orange), stiff					
0.30						
0.40	0.52-0.65: Shale (weak)					
0.50			TP6/0.5	0	-	-
0.60	End TP6 @ 0.65m in natural shale					
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP7

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296582	WIDTH:	2.1 - 2.1
NORTHING:	6175429	DEPTH:	0.65m

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.2: Silty clay (brown/grey), loose Rootlets present					
0.10						
0.20	0.2-0.6: Clay (orange), soft w/ trace medium gravel (shale)		TP7/0.5	0	-	-
0.30						
0.40						
0.50						
0.60	0.6-0.65: Shale (weak)					
0.70	End TP7 @ 0.65 in natural shale					
0.80						
0.90						
1.00						
1.10	NB: ACM observed on surface adj to TP.					
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP8

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296537	WIDTH:	1.8 x 1.8
NORTHING:	6175432	DEPTH:	1.0

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0.0-0.45 Clayey silt w/ some large gravel (shale, hard)					
0.10						
0.20						
0.30	0.4-0.5: Concrete boulder + plastic bottle		TP8/0.5	0	-	-
0.40	0.45-0.9: Mottled clay (red/grey), stiff		Dup & Trip			
0.50						
0.60						
0.70						
0.80						
0.90	0.9-1.0: Shale (weak)					
1.00	End TP8 in natural shale		TP8/0.8	0	-	-
1.10						
1.20						
1.30						
1.40	Test pit located in centre of a					
1.50	grassed, non-conforming mound					
1.60	~30m long					
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP8 - North

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296533	WIDTH:	3.1
NORTHING:	6175469	DEPTH:	0.9

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0 - 0.38: Silty clay (dark brown), stiff w/ trace FM (brick, fibreglass, wire, concrete)		TP8-N/0.35	0	-	-
0.10						
0.20						
0.30	0.38 - 0.8: Clay (brown), stiff w/ trace medium gravel (shale)					
0.40						
0.50						
0.60						
0.70						
0.80	0.8 - 0.9: Shale (weat)		TP8-N/0.8	0	-	-
0.90	End TP8-North @ 0.9m in natural shale					
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP8 - South

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296540	WIDTH:	2.1 x 2.1
NORTHING:	6175425	DEPTH:	0.8

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0 - 0.3 Silt (60%) & clay (40%) w/ trace FM (fibre glass, concrete, PVC) to 0.1		TP8-S/0.3	0	-	-
0.10						
0.20						
0.30	0.3 - 0.7: Sandy clay (dark brown), loose					
0.40						
0.50						
0.60						
0.70	0.7 - 0.8 Clay (dark brown) stiff w trace medium gravel (shale		TP8-S/0.8	0	-	-
0.80	0.8: Shale (weak)					
0.90	End TP8-S in natural shale					
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP9

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296515	WIDTH:	2.1 x 2.1
NORTHING:	6175433	DEPTH:	0.9

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0 - 0.3: Clayey silt (grey/brown). Rootlets present					
0.30	0.3 - 0.8: Mottled clay (brown w/ trace orange) stiff					
0.70			TP9/0.6	0	-	-
0.80	0.8 - 0.9: As above w/ some medium gravel (shale)					
1.00	End TP9 @ 0.9m in natural shale					

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP10

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296572	WIDTH:	1.4 - 1.9
NORTHING:	6175449	DEPTH:	0.48

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0 - 0.2: Crushed concrete gravel (med to large) w/ trace silt & plastic Minor staining (green)		TP10/0.1	0	-	-
0.20	0.2 - 0.4: Clay (red/brown), stiff					
0.40	0.4 - 0.48: Shale (weak)					
0.48	End TP10 @ 0.48 in natural shale					

Notes:
Descriptions are based on observations and hand testing of grab samples
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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP11

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296560	WIDTH:	1.4 x 1.4
NORTHING:	6175481	DEPTH:	1.0

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.45: Silt (60%) & medium gravel (40%) Shale w/ trace coal/coalwash		TP11/0.3	0	-	-
0.45	0.45 - 0.9. Medium / large gravel (shale) w/ some silt					
0.90	0.9 - 1.0. Shale (very weak)		TP11/0.8	0	-	-
1.00	End TP 11 @ 1.0 in natural shale					
	Adjacent mixed waste stockpile (ACM present)	TP11 SP/ Frag1				

Notes:
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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP12

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296570	WIDTH:	1.8 x 1.8
NORTHING:	6175487	DEPTH:	1.05

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.9 Silty Clay (70%) & Foriegn Material (brick, fibre glass)					
	Pocket of ACM @ 0.6m	TP12/0.6	TP12/0.6	0	-	-
	Extensive cabling, household waste & demo waste	Frag				
0.90	0.9 - 1.05: Shale (Weak)		TP12/0.9	0	-	-
1.05	End TP 12 @ 1.05 in natural shale					
	Waste occurs in narrow trench ~0.8m wide. Mass does not extend south, east or west.					
	Shallow TP ~2m north terminated in natural shale @ 0.55m					

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP13

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296528	WIDTH:	3.4 - 3.4
NORTHING:	6175469	DEPTH:	0.86

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.3: Silty clay (dark). Rootlets					
0.30	0.3-0.7: Clay (dark brown) stiff		TP13/0.6 (Triplicate) XP/0.6	0	-	-
0.70	0.7-0.86: As above w/ some medium gravel (shale)					
0.90	End TP13 @ 0.86 in natural shale					

Notes:
Descriptions are based on observations and hand testing of grab samples.
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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP14

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296491	WIDTH:	2.3 - 2.3
NORTHING:	6175454	DEPTH:	0.66

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.2: Silty clay (light brown), loose. Rootlets present					
0.20	0.2-0.5: Clay (light brown), stiff	SW	TP14/04	0	-	-
0.50	0.5-0.66: Shale (weak) w/ some clay					
0.70	End TP14 @ 0.66 in natural clay					

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP15

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296507	WIDTH:	2.4 x 2.4
NORTHING:	6175483	DEPTH:	0.54

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00 – 0.10	0 - 0.18: Silty clay (dark brown), rootlets present					
0.10 – 0.20						
0.20 – 0.30						
0.30 – 0.40	0.18 - 0.49: Mottled clay (dark brown/orange), firm		TP15/04	0	-	-
0.40 – 0.50						
0.50 – 0.60	0.49 - 0.54: Shale (weak)					
0.60 – 0.70	End TP15 @ 0.54 in natural shale					
0.70 – 0.80						
0.80 – 0.90						
0.90 – 1.00						
1.00 – 1.10						
1.10 – 1.20						
1.20 – 1.30						
1.30 – 1.40						
1.40 – 1.50						
1.50 – 1.60						
1.60 – 1.70						
1.70 – 1.80						
1.80 – 1.90						
1.90 – 2.00						
2.00 – 2.10						
2.10 – 2.20						
2.20 – 2.30						
2.30 – 2.40						
2.40 – 2.50						
2.50 – 2.60						
2.60 – 2.70						
2.70 – 2.80						
2.80 – 2.90						
2.90 – 3.00						

Notes:
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Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP16

PROJECT No:	ENRS1153	DATE:	6 / 5 / 2019
LOCATION:	APBP	LOGGED BY:	ML, TB
CLIENT:	FH	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296547	WIDTH:	2.1 x 2.1
NORTHING:	6175501	DEPTH:	0.76

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00 – 0.10	0-0.12: Silty clay (60%) & medium blue metal gravel (40%). Rootlets present		TP16/0.1	0	-	-
0.10 – 0.20	0.12 - 0.35: Silty clay					
0.20 – 0.30						
0.30 – 0.40	0.35 - 0.6: Mottled clay (light brown/orange), trace charcol @ 0.54m					
0.40 – 0.50						
0.50 – 0.60			TP16/0.5	0	-	-
0.60 – 0.70	0.6 - 0.76: Shale (weak)					
0.70 – 0.80	End TP16 @ 0.76m					
0.80 – 0.90						
0.90 – 1.00						
1.00 – 1.10						
1.10 – 1.20						
1.20 – 1.30						
1.30 – 1.40						
1.40 – 1.50						
1.50 – 1.60						
1.60 – 1.70						
1.70 – 1.80						
1.80 – 1.90						
1.90 – 2.00						
2.00 – 2.10						
2.10 – 2.20						
2.20 – 2.30						
2.30 – 2.40						
2.40 – 2.50						
2.50 – 2.60						
2.60 – 2.70						
2.70 – 2.80						
2.80 – 2.90						
2.90 – 3.00						

Notes:
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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP17

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	EW Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296558	WIDTH:	2.0 x 2.0
NORTHING:	6175592	DEPTH:	[redacted] 0.8

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.2 : topsoil (silty clay/sands). ACM fragments visible adjacent to TP.		TP17/0.5	0		
0.70	0.2-0.75 : clay, moist, plastic w/ some weathered shale gravel. Gray mottles.					
0.80	0.8 : Excavator refusal in weathered shale.					
	NB: ACM observed on surface adj to TP.					

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP18

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	EW Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296576	WIDTH:	2.2 x 2.2
NORTHING:	6175526	DEPTH:	0.6

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.3 : Topsoil (silty clays) w/ some fine silty sands.		TP18/0.3	0		
0.30	0.5-0.5 : slightly moist clay (gray/yellow) w/ some fine yellow sands + weathered shale gravel.					
0.60	0.6 : excavator refusal on weathered shale.					

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP19

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APSP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	EH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296470	WIDTH:	2.0 x 2.0
NORTHING:	6175517	DEPTH:	0.8

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.3: Topsoil (silty clays w/ some fine sands)		TP19/0.2	0		
0.10						
0.20						
0.30	0.3-0.5: clay, st/ff. w/ some fine sands and weathered shale gravel.					
0.40						
0.50	0.6-0.8: weathered shale. Excavator refusal @ 0.8.		TP19/0.8	0		
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP20

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APSP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	EH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296461	WIDTH:	2.0 x 2.0
NORTHING:	6175544	DEPTH:	0.8

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.5: Topsoil (silty clay w/ fine sands).		TP20/0.5	0		
0.10						
0.20						
0.30	0.5-0.6: Stiff. Rigthle clay w/ large (10-100mm) weathered shale gravel / cobbles.					
0.40						
0.50						
0.60						
0.70	0.6-0.8: weathered shale. Excavator refusal @ 0.8m.					
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP21

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APSP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296492	WIDTH:	2.0 x 2.0
NORTHING:	6175554	DEPTH:	1.2

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	(metal, rubber, PVC present on surface adj TP)		TP21/0.2	0		
0.10	0-0.5: topsoil (silty clays) w/ some fine sands.					
0.20						
0.30						
0.40						
0.50	0.5-0.7: Friable clay (brown/yellow) w/ some fine sands + weathered shale gravel.					
0.60						
0.70						
0.80						
0.90						
1.00			TP21/1.2	0		
1.10	0.7-1.2: weathered shale w/ some friable clay. Excavator refusal @ 1.2m					
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP22

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APSP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296521	WIDTH:	2.0 x 2.0
NORTHING:	6175562	DEPTH:	0.6

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	(ACM visible on surface adj to TP on east + west)					
0.10	0-0.1: Topsoil (silty sands)					
0.20						
0.30	0.1-0.4: weathered shale w/ some clay and yellow fine sands.		TP22/0.4	0		
0.40						
0.50	0.6: weathered shale, excavator refusal.					
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP13

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296551	WIDTH:	2.0 x 2.0
NORTHING:	6175566	DEPTH:	1.1

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	(ACM visible on surface adj to TP)					
0.10	0-0.2: Topsoil (silty clays) w/ one rubber car hose @ 0.2m.					
0.20						
0.30			TP13/0.4	0		
0.40	0.2-0.6: clay, moist, plastic (brown/yellow/grey) w/ some fine sands. Patches of red clay (fill?) present. Minor charcoal present.					
0.50						
0.60						
0.70	0.6-0.8: clay (moist, plastic, brown/yellow/grey) w/ weathered shale gravel.					
0.80						
0.90						
1.00	0.8-1.1: weathered shale w/ some clays. Excavator refusal.		TP13/1.1	0		
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP14

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296528	WIDTH:	2.0 x 2.0
NORTHING:	6175611	DEPTH:	0.5

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.1: thin layer of silty sands					
0.10	0.1-0.5: weathered shale w/ some stiff yellow clay.					
0.20			TP14/0.5	0		
0.30	0.5-0.5: weathered shale w/ some patches of stiff, dark clay. Very hard ground, excavator refusal @ 0.5m.					
0.40						
0.50						
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP25

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296549	WIDTH:	2.0 x 1.0
NORTHING:	6175608	DEPTH:	0.8

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.2: silty sands					
0.10						
0.20	0.2-0.4: clay (brown/orange, stiff) w/ some weathered shale gravel.					
0.30						
0.40						
0.50						
0.60						
0.70	0.4-0.8: weathered shale w/ some brown/orange clays (minor). Excavator refusal @ 0.8 in natural material.		TP25/0.8	0		
0.80						
0.90						
1.00						
1.10						
1.20	NB: ACM observed on surface adj to TP.					
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP26

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH Contractor
SURFACE RL:		METHOD:	MECH. EXCAVATOR
EASTING:	296519	WIDTH:	2.0 x 2.0
NORTHING:	6175598	DEPTH:	0.85

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
	(ACM visible on surface adj. TP)					
0.00	0-0.2: silty sands w/ some clay (topsoil). 50mm diametre metal pipe (vent line?) encountered.					
0.10						
0.20						
0.30	0.2-0.6: stiff clay w/ some weathered shale gravel. Foreign mat unc. brick, rubber, metal and plastic present.		TP26/0.5	0		
0.40						
0.50						
0.60						
0.70	0.6-0.85: weathered shale w/ minor clay. Excavator refusal.					
0.80						
0.90						
1.00						
1.10						
1.20	0.7: ~200mm diametre metal pipe?, running E → W.					
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
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Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP27

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	EH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296488	WIDTH:	2.0 x 2.0
NORTHING:	6175594	DEPTH:	1.0

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	(near visible on surface adj TP) 0-0.5: silty sands w/ some silty clay (topsoil). Foreign mat inc. car parts, rubber, plastic, metal + glass present. ACM on surface surrounding TP.		TP27/0.5	0		
0.50	0.5-0.8: clay: plastic, mottled yellow/ gray. w/ some fine sands and weathered shale gravel.		TP27/1.0	0		
0.80	0.8-1.0: weathered shale + excavator refusal @ 1.0.					
3.00						

Notes:
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Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP28

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	EH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296464	WIDTH:	2.0 x 2.0
NORTHING:	6175585	DEPTH:	0.5

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.4: silty sands w/ some silty clays (topsoil)		TP28/0.4	0		
0.50	0.5: brown clay, soft, rapidly becoming weathered shale. Very hard, instant excavator refusal @ 0.5.					
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP29

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296485	WIDTH:	2.0 x 2.0
NORTHING:	6175624	DEPTH:	TP00

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.2: silty sands (topsoil). Heavily grassed.					
0.10						
0.20						
0.30						
0.40						
0.50			TP29/1.2	0		
0.60	0.2-1.7: silty sands, plastic clay (mottled brown/grey) w/ extensive foreign mat. inc. metal, thick cable, multiple types, assorted car parts, brick, plastic, glass, car yard tip. No ACM identified although likely. Some dark staining present w/ saturated soil present @ 1.2 (sampled)					
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60			TP29/1.7	0		
1.70	1.7-1.9: light grey weathered shale, soft. TP terminated in mix of competent ground/ excavator refusal.					
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
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Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP30

PROJECT No:	ENRS1153	DATE:	7/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296479	WIDTH:	1.2 x 1.2
NORTHING:	6175625	DEPTH:	1.6

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.2: silty sands (topsoil), heavily vegetated/ grassed.					
0.10						
0.20	0.2-1.4: soft, dry, yellow clay w/ fine sands. some weathered sandstone gravel present - Minor foreign mat. inc. bricks, tiles, glass and metal present to 0.5m.					
0.30						
0.40						
0.50			TP30/1.2	0		
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40	1.4-1.6: soft weathered shale w/ some clay. TP terminated in natural ground.					
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP51

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296487	WIDTH:	2.0 x 2.0
NORTHING:	6175607	DEPTH:	0.9

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.4: silty sands / silty clays (topsoil) w/ foreign mat inc. metal, rubber, brick + glass. (minor quantities)		TP51/0.2	0		
0.10						
0.20	AC sheeting frag for 0.3, 0.4					
0.30						
0.40						
0.50	0.4-0.7: yellow/ gray clays w/ some fine sand + ~~gr~~ weathered shale grave'.		TP51/0.7	0		
0.60						
0.70	0.7-0.9: weathered shale. TP termination in natural ground.					
0.80						
0.90						
1.00						
1.10	NB: ACM observed on surface adj. to TP					
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
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Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP52

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296502	WIDTH:	2.0 x 2.0
NORTHING:	6175626	DEPTH:	0.6

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.3: silty sands + silty clays (topsoil) w/ foreign mat. inc. metal, plastic and car parts.		TP52/0.3	0		
0.10						
0.20						
0.30	0.3-0.5: stiff clay, brown w/ grey mottles and minor fine sands.					
0.40						
0.50						
0.60	0.6: weathered shale. TP termination in natural ground.					
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP33

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296552	WIDTH:	2.0 x 1.0
NORTHING:	6175631	DEPTH:	1.5

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	(ACM visible on surface adj TP)					
0.10	0-1.1 : sandy silts w/ stiff brown/					
0.20	yellow clay. Extensive amounts of					
0.30	brick + concrete. Timber and metal					
0.40	also present.					
0.50			TP33/1.0	0		
0.60						
0.70						
0.80						
0.90						
1.00						
1.10	1.1-1.5 : mix of weathered shale					
1.20	and clay/ fine lime metal. Water					
1.30	encountered at 1.4 (old drain?)					
1.40	TP terminated @ 1.5 due to					
1.50	excavator refusal (natural ground on					
1.60	eastern side, foreign mat + fill					
1.70	western.					
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP34

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296558	WIDTH:	2.0 x 2.0
NORTHING:	6175634	DEPTH:	1.2

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.2 : topsoil (silty sands). Some		TP34/0.1	0		
0.10	coal wash / charcoal present in top					
0.20	0.1					
0.30						
0.40						
0.50						
0.60						
0.70	0.2-1.0 : clay, stiff + slightly plastic,		TP34/1.0	0		
0.80	brown/grey/ yellow mottles. Some					
0.90	weathered shale present.					
1.00						
1.10						
1.20	1.0-1.2 : weathered shale. Excavator					
1.30	refusal.					
1.40						
1.50	NB: ACM observed on surface adj.					
1.60	to TP.					
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP55

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APZP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296580	WIDTH:	2.0 x 2.0
NORTHING:	6175640	DEPTH:	0.8

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.3: topsoil (silty sands). Minor foreign material inc. metal + plastic.					
0.30	0.3-0.6: clay (moist, brown, plastic) w/ some silty sands and weathered shale gravel.		TP55/0.4	0		
0.60	0.6-0.8: weathered shale w/ minor gray clay. Excavator refusal @ 0.8.					
0.80	NB: 1CM observed on surface adj. to TP.					
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP56

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APZP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296578	WIDTH:	2.0 x 2.0
NORTHING:	6175674	DEPTH:	0.6

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.2: topsoil (silty sands + silty clay)		TP56/0.2	0		
0.20	0.2-0.5: clay, brown/yellow, stiff w/ fine sands. Some small weathered shale gravel present towards 0.5					
0.50	0.5-0.6: weathered shale, excavator refusal @ 0.6.					
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP57

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296542	WIDTH:	2.0 x 2.0
NORTHING:	6173661	DEPTH:	0.6

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	(ACM visible on surface adj TP)					
0.10	0-0.1 : mulch w/ some silty sands.					
0.20	0.1 - 0.3 : clay, yellow/grey mottles, stiff and friable.		TP57/0.5	0		
0.30						
0.40						
0.50	0.3 - 0.6 : increasing weathered shale gravel, becoming weathered shale w/ minor stiff clay. Excavator refusal @ 0.6.					
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and handtesting of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP58

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296508	WIDTH:	2.0 x 2.0
NORTHING:	6173659	DEPTH:	1.0

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.2 : topsoil (silty sands)					
0.10						
0.20	0.2-0.4: clay, brown, plastic w/ some silty sands. becoming stiff w/ yellow grey mottles.		TP58/0.5	0		
0.30						
0.40						
0.50	0.4-0.8: stiff brown clay w/ yellow + grey mottles.					
0.60						
0.70						
0.80	0.8 - 1.0 clay as above. becoming very stiff w/ increasing weathered shale. Excavator refusal @ 1.0.		TP58/1.0	0		
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP59

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296479	WIDTH:	2.0 x 2.0
NORTHING:	6175663	DEPTH:	0.6

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0 - 0.2 : topsoil (silty sands)					
0.10						
0.20	0.2 - 0.5 : clay, brown, stiff w/ increasing grey/ yellow mottles.		TP59/04	0		
0.30						
0.40						
0.50						
0.60	0.6 : weathered shale, excavator refusal.					
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP40

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296471	WIDTH:	2.0 x 2.0
NORTHING:	6175696	DEPTH:	0.9

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0 - 0.1 : topsoil (silty sands)					
0.10						
0.20	0.1 - 0.5 : light brown friable clay w/ 10 - 30 mm gravel.		TP40/0.2	0		
0.30						
0.40						
0.50	0.5 - 0.7 brown, moist plastic clay w/ extensive fill material inc metal, plastic, electrical wires and various car parts.					
0.60						
0.70						
0.80						
0.90	0.7 - 0.9 : extremely stiff brown clay w/ orange mottles. Excavator refusal.		TP40/0.9	0		
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP41

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296527	WIDTH:	2.0 x 2.0
NORTHING:	6175670	DEPTH:	0.5

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
	(ACM visible on surface, adj TP)					
0.00–0.10	0-0.1: topsoil (silty sands)					
0.10–0.50	0.2-0.5. stiff clay, brown. Some fine sands.		TP41/0.3	0		
0.50–0.70	0.3-0.5: clay as above w/ increasing shale gravel. TP termination on weathered shale @ 0.5m.					

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP42

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH Contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296506	WIDTH:	2.0 x 2.0
NORTHING:	6175700	DEPTH:	1.4

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00–0.10	(ACM visible on surface adj TP) 0-0.6. Silty sands w/ friable clay. Foreign material inc bricks, plastic, metal and old car parts present.	TP42/0.3 →		0		
0.10–0.70						
0.70–0.80	0.6-0.8: brown clay, stiff, w/ silty sands.					
0.80–1.20	0.8-1.2: as above w/ yellow & red mottles, imported fill?					
1.20–1.40	1.2-1.4: weathered shale. Excavator refusal.	TP42/1.2 →		0		

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP43

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296529	WIDTH:	2.0 x 2.0
NORTHING:	6175705	DEPTH:	1.2

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.4: silty sands w/ friable clay. gravel 10-20mm present.		TP43/0.6	0		
0.40	0.4-1.0: brown clay, moist, stiff, w/ some silty sands.					
1.00	1.0-1.2: increasing shale gravel w/ TP terminating in weathered shale @ 1.2m.					

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP44

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296543	WIDTH:	2.0 x 1.0 x
NORTHING:	6175695	DEPTH:	0.5

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.1: thin layer of mulch and residual topsoil.		TP44/0.3	0		
0.10	0.1-0.5: stiff clays, mottled brown/ yellow w/ fine sands. Increasing shale gravel w/ TP terminating in weathered shale @ 0.5m.					

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP45

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296548	WIDTH:	2.0 x 1.0
NORTHING:	6175722	DEPTH:	1.3

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.1: hardstand / blue metal (2-5mm)					
0.10						
0.20						
0.30						
0.40						
0.50	0.1-0.8: Brown clay, plastic w/ fine sand & increasing shale gravel. Tree roots present.		TP45/0.6	0		
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20	0.8-1.3: weathered shale, TP termination @ 1.3					
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP46

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296589	WIDTH:	1.5 x 1.5
NORTHING:	6175706	DEPTH:	0.6

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.2: 2-5mm blue metal		TP46/0.2	0		
0.10						
0.20						
0.30	0.3-0.6: clay, stiff, yellow w/ increasing shale gravel. TP termination on weathered shale @ 0.6.					
0.40						
0.50			TP46/0.6	0		
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP47

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296581	WIDTH:	1.5 x 1.5
NORTHING:	6175695	DEPTH:	0.6

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.3: 2-5mm blue metal					
0.10						
0.20						
0.30	0.3-0.6: clay, stiff, yellow w/ increasing shale gravel. TP terminated on weathered shale @ 0.6m		TP47/0.6	0		
0.40						
0.50						
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20						
1.30						
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
2.30						
2.40						
2.50						
2.60						
2.70						
2.80						
2.90						
3.00						

Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

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ENVIRONMENTAL TESTPIT INVESTIGATION LOG

Test Pit Number: TP48

PROJECT No:	ENRS1153	DATE:	8/5/19
LOCATION:	APBP	LOGGED BY:	CA
CLIENT:	Fulton Hogan	EXCAVATED BY:	FH contractor
SURFACE RL:	-	METHOD:	MECH. EXCAVATOR
EASTING:	296511	WIDTH:	1.5 x 1.5
NORTHING:	6175182	DEPTH:	1.3

Depth Metres	Description	Sample ID (ASS)	Sample ID (Chem)	PID Reading (ppm)	pH (field)	pH (FOX)
0.00	0-0.3: silty sands w/ shale gravel (10-20mm)		TP48/0.4	0		
0.10			TP48/0.4(1)	0		
0.20	0.3-0.4: Dark stained silty sands, coal wash?					
0.30						
0.40	0.4-0.6: stiff brown clay, slightly moist					
0.50						
0.60						
0.70						
0.80						
0.90						
1.00						
1.10						
1.20	0.6-1.2: light brown/grey clay w/ shale gravel. Some fine yellow sands.		TP48/1.3	0		
1.30	1.2-1.3: weathered shale, TP termination.					
1.40						
1.50						
1.60						
1.70						
1.80						
1.90						
2.00						
2.10						
2.20						
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2.90						
3.00						

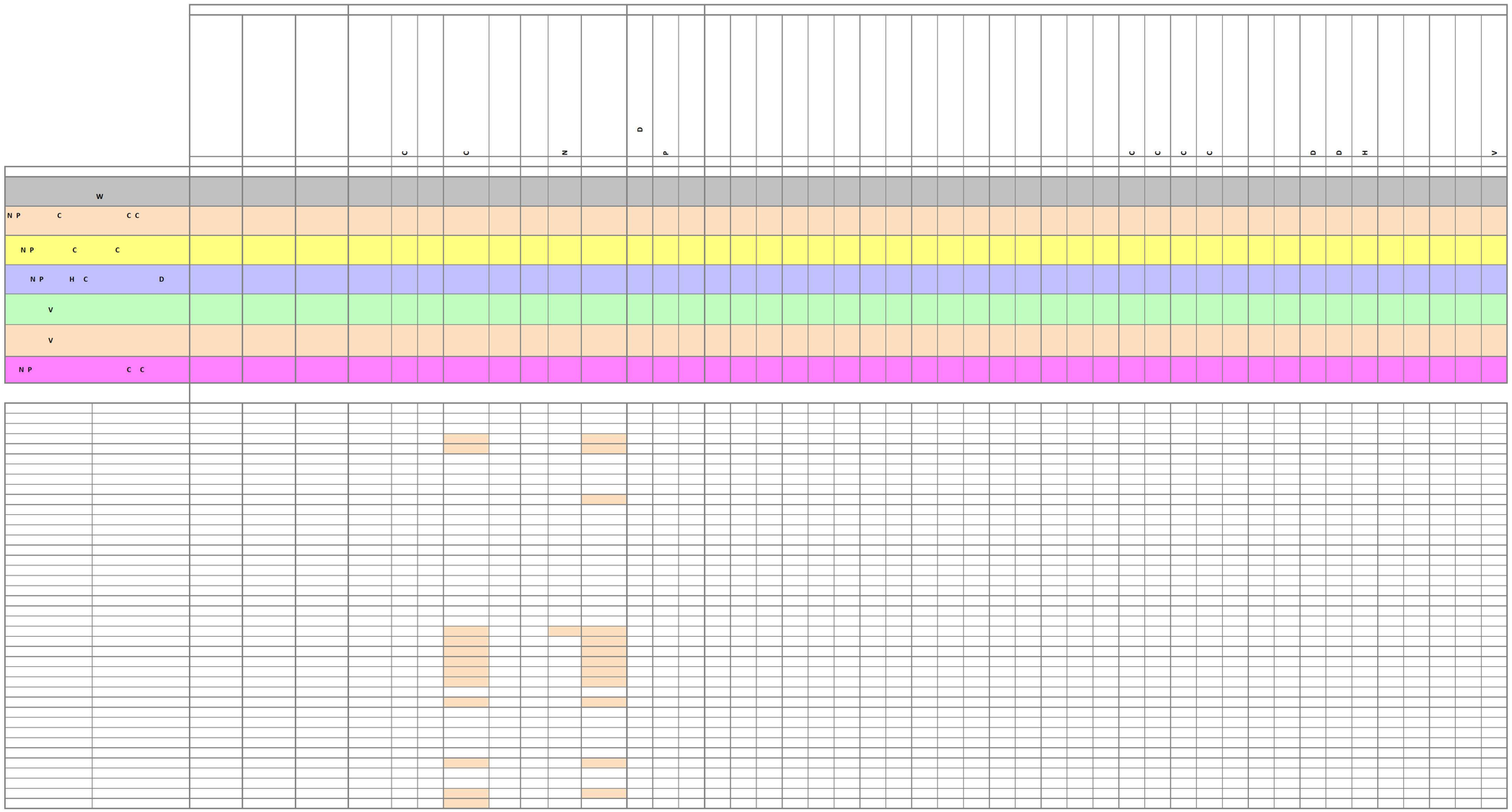
Notes:
Descriptions are based on observations and hand testing of grab samples.
Mechanical Tests were not performed unless otherwise stated

Attachment 3

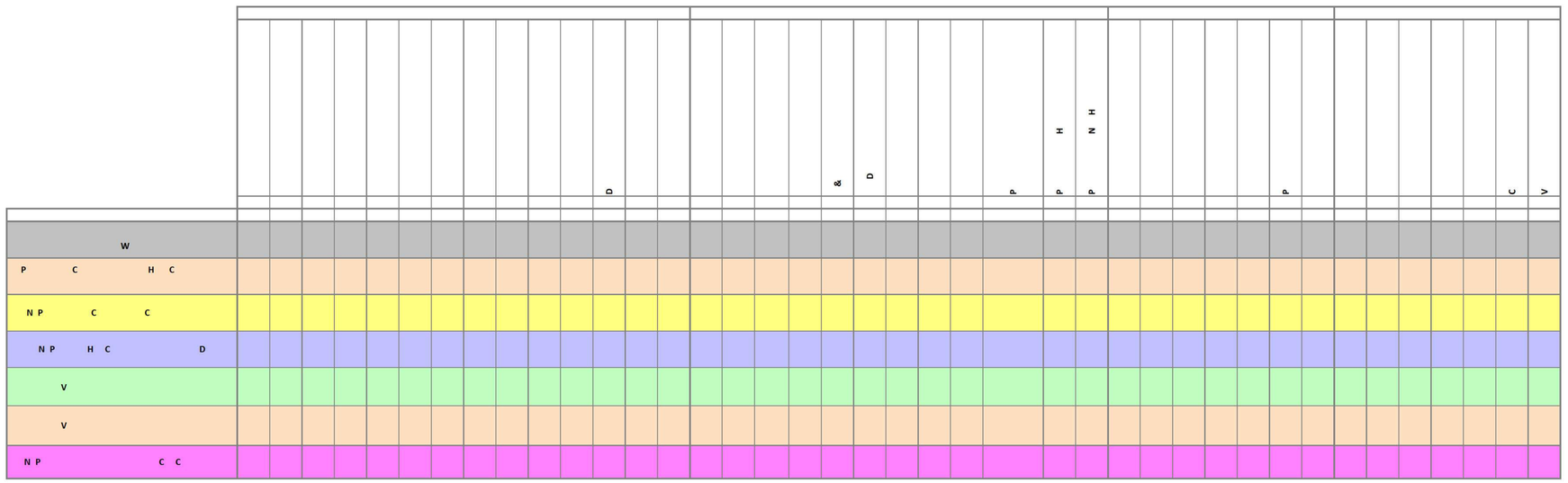
Consultants' Analytical Tables

| | | |

				&				C C	C C		C C	C C	C C	C C	C C	C C	C C	C C	N				P Q		P Q R	Q OR	Q	Q				D				N	P H	P	P
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			Lab Report Number	ES1715554	ES1715554		ES1715554	ES1715554		ES1715554	ES1715554		ES1715554	551729		ES1715554	551729		ES1715554	551729	
			Field ID	PAECO2-BH25_0.5	QA1	**RPD**	PAECO2-BH01_1.0	QA2	**RPD**	PAECO2-SP2/3_0.2	QA3	**RPD**	PAECO2-BH25_0.5	QA1-A1	**RPD**	PAECO2-BH01_1.0	QA2-A2	**RPD**	PAECO2-SP2/3_0.2	QA3-A3	**RPD**
			Sampled Date/Time	20/06/2017	20/06/2017		20/06/2017	20/06/2017		20/06/2017	20/06/2017		20/06/2017	20/06/2017		20/06/2017	20/06/2017		20/06/2017	20/06/2017	
Chem Group	**Chem Name**	**Units**	**EQL**																		
	APPROVED IDENTIFIER:	--																			
	Benzo(a)pyrene TEQ (half LOR)_	mg/kg	0.5	0.6	0.6	0				0.6	0.6	0	0.6	0.6	0				0.6	0.6	0
	Description	--																			
	Moisture Content	%	1	15.3	14.9	3	7.5	7.3	3	6.3	6.8	8	15.3			7.5			6.3		
	Sum of polycyclic aromatic hydrocarbons	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5						<0.5		
NA	AsbestosType	--																			
BTEX	Benzene	mg/kg	0.2 : 0.1 (Interlab)	<0.2	<0.2	0	<0.2			<0.2	<0.2	0	<0.2	<0.1	0	<0.2	<0.1	0	<0.2	<0.1	0
	Toluene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.1	0	<0.5	<0.1	0
	Ethylbenzene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.1	0	<0.5	<0.1	0
	Xylene (m & p)	mg/kg	0.5 : 0.2 (Interlab)	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5	<0.2	0	<0.5	<0.2	0	<0.5	<0.2	0
	Xylene (o)	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.1	0	<0.5	<0.1	0
	Xylene Total	mg/kg	0.5 : 0.3 (Interlab)	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.3	0				<0.5	<0.3	0
	Total BTEX	mg/kg	0.2	<0.2	<0.2	0				<0.2	<0.2	0	<0.2						<0.2		
TPH	C6 - C9	mg/kg	10 : 20 (Interlab)	<10	<10	0				<10	<10	0	<10	<20	0				<10	<20	0
	C10 - C14	mg/kg	50 : 20 (Interlab)	<50	<50	0				<50	<50	0	<50	<20	0				<50	<20	0
	C15 - C28	mg/kg	100 : 50 (Interlab)	<100	<100	0				<100	<100	0	<100	<50	0				<100	84	0
	C29-C36	mg/kg	100 : 50 (Interlab)	<100	<100	0				<100	<100	0	<100	<50	0				<100	110	10
	+C10 - C36 (Sum of total)	mg/kg	50	<50	<50	0				<50	<50	0	<50	<50	0				**<50**	**194**	**118**
CRC Care TPH Fractions	C6-C10	mg/kg	10 : 20 (Interlab)	<10	<10	0				<10	<10	0	<10	<20	0				<10	<20	0
	C10-C16	mg/kg	50	<50	<50	0				<50	<50	0	<50	<50	0				<50	<50	0
	C16-C34	mg/kg	100	<100	<100	0				<100	<100	0	<100	<100	0				**<100**	**170**	**52**
	C34-C40	mg/kg	100	<100	<100	0				<100	<100	0	<100	<100	0				<100	<100	0
	C10 - C40 (Sum of total)	mg/kg	50	<50	<50	0				<50	<50	0	<50						<50		
	F1: C6-C10 less BTEX	mg/kg	10 : 20 (Interlab)	<10	<10	0				<10	<10	0	<10	<20	0				<10	<20	0
	F2: >C10-C16 less NAPHTHALENE	mg/kg	50	<50	<50	0				<50	<50	0	<50	<50	0				<50	<50	0
MAH	1,2,4-trimethylbenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,3,5-trimethylbenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Isopropylbenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	n-butylbenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	n-propylbenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	p-isopropyltoluene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	sec-butylbenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	Styrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	tert-butylbenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
PAH	BaP TEQ (zero)	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5																		
	Benzo(b+j)fluoranthene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Acenaphthene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Acenaphthylene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Anthracene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Benz(a)anthracene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Benzo(a) pyrene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Carcinogenic PAHs (as BaP TEQ)	mg/kg	0.5																		
	Benzo(g,h,i)perylene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Chrysene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Dibenz(a,h)anthracene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Fluoranthene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Fluorene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Naphthalene	mg/kg	1 : 0.5 (Interlab)	<1	<1	0	<1	<1	0	<1	<1	0	<1	<0.5	0	<1	<0.5	0	<1	<0.5	0
	Naphthalene	mg/kg	1 : 0.5 (Interlab)	<1	<1	0				<1	<1	0	<1	<0.5	0				<1	<0.5	0
	Naphthalene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Phenanthrene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Pyrene	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
Asbestos	weight of sample	g	0.01																		
Metals	Arsenic	mg/kg	5 : 2 (Interlab)	<5	5	0				<5	<5	0	<5	5.4	8				<5	5.7	13
	Cadmium	mg/kg	1 : 0.4 (Interlab)	<1	<1	0				1	<1	0	<1	0.4	0				1	0.8	22
	Chromium (III+VI)	mg/kg	2 : 5 (Interlab)	20	22	10				**11**	**33**	**100**	20	18	11				11	10	10
	Copper	mg/kg	5	50	53	6				58	49	17	50	39	25				**58**	**39**	**39**
	Lead	mg/kg	5	42	42	0				74	74	0	**42**	**30**	**33**				74	75	1
	Mercury	mg/kg	0.1	<0.1	<0.1	0				<0.1	<0.1	0	<0.1	<0.1	0				<0.1	<0.1	0
	Nickel	mg/kg	2 : 5 (Interlab)	10	11	10				8	7	13	10	8.9	12				**8**	**5.2**	**42**
	Zinc	mg/kg	5	136	149	9				111	95	16	136	110	21				111	88	23
Inorganics	Moisture	%	1																		
VOCs	cis-1,4-Dichloro-2-butene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	Pentachloroethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	trans-1,4-Dichloro-2-butene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		

Chlorinated Hydrocarbons	1,1,1,2-tetrachloroethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,1,1-trichloroethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,1,2,2-tetrachloroethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,1,2-trichloroethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,1-dichloroethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,1-dichloroethene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,1-dichloropropene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	1,2,3-trichloropropane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,2-dibromo-3-chloropropane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	1,2-dichloroethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,2-dichloropropane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,3-dichloropropane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	2,2-dichloropropane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	Bromodichloromethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Bromoform	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Carbon tetrachloride	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Chlorodibromomethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Chloroethane	mg/kg	5 : 0.5 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	0	<5	<0.5	0	<5	<0.5	0	<5	<0.5	0
	Chloroform	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Chloromethane	mg/kg	5 : 0.5 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	0	<5	<0.5	0	<5	<0.5	0	<5	<0.5	0
	cis-1,2-dichloroethene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	cis-1,3-dichloropropene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Dibromomethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Hexachlorobutadiene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	Trichloroethene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Tetrachloroethene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	trans-1,2-dichloroethene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	trans-1,3-dichloropropene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Vinyl chloride	mg/kg	5 : 0.5 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	0	<5	<0.5	0	<5	<0.5	0	<5	<0.5	0
Halogenated Hydrocarbons	1,2,3-trichlorobenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	1,2,4-trichlorobenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	1,2-dibromoethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,2-dichlorobenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,3-dichlorobenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	1,4-dichlorobenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	2-chlorotoluene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5			<0.5			<0.5		
	4-chlorotoluene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Bromobenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Bromomethane	mg/kg	5 : 0.5 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	0	<5	<0.5	0	<5	<0.5	0	<5	<0.5	0
	Chlorobenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Dichlorodifluoromethane	mg/kg	5 : 0.5 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	0	<5	<0.5	0	<5	<0.5	0	<5	<0.5	0
	Iodomethane	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Trichlorofluoromethane	mg/kg	5 : 0.5 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	0	<5	<0.5	0	<5	<0.5	0	<5	<0.5	0
Phenols	2,4-dimethylphenol	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	2-methylphenol	mg/kg	0.5 : 0.2 (Interlab)	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.2	0				<0.5	<0.2	0
	2-nitrophenol	mg/kg	0.5 : 1 (Interlab)	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<1	0				<0.5	<1	0
	3-&4-methylphenol	mg/kg	1 : 0.4 (Interlab)	<1	<1	0				<1	<1	0	<1	<0.4	0				<1	<0.4	0
	4-chloro-3-methylphenol	mg/kg	0.5 : 1 (Interlab)	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<1	0				<0.5	<1	0
	Phenol	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
Halogenated Phenols	2,4,5-trichlorophenol	mg/kg	0.5 : 1 (Interlab)	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<1	0				<0.5	<1	0
	2,4,6-trichlorophenol	mg/kg	0.5 : 1 (Interlab)	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<1	0				<0.5	<1	0
	2,4-dichlorophenol	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	2,6-dichlorophenol	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	2-chlorophenol	mg/kg	0.5	<0.5	<0.5	0				<0.5	<0.5	0	<0.5	<0.5	0				<0.5	<0.5	0
	Pentachlorophenol	mg/kg	2 : 1 (Interlab)	<2	<2	0				<2	<2	0	<2	<1	0				<2	<1	0
Solvents	Methyl Ethyl Ketone	mg/kg	5 : 0.5 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	0	<5	<0.5	0	<5	<0.5	0	<5	<0.5	0
	2-hexanone (MBK)	mg/kg	5	<5	<5	0	<5	<5	0	<5	<5	0	<5			<5			<5		
	4-Methyl-2-pentanone	mg/kg	5 : 0.5 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	0	<5	<0.5	0	<5	<0.5	0	<5	<0.5	0
	Carbon disulfide	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Vinyl acetate	mg/kg	5	<5	<5	0	<5	<5	0	<5	<5	0	<5			<5			<5		

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (1-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

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Table 13: Total Concentration Results - Soil
APRB Project: Cut #1 (PAEC02)

Analyte			Organochlorine Pesticides (OCP)					Organophosphate Pesticides (OPP)	Total PCB's	Total Phenols	VOCs											BTEX					Total Recoverable Hydrocarbons					Polycyclic Aromatic Hydrocarbons (PAHs)				Metals / Metalloids							Asbestos		< ASC NEPM 2013 Suitability for Re Use On Site	Soil / Waste Classification
			Aldrin	Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor				Monocyclic Aromatic Hydrocarbons	Oxygenated Compounds	Halogenated Aliphatic Compounds	Halogenated Aromatic Compounds	Trihalomethanes	Total Phthalates (Plasticisers)	Nitrosamines	Nitroaromatics and Ketones	Haloethers	Chlorinated Hydrocarbons	Anilines and Benzidines	Chlorinated Hydrocarbons	Benzene	Toluene	Ethyl benzene	m+p-Xylene	o-Xylene	TRH C6-C9	TRH C10-C36	F1 TRH C6-C10	F2 TRH C10-C16	F3 TRH C16-C34	F4 TRH C34-C40	Total TRH C10-C40	Naphthalene	Benzo(a)pyrene	Benzo(a)pyrene TEQ	Total Positive PAHs	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	FA & AF (Friable Asbestos)	Bonded ACM		
Site Assessment Criteria - NEPM (2013) Soil Investigation Levels (mg/Kg)																																													
HIL 'D' (Industrial / Commercial)			45	45	530	3600	50	-	1	240000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	4000	3000	900	3600	240000	**1500**	730	6000	35000				
HSL 'D'	CLAY	**0-1m**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	NL	NL	NL	NL	-	-	310	-	-	-	-	-	-	-	-	-	-	-	-	-				
		1-2m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	NL	NL	NL	NL	-	-	480	-	-	-	-	-	-	-	-	-	-	-	-	-				
		2-4m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	NL	NL	NL	NL	-	-	NL	-	-	-	-	-	-	-	-	-	-	-	-	-				
		>4m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	NL	NL	NL	NL	-	-	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001%	0.05%		
Management Limits (Industrial / Commercial)		**Coarse**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700	1000	3500	10000	-	-	-	-	-	-	-	-	-				
		Fine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800	1000	5000	10000	-	-	-	-	-	-	-	-	-				
EIL/ESL (Industrial/ Commercial)		**Coarse**	-	-	-	640	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75	135	165	180	180	-	-	215	**215**	1700	3300	-	370	3	-	-	160	-	-	1200(pH8)	1800	-	-	-	
		Fine	-	-	-	640	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	95	135	185	95	95	-	-	170	**170**	2500	6600	-	370	3	-	-	160	-	-	1200(pH8)	1800	-	-	-	
CRC Care (2011) HSL D (Direct Contact)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	430	99000	27000	81000	81000	-	-	26000	20000	27000	38000	-	11000	-	-	-	-	-	-	-	-	-	-	-	
CRC Care (2011) Intrusive Work (Direct Conact)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1100	120000	85000	130000	130000	-	-	82000	62000	85000	120000	-	29000	-	-	-	-	-	-	-	-	-	-	-	
Dutch (2000) Target Value (Soil)			6E-05	5E-04	3E-05	0.01	7E-04	-	0.02	0.05	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	0.03	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	1	29	0.8	100	36	85	0.3	35	140	-	zero		
Dutch (2000) Intervention Value (Soil)			-	-	5	4	4	-	1	40	-	-	-	-	-	60	-	-	-	-	-	-	1	130	50	25	25	60	60	60	60	60	60	60	-	-	-	40	29	0.8	100	36	85	0.3	35	140	-	10mg/kg		
NSW EPA - Waste Classification Guidelines (2014)																																													
General Solid Waste (GSW)		CT1 mg/Kg	-	-	-	-	-	-	-	288	-	-	-	-	-	20	-	-	-	-	-	-	10	288	600	1000	1000	-	-	-	-	-	-	-	-	0.8	-	200	100	20	100	-	100	4	40	-	-	-	
		TCLP1 mg/L	-	-	-	-	-	-	-	14.4	-	-	-	-	-	1	-	-	-	-	-	-	0.5	14.4	30	50	50	-	-	-	-	-	-	-	-	0.04	-	-	5	1	5	-	5	0.2	2	-			
		SCC1 mg/Kg	<50	<50	<50	<50	<50	<50	<50	518	-	-	-	-	-	600	-	-	-	-	-	-	18	518	1080	1800	1800	650	10000	-	-	-	-	-	-	10	-	200	500	100	1900	-	1500	50	1050	-	-	-	
Restricted Solid Waste (RSW)		CT2 mg/Kg	-	-	-	-	-	-	-	1152	-	-	-	-	-	80	-	-	-	-	-	-	40	1152	-	4000	4000	-	-	-	-	-	-	-	-	3.2	-	800	400	80	400	-	400	16	160	-	-	-	
		TCLP2 mg/L	-	-	-	-	-	-	-	57.6	-	-	-	-	-	4	-	-	-	-	-	-	2	57.6	120	200	200	-	-	-	-	-	-	-	-	0.16	-	-	20	4	20	-	20	0.8	8	-			
		SCC2 mg/Kg	<50	<50	<50	<50	<50	<50	<50	2073	-	-	-	-	-	2400	-	-	-	-	-	-	72	2073	4320	7200	7200	2600	40000	-	-	-	-	-	-	23	-	800	2000	400	7600	-	6000	200	4200	-	-	-	
Total Concentrations - PQL			**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.2**	**0.1**	**0.5**	**0.5**	**5.0**	**5.0**	**0.5**	**0.5**	**0.5**	**1.0**	**1.0**	**0.5**	**2.5**	**1.0**	**2.5**	**0.2**	**0.5**	**0.5**	**0.5**	**0.5**	**10**	**50**	**10**	**50**	**100**	**100**	**50**	**0.05**	**0.05**	**0.05**	**0.05**	**5**	**1**	**2.0**	**5**	**5**	**0.1**	**2**	**5**	**0.001**			
Area	**ID / Depth (m)**	**Desciption**	**Date**	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	% w/w			
Potential Area of Environmental Concern (PAEC02) - Fulton Hogan Cut No.1	TP01/0.5	Soil	6/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**5**	<1	**12**	**16**	**8**	<0.1	**8**	**31**	----		<NEPM 'D'	<CT1
	TP02/0.65	Soil	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**6**	<1	**13**	**20**	**11**	<0.1	**6**	**34**	----		<NEPM 'D'	<CT1
	TP03/0.5	Soil	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**9**	<1	**13**	**16**	**12**	<0.1	**4**	**17**	----		<NEPM 'D'	<CT1
	TP04/0.5	Soil	6/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**6**	<1	**15**	**24**	**13**	<0.1	**4**	**33**	----		<NEPM 'D'	<CT1
	TP05/0.4	Soil	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**14**	**23**	**14**	<0.1	**4**	**27**	----		<NEPM 'D'	<CT1
	TP06/0.5	Soil	6/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**9**	<1	**17**	**25**	**15**	<0.1	**4**	**28**	----		<NEPM 'D'	<CT1
	TP07/0.5	FILL	6/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5	<5	<0.5	<0.5	<0.5	<1.0	<1	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**5**	<1	**14**	**21**	**11**	<0.1	**2**	**16**	Asbestos Observed		<NEPM 'D'	<CT1
	TP08/0.5	FILL	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**6**	<1	**10**	**19**	**42**	<0.1	**7**	**42**	----		<NEPM 'D'	<CT1
	TP08-N/0.3	FILL	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**11**	**19**	**20**	<0.1	**8**	**63**	----		<NEPM 'D'	<CT1
	TP08-S/0.3	FILL	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**6**	<1	**10**	**28**	**25**	<0.1	**6**	**49**	----		<NEPM 'D'	<CT1
	TP09/0.6	FILL	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**6**	<1	**10**	**16**	**12**	<0.1	**7**	**31**	----		<NEPM 'D'	<CT1
	TP10/0.1	FILL	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**464**	**33**	**9**	<0.1	**11**	**52**	----		<NEPM 'D'	**<SCC1**
	TP11/0.3	FILL	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**6**	<1	**13**	**42**	**11**	<0.1	**9**	**40**	Asbestos Observed		<NEPM 'D'	<CT1
	TP12/0.6	FILL	6/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**7**	<1	**12**	**47**	**23**	<0.1	**7**	**322**	Asbestos Observed		<NEPM 'D'	<CT1
	TP13/0.6	Soil	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**12**	**16**	**17**	<0.1	**13**	**52**	----		<NEPM 'D'	<CT1
	TP14/0.4	Soil	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**5**	<1	**11**	**14**	**16**	<0.1	**17**	**40**	----		<NEPM 'D'	<CT1
	TP15/0.4	FILL	6/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5	<5	<0.5	<0.5	<0.5	<1.0	<1	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**5**	<1	**10**	**13**	**16**	<0.1	**6**	**32**	----		<NEPM 'D'	<CT1
	TP16/0.1	Soil	6/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**7**	**146**	<5	<0.1	**8**	**50**	----		<NEPM 'D'	<CT1
	TP17/0.5	FILL	7/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5	<5	<0.5	<0.5	<0.5	<1.0	<1	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**16**	**16**	**8**	<0.1	**5**	**39**	Asbestos Observed		<NEPM 'D'	<CT1
	TP18/0.3	Soil	7/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**5**	<1	**14**	**14**	**9**	<0.1	**12**	**39**	----		<NEPM 'D'	<CT1
	TP19/0.2	Soil	7/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**6**	<1	**13**	**11**	**13**	<0.1	**10**	**32**	----		<NEPM 'D'	<CT1
	TP20/0.5	Soil	7/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**12**	**10**	**8**	<0.1	**10**	**28**	----		<NEPM 'D'	<CT1
	TP21/0.2	Soil	7/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**7**	<1	**10**	**14**	**19**	<0.1	**6**	**48**	----		<NEPM 'D'	<CT1
	TP22/0.4	FILL	7/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**15**	**16**	**5**	<0.1	**5**	**45**	Asbestos Observed		<NEPM 'D'	<CT1
	TP23/0.4	FILL	7/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**23**	**13**	**9**	<0.1	**6**	**40**	Asbestos Observed		<NEPM 'D'	<CT1
	TP24/0.5	FILL	7/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**8**	**15**	**8**	<0.1	**<2**	**19**	----		<NEPM 'D'	<CT1
	TP25/0.8	FILL	7/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**990**	<10	**460**	**510**	<100	**970**	<0.5	<0.5	<0.5	<0.5	<5	<1	**9**	**12**	**14**	<0.1	**3**	**34**	Asbestos Observed	**>NEPM 'D'**	GSW <CT1
	TP26/0.5	FILL	7/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5	<5	<0.5	<0.5	**0.9**	<1.0	<1	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**6**	<1	**14**	**31**	**48**	<0.1	**4**	**156**	Asbestos Observed	**>NEPM 'D'**	<CT1
	TP27/0.3	FILL	7/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**230**	<10	**200**	<100	**200**	<0.5	<0.5	<0.5	<0.5	**8**	**2**	**19**	**135**	**512**	**0.2**	**20**	**561**	Asbestos Observed	<NEPM 'D'	**<SCC1 & <TCLP1**
	TP28/0.4	Soil	7/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**6**	<1	**11**	**7**	**15**	<0.1	**4**	**18**	----		<NEPM 'D'	<CT1
	TP29/1.2	FILL	7/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	**0.4**	<0.5	<0.5	<5	<5	<0.5	<0.5	**24.1**	<1.0	<1	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**290**	<10	<50	**230**	**120**	**350**	<0.5	<0.5	<0.5	<0.5	**8**	**14**	**23**	**181**	**633**	<0.1	**76**	**1470**	----		<NEPM 'D'	**<SCC1 & <TCLP1**
	TP30/1.2	FILL	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5	<5	<0.5	<0.5	<0.5	<1.0	<1	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**11**	**34**	**81**	<0.1	**4**	**76**	----		<NEPM 'D'	<CT1
	TP31/0.2	FILL	8/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**170**	<10	<50	**190**	**130**	**320**	<0.5	<0.5	<0.5	<0.5	**9**	**4**	**20**	**383**	**444**	<0.1	**18**	**796**	Asbestos Observed	<NEPM 'D'	**<SCC1**
	TP34/0.1	FILL	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5	<5	<0.5	<0.5	<0.5	<1.0	<1	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	**1**	**8**	**453**	**100**	<0.1	**10**	**277**	Asbestos Observed	<NEPM 'D'	**<SCC1 & <TCLP1**
	TP34/1.0	FILL	8/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**11**	**18**	**15**	<0.1	**3**	**42**	----		<NEPM 'D'	<CT1
	TP35/0.4	FILL	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**5**	<1	**11**	**27**	**47**	<0.1	**4**	**54**	Asbestos Observed	<NEPM 'D'	<CT1
	TP37/0.5	FILL	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**13**	**9**	**11**	<0.1	**4**	**41**	Asbestos Observed	<NEPM 'D'	<CT1
	TP39/0.4	FILL	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**7**	<1	**14**	**8**	**9**	<0.1	**<2**	**24**	----		<NEPM 'D'	<CT1
	TP42/0.3	FILL	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5	<5	<0.5	<0.5	<0.5	<1.0	<1	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**7**	<1	**14**	**51**	**69**	<0.1	**10**	**88**	Asbestos Observed	<NEPM 'D'	<CT1
	TP43/0.6	FILL	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**5**	<1	**16**	**20**	**14**	<0.1	**4**	**45**	----		<NEPM 'D'	<CT1
	TP44/0.3	FILL	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	**0.6**	<0.5	<0.5	<5	<5	<0.5	<0.5	<0.5	<1.0	<1	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**6**	**2**	**17**	**66**	**120**	<0.1	**10**	**128**	----		<NEPM 'D'	**<SCC1 & <TCLP1**
	TP46/0.2	Soil	8/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**610**	**14**	<5	<0.1	**5**	**48**	----		<NEPM 'D'	**<SCC1**
	SP1/1	Fill	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**120**	<10	<50	**180**	<100	**180**	<0.5	<0.5	<0.5	<0.5	**9**	**5**	**36**	**819**	**427**	**0.1**	**96**	**1190**	Asbestos Observed	<NEPM 'D'	**<SCC1 & <TCLP1**
	SP1/2	Fill	8/05/2019	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**270**	<10	<50	**220**	**120**	**340**	<0.5	<0.5	<0.5	<0.5	**11**	**6**	**38**	**427**	**443**	**0.2**	**31**	**1060**	Asbestos Observed	<NEPM 'D'	**<SCC1 & <TCLP1**
	SP1/3	Fill	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	**0.1**	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**290**	<10	<50	**250**	<100	**250**	<0.5	<0.5	<0.5	<0.5	**11**	**3**	**36**	**278**	**324**	**0.1**	**23**	**670**	Asbestos Observed	<NEPM 'D'	**<SCC1 & <TCLP1**
	SP2/1	Fill	8/05/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**5**	<1	**11**	**101**	**106**	<0.1	**7**	**132**	Asbestos Observed

TABLE 14: Total Concentration Results - Leachate
APRB Cut No.1 PAEC02

GILs -Trigger Values for Freshwater (Protection of 95% of Species) [A]			24000 (As III)	200	1000 (CrVI)	1400	3400	600	11000	8000	
GILs -Trigger Values for Marine Water (Protection of 95% of Species) [A]			-	5500	4400	1300	4400	400	70000	15000	
Australian Drinking Water Guidelines (2018)[C]		Health	10	2	50	2000	10	1	20	-	
		Aesthetic	-	-	-	1000	-	-	-	3000	
NSW EPA (2014) Waste Classification Guidelines		GSW TCLP1 mg/L	5	1	5	-	5	0.2	2	-	
		RSW TCLP2 mg/L	20	4	20	-	20	0.8	8	-	
	Sample ID.	Date Sampled	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Comments
		Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
		Laboratory LOR	0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.005	
ASLP - DI Water Leachate	TP01/0 5	6/05/2019	<0.001	<0.0001	<0.001	<0 001	<0.001	<0 0001	<0 001	**0.019**	<GILs; <ADWG; <TCLP1
	TP04/0 5	6/05/2019	<0.001	<0.0001	**0.001**	<0 001	<0.001	<0 0001	<0 001	**0.161**	<GILs; <ADWG; <TCLP1
	TP06/0 5	6/05/2019	<0.001	<0.0001	<0.001	<0 001	<0.001	<0 0001	<0 001	**0.222**	<GILs; <ADWG; <TCLP1
	TP07/0 5	6/05/2019	**0.006**	<0.0001	**0.021**	**0.07**	**0.029**	<0 0001	**0.008**	**1.98**	<GILs; <ADWG; <TCLP1
	TP10/0.1	6/05/2019	-	-	**0.004**	-	-	-	-	-	<GILs; <ADWG; <TCLP1
	TP12/0 6	6/05/2019	**0.002**	**0.0003**	**0.005**	**0.029**	**0.008**	<0 0001	**0.003**	**0.902**	<GILs; <ADWG; <TCLP1
	TP15/0.4	6/05/2019	<0.001	**0.0001**	<0.001	**0.01**	**0.004**	<0 0001	**0.003**	**1.37**	<GILs; <ADWG; <TCLP1
	TP17/0 5	7/05/2019	**0.002**	**0.0001**	**0.006**	**0.03**	**0.013**	<0 0001	**0.004**	**1.54**	<GILs; <ADWG; <TCLP1
	TP18/0 3	7/05/2019	<0.001	<0.0001	<0.001	**0.006**	**0.001**	<0 0001	**0.002**	**1.2**	<GILs; <ADWG; <TCLP1
	TP20/0 5	7/05/2019	<0.001	<0.0001	<0.001	**0.007**	**0.003**	<0 0001	**0.001**	**1.35**	<GILs; <ADWG; <TCLP1
	TP22/0.4	7/05/2019	<0.001	<0.0001	**0.001**	**0.007**	**0.001**	<0 0001	**0.001**	**1.4**	<GILs; <ADWG; <TCLP1
	TP23/0.4	7/05/2019	**0.002**	<0.0001	**0.008**	**0.022**	**0.007**	<0 0001	**0.005**	**1.58**	<GILs; <ADWG; <TCLP1
	TP26/0 5	7/05/2019	**0.002**	**0.001**	**0.007**	**0.165**	**0.093**	<0 0001	**0.008**	**1.72**	<GILs; <ADWG; <TCLP1
	TP27/0 3	7/05/2019	**0.003**	**0.0053**	**0.013**	**0.578**	**1.1**	**0.0008**	**0.047**	**3.14**	<GILs; <ADWG; <TCLP1
	TP29/1 2	7/05/2019	**0.001**	**0.0007**	<0.001	**0.028**	**0.142**	<0 0001	**0.028**	**1.47**	<GILs; <ADWG; <TCLP1
	TP30/1 2	8/05/2019	**0.002**	**0.0007**	**0.003**	**0.056**	**0.049**	<0 0001	**0.004**	**1.58**	<GILs; <ADWG; <TCLP1
	TP31/0 2	8/05/2019	-	-	-	-	**0.669**	-	-	-	<GILs; <ADWG; <TCLP1
	TP34/0.1	8/05/2019	<0.001	**0.0006**	<0.001	**0.078**	**0.073**	<0 0001	**0.005**	**1.41**	<GILs; <ADWG; <TCLP1
	TP35/0.4	8/05/2019	**0.002**	**0.0012**	**0.004**	**0.09**	**0.057**	<0 0001	**0.006**	**1.39**	<GILs; <ADWG; <TCLP1
	TP37/0 5	8/05/2019	<0.001	<0.0001	**0.003**	**0.007**	**0.006**	<0 0001	**0.002**	**1.32**	<GILs; <ADWG; <TCLP1
	TP39/0.4	8/05/2019	**0.012**	**0.0002**	**0.051**	**0.045**	**0.049**	<0 0001	**0.01**	**2.17**	<GILs; <ADWG; <TCLP1
	TP42/0 3	8/05/2019	<0.001	**0.0013**	**0.002**	**0.126**	**0.062**	<0 0001	**0.012**	**1.66**	<GILs; <ADWG; <TCLP1
	TP43/0 6	8/05/2019	**0.011**	**0.0013**	**0.062**	**0.081**	**0.048**	<0 0001	**0.018**	**2.14**	<GILs; <ADWG; <TCLP1
	TP44/0 3	8/05/2019	<0.001	**0.0008**	**0.002**	**0.032**	**0.047**	<0 0001	**0.003**	**1.38**	<GILs; <ADWG; <TCLP1
	TP46/0 3	8/05/2019	-	-	**0.004**	-	-	-	-	-	<GILs; <ADWG; <TCLP1
TCLP - Leachate Analysis	TP01/0 5	6/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.1**	<GILs; <ADWG; <TCLP1
	TP04/0 5	6/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.1**	<GILs; <ADWG; <TCLP1
	TP06/0 5	6/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.2**	<GILs; <ADWG; <TCLP1
	TP07/0 5	6/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.1**	<GILs; <ADWG; <TCLP1
	TP10/0.1	6/05/2019	-	-	<0.01	-	-	-	-	-	<GILs; <ADWG; <TCLP1
	TP12/0 6	6/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**2**	<GILs; <ADWG; <TCLP1
	TP15/0.4	6/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.2**	<GILs; <ADWG; <TCLP1
	TP17/0 5	7/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.2**	<GILs; <ADWG; <TCLP1
	TP18/0 3	7/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.2**	<GILs; <ADWG; <TCLP1
	TP20/0 5	7/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.1**	<GILs; <ADWG; <TCLP1
	TP22/0.4	7/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.2**	<GILs; <ADWG; <TCLP1
	TP23/0.4	7/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.2**	<GILs; <ADWG; <TCLP1
	TP26/0 5	7/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**1.8**	<GILs; <ADWG; <TCLP1
	TP27/0 3	7/05/2019	<0.1	<0 05	<0.1	**0.9**	**0.9**	<0 0010	<0.1	**3.7**	<GILs; <ADWG; <TCLP1
	TP29/1 2	7/05/2019	<0.1	**0.07**	<0.1	<0.1	**1.0**	<0 0010	**0.7**	**9.7**	<GILs; <ADWG; <TCLP1
	TP30/1 2	8/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.6**	<GILs; <ADWG; <TCLP1
	TP31/0 2	8/05/2019	-	-	-	-	**0.6**	-	-	-	<GILs; <ADWG; <TCLP1
	TP34/0.1	8/05/2019	<0.1	<0 05	<0.1	**0.1**	<0.1	<0 0010	<0.1	**3**	<GILs; <ADWG; <TCLP1
	TP35/0.4	8/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.3**	<GILs; <ADWG; <TCLP1
	TP37/0 5	8/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.4**	<GILs; <ADWG; <TCLP1
	TP39/0.4	8/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.6**	<GILs; <ADWG; <TCLP1
	TP42/0 3	8/05/2019	<0.1	<0 05	<0.1	**0.3**	<0.1	<0 0010	<0.1	**0.8**	<GILs; <ADWG; <TCLP1
	TP43/0 6	8/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.5**	<GILs; <ADWG; <TCLP1
	TP44/0 3	8/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.5**	<GILs; <ADWG; <TCLP1
	TP46/0 2	8/05/2019	-	-	**0.02**	-	-	-	-	-	<GILs; <ADWG; <TCLP1
	SP01/1	8/05/2019	<0.1	<0 05	<0.1	**0.3**	**0.2**	<0 0010	<0.1	**9.8**	<GILs; <ADWG; <TCLP1
	SP01/2	8/05/2019	<0.1	<0 05	<0.1	**0.3**	**0.2**	<0 0010	<0.1	**6.1**	<GILs; <ADWG; <TCLP1
	SP01/3	8/05/2019	<0.1	<0 05	<0.1	**0.3**	**0.1**	<0 0010	<0.1	**2.7**	<GILs; <ADWG; <TCLP1
	SP02/1	8/05/2019	<0.1	<0 05	<0.1	<0.1	<0.1	<0 0010	<0.1	**0.8**	<GILs; <ADWG; <TCLP1
	SP02/2	8/05/2019	<0.1	<0 05	<0.1	**1.7**	**44.2**	<0 0010	<0.1	**2.3**	<GILs; **>ADWG >TCLP2**
	SP02/3	8/05/2019	<0.1	<0 05	<0.1	<0.1	**0.1**	<0 0010	<0.1	**0.7**	<GILs; <ADWG; <TCLP1

[A] **Investigation levels apply to typical slightly-moderately disturbed systems. Trigger Levels for 95% of species. See ANZECC & ARMCANZ (2000) for guidance on applying these levels to different ecosystem conditions.**

[C] **Investigation levels are taken from the health values of the Australian Drinking Water Guidelines (NHMRC 2018).**

Table 15: Summary of Relative Percent Differences (RPD) in Soil Samples

Analyte	*LOR*	TP08/0.5	ZP/0.5	RPD %	TP8/0.5 Intra Lab Duplicate	RPD %	Acceptable	*LOR*	TP13/0.6	XP/0.6	RPD %	NA	RPD %	Acceptable
Arsenic	5	**6**	<5	18%	**5**	18%	PASS	5	<5	**6**	18%	-	-	PASS
Cadmium	1	<1	<1	0%	<0.4	<LOR	PASS	1	<1	<1	0%	-	-	PASS
Chromium	2	**10**	**10**	0%	**10**	0%	PASS	2	**12**	**14**	15%	-	-	PASS
Copper	5	**19**	**17**	11%	**17**	11%	PASS	5	**16**	**17**	6%	-	-	PASS
Lead	5	**42**	**24**	55%	**23**	58%	<5xLOR=PASS	5	**17**	**20**	16%	-	-	PASS
Mercury	0.1	<0.1	<0.1	0%	<0.1	0%	PASS	0.1	<0.1	<0.1	0%	-	-	PASS
Nickel	2	**7**	**7**	0%	**7**	0%	PASS	2	**13**	**14**	7%	-	-	PASS
Zinc	5	**42**	**41**	2%	**44**	5%	PASS	5	**52**	**46**	12%	-	-	PASS
F1 TRH C6-C10	10	<10	<10	0%	<25	<LOR	PASS	10	<10	<10	0%	-	-	PASS
F2 TRH C10-C16	50	<50	<50	0%	<50	<LOR	PASS	50	<50	<50	0%	-	-	PASS
F3 TRH C16-C34	100	<100	<100	0%	<100	<LOR	PASS	100	<100	<100	0%	-	-	PASS
F4 TRH C34-C40	100	<100	<100	0%	<100	<LOR	PASS	100	<100	<100	0%	-	-	PASS
Total PAHs	100	<0 5	<0.5	0%	<0.05	<LOR	PASS	100	<0.5	<0 5	0%	-	-	PASS

Analyte	*LOR*	TP24/0.5	TPX/0.5	RPD %	TP24/0.5 Intra Lab Duplicate	RPD %	Acceptable	*LOR*	TP37/0.5	TPY/0.5	RPD %	TP37/0.5 Intra Lab Duplicate	RPD %	Acceptable
Arsenic	5	<5	<5	0%	<4	<LOR	PASS	5	<5	<5	0%	<4	<LOR	PASS
Cadmium	1	<1	<1	0%	<0.4	<LOR	PASS	1	<1	<1	0%	<0.4	<LOR	PASS
Chromium	2	**8**	**8**	0%	**8**	0%	PASS	2	**13**	**17**	27%	**13**	0%	PASS
Copper	5	**15**	**16**	6%	**15**	0%	PASS	5	**9**	**14**	43%	**10**	11%	PASS
Lead	5	**8**	**7**	13%	**7**	13%	PASS	5	**11**	**14**	24%	**11**	0%	PASS
Mercury	0.1	<0.1	<0.1	0%	<0.1	<LOR	PASS	0.1	<0.1	<0.1	0%	<0.1	<LOR	PASS
Nickel	2	<2	<2	0%	**2**	0%	PASS	2	**4**	**5**	22%	**4**	0%	PASS
Zinc	5	**19**	**21**	10%	**18**	5%	PASS	5	**41**	**68**	50%	**50**	20%	PASS
F1 TRH C6-C10	10	<10	<10	0%	<25	<LOR	PASS	10	<10	<10	0%	<25	<LOR	PASS
F2 TRH C10-C16	50	<50	<50	0%	<50	<LOR	PASS	50	<50	<50	0%	<50	<LOR	PASS
F3 TRH C16-C34	100	<100	<100	0%	<100	<LOR	PASS	100	<100	<100	0%	<100	<LOR	PASS
F4 TRH C34-C40	100	<100	<100	0%	<100	<LOR	PASS	100	<100	<100	0%	<100	<LOR	PASS
Total PAHs	100	<0 5	<0.5	0%	<0.05	<LOR	PASS	100	<0.5	<0 5	0%	<0 05	<LOR	PASS

Analyte	*LOR*	TP42/0.3	TPX/0.3	RPD %	TP42/0.3 Intra Lab Duplicate	RPD %	Acceptable	*LOR*	-	-	RPD %	-	RPD %	Acceptable
Arsenic	5	**7**	**6**	15%	**4**	55%	<5xLOR=PASS	5						
Cadmium	1	<1	<1	0%	**0.5**	0%	PASS	1						
Chromium	2	**14**	**15**	7%	**20**	35%	PASS	2						
Copper	5	**51**	**52**	2%	**41**	22%	PASS	5						
Lead	5	**69**	**61**	12%	**46**	40%	PASS	5						
Mercury	0.1	<0.1	<0.1	0%	<0.1	<LOR	PASS	0.1						
Nickel	2	**10**	**7**	35%	**4**	86%	<5xLOR=PASS	2						
Zinc	5	**88**	**95**	8%	**66**	29%	PASS	5						
F1 TRH C6-C10	10	<10	<10	0%	<25	<LOR	PASS	10						
F2 TRH C10-C16	50	<50	<50	0%	<50	<LOR	PASS	50						
F3 TRH C16-C34	100	**100**	<100	0%	<100	<LOR	PASS	100						
F4 TRH C34-C40	100	<100	<100	0%	<100	<LOR	PASS	100						
Total PAHs	100	<0 5	<0.5	0%	<0.05	<LOR	PASS	100						

RPD Calculation Method = $\frac{D1-D2}{(D1+D2)/2}$ **x 100**

Acceptance criteria for Inorganics RPD<30%
Acceptance criteria for Organics RPD<50%
Results below detection limit were assumed to be equal to the PQL for RPD calculations
Results above the acceptance criteria were assessed to be disregarded if results were <5 x the Laboratory LOR or PQL

Table 13: Asbestos in Soil Validation Results against Site Assessment Criteria (SAC)

Form of Asbestos	Health Screening Level (w/w)			
	Residential A[1]	Residential B[2]	Recreational C[3]	Commercial/ Industrial D[4]
Bonded ACM	0.01%	0.04%	0.02%	0.05%
FA and AF (friable asbestos)	0.001%			
All forms of asbestos	No visible asbestos for surface soil			

Sample ID	Date	NATA Accredited Laboratory Results
Fence 01	20/09/2019	*No Asbestos Detected in Soil Validation Sample*
Fence 02	20/09/2019	*No Asbestos Detected in Soil Validation Sample*
Fence 03	20/09/2019	*No Asbestos Detected in Soil Validation Sample*
West Cut (south)	20/09/2019	*No Asbestos Detected in Soil Validation Sample*
Cut 1/CC03/S1	27/09/2019	*No Asbestos Detected in Soil Validation Sample*
Cut 1/CC03/S2	27/09/2019	*No Asbestos Detected in Soil Validation Sample*
Cut 1/CC03/S3	27/09/2019	*No Asbestos Detected in Soil Validation Sample*
Cut 1/V2/ASBINS	1/10/2019	*No Asbestos Detected in Soil Validation Sample*
Cut 1/V7/ASBINS	1/10/2019	*No Asbestos Detected in Soil Validation Sample*
Cut 1/V11/ASBINS	1/10/2019	*No Asbestos Detected in Soil Validation Sample*
Cut 1/V12/ASBINS	1/10/2019	*No Asbestos Detected in Soil Validation Sample*

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Table 13: Total Concentration Results - Soil
Fulton Hogan: Cut #1 - Validation of Heavily Contaminated Area

Analyte			Organochlorine Pesticides (OCP)					Total PCB's	Organophosphate Pesticides (OPP)	Total Phenols	VOCs												BTEX					Total Recoverable Hydrocarbons							Polycyclic Aromatic Hydrocarbons (PAHs)				Metals / Metalloids								Asbestos		< ASC NEPM Suitability for Re-Use On Site
			Aldrin	Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor				Monocyclic Aromatic Hydrocarbons	Oxygenated Compounds	Halogenated Aliphatic Compounds	Halogenated Aromatic Compounds	Trihalomethanes	Total Phthalates (Plasticisers)	Nitrosamines	Nitroaromatics and Ketones	Haloethers	Chlorinated Hydrocarbons	Anilines and Benzidines	Chlorinated Hydrocarbons	Benzene	Toluene	Ethyl benzene	m+p-Xylene	o-Xylene	TRH C6-C9	TRH C10-C36	F1 TRH C6-C10	F2 TRH C10-C16	F3 TRH C16-C34	F4 TRH C34-C40	Total TRH C10-C40	Naphthalene	Benzo(a)pyrene	Benzo(a)pyrene TEQ	Total Positive PAHs	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	FA & AF (Friable Asbestos)	Bonded ACM	
Site Assessment Criteria - NEPM (2013) Soil Investigation Levels (mg/Kg)																																														
HIL 'D' (Industrial / Commercial)			45	45	530	3600	50	1	-	240000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	4000	3000	900	3600	240000	1500	730	6000	35000			
HSL 'D'	SAND	0-1m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	NL	NL	230	230	-	-	260	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		1-2m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	NL	NL	NL	NL	-	-	370	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		2-4m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	NL	NL	NL	NL	-	-	630	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		>4m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	NL	NL	NL	NL	-	-	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	SILT	0-1m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	NL	NL	NL	NL	-	-	250	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		1-2m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	NL	NL	NL	NL	-	-	360	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		2-4m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	NL	NL	NL	NL	-	-	590	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		>4m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	NL	NL	NL	NL	-	-	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001%	0.05%	
	CLAY	0-1m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	NL	NL	NL	NL	-	-	310	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		1-2m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	NL	NL	NL	NL	-	-	480	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		2-4m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	NL	NL	NL	NL	-	-	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		>4m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	NL	NL	NL	NL	-	-	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Management Limits (Industrial / Commercial)		Coarse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700	1000	3500	10000	-	-	-	-	-	-	-	-	-	-			
		Fine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800	1000	5000	10000	-	-	-	-	-	-	-	-	-	-			
EIL/ESL (Industrial/ Commercial)		Coarse	-	-	-	640	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75	135	165	180	180	-	-	215	215	1700	3300	-	370	3	-	-	160	-	-	1200(pH8)	1800	-	-	-			
		Fine	-	-	-	640	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	95	135	185	95	95	-	-	170	170	2500	6600	-	370	3	-	-	160	-	-	1200(pH8)	1800	-	-	-			
CRC Care (2011) HSL D (Direct Contact)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	430	99000	27000	81000	81000	-	-	26000	20000	27000	38000	-	11000	-	-	-	-	-	-	-	-	-	-	-			
CRC Care (2011) Intrusive Work (Direct Conact)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1100	120000	85000	130000	130000	-	-	82000	62000	85000	120000	-	29000	-	-	-	-	-	-	-	-	-	-	-			
Dutch (2000) Target Value (Soil)			6E-05	5E-04	3E-05	0.01	7E-04	-	0.02	0.05	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	0.03	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	1	29	0.8	100	36	85	0.3	35	140	-	zero	
Dutch (2000) Intervention Value (Soil)			-	-	5	4	4	-	1	40	-	-	-	-	-	60	-	-	-	-	-	-	1	130	50	25	25	60	60	60	60	60	60	60	-	-	-	40	29	0.8	100	36	85	0.3	35	140	-	10mg/kg	
Total Concentrations - PQL			0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5	10	50	10	50	100	100	50	0.05	0.05	0.05	0.05	5	1	2.0	5	5	0.1	2	5	0.001		
Area	ID (m)	Depth (m)	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	% w/w		
Area Location Description (Group as required)	Cut 1/V1	0.1	30/09/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**9**	**16**	**22**	<0.1	<2	**25**	No Asbestos Observed		
	Dup1/1.5	0.1	30/09/2019	----	----	----	----	----		----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**13**	**89**	**12**	<0.1	**6**	**39**			
	Cut 1/V2	0.1	30/09/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**6**	**10**	<5	<0.1	<2	**11**	No Asbestos Detected		
	Cut 1/V3	0.1	30/09/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**10**	**15**	**8**	<0.1	**2**	**22**			
	Cut 1/V4	0.1	1/10/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**10**	**15**	**12**	<0.1	**3**	**33**			
	Cut 1/V5	0.1	1/10/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	**0.6**	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**170**	<10	<50	**210**	<100	**210**	<0.5	<0.5	**1.2**	<0.5	**5**	**2**	**14**	**96**	**164**	<0.1	**16**	**297**	No Asbestos Observed		
	Cut 1/V6	0.1	1/10/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**20**	**34**	**29**	<0.1	**10**	**61**			
	Cut 1/V7	0.1	1/10/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	**0.1**	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**150**	<10	<50	**190**	<100	**190**	<0.5	<0.5	**1.2**	<0.5	**10**	**5**	**21**	**285**	**574**	<0.1	**76**	**1070**	No Asbestos Detected		
	Cut 1/V8	0.1	1/10/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**8**	**11**	**9**	<0.1	<2	**18**			
	Cut 1/V9	0.1	1/10/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	**5**	<1	**9**	**10**	<5	<0.1	<2	**15**	No Asbestos Observed		
	Cut 1/V10	0.1	1/10/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**9**	**8**	**7**	<0.1	<2	**12**			
	Cut 1/V11	0.1	1/10/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**13**	**9**	**7**	<0.1	**2**	**23**	No Asbestos Detected		
	Cut 1/Dup 2	0.1	1/10/2019	----	----	----	----	----		----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	**6**	<1	**11**	**9**	**10**	<0.1	**3**	**21**	No Asbestos Observed		
	Cut1/V12	0.1	1/10/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<2.5	<1.0	<2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	**8**	<1	**48**	**128**	**44**	<0.1	**20**	**158**	No Asbestos Detected		
95% Upper Confidence Limit Calculations (mg/Kg)																																															
Number of samples			12	12	12	12	12	14	12	12	7	7	7	7	7	7	7	7	7	7	7	7	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	-	-	
Maximum			0.03	0.03	0.03	0.03	0.03	0.10	0.60	0.25	0.25	2.50	2.50	0.25	0.25	0.25	0.50	0.50	0.25	1.25	0.50	1.25	0.10	0.25	0.25	0.25	0.25	5.0	170	5.0	25	210	50	210	0.25	0.25	1.20	0.25	10.0	5.0	48.0	285	574.00	0.05	76.00	1070.00	-	-	
Minimum			0.03	0.03	0.03	0.03	0.03	0.00	0.05	0.25	0.25	2.50	2.50	0.25	0.25	0.25	0.50	0.50	0.25	1.25	0.50	1.25	0.10	0.25	0.25	0.25	0.25	5.0	25	5.0	25	50	50	25	0.25	0.25	1.20	0.25	2.50	0.50	6.0	8.0	2.5	0.05	1.0	11.0	-	-	
Standard deviation			0.00	0.00	0.00	0.00	0.00	0.04	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.18	0.00	0	55	0	64	0.00	0.00	0.00	0.00	2.45	1.24	10.59	77.74	152.42	0.00	19.88	282.10	-	-	
Coefficient of Variation			0.00	0.00	0.00	0.00	0.00	0.42	1.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11	0.00	0.0	0.8	0.0	1.3	0.00	0.00	0.00	0.00	0.61	1.33	0.74	1.48	2.36	0.00	1.95	2.19	--	-	
t statistic at a=0.05			1.80	1.80	1.80	1.80	1.80	1.77	1.80	1.80	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.77	1.77	1.77	1.77	1.77	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	-	-	
Average			0.03	0.03	0.03	0.03	0.03	0.09	0.10	0.25	0.25	2.50	2.50	0.25	0.25	0.25	0.50	0.50	0.25	1.25	0.50	1.25	0.10	0.25	0.25	0.25	0.25	5	44	5	25	71	50	50	0.25	0.25	1.20	0.25	4.04	0.93	14.36	52.50	64.50	0.05	10.21	128.93	-	-	
95% UCL average			**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.10**	**0.18**	**0.25**	**0.25**	**2.50**	**2.50**	**0.25**	**0.25**	**0.25**	**0.50**	**0.50**	**0.25**	**1.25**	**0.50**	**1.25**	**0.10**	**0.25**	**0.25**	**0.25**	**0.25**	**5.0**	**68**	**5.0**	**25**	**97**	**50**	**80**	**0.25**	**0.25**	**1.20**	**0.25**	**5.2**	**1.5**	**19.4**	**89.3**	**136.6**	**0.1**	**19.6**	**262.4**	No Asbestos Detected		

Notes: Basis for NEPM (2013) ESL for B(a)P has been rescindered. Recommend application of HSL 'A' 3 mg/kg pending publication of updated ESL.