132/11 kV Zone Substation

Review of Environmental Factors

Endeavour Energy

1 March 2026

→ The Power of Commitment

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GHD Pty Ltd | ABN 39 008 488 373

Level 15, 133 Castlereagh Street

Sydney, NSW 2000, Australia

T +61 2 9239 7100 | **E** sydmail@ghd.com | **ghd.com**

Executive summary

Endeavour Energy (EE) propose to construct a new 132/11 Kilovolt (kV) Zone Substation and install and operate a new 132 kV underground transmission feeder running between the new substation and the Orana Park and Bringelly Zone Substations (the project).

The Oran Park Zone Substation is currently supplying the area however is reaching its capacity to accommodate growing residential development. Without additional infrastructure, this could lead to power shortages and prevent new customers from connecting to the network. To meet future demand, the project would support new developments, particularly in the Maryland precinct, where significant electricity capacity will be needed by 2034. The area, part of Sydney's Southwest Priority Growth Area, is expected to see around 40,000 new homes by 2050, along with schools, shops, and businesses.

This Review of Environmental Factors (REF) details the possible environmental impacts and identifies mitigating measures to be incorporated into the design, construction and operation of the proposal to minimise environmental impacts.

EE is the Determining Authority for these works. The works are subject to the provisions of The Code of Practice (The Code) for Authorised Network Operators (ANO), State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) and require assessment and approval under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

No significant environmental constraints to the project were identified by the assessment process and GHD has concluded that there are no aspects of this project that have the potential to lead to, or result in, significant adverse impacts on the environment.

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Decision statement

This REF concludes that:

The project is not likely to have a significant impact on the environment and accordingly, an Environmental Impact Statement (EIS) is not required.

The project will not be carried out in an area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities or their habitats or impact biodiversity and a Species Impact Statement is not required.

The project is not likely to significantly impact on a matter of national environmental significance or the environment of Commonwealth land and a referral to the Australian Government Department of Agriculture, Water and Environment is therefore not required under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Provided the mitigation measures identified in Chapter 6 and 7 of this REF are included in the Environmental Management Plan (EMP), the proposed activity is unlikely to significantly affect the environment.

Certification

I certify that I have reviewed and endorsed the contents of this REF document and, to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines for Division 5.1 Assessments approved under clause 170 of the EP&A Regulation, and the information it contains is neither false or misleading. This is a determination that the project as assessed in this REF meets the requirements under Part 5 of the EP&A Act.

Prepared by	Endorsed by	Determined by
T Holmes	Endeavour Energy	Endeavour Energy

1. Introduction

1.1 Project overview

Endeavour Energy (EE) propose to construct a new 132/11 Kilovolt (kV) Zone Substation and install and operate a new 132 kV underground transmission feeder running between the new substation and the Orana Park and Bringelly Zone Substations (the project).

Key features of the project include:

– construction of 132/11 kV Zone Substation
– construction of 132 kV underground transmission feeder
– trenching in kerbside roadway lanes
– underboring
– laying and jointing of conduits
– installation of a concrete joint bay
– hauling of cables through conduits
– backfilling of trenches and joint bays
– reinstatement of pavement and other surfaces.

This review of environmental factors (REF) has been prepared by GHD Pty Ltd (GHD) on behalf of EE to assess potential environmental impacts associated with the project. The REF has been developed in accordance with Section 171 of the NSW Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) with consideration of measures that would be implemented to avoid or minimise the potential for environmental impacts as a result of construction and operation of the project.

This REF is based on a desktop review of potential environmental sensitives at the site, a site visit undertaken by GHD, technical assessment reports and other relevant project documentation provided by EE.

1.2 Location of the study area

The project is located in the Camden City local government area (LGA) within the suburbs of Oran Park and Bringelly, in Western Sydney. The location is approximately seven kilometres (km) north of the City of Camden central business district.

The study area includes land within the future Maryland Precinct within Lot 99 DP 1302677 and The Northern Road corridor, which is a State Road between Maryland Link Roads 2 and 3.

From the new substation, the proposed feeders would be underbored to the eastern side of The Northern Road and would then run north to the Bringelly Zone Station and south to the Orana Park Zone Substation within The Northern Road corridor.

The location of the project is outlined on Figure 3.1.

1.3 The proponent

Endeavour Energy is an Authorised Network Operator (ANO) under the Electricity Network Assets (Authorised Transactions) Act 2015, and as such is a determining authority for the purpose of section 5.6 of the EP&A Act. Accordingly, Endeavour Energy is the proponent and determining authority for this proposal. Purpose of this report

For an activity subject to Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), Section 5.5 imposes a duty on a determining authority to ‘examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity’. Determining authorities make a determination about whether a project can proceed, and on what basis.

The purpose of this REF is to summarise the results of the environmental impact assessment for the project and provide information about the project. In summary, the REF will assist EE, to undertake the following:

- determine whether the project should be approved, taking into account to the fullest extent possible all matters affecting or likely to affect the environment
- determine the significance of any impact on threatened species as defined by the *Biodiversity Conservation Act 2016* (BC Act) and/or *Fisheries Management Act 1994* (FM Act), in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- determine the potential for the project to significantly impact any other matters of national environmental significance or Commonwealth land, and the need to make a referral to the Australian Government Department of Climate Change, Energy, the Environment and Water for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- develop appropriate conditions (based on the safeguards and management measures in the REF) to be attached to any approval granted.

Section 171 of the Environmental Planning and Assessment Regulation 2021 (the Regulation) lists, for the purposes of Part 5 of the EP&A Act, the factors to be taken into account when considering the likely impact of an activity on the environment. Section 6 considers the potential impacts of the project against these factors.

2. Project justification

2.1 Project design requirements

Based on the identified constraints at the project site and the context within which the project is to be carried out, the following factors have been identified as key to meeting the project objectives:

– Supply security – ensuring that customers power supply in accordance with EE's obligations under the *Electricity Supply Act 1995* is met
– Environmental impacts – ensuring that any proposed works result in as little impact on the environment as possible
– Technical suitability – all relevant design standards must be met.

These requirements were considered as part of the options assessment in determining the preferred development option.

2.2 Project need

The area is currently supplied by Oran Park Zone Substation (ZS), which has a total capacity of 90 megavolt ampere (MVA) and a firm capacity of 45 MVA. The largely residential densification of the area will result in load at risk from 2024, when the firm capacity of Oran Park ZS is exceeded. From then, there will be a large amount of load at risk and ultimately sustained involuntary load shedding. This will result in customers not being able to connect to the network, which contravenes EE's obligation to provide connection services. As such, the project is required to service future customers in the areas surrounding the Oran Park ZS, in particular the Maryland development precinct with a load of 53 mega volt-amperes (MVA) needed to be achieved within the Lowes Creek catchment alone by 2034.

The planned development precincts of Oran Park Town Centre, Lowes Creek Maryland's, Pondicherry, and South Creek West (Precincts 1-5), are located in Sydney's Southwest Priority Growth Area, within the Camden LGA. These precincts will ultimately account for approximately 40,000 new residential dwellings by 2050 and will also include ancillary loads consisting of town centres, schools, community facilities, and future commercial and industrial spaces.

Based on information received, the precincts of Oran Park, Lowes Creek Marylands, Pondicherry, and two of the five South Creek West precincts, known as Greenways (4) and Cobbity South Creek West (5), will account for 20,500 additional lots by 2050. These precincts are expected to require approximately 172 MVA capacity by 2050 and will ultimately require supply via two 90 MVA firm zone substations.

2.3 Consideration of alternatives

2.3.1 Feasibility assessment

A sub-transmission feeder route feasibility assessment was completed by EE on 28 March 2024 responding to the identified need for network upgrades.

The assessment considered identification of options (including preferred option) for the feasibility assessment which are summarised in Table 2.1.

Table 2.1 Summary of options considerations

Description	Solution type	Value ($ Million)	Assessment	Rank
Establish Lowes Creek Zone Substation with x2 132 kV/11kV and 45 MVA transformer in 2027 (outdoor)	Network	3.86	Greatest net benefits preferred long term option	1

Description	Solution type	Value ($ Million)	Assessment	Rank
Establish Lowes Creek Zone Substation with x2 132 kV/11kV and 45 MVA transformer in 2027 (indoor)	Network	3.81	Technically feasible, lower net benefits	2
Install 3rd transformer at Oran Park Zone Substation in 2027 and install 1 x 132/11 kV 45 MVA transformer at Lowes Creek Zone Substation in 2032	Network	1.86	Technically feasible, lower net benefits	3

3. Project description

3.1 Overview

Endeavour Energy (EE) propose to construct a new 132/11 kilovolt (kV) Zone Substation and install and operate a new 132 kV underground transmission feeder running between the new substation and the Orana Park and Bringelly Zone Substations.

The total length of the feeder would be approximately 1.05 kilometres (km). The majority of the route would be beneath the Northern Road Reserve adjacent to existing 132 kV overhead transmission infrastructure.

The transmission route would be installed primarily via open trenching in The Northern Road reserve. The remaining section the route beneath (approximately 10%) would be installed using horizontal directional drilling (HDD) methods beneath The Northern Road corridor.

The route of the permanent feeder and location of the new substation is shown within the disturbance footprint known as the project site on Figure 3.1.

The substation would consist of the following major equipment:

– 1 x 11/0.415 kV outdoor padmount substation
– 1 x relay room
– 1 x substation building, comprising the following:
  - 132 kV switch room with 1 x 132 kV gas insulated switchgear
  - 11 kV switch room with 3 x 11 kV switchgear
  - 2 x 45 mega volt-amperes (MVA) power transformers
  - 2 x protection and control rooms with the corresponding protection and controls equipment
  - amenities room.

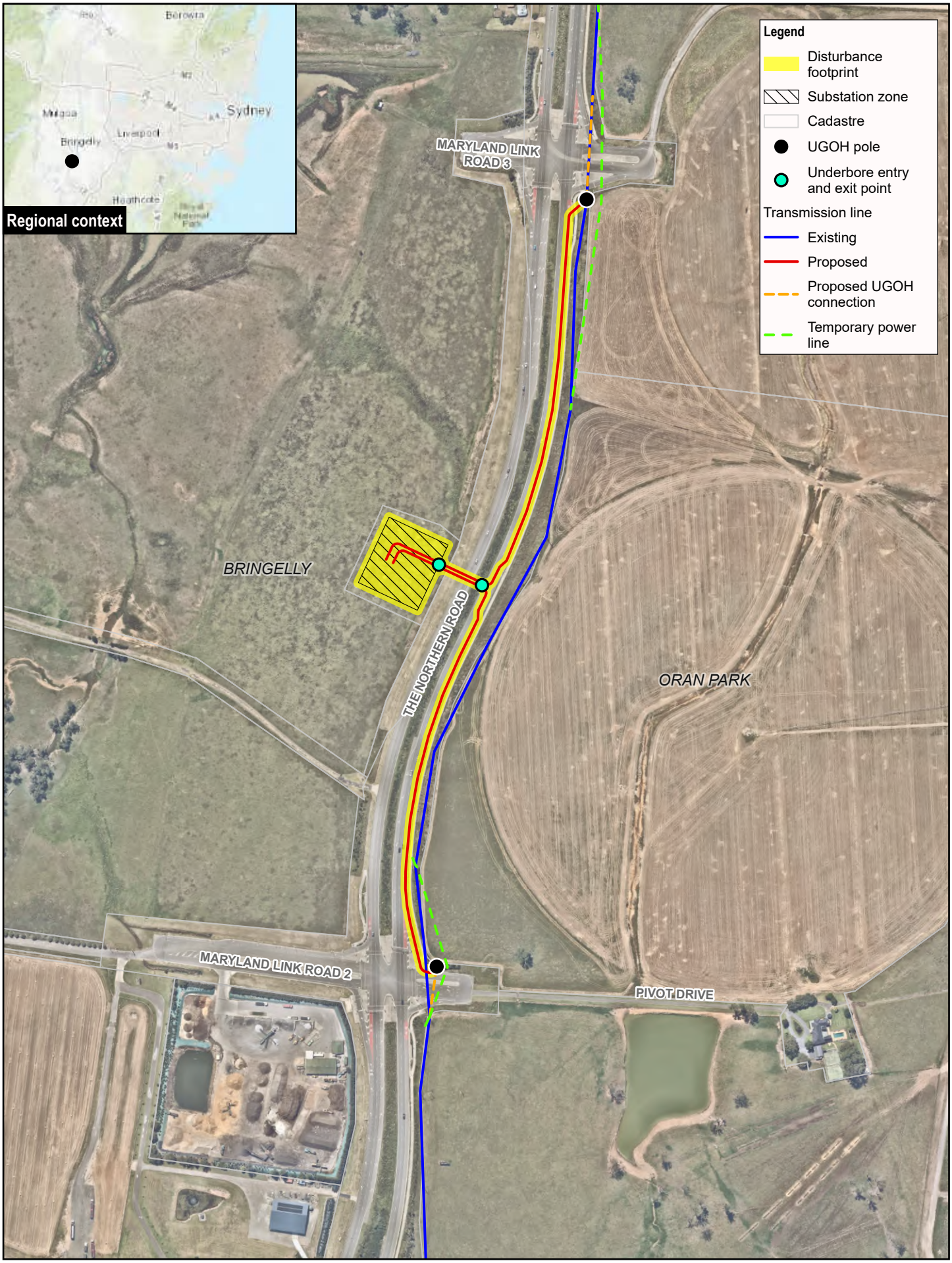
Construction of the project would involve:

– site establishment, including construction of laydown areas
– boring the feeder between HDD entry/exit pits under The Northern Road
– trenching sections of the feeder in locations where underboring is not required
– construction and assembly of the substation
– commissioning and operation of the new infrastructure.

The majority of construction works for the substation would be undertaken during standard construction hours as defined in the *Interim Construction Noise Guideline* (DECC 2009).

Night works would be required for the installation of the 132 kV feeder within The Northern Road corridor.

Subject to receipt of planning approvals, it is anticipated that construction could commence mid 2026 with commissioning of the new infrastructure in the third quarter of 2029.



Paper Size ISO A4

0 50 100 150 200

Metres

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

Endeavour Energy
132/11 kV Lowes Creek Zone Substation

Project No. **12641966**
Revision No. **A**
Date **26/02/2025**

Project layout

FIGURE 3.1

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Data source: Imagery - Nearmap: World Topographic Map: Esri, HERE, Garmin, FAO, USGS, NGA; General topographic data - NSWSS, 2024. Created by: pfernandes

3.2 Construction methodology

3.2.1 Horizontal directional drilling

The proposed methodology for HDD includes:

- Establish site facilities, material storage and stockpile locations
- Install temporary fencing to secure work and storage areas
- Locate HDD rig, fluid delivery system, and down hole tooling and drill rods in fenced area
- Excavate entry hole and exit pits
- Underbore pilot hole from entry to exit
- Enlarge pilot hole to full diameter to accommodate high-density polyethylene underbore pipe. Several passes may be required
- Deliver and offload underbore pipe
- Pull pipe through underbore
- Pull rope with mandrel attached through each of the conduits at the underbore entry and exit pits to prove they are fit for installation of transmission cables.

The typical underbore cross section is described in Figure 3.2.

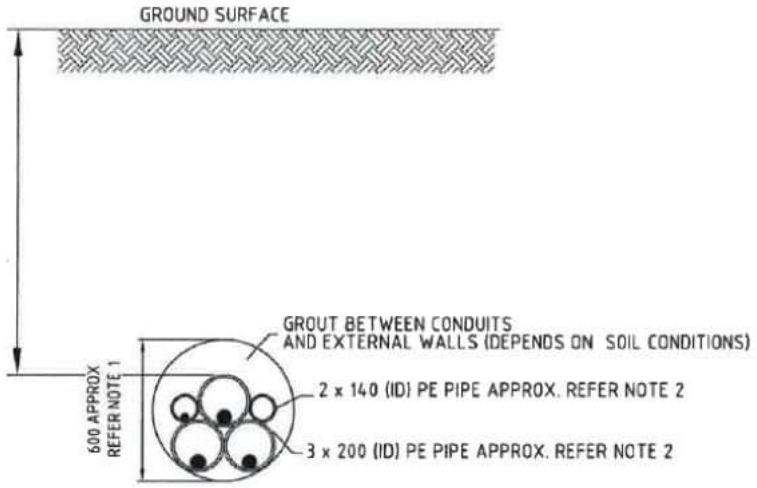

Figure 3.2 Typical underbore cross section (Endeavour Energy, 2022)

3.2.2 Open trenching

The proposed methodology for open trenching includes:

- Establish site facilities, material storage and stockpile locations
- Remove road surface or grass cover
- Excavate trenches to 0.9 m width and 1.2 m depth (approximately)
- Stockpile suitable backfill material if permitted and remove remaining excavated material from site
- Install conduits and backfill
- Restore road surface or seed/returf as applicable
- Road plates to be installed over open points at each end of the excavation
- Install jet line from end to end of completed conduit installation to facilitate pulling of cables.

It is estimated that approximately 1.080 m^3 of spoil would be generated through trenching construction works. This spoil would be disposed of at a facility approved to receive this material. Typical trenching offsets and detail within a roadway are described in Figure 3.3 and Figure 3.4.

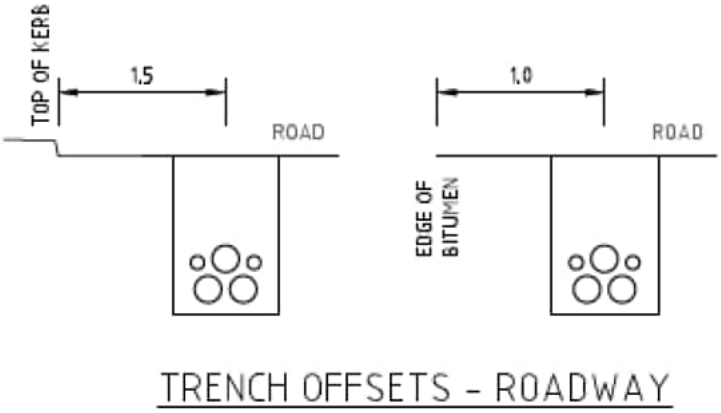

Figure 3.3 Typical trench offsets within a roadway (Endeavour Energy, 2022)

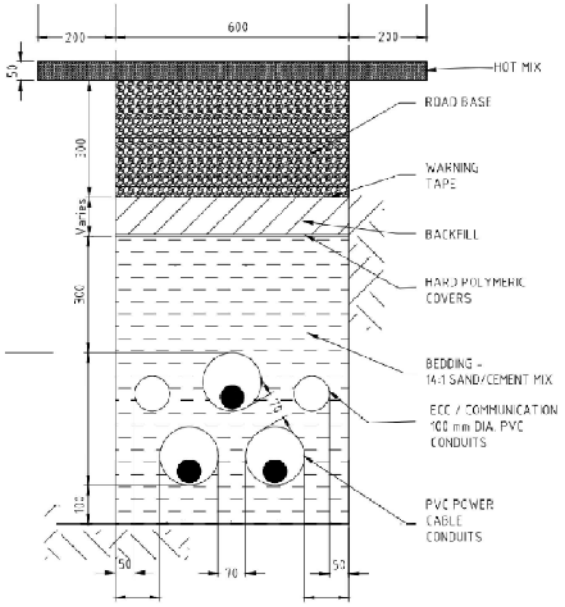

Figure 3.4 Typical trench detail within a roadway (Endeavour Energy, 2022)

3.2.3 132/ 11kV substation

The proposed methodology for the substation works includes:

- Site establishment, install builders site and amenities including site office
- Excavation works within transformer bay
- Install support structures for transformers, i.e. concrete foundation, steelwork and steel column supports
- Excavate trench and install 11kV conduits
- Backfill and restore surface
- Install two new 45 MVA power transformers using 220 tonne and 25 tonne cranes
- Connect, test and commission transformers.

Approximate bulk earthwork volumes are described in Table 3.1. Spoil would be disposed of at a facility approved to receive this material.

Table 3.1 Estimated earthwork volumes (substation)

Earthworks	Total
Total cut	1,433 m^3
Total fill	386 m^3
Net total	**1,047 m^3 fill**

Upon completion of trenching and HDD construction works, 132 kV feeder cables would be progressively pulled through conduits by cable pulling winches set up at the substation. All open pits would then be suitably backfilled.

3.3 Timing, duration, hours of work

3.3.1 Program

Construction works for the project are anticipated to commence in mid-2026 and be completed in 2029, with commissioning in May 2028. The project program is subject to all approvals being received.

The estimated timing and duration of the proposed activities are as follows:

– substation construction is expected to take approximately six months
– trenching is expected to progress at 20-30 m per day, taking approximately six weeks
– the underbore of The Northern Road is expected to take a total of two weeks to complete
– this would be followed by cable pulling and jointing which would occur for approximately another two weeks once the conduits are installed.

The overall duration of the project would be confirmed with the selected contractor and their preferred construction methodologies.

3.3.2 Hours of work

The project would be undertaken during the recommended standard hours detailed in *the Interim Construction Noise Guideline* (DECC 2009) as follows:

– Monday to Friday 7am to 6pm
– Saturday 7am to 1pm
– No work Sundays or public holidays.

The majority of proposed works including HDD would be carried out during standard working hours.

At times, out of hours work may be required to minimise traffic impacts on The Northern Road. The process for undertaking out of hours works would be followed as described in the Endeavour Energy Environmental Guidelines Handbook. Appropriate internal and external approvals would be obtained where required prior to any out of hours works being carried out.

Should any longer than two nights of out of hours work be required, the construction manager would apply to Endeavour Energy Environmental Services Team to progress approval for those works.

3.4 General construction information

3.4.1 Plant and equipment

Plant and equipment proposed to be used for each stage of construction works are outlined in Table 3.2.

Table 3.2 Plant and equipment requirements

Stage of work	Plant and equipment
132/11 kV Substation	– Tilt tray

Stage of work	Plant and equipment
	– Heavy rigid truck with crane – Demolition saw – 5 tonne excavator – Non-destructive examination truck – 10 tonne excavator – 25 tonne crane – 220 tonne crane – Flatbed truck – Tipper – Asphalt truck – Low loader – Cable winch – Pantech truck
Trenching	– Tilt tray – Demolition saw – 5 tonne excavator – 10 tonne excavator – Tip truck – Asphalt truck – 12 tonne Franna crane – Pneumatic pump
HDD	– Heavy rigid truck with crane – 3 x semi-trailers – 5 tonne excavator – HDD rig – Fluid delivery system – Drill rods and down hole tooling – Vacuum truck

3.4.2 Construction workforce

The construction workforce is expected to comprise of up to 20 personnel at peak construction. The final number of construction workers would be confirmed by the construction contractor during construction planning.

3.4.3 Construction traffic and access

Construction access

Access to the project site would be via the existing State and local roads adjacent to the project site, including:

– The Northern Road

– Maryland Link Road 3 (access would be provided by the developer).

Construction traffic

It is estimated that on average up to five light vehicles and four heavy vehicles would be used to access various areas of the project site during each day of construction, as detailed in Table 3.3. Light vehicles would generally be for workers and heavy vehicles would be for delivering equipment and materials.

Table 3.3 Construction traffic volumes and frequency

Vehicle type	Quantity and frequency	Period	Total
Piling rig	1 / month	6-month period	6

Vehicle type	Quantity and frequency	Period	Total
48 foot flat deck	2 / month	12-month period	24
15 tonne tipper truck	25 / month	5-month period	75
Concrete truck	20 / month	3-month period	60
Light car/ truck	100 / month or 5 per day	Full construction period	2,200

Traffic management

Specific Traffic Management Control Plans are to be developed for works undertaken near roads in accordance with the Australian Standard 1742.3-2002: *Manual of Uniform Traffic Control Devices* and the NSW Roads and Maritime Services *QA Specification G10 "Traffic Control at Worksites", Version 4*. For short periods of time during construction, traffic on The Northern Road may be restricted to one lane.

3.4.4 Ancillary facilities

The substation site would accommodate laydown of equipment and materials and parking of construction vehicles. No ancillary facilities are proposed outside of the disturbance footprint. Access would be provided from Maryland Link Road 3.

3.5 Operation and maintenance

The substation would not be permanently occupied however would require regular maintenance. Anticipated workforce numbers would be a maximum of four personnel and two light vehicles attending the substation for one day per month for the operational life of the facility (approximately 30 years).

3.6 Easement requirements

The project is proposed to be undertaken within an existing transmission easement. It is not proposed to modify the existing easement. The project would also not impact upon Endeavour's ability to access the easement at any time with the works to ensure access to and along the easement is always available.

4. Statutory and planning context

4.1 Environmental planning

The Environmental Planning & Assessment Act 1979 (EP&A Act) provides the statutory planning context for environmental assessment and approval of works to be undertaken by an ANO. Endeavour Energy is an ANO.

The EP&A Act defines two approval processes depending on whether a project, or components of it, is considered an "Activity" (addressed under Part 5 of the EP&A Act) or a "Development" (addressed under Part 4 of the EP&A Act).

On 14 June 2017, Endeavour Energy was transacted and became an ANO. Endeavour Energy is now a privately managed network business, in accordance with the *Electricity Networks Assets* (Authorised Transactions) *Act 2015* and is subject to the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation).

The NSW Government has prescribed the ANOs as "Prescribed Determining Authorities" for the purposes of Part 5 Section 5.6 of the EP&A Act and the definition of "public authority" under Section 4(1) of that Act. This prescription allows an ANO to be a Part 5 Determining Authority for the purposes of an electricity transmission or distribution network.

While Part 5 Activities do not require development consent under Part 4 of the EP&A Act, consideration of an Activity's environmental impact is required under Section 5.5 of that Act. This is accompanied by Section 5.7, which requires an EIS to be prepared if an Activity is likely to significantly affect the environment.

Section 198(1)(c), in Division 6 of the EP&A Regulation outlines the types of activities this applies to:

– development for the purposes of the construction, maintenance or operation of a transacted electricity transmission or distribution network.
– geotechnical investigations relating to a transacted electricity transmission or distribution network.
– environmental management and pollution control relating to a transacted electricity transmission or distribution network.
– access for the purposes of the construction, maintenance or operation of a transacted electricity transmission or distribution network.
– temporary construction sites and storage areas, including temporary batching plants, the storage of plant and equipment and the stockpiling of excavated material.

As a Determining Authority, an ANO can assess and self-determine activities that are not likely to significantly affect the environment and are conducted for and on behalf of the ANO for the purposes of electricity transmission or distribution.

By virtue of an ANO's status under the Transport and Infrastructure SEPP, certain activities will be subject to Chapter 2, Part 2.3, *Division 5, Subdivision 1- Electricity Transmission or Distribution Networks* - of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP) for the purposes of development connected with electricity transmission or distribution.

These are outlined below:

Under "Clause 2.44 Development permitted without consent"

(1) "Development for the purpose of an electricity transmission or distribution network may be carried out by or on behalf of an electricity supply authority or public authority without consent on any land. However, such development may be carried out without consent on land reserved under the National Parks and Wildlife Act 1974 *only if the development— …*

The Transport and Infrastructure SEPP's definition of an "electricity transmission or distribution network" includes the following components:

(a) above or below ground electricity transmission or distribution lines (and related bridges, cables, conductors, conduits, poles, towers, trenches, tunnels, ventilation and access structures) …

(b) above or below ground electricity switching stations or electricity substations, feeder pillars or transformer housing, substation yards or substation buildings,

…

The aim of the Transport and Infrastructure SEPP, Chapter 2 Infrastructure is to facilitate the effective delivery of infrastructure across the State, through increased regulatory certainty, improved efficiency and flexibility in the location of infrastructure and service facilities, while still providing adequate stakeholder consultation.

Since development for the purpose of an electricity transmission or distribution network may be carried out by or on behalf of an electricity supply authority or public authority without consent on any land under the Transport and Infrastructure SEPP, a Review of Environmental Factors is required to satisfy Endeavour Energy's duty to consider environmental impacts under Section 5.5 of Division 5.1 of the EP&A Act.

4.2 Land use zoning

The project traverses the City of Camden local government area (LGA) and therefore the Camden Local Environmental Plan 2010 (Camden LEP) applies to the site. 'Public utility undertaking' is the relevant land use for the proposal, defined as follows in the Camden LEP:

public utility undertaking *means any of the following undertakings carried on or permitted to be carried on by or by authority of any Public Service agency or under the authority of or in pursuance of any Commonwealth or State Act—*

(a) railway, road transport, water transport, air transport, wharf or river undertakings,

(b) undertakings for the supply of water, hydraulic power, electricity or gas or the provision of sewerage or drainage services,

and a reference to a person carrying on a public utility undertaking includes a reference to a council, electricity supply authority, Public Service agency, corporation, firm or authority carrying on the undertaking.

The project traverses through the B5 Business Development and SP2 Infrastructure zone under the Camden LEP. 'Public utility undertaking' is prohibited in the SP2 zone and not provided for in the B5 Business Development Zone.

Clause 5.12 of the Camden LEP states that the Plan does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out with or without development consent, or that is exempt development, under Chapter 2 of the Transport and Infrastructure SEPP.

As outlined above, under section 2.44(1) of the Transport and Infrastructure SEPP, development for the purpose of an electricity transmission or distribution network may be carried out by or on behalf of an electricity supply authority or public authority without consent on any land. Endeavour Energy is a determining authority for the purposes of an electricity transmission or distribution network. The project is permitted without consent under the Transport and Infrastructure SEPP, the consent requirements of the LEP do not apply.

4.3 Electricity Supply Act 1995

The *Electricity Supply Act 1995* (Electricity Supply Act) defines Endeavour Energy's licencing requirements and provides a framework for the development and maintenance of electrical infrastructure. In summary, it allows Endeavour Energy to trim and remove trees, carry out works on public roads and acquire land. The Act also requires that works (other than routine repairs or maintenance works) must not be undertaken unless a minimum of 40 days' notice is supplied to the relevant local council. Any submission received must be considered by Endeavour Energy. Details of this consultation which has been undertaken is outlined in section 5.1.2.

4.4 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is the key piece of environmental protection and pollution control legislation in NSW. All work potentially resulting in pollution must comply with the POEO Act.

Electricity transmission is not listed as a scheduled activity under Schedule 1 of the POEO Act and therefore an Environment Protection Licence is not required for the project.

4.5 Roads Act 1993

The objects of the *Roads Act 1993* (Roads Act) are to govern the use and access to public roads, manage opening and closing of public roads, provide classification of roads, and identify the functions of road authorities. The Roads Act states that a road authority (which includes Transport) may carry out road work on any public road for which it is the relevant road authority and on any other land under its control (Division 1, Section 71). If the road is not under the control of the authority undertaking the works, then consent is required.

Section 138 of the Roads Act requires consent to be obtained from the appropriate road authority for works to:

– erect a structure or carry out a work in, on or over a public road
– dig up or disturb the surface of a public road
– remove or interfere with a structure, work or tree on a public road
– pump water into a public road from any land adjoining the road
– connect a road (whether public or private) to a classified road.

The project is in part located on a classified road that is managed by Transport (The Northern Road) and would affect local roads that are managed by Camden City Council. A Road Occupancy Licence would be required from Transport for NSW prior to any activity likely to impact on traffic flows.

4.6 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) seeks to conserve biological diversity at bioregional and State scales; to maintain the diversity and quality of ecosystems and enhance their capacity to adapt to change and provide for the needs of future generations; to assess the extinction risk of species and ecological communities and identify key threatening processes through an independent and rigorous scientific process; and to establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity.

The BC Act lists species, populations and ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats. If any of these could be impacted by the project, an assessment of significance that addresses the requirements of Section 7.3 of the BC Act must be completed to determine the significance of the impact.

The project is not expected to impact upon any species, populations or ecological communities listed under the BC Act as outlined in section 7.1.

4.7 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) provides protection for items of State heritage significance that are listed on the State Heritage Register, as well as for unlisted archaeological relics. Section 57 of the Heritage Act requires that works proposed for items protected by the Heritage Act are approved by the Heritage Council of NSW or its delegates, as appropriate.

The project would not intersect any items listed on the State heritage register. Therefore, the project would not require approval from The Heritage Council of New South Wales.

4.8 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NP&W Act) provides for the establishment, preservation and management of national parks, State reserves, historic sites and certain other areas, and the protection of certain fauna, native plants and Aboriginal heritage in NSW. There are no reserved lands under the NP&W Act within the project site.

Section 86 of the NP&W Act identifies offences relating to the harm of Aboriginal objects or places. An Aboriginal Heritage Impact Permit (AHIP) issued under Section 90 of the NP&W Act is required if impacts to Aboriginal objects and/or places cannot be avoided.

Potential impacts to Aboriginal cultural heritage as a result of the project have been assessed in accordance with Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW, 2010) and are detailed in section 6.3. The assessment found that the project would not directly impact Aboriginal heritage sites and an AHIP would not be required.

4.9 State Environmental Planning Policy (Sydney Region Growth Centres) 2006

The State Environmental Planning Policy (Sydney Region Growth Centres) 2006 (Growth Centres SEPP) was originally established to guide urban development in Sydney's designated northwest and southwest growth areas, ensuring a coordinated approach to land use, infrastructure, and environmental management. Amendments to this SEPP have refined planning controls to better align with evolving development needs, infrastructure capacity, and environmental protections.

The Maryland development precinct in western Sydney, where the project site is located, falls within the South West Growth Area, meaning it is subject to the provisions of this SEPP. Key considerations for the project under the amended policy include:

- **Urban development and infrastructure alignment:** The project supports the planned growth of the Maryland precinct by ensuring essential infrastructure, such as electricity supply, is in place to meet increasing demand from residential, commercial, and community developments.
- **Biodiversity certification and environmental protections:** The Growth Centres SEPP amendments align with biodiversity certification requirements, mapping areas as either Certified or Non-Certified. The project site is within a certified area, meaning development can proceed without additional biodiversity assessment. Refer to section 6.8 for a more detailed discussion.
- **Precinct-specific planning controls:** The amendments to the SEPP have refined development standards across precincts, including land zoning, open space provisions, and infrastructure planning. The project aligns with these controls by supporting the orderly rollout of essential services that will facilitate housing supply and employment growth in the Maryland precinct.
- **Sustainability and liveability objectives:** The Growth Centres SEPP places greater emphasis on sustainable urban development, including energy efficiency, water management, and connectivity. The project contributes to these goals by ensuring reliable energy infrastructure to support smart growth principles, minimising the risk of network constraints that could impact housing delivery and economic development in the region.

4.10 Summary of other legislative requirements

Table 4.1 outlines the other legislative requirements which apply during the construction and operation of the project.

Table 4.1 Other legislative requirements relevant to the project

Legislation	Authority	Responsibility	Requirement	Comment
EP&A Act 1979	Endeavour Energy	Endeavour Energy	The project's REF is to be prepared to meet the environmental assessment requirements of Part 5, Division 5.1 of the EP&A Act.	REF prepared in accordance with Part 5 of the EP&A Act
EP&A Regulation 2021	Endeavour Energy	Endeavour Energy	Consideration – Cl 171 (2) of the factors to consider regarding the impact of an activity on the environment.	Relevant factors have been considered in this REF

Legislation	Authority	Responsibility	Requirement	Comment
Contaminated Land Management Act 1997	NSW EPA	Principal Contractor/Endeavour Energy	Notification – s60 by a person whose activities have contaminated land or a landowner whose land has been contaminated is required to notify OEH when they become aware of the contamination.	If contamination is identified, the duty to report would be triggered as appropriate.
Rural Fires Act 1997	NSW Rural Fire Service (RFS)	Principal Contractor/ Endeavour Energy	Consideration – s63 public authorities must take all reasonable steps to prevent the occurrence and minimise the spread of bushfires on or from lands vested in or under its control/management.	Refer to section 6.10

4.11 Commonwealth legislation

4.11.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) outlines the Commonwealth Government's role regarding environmental assessment, biodiversity conservation, the management of protected species, populations and communities and heritage items. If an action is likely to have a significant impact on any of the matters of national and environmental significance (MNES), a referral to the Australian Government would be required. A search of the EPBC Protected Matters Search Tool (PMST) was undertaken on 10 October 2024. This REF finds that the project is unlikely to have a significant impact on any matters of national environmental significance (refer to Appendix A).

4.11.2 Native Title Act 1993

The *Native Title Act 1993* recognises and protects native title. The Act covers actions affecting native title and the processes for determining whether native title exists and compensation for actions affective native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements, and the National Native Title Register. Procedural rights to negotiate are provided under the Act to ensure that future acts are carried out validly. Section 24KA provides that a future act includes proposed public infrastructure on land or waters that affects native title rights or interest.

A search of the Native National Title Tribunal listed no Registered Native Title Claims or Registered Indigenous Land Use Agreements within the project site.

5. Community consultation

5.1 Statutory consultation

Consultation was undertaken in accordance with the statutory requirements outlined in State Environmental Planning Policy (Transport and Infrastructure) 2021 and the *Electricity Supply Act 1995*. The details of the requirement for this consultation and any responses received are outlined in the following sections.

5.1.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

A review of the project against the consultation requirements outlined in State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP) has been undertaken. In accordance with Sections 2.10 and 2.11 of the Transport and Infrastructure SEPP, it is a requirement to consult with Camden Council due to the potential for impact to the following:

– Section 2.10(1)(e) – public place that is under a Council's management or control
– Section 2.10(1)(f) – road and footpath excavation.

Camden Council and Transport for NSW were notified on 14 and 20 January 2025 of the project and invited to provide comments.

A response was received from the Council's development assessment department on 15 January 2025 stating that they are generally satisfied with the project and intend to assess the land access requirements and methods of construction once plans are finalised.

A response was received from Transport for NSW on 22 January 2025, which suggested the substation footprint be moved back 5 m from the road boundary to allow for future road widening. EE responded to Transport for NSW on 11 February 2025 stating that the legal boundaries established as part of the Maryland Precinct subdivision have already taken into account potential future road widening. No further consultation was considered to be required. No design changes were made in response to this comment.

5.1.2 Electricity Supply Act 1995

Section 45(4) of the *Electricity Supply Act 1995* states that Endeavour Energy is required to consult with Camden Council should it wish to undertake works other than routine repairs or maintenance work.

As previously mentioned, a response was received from the Council's development assessment department on 15 January 2025 stating that they are generally satisfied with the project and intend to assess the land access requirements and methods of construction once plans are finalised.

5.2 Consultation procedure

The Consultation Protocol for Review of Environmental Factors for Class 4 and 5 Activities (Endeavour Energy, 2023) outlines consultation requirements which must be followed when preparing an REF for a Class 4 activity. In respect of consultation with members of the public, for Class 4 REF's, Endeavour Energy must:

– publish a notice on its website and in a newspaper which circulates in the region of the location of the project or in NSW generally (where appropriate), which:
  - describes briefly the project, including its location
  - describes briefly the types of environmental impacts which the project may have
  - invites members of the public to make submissions on the proposal by a nominated date, no earlier than 20 business days from the date of the publication of the notice (the Public Consultation Period)
  - provides the contact details of a nominated contact person at Endeavour Energy to receive submissions in writing

– take into account any submissions received from a member of the public regarding the project during the Public Consultation Period (or any further period agreed by Endeavour Energy) and document in the REF how this has been undertaken.

In addition, under Section 171(4) of the EP&A Regulation require that all REFs be published on the determining authority's website if above a particular monetary threshold. The capital investment value of the project is above the threshold and this REF will be published in accordance with the EP&A Regulation.

In accordance with the requirements, a public notice in relation to the draft REF will be published. The draft REF will also be published on the Endeavour Energy website at https://www.endeavourenergy.com.au/community/works-in-your-area.

5.3 Consultation to be undertaken

All potentially affected residents will be notified prior to the commencement of construction works. Details are to include the likely duration of the works and 24-hour contract details for the Project Manager and Construction Contractor. In the event any electricity supply outages are required to facilitate the safe construction of the project, impacted landowners will be notified in advance.

The Construction Environmental Management Plan (CEMP) for the project will include site specific control measures as required. In addition, the Project Manager will develop a project specific complaints and grievance handling protocol to be adhered to.

6. Environmental impact assessment

6.1 Overview

The following environmental factors were addressed in detail to determine the environmental impact associated with the project:

– Traffic and access
– Aboriginal heritage
– Non-Aboriginal heritage
– Soils and contamination
– Hazard and risk
– Biodiversity
– Water
– Noise and vibration
– Property and land use.

Environmental factors with lower risks were also considered, including; waste, air quality, climate change, utilities and services, visual, socio-economic and cumulative impacts.

Prior to the commencement of construction, a Construction Environmental Management Plan (CEMP) would be developed by a construction contractor with the approval of EE, which would capture the management and mitigation measures presented in this REF, providing further site-specific detail where appropriate, and responsibilities and timing for their implementation.

6.2 Traffic and access

This section provides a summary of the traffic and transport assessment prepared by GHD. A copy of the full report is provided in Appendix B.

6.2.1 Methodology

The traffic and transport assessment included:

– a desktop review to gain an understanding of existing conditions, traffic operations and any additional potential safety issues within the vicinity of the project site
– reviewing available traffic data and site access arrangements to determine the existing performance of the surrounding road network
– reviewing anticipated workforce and traffic numbers
– a mid-block assessment to assess the capacity of the road network to accommodate additional traffic generated by the proposed modification
– assessing potential traffic, transport and access impacts
– providing management and mitigation measures.

Traffic volume and performance

Traffic counts were undertaken between 7 December 2024 and 14 December 2024 on The Northern Road between Maryland Link Roads 2 and 3 in proximity to the Lowes Creek substation site. Traffic survey details are contained in Appendix A of Appendix B.

The capacity of the road network was determined using a volume to capacity ratio (VCR). The VCR is the ratio of the volume of vehicles (demand) and the capacity of the road. The ratio gives an indication of the road's degree of saturation and its ability to accommodate additional traffic. A lower VCR signifies low traffic volumes and generally

indicates a better quality of service for road users. A ratio greater than one suggests that the road is oversaturated and cannot handle additional volume, leading to delays and queue build-up.

The VCR was calculated for The Northern Road.

6.2.2 Existing environment

Road network

The following local and State (classified) roads are located in the vicinity of the project site:

– **The Northern Road:** a State road in the western Sydney region that connects Narellan in the south and Cranebrook in the north with a distance of approximately 44 km. The Northern Road is sealed with typically two lanes each way with a divided carriageway. At the signalised intersections with Maryland Link Road 2 (south of the site) and Maryland Link Road 3 (north of the site), there is a designated right turn lane and left turn slip lane.

– **Maryland Link Road 2 and 3**: Maryland Link Road 2 is located about 450 m south of the project site, while Maryland Link Road 3 is approximately 400 m north, with both roads running east - west. Both are terminating local roads, currently providing a U-turn facility for The Northern Road under signal control. Each road also has designated right-turn lanes onto The Northern Road.

Traffic volume and performance

The calculated VCR and traffic volumes for The Northern Road for the year 2024 are provided in Table 6.1. The data indicates that The Northern Road operates with traffic volumes within maximum capacity at peak times with available capacity and, as such, also within the remainder of the day and night periods.

Table 6.1 ***Existing mid-block VCR – base case 2024***

Road name	Direction	Number of lanes	Capacity per lane[1]	Existing traffic (2024) (passenger car units)		Volume capacity ratio (2024)	
				Average Weekday AM Peak	Average Weekday PM Peak	AM Peak	PM Peak
The Northern Road	Northbound	2	1,200	1,678	946	0.70	0.39
	Southbound	2	1,200	931	1,811	0.39	0.75

LEGEND *Free flow* *Congested*

Notes: 1. Austroads Guide to Traffic Management Part 3 – Traffic Studies and Analysis Methods - Table 6.1
2. 1 light vehicle = 1 pcu, 1 heavy vehicle = 2 pcu (note: inclusive of both medium and heavy vehicles)

Heavy vehicle routes

The Northern Road is approved to accommodate vehicles up to 26 metre B-double trucks and is a designated oversized and/ or overmass vehicle route.

Road crash information

Crash incident data was collected from statistics published by the NSW Centre for Road Safety, for the most recent five year period (2019 to 2023).

One crash occurred in 2020 during daylight hours at the intersection of Maryland link Road 2 and The Northern Road. Another crash occurred in 2023 during daylight hours approximately 120 m north of the intersection of Maryland link Road 3 and The Northern Road. Both crashes did not result in any injuries.

Public transport, active transport and parking

Due to its rural location, there are no public transport or active transport facilities or services in proximity to the project site.

The Northern Road currently has a shared footpath on the eastern kerb and a short length (approximately 80 m) of shared path on the western kerb north of the intersection with Maryland Link Road 2. The intersections with Maryland Link Road 2 and 3 are signalised, with both pedestrian and cycle lanterns for the crosswalk, with a staged crossing across The Northern Road.

There are currently No Stopping restrictions along The Northern Road and Maryland Link Road 2 and three U Turn areas.

6.2.3 Potential impacts

Construction

Traffic generation – Peak hour

Construction vehicle movements would comprise both heavy and light vehicles and would vary across the construction program, depending on the construction activity being undertaken. Construction would create additional traffic on the road network around the project site.

It is estimated that peak activity would occur during the installation of structural, mechanical, electrical and instrumentation equipment, with up to five light vehicle movements per day and up to four heavy vehicle movements per day.

The potential impacts on the road network were quantified by adding the traffic generated by construction of the project to the expected future traffic volumes during peak hours on the road network, as provided in Table 6.2.

Table 6.2 ***Estimated increase in peak hour two-way traffic volumes – with construction***

Road Name	Direction	Capacity (pcu / direction) *	Background volumes		Construction trips 2024 - 2028				2028 VCR	
			AM Peak (pcu)	PM Peak (pcu)	Weekday AM Peak (pcu)	Week day PM Peak (pcu)	Weekend AM Peak (pcu)	Weekend PM Peak (pcu)	AM Peak	PM Peak
The Northern Road	Northbound	2,400	1,846	1,041	21	21	22	22	0.78	0.44
	Southbound	2,400	1,025	1,993	21	21	22	22	0.44	0.84

LEGEND *Free flow* *Congested*

Note 1: 2027 volumes based on 2024 traffic surveys and background annual growth of three per cent (Refer to Appendix B for 2024 data)
Note 2: Number of lanes = 2 in each direction with a capacity of 1,200 pcu per lane
Note 3: 1 light vehicle = 1 pcu, 1 heavy vehicle = 2 pcu (note: inclusive of both medium and heavy vehicles)
Note 4: Construction vehicle trip based on 20 light vehicles plus 1 heavy vehicle during the peak hour (refer to Appendix B)

The assessment indicated that the VCR of The Northern Road with the addition of traffic generated by construction at the project site would fall within the range of 0.44 to 0.84. This means that the roads are expected to have around 98% spare capacity to accommodate additional traffic volumes.

The assessment concludes that construction is expected to have minimal impact on peak hour traffic volumes and road network operations along key roads within the vicinity of the project site.

Traffic generation – Off peak

The following assessment has been carried out in the event of the potential closure of the southbound kerbside traffic lane on The Northern Road for the open trench installation of the utility services.

It has been assumed that such lane closure would be carried out outside road network peak periods and likely between 7:00pm and 5:00am on weekdays.

The data in Table 6.3 indicates that The Northern Road operates with traffic volumes within maximum capacity at the peak of off peak times under a single lane operation, should the open trench works require a kerbside lane closure.

Table 6.3 ***Off peak single lane mid-block VCR***

Road name	Direction	Number of lanes	Capacity per lane[1]	Existing traffic (2024) Average Weekday maximum off peak		2028 base case	Volume capacity ratio (2027)
				Survey traffic flow	passenger car units	passenger car units	
The Northern Road	Southbound	1	1,200	520	590	649	0.54

LEGEND *Free flow* *Congested*

Notes: 1. Austroads Guide to Traffic Management Part 3 – Traffic Studies and Analysis Methods - Table 6.1
2. 1 light vehicle = 1 pcu, 1 heavy vehicle = 2 pcu (note: inclusive of both medium and heavy vehicles

Other impacts

Road safety

Construction traffic volumes generated by the project are relatively small and will have a negligible impact on road safety, with drivers utilising the existing signalised intersections and designated turn and slip lanes on The Northern Road to access Maryland Link Road 3.

Should lane closure be required to facilitate the open trench installation, it is assumed this would occur in off peak road network periods under the approval of Transport for NSW. Applicable traffic management controls would be in place to advise drivers of the of the change in road conditions in advance of the works area and safely direct drivers past the works area.

Public transport and transport facilities

No existing public transport (i.e. buses or trains) operate within the vicinity of the project site.

The transmission cable crossing of The Northern Road would be undertaken using a trenchless direct drilling method (HDD), and existing road network operations are not expected to be impacted.

Open trench works are to occur on the eastern verge of The Northern Road. If a lane closure is required to complete this works, this would be undertaken during off peak periods as per any direction from Transport for NSW.

No potential impacts on other forms of transport have been identified.

Operation

Operation of the substation would require access for up to two light vehicles for one day each month. Given the very small number of vehicle movements required for operation and maintenance activities, the traffic impacts associated with the operation and maintenance of the project are expected to be negligible.

Decommissioning

The corresponding traffic impacts associated with decommissioning of the substation are likely to be lower than the construction and readily accommodated by the existing transport infrastructure. Therefore, traffic impacts are likely to be negligible.

6.2.4 Mitigation measures

General management and mitigation measures are recommended in relation to traffic are provided in Table 6.4.

Table 6.4 Mitigation measures – traffic

Environmental aspect	Mitigation measure	Responsibility	Timing
Impacts on roads, utilities, transport, emergency access and parking.	The design will continue to be refined to avoid or minimise impacts on the surrounding road and transport network as far as reasonably practicable. Input will be sought from relevant stakeholders (including the Camden Council, Transport for NSW, emergency services, and utility service providers) prior to finalising the design of those aspects of the project that have the potential to affect the operation of infrastructure under the management of these stakeholders. This will include confirming ongoing operation and maintenance arrangements.	Contractor / EE	Pre-construction / Construction
Potential for traffic, transport, access and parking impacts during construction.	A construction traffic and access management plan (CTMAP) will be prepared prior to construction and implemented as part of the Construction Environmental Management Plan (CEMP). The plan will detail processes and responsibilities to minimise traffic and access delays and disruptions and identify and respond to changes to road access. Appropriate traffic control measures in the vicinity of the study area will be adopted to ensure that the safety of all road users is not impacted by construction-related vehicles travelling to and from the project site. The plan will be developed in consultation with relevant stakeholders, including Camden Council, Transport for NSW, emergency services and utility service providers consulted as necessary. The plan will include a driver's code of conduct for haulage operations to define appropriate driver behaviour and safety requirements for drivers operating heavy vehicles on public roads.	Contractor	Pre-construction / Construction
Access impacts	Disruption to access to private properties and local roads will be minimised as far as practicable. Where temporary disruption to access cannot be avoided (such as during trenching), consultation will be undertaken with the owners, occupants and managers of affected properties and road infrastructure to confirm their access requirements and determine alternative arrangements. Alternative access arrangements, such as bypass tracks, detours or crossing plates, will be implemented during road crossings. The community should be updated with project changes during construction, including any temporary changes to access arrangements.	Contractor	Construction
Impacts on roads	Road condition surveys will be undertaken of the public roads proposed to be used, prior to and following the completion of construction, and provided to the relevant road authority. Condition monitoring will be carried out during construction. Rectification measures will be implemented as needed, during and/or following completion of construction, to address any damage caused during construction.	Contractor	Construction
Managing the potential for cumulative transport and traffic impacts	The potential for cumulative construction transport and traffic impacts will be reviewed and coordinated with other projects, in consultation with relevant stakeholders, Camden Council, Transport for NSW and private developers. The review will include: – projects with the potential to affect access and capacity – coordinating works and identifying efficient re-routing options as appropriate.	Contractor / EE	Pre-construction / Construction

Environmental aspect	Mitigation measure	Responsibility	Timing
Impacts to active transport	Active transport facilities on the key roads in the study area have negligible use, however, should there be an alteration to active transport facilities, during construction, such works are to accommodate the active transport road user. This would be outlined in the construction traffic and access management plan (CTAMP) that will be prepared prior to construction.	Contractor	Pre-construction / Construction
Potential lane closures	Should lane closures be required, such will be in consultation with Transport for NSW and under their approval. Such works are likely to be required to be undertaken within the road network off peak periods. A construction traffic and access management plan (CTAMP) will be prepared prior to construction, including Traffic Guidance Schemes in line with Transport for NSW Traffic Control at Worksites Technical Manual to inform motorists of changed road conditions.	Contractor	Pre-construction / Construction

6.3 Aboriginal heritage

6.3.1 Methodology

An Aboriginal Due Diligence Assessment was undertaken by GHD. The assessment included:

- searches of the Aboriginal Heritage Information System (AHIMS) (the results of this search may be relied upon for 12 months)
- searches of the NSW State Heritage Inventory, Register of National Estate, and the National Trust Heritage Register
- review of all legislation relevant to heritage matters within the study area, including:
  - *National Parks and Wildlife Act 1974*
  - *Heritage Act 1977*
  - Camden Local Environmental Plan 2010
  - *Environmental Protection and Biodiversity Conservation Act 1999*
  - *Native Title Act 1993*
  - *Aboriginal and Torres Strait Islander Heritage Protection Act 1984.*
- review of previously undertaken Aboriginal heritage assessments and archaeological report
- review of the environmental context of the study area
- development of a European land use history for the study area
- assessing the proposed activity against the five-step assessment process set out by the with the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales 2010 (DECCW, 2010).

6.3.2 Existing environment

Geology and soils

The project site is located on the Cumberland Plains within the Western Sydney region, underlain by Triassic sedimentary formations of the Wianamatta Group. These include Ashfield Shales, Bringelly Shale, and Minchinbury Sandstone, comprising quartz-lithic sandstone, siltstone, and claystone. The dominant soil landscape is the Blacktown soil unit, characterised by shallow to moderately deep texture contrast soils, including loams and clays with varying acidity and structural properties. These soil conditions influence erosion potential, land stability, and suitability for different land uses.

Landscape

The Cumberland Plains feature gently undulating terrain with low hills and valleys, shaping local drainage patterns and biodiversity distribution. The topography has historically supported agricultural use and settlement due to its relatively fertile soils and water availability. Areas of deeper soils within valleys have a higher likelihood of preserving sub-surface artefacts. The region continues to provide important ecological functions, including habitat connectivity with nearby conservation areas.

Hydrology

The project site lies within the Upper South Creek Hydrogeological Landscape, characterised by moderate to high rainfall and lateral water movement through shale and sandstone formations. Natural and modified water bodies, including scattered dams and lakes, exhibit varying salinity levels. The site is bordered to the south by the Mulgoa and Cawdor hydrogeological landscapes, with Lowes Creek situated approximately 1 kilometre north. Groundwater movement is influenced by fractured rock formations, affecting aquifer recharge rates and local water availability.

Aboriginal heritage

The Tharawal (also spelled Dharawal) people are the traditional custodians of the land encompassing the project site. They are the northernmost group of the coastal Yuin language family, traditionally spoken in the Illawarra region between Botany Bay and Jervis Bay. (Norman Tindale, 1974) notes their traditional lands extend "from the south side of Botany Bay and Port Hacking to north of Shoalhaven River, inland to Campbelltown and Camden". The Tharawal language is classified as a southern dialect of the Dharawal language.

Post-colonisation, delineating precise group boundaries has been challenging, as these boundaries were historically fluid and influenced by various factors. The Tharawal people's interests are represented by the Tharawal Local Aboriginal Land Council, which supports traditional custodians in heritage management and community initiatives.

Tharawal people utilised the natural resources of the landscape to uphold beliefs, subsist through resource exploitation for hunting and construction of wooden structures, as well as mark the landscape with physical markers. The most enduring artefact type for Tharawal and Aboriginal people generally are stone tools, or the stone portions of the tools (Attenbrow V, 2010). Tool types known in the Cumberland Plains region include Bondi points, blades, adzes, ground edge axes, scrapers, grinding stones, cores, microliths, and the flakes created during tool manufacture or flakes used as tools.

Previous investigations

Artefact Heritage was engaged by GHD, on behalf of Roads and Maritime, to carry out an Aboriginal archaeological survey and assessment for The Northern Road upgrade in line with Stage 2 of the Roads and Maritime Aboriginal Cultural Heritage Procedure (Artefact, 2012).

This detailed assessment relevant to the project site was reviewed as part of the due diligence process.

Aboriginal Heritage Information System database search

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 12 February 2025. The search identified 10 AHIMS sites located within the study area as listed in Table 6.5. There are no previously recorded Aboriginal sites within the study area.

The nearest Aboriginal heritage site to the project site is #45-5-5204, located 300 m west of the proposed transmission corridor and 40 m north of the proposed substation footprint. Site #45-5-5200 is also located 400 m southwest of the proposed substation footprint.

Table 6.5 Summary of Aboriginal heritage sites within the study area

Site ID	Site name	Site Type
45-5-5683	MN AFT 1	Isolated Artefact
45-5-5202	LCM IF 4	Isolated Artefact

Site ID	Site name	Site Type
45-5-5204	LCM IF 6	Isolated Artefact
45-5-5684	Vitocco Farm AS 1	Isolated Artefact
45-5-5682	MN IF 1	Isolated Artefact
45-5-5199	LCM IF 1	Isolated Artefact
45-5-5201	LCM IF 3	Isolated Artefact
45-5-5681	Vitocco Farm IF 1	Isolated Artefact
45-5-5200	LCM AS 2	Potential Archaeological Deposit
45-5-4040	Isolated Object 2043-5	Isolated Artefact
45-5-5203	LCM IF 5	Isolated Artefact

6.3.3 Potential impacts

Following the completion of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW, 2010), it is concluded that:

– the proposed activities would include ground disturbance (i.e. trenching and underboring) to be undertaken in an area which is already a highly modified and disturbed landscape
– based on previous Aboriginal cultural heritage reports (AHIP) the project has a low-moderate likelihood of containing Aboriginal objects
– an application for an AHIP is not required for the proposed development as harm to Aboriginal objects listed on AHIMS can be avoided as no AHIMS sites are located within the development footprint. Impacts to unidentified Aboriginal cultural heritage objects can be managed through the implementation of appropriate management and mitigation measures.

The project has low-moderate potential to uncover Aboriginal objects. However, there are 10 sites recorded on the AHIMS database within 1 km of the project. Management and mitigation measures will need to be implemented to reduce the risk of disturbance or destruction of Aboriginal cultural heritage material (i.e. avoiding known sites, implementing an unexpected finds protocol).

No impacts are expected during the operation of the substation.

6.3.4 Mitigation measures

General management and mitigation measures are recommended in relation to Aboriginal heritage are provided in Table 6.6.

Table 6.6 Mitigation measures – Aboriginal heritage

Environmental aspect	Mitigation measure	Responsibility	Timing
Unexpected finds	An Unexpected Finds Procedures will be developed and implemented to ensure the appropriate management of Aboriginal objects or places within the study area.	Contractor	Construction
Unexpected finds	The NPW Act requires that, if a person finds an Aboriginal object on land and the object is not already recorded on AHIMS, they are legally bound under s.89A of the NPW Act to notify DECCW as soon as possible of the object's location. If a person finds an Aboriginal object which is not recorded on AHIMS, they should contact DECCW as soon as practicable.	Contractor	Construction

6.4 Historic heritage

6.4.1 Existing environment

A search of the following databases was undertaken on 12 February 2025:

– NSW State Heritage Inventory
– EPBC Act heritage list
– Australian Heritage Places Inventory
– Schedule 5 of Camden LEP 2010.

The State Heritage Register indicates the nearest item to the project disturbance footprint of historic heritage is 'Maryland' listed as item #01690 on the State Heritage Register. Maryland is located approximately 500 m west.

No other historic heritage items are located within 1 km of the project site.

European history of the locality

European settlement expanded rapidly into the Cumberland Plains after 1777, with intensive agricultural activities reshaping the landscape by 1792, leading to widespread deforestation. The Tharawal people were dispossessed of their ancestral lands, resulting in violent conflicts with neighbouring groups and Europeans (Gapps, 2018). The first 40 years of colonisation were marked by continuous warfare and massacres, eventually forcing Aboriginal people into servitude (Gapps, 2018; Kerkhove, 2023; State Library of NSW, 2025). By 1829, settlers had been granted 42,610 acres in Camden (Perry, 1957), with large-scale land clearing becoming a hallmark of colonialism.

During the contact period**,** Europeans entered the Cow Pastures district in 1795, after Aboriginals reported a herd of wild cattle. Despite initial resistance from Governors, the region was prepared for settlement by Governor Macquarie in 1814. The following drought led to violence between Europeans and the Gundangara people, who raided crops due to food shortages. This sparked a cycle of retaliatory violence, culminating in massacres between 1814 and 1816 (Gapps, 2018; Kerkhove, 2023).

Ground disturbance

Historical land use by European settlers and progressive modification and development since European settlement included ground disturbing activities which impacted objects and sites of Aboriginal Significance. This section discusses this disturbance with regard to the likelihood of culturally significant material being present in the existing landscape.

The dominant land use within the study area has been agricultural development and cropping undertaken across the area since European settlement. Vegetation clearing, grazing, ploughing, cropping and the construction of fences are likely to have affected the integrity of subsurface archaeological deposits within the project site. However, these activities would not have necessarily caused outright removal of archaeological material.

The development of The Northern Road which runs parallel with the project site and has resulted in impacts to the ground surface, including leveling and scarring to create the road reserve.

Nonorrah (Marylands) heritage site

Maryland is a homestead complex comprising 34.8 hectares of land, located on the western side of The Northern Road, west of the project site (Heritage NSW, 2025). The complex is situated within the Nonorrah land grant owned by Scottish engineer, manufacturer, flour miller and grazier John Dickson (Wrigley, 2006). Maryland was managed by Dickson and his apprentice Thomas Barker until Dickson returned to the United Kingdom in 1833 (Britton, 2000).

Barker contributed extensively to the Maryland complex, expanding it from purely agricultural and grazing land to include entrance lodges, ornamental gardens, vineyards, orchards and kitchen gardens (Lowe, 2016, p. 56). A number of residential houses and cottages are present across the area.

The complex is excellent physical condition; however the gardens associated with several of the outbuildings are overgrown, including the stables, couch house, workshop, meatworks, guesthouses and winery facilities.

Previous historical investigations and research

Several archaeological assessments have been undertaken within the study area, which provided insight for the assessment:

- **Helen Proudfoot (1973)**: Emphasised preserving the rural aesthetics of Maryland, highlighting its late 1880s homestead as a heritage item of local significance. Recommended National Trust involvement and appropriate landscaping.
- **Helen Proudfoot (1990)**: Argued that the South Creek catchment, including Maryland, contains nationally significant heritage items, focusing on both Aboriginal and European heritage. Recommended detailed land use histories and preservation of the area's aesthetic character.
- **Perumal Murphy Pty Ltd (1990)**: Advocated for incorporating Maryland Heritage into local environmental plans, preserving the original landscape, gardens, and historic structures, and maintaining the precinct's aesthetic value.
- **Colleen Morris and Geoffrey Britton (2000)**: Assessed Maryland for inclusion in the Camden LEP, recommending the maintenance of its cultural landscape and State heritage listing, with management plans to conserve buildings, gardens, and ornamental plantings.
- **Artefact Heritage Services (2011)**: Conducted a Statement of Heritage Impact for the Northern Road upgrade, concluding no visual impact on the Maryland homestead due to surrounding vegetation, and no further mitigation was required.

6.4.2 Potential impacts

Construction

Given the distance to the nearest identified historic heritage item, no impacts on known historic heritage items are anticipated from the project. The project site has been substantially disturbed by the construction and operation of The Northern Road, making it unlikely that items of potential historic heritage significance would be present. In the unlikely event that such items are uncovered during ground excavation, the unexpected finds protocol outlined in section 6.4.3 would be implemented.

Operation

After construction is complete, no further ground disturbance would be required. As such, no impacts to historic heritage are expected during the operation of the project.

6.4.3 Mitigation measures

General management and mitigation measures are recommended in relation to historic heritage are provided in Table 6.7.

Table 6.7 Mitigation measures – historic heritage

Environmental aspect	Mitigation measure	Responsibility	Timing
Unexpected finds	In the event that a site or artefact as defined by the *Heritage Act 1977* is identified during construction works, works must cease immediately at the location and no further harm to the object shall occur. The contractor will engage the Heritage Division, DCCEEW and a qualified heritage consultant, in accordance with Section 146 of the *Heritage Act 1977*, to determine an appropriate course of action prior to the recommencement of work in the area of the item. No work must commence in the vicinity of the find until any required approvals have been given by the Heritage Division.	Contractor	Construction

6.5 Soils and contamination

A soil and contamination assessment was undertaken by GHD to assess the potential for contamination to be present that may impact construction. The study provided a preliminary in-situ waste classification of soils that may require offsite disposal as part of construction along the project alignment.

A copy of the full assessment is provided in Appendix C.

6.5.1 Methodology

The soil and contamination assessment involved:

– completion of a site inspection on 9 September 2024 to provide a visual assessment for potential contamination sources
– limited desktop study, a review of site history, previous environmental investigation (if available), site environmental setting information (e.g., geology, topography, groundwater bore database search, acid sulfate soils maps and soil landscapes)
– site attendance to collect soil samples from 12 selected boreholes that were drilled during the site investigation (in tandem with the geotechnical investigation)
– dispatch of collected samples to a National Association of Testing Authorities (NATA) accredited laboratory for analysis of a suite of parameters
– preliminary summary of the findings and discuss any additional works required to progress design.

6.5.2 Existing environment

The study area is predominantly rural consisting of road formation or previously disturbed rural land. Soils, where they are present are moderately reactive to surface movement. Topography is gently sloping with the highest point reaching an elevation of 85 m Australian Height Datum (AHD) on The Northern Road.

A review of the eSpade website indicates the project is situated within an area characterised by the ‘Blacktown’ soil landscape. The landscape is described as gently undulating rises, completely cleared of open forest and open woodland with horticulture dominating the area surrounding Lowes Creek.

Based on a review of information, potential contamination sources at and in close proximity to the site have been assessed to include the following:

– agricultural land uses prior to the development of The Northern Road
– presence of fill material of unknown nature, quality and origin underlying The Northern Road (imported and used during historic and more recent construction)
– use of pesticides/herbicides along the roadway and as part of ongoing maintenance.

A search of the EPA’s Contaminated Land Record and the List of NSW Contaminated Sites Notified to the EPA was undertaken on 28 January 2025. No sites are recorded within 200 m of the project.

A search of publicly available Acid Sulfate Soils mapping (NSW SEED data portal) on 28 January 2025 did not identify any Acid Sulfate Soils within 200 m of the project.

A search of publicly available Naturally Occurring Asbestos mapping (NSW SEED data portal) on 28 January 2025 did not identify naturally occurring asbestos within 200 m of the project.

Previous investigations

A detailed site investigation (DSI) and poly-fluoroalkyl substances (PFAS) investigation was undertaken for the future Maryland Precinct development site in July and August 2023. The study area includes the substation footprint, however, excludes the transmission corridor. 30 surface samples were taken within the proposed substation footprint.

Soil testing at the proposed substation footprint found that key per- and polyfluoroalkyl substances (PFAS), including perfluoro octane sulfonate (PFOS), perfluoro hexane sulfonate (PFHxS), and perfluorooctanoic acid (PFOA), were all below safe limits for the intended land use. This means that both the soil already at the site and

any excavated materials from within the area of investigation can be safely used for re-constructing the landform within the substation footprint.

The DSI indicates material with PFAS concentrations above ecological investigation levels (EILs, equivalent to EGVs) are suitable for use in the substation site provided they are placed below hardstand or 2 m below final ground level.

The DSI also states that the risk of PFAS migration in future will be greatly reduced by planned remedial works removing PFAS contaminated soils above land use criteria and minimising surface water infiltration by proposed ZS construction and associated hardstand areas and stormwater drainage infrastructure.

The site Developer (Marylands) must obtain a Development Consent and (at its cost):

a. remove all PFAS impacted soil from the Property which exceeds the HIL-A (0.01mg/kg) level in accordance with the RAP;
b. backfill and bench the Property with material which has a total PFAS concentration no greater than 0.003mg/kg and is otherwise suitable as ENM/VENM; and
c. provide a final Site Audit Statement to Endeavour Energy.

6.5.3 Soil sampling results

Human health

Concentrations of heavy metals were all below the adopted human health screening criteria for commercial, industrial land use and intrusive maintenance workers. Asbestos was not detected in the soil samples analysed nor was it observed at the surface during the site walkover.

Waste classification

Contaminant concentration results were compared to the relevant criteria in Table 1 and 2 of the NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (NSW EPA, 2014).

Concentrations of heavy metals were reported below the contaminant threshold (CT1) for General Solid Waste Non-Putrescible with the exception of the following boreholes:

– BH02 at a depth of 1.5 to 1.7 m had a nickel concentration of 69 mg/kg recorded against a CT1 threshold of 40 mg/kg
– BH06 at a depth of 1.5 to 1.7 m had a benzo(a)pyrene concentration of 1.0 mg/kg recorded against a CT1 threshold of 0.8 mg/kg.

The results of the laboratory analysis did not indicate evidence of significant contamination in the soils underlying the project site. Concentrations of analytes were below the adopted assessment criteria protective of human health and asbestos was not detected, nor observed, during the investigation. This indicates that the risks to current and future users of the site are low.

6.5.4 Potential impacts

Construction

Potential impacts arising from ground disturbed by the project may include:

– erosion of exposed soils and stockpiled material by water and wind
– dust generation from excavation, grading and vehicle movements over exposed soils
– elevated sediment loads from surface water runoff entering waterways and farm dams
– mobilisation and/or exposure of buried contaminants.

Construction would temporarily expose the natural ground surface and sub-surface material. Stockpiling of spoil and backfill material, if not managed, would also be at risk of erosion. Erosion potential would be elevated in areas where more extensive disturbance is proposed such as where joint bays are proposed or at launch and exit pits associated with the underbore. Uncontrolled site water can lead to downstream pollution and land degradation.

Potential sedimentation and erosion impacts would be minimised by implementing standard best-practice soil erosion management measures during construction and progressively stabilising work locations upon completions as work proceeds sequentially along the feeder.

There is also potential for chemical and fuel spills during construction, which may result in localised contamination of soils. However, the number of vehicles and equipment required on-site is relatively minor. There would be minimal need for refuelling or storage of contaminants on site, therefore the potential for contamination is considered to be low provided standard mitigation measures are implemented.

Earthworks may also result in the mobilisation of unexpected, buried contaminants. Inappropriate management could result in contaminants being spread, with potential impacts on water and soil quality and human and ecological health. Standard controls for unexcepted finds of waste and contaminated materials controls would be implemented.

Operation

The project includes the backfilling and reinstatement of surfaces associated with all trenches, joint bays and underbore pits and there would be no ongoing impacts during operation.

6.5.5 Mitigation measures

General management and mitigation measures are recommended in relation to soils and contamination are provided in Table 6.8.

Table 6.8 Mitigation measures – soils and contamination

Environmental aspect	Mitigation measure	Responsibility	Timing
Soils / Contamination	A construction environmental management plan (CEMP) for the works should include an unexpected finds protocol (UFP) to assist with the management of contaminated soil and/or groundwater if it is encountered during future site works.	Contractor/ EE	Pre-construction / Construction
Soils / Contamination	Soil disturbance will be minimised by clearly demarcating the works footprint and marking all other areas as no-go zones prior to works commencing.	Contractor	Pre-construction
Soils / Contamination	Erosion and sediment control measures are to be implemented and maintained to: – prevent sediment moving off site and sediment-laden water entering any water course, drainage lines, or drain inlets – reduce water velocity and capture sediment on site – minimise the amount of material transported from site to surrounding pavement surfaces – divert clean water around the site.	Contractor	Construction
Soils / Contamination	Spoil and fill material management and dewatering of worksites will be managed in accordance with the following Endeavour Energy Standards and the Environmental Guidelines Handbook which are available on the Endeavour Energy standards and Accredited Service Provider (ASP) website: – EMS 0007 – Waste Management – EMS 0008 – Environmental Incidence Response and Management – EMS 0013 – Spoil management.	Contractor	Construction
Soils / Contamination	An unexpected find protocol pertaining to contamination will be included in the CEMP for the proposed feeders. The protocol will include procedures for the assessment and management of unexpected contamination encountered (if any) during construction. Awareness training will be provided	Contractor	Construction

Environmental aspect	Mitigation measure	Responsibility	Timing
	for all onsite staff to assist in the identification of potentially contaminated material.		
Soils / Contamination	Works including vehicular movements will not be permitted during or immediately following heavy rain or inclement weather where disturbance of the subsoil is likely to occur within impervious or unsealed surface areas. However, construction works may be able to continue during or following inclement weather where those works are restricted to only along the road reserve section of the route or other impervious surfaces.	Contractor	Construction
Soils / Contamination	Spill kits will be available at the construction site, and all persons undertaking construction works will be made familiar with their use and aware of incident response procedures.	Contractor	Construction
Soils / Contamination	All areas disturbed by works will be progressively stabilised and rehabilitated to ensure stable surfaces are obtained as soon as practical (progressively where possible).	Contractor	Construction
Soils / Contamination	All chemicals (fuels, concrete) will be stored in impervious bunded areas located at away from stormwater pits and waterways and in accordance with manufacturer's instructions.	Contractor	Construction
Soils / Contamination	Refuelling will be in accordance with manufacturer's instructions and will only be in designated bunded refuelling areas.	Contractor	Construction

6.6 Noise and vibration

A qualitative desktop noise assessment was undertaken by GHD to assess the potential for noise impacts to both existing and future sensitive receivers during operation of the project. Construction noise was also considered however did not require modelling due to the absence of existing receivers in the immediate vicinity of the project.

6.6.1 Methodology

The qualitative noise assessment involved:

– Identification of existing and future sensitive receivers.
– Adopt guidelines from Noise Policy for Industry (EPA, 2017).
– Define intrusiveness and project amenity noise levels for each receiver type.
– Establish project noise trigger levels (PNTLs) for daytime, evening, and night.
– Noise modelling undertaken using CadnaA 2025 noise modelling software to predict the operational noise levels at the future receivers.

The noise assessment was undertaken with reference to the following guidelines and codes of practice:

– *Road Noise Policy* (DECCW, 2011)
– The *Noise Policy for Industry* (EPA, 2017)
– *Construction Noise and Vibration Guideline (TfNSW, 2023).*

The inputs and parameters used in the assessment are provided in Table 6.9.

Table 6.9 Noise modelling parameters

Input	Parameter used
Prediction algorithm	ISO 9613-2:1996
Weather conditions	Based on an average temperature of 10 °C and an average humidity of 70%.
Meteorological conditions	Well-developed moderate ground based temperature inversion, such as commonly occurs on clear, calm nights or 'downwind' conditions which are favourable to sound propagation.
Model inputs	
Noise sources	2x high-voltage transformers with a sound power level of 72 dBA (105% excitation and ODAF cooling), as specified by the manufacturer.
Topography	Conservatively, the topography was assumed to be flat.
Receiver heights	1.5 m above ground level
Ground absorption	0.0 for all areas (0 is non-porous ground and 1 is porous ground such as that found in a rural setting comprising of mainly grass and vegetation)

6.6.2 Existing environment

The project would be undertaken within a predominantly rural area of Western Sydney. Sensitive receivers include residential and commercial sites within 200 m of the project site, identified in Table 6.10.

Table 6.10 Identified sensitive receivers

Receiver	Address	Distance from project
Residential dwelling	749 The Northern Road, Bringelly 2556	400 m south
Residential dwelling	772 Maryland Link Road 2, Oran Park 2570	400 m east
Residential dwelling	877 The Northern Road, Bringelly 2556	250 m north
Residential dwelling	895 The Northern Road, Bringelly 2556	400 m north
Residential dwelling	900 The Northern Road, Oran Park 2570	600 m northeast
Green life Resource Recovery Facility	761 The Northern Road, Bringelly 2556	150 m southwest

6.6.3 Future land use

The substation site is adjacent to land planned for the Lowes Creek Maryland Precinct, which is intended for a combination of residential and commercial development. As a result, future sensitive receivers are expected to be located within 50 m of the substation boundary once the precinct is fully developed.

The nearest sensitive receivers to the project are adjacent future residential and commercial receivers associated within the indicative land use plan adopted for the Lowes Creek Maryland Precinct (refer to Figure 6.3). The nearest future residential receivers modelled would be located 20 m west of the substation boundary at their closest point and approximately 80 m from the indicative transformer locations (modelled in the assessment). Future commercial sites would be located immediately adjacent to the zone substation to the north.

6.6.4 Assessment criteria

The assessment of operational noise from the project is based on the *Noise Policy for Industry* (EPA, 2017). Key criteria include:

– Project amenity noise level:
  - Represents the total industrial noise at a receiver from all new and approved sources.
  - Set 5 dBA below the recommended amenity noise level to ensure compliance.
– Receiver classification:
  - Residential receivers are classified according to land use and existing noise levels.

- For this project, receivers are classified as ‘rural residential’, reflecting the nearby highway and proposed medium-density development.

The recommended amenity noise management levels are provided in Table 6.11.

Table 6.11 Recommended amenity noise levels

Receiver category	Time of day	Recommended amenity noise level $L_{Aeq,period}$ dBA
Rural residential	Day	50
	Evening	45
	Night	40
Commercial premises	When in use	65

The project amenity noise level is the objective for noise from a single premise and is set at 5 dBA below the recommended amenity noise level to ensure that the industrial noise levels remain within the recommended amenity noise level.

Project noise trigger levels were determined and are provided in Table 6.12. As the project would operate continuously, predicted noise was also assessed for the night period. The minimum background noise levels and intrusiveness noise levels have been adopted in lieu of background noise monitoring.

Table 6.12 Project noise trigger levels

Receiver type	Assessment period	Intrusive noise level, $L_{Aeq,15min}$ dBA	Project amenity noise level, $L_{Aeq,15min}$ dBA	Project noise trigger level, $L_{Aeq,15min}$ dBA
Rural residential	Day	40	52	**40**
	Evening	35	43	**35**
	Night	35	38	**35**
Commercial premises	When in use	Not applicable	63	**63**

6.6.5 Potential impacts

Construction

Construction would generally be carried out during standard work hours however some night works are proposed for the 132 kV feeder works to minimise traffic disruption to The Northern Road. Noise generating activities would include:

– trenching, bedding, compaction and backfilling
– excavation associated with joint bays and underbore launch and exit pits
– reinstatement of road pavements, kerbs and nature strips
– delivery of concrete structures and other materials and use of concrete trucks
– movement and use of heavy vehicles, plant and machinery
– use of hand tools and construction vehicles
– establishment of site controls and ground stabilisation and demobilisation.

The feeder work would be carried out over a three week period with the feeders installed in stages progressively along the alignment, minimising the time that sensitive receivers would be exposed to noise generated by the project. It is expected that trenching would proceed at around 20 - 30 m per day until completion.

Cable pulling would take a further two weeks to complete, however noise impacts would be minimal for this activity. The construction of joint bays, and underboring, would require a longer construction period of 1 - 4 weeks. The location for these activities are to be located as far as reasonably practical from sensitive receivers.

The ZS construction works will result in some noise generation. Construction of the ZS facility is anticipated to continue in stages for up to two years to commissioning of the ZS. Typical noise generation would be associated

with excavation machinery, small machinery typical of building contractors, hand tools, compressor equipment and generators as well as small and large trucks for materials and equipment delivery. All plant and vehicles will be fitted with appropriate noise suppression equipment. Work will generally be carried out during standard construction hours unless otherwise approved.

During any given period, the machinery items to be used on site would operate at maximum sound power levels for only brief periods. At other times, machinery may produce lower sound levels. It is highly unlikely that all construction equipment would be operating at their maximum sound power levels at any one time.

Construction machinery as detailed in section 3.4.1 was compared against the recommended minimum working distances for vibration intensive plant provided in the *Transport for NSW Construction Noise and Vibration Guideline* (CNVG) (TfNSW, 2023). Work would not be undertaken within the minimum distances outlined in the CNVG for prevention of cosmetic damage to buildings or human response to vibration. On this basis, impacts to human comfort or damage to buildings related to vibration from the project is unlikely.

Operation

The substation would be located adjacent to land planned for future residential and commercial development within the Lowes Creek Maryland Precinct. During operation, noise from transformers, switchgear, and associated equipment has the potential to contribute to ambient sound levels at nearby future receivers.

Potential impacts may include:

– Audible noise causing disturbance to residents, particularly during evening and night periods.
– Industrial noise combining with background levels could reduce the acoustic amenity of future residential and commercial areas.
– Specific equipment noise (e.g., transformers) may be more noticeable or annoying than general background noise.

Table 6.13 presents the predicted operational noise levels at future receivers. A conservative 5 dB correction was applied to the predicted noise levels to consider possible tonal noise characteristics from the substation.

The project is predicted to comply with the project noise trigger levels and therefore operational noise impacts to future receivers are not anticipated.

Table 6.13 Predicted operational noise levels

Receiver ID	Nighttime project noise trigger level (dBA)	Predicted operational noise level[1] $L_{Aeq,15min}$ (dBA)	Complies with PNTL?
RES1	35	32 (27 + 5)	Yes
RES2	35	33 (28 + 5)	Yes
RES3	35	33 (28 + 5)	Yes
RES4	35	33 (28 + 5)	Yes
COM1	63	37 (32 + 5)	Yes
COM2	63	35 (30 + 5)	Yes

Note 1: A conservative 5 dB correction is applied to the predicted noise levels to consider potential tonal noise characteristics from the substation.

Maintenance activities would be infrequent and short-term in nature. Noise from general maintenance activities is unlikely to cause adverse impacts to nearby future receivers.

6.6.6 Mitigation measures

General management and mitigation measures are recommended in relation to construction noise are provided in Table 6.14.

Table 6.14 Mitigation measures – noise

Environmental aspect	Mitigation measure	Responsibility	Timing
Noise	All sensitive receivers likely to be affected by high noise producing activities or out of-hours work will be notified in accordance with ICNG (DECC, 2009) at least five working days prior to commencement of the works. The notification will provide details of: – the project – the construction period and construction hours – contact information for project management staff – complaint and incident reporting – how to obtain further information.	Contractor	Pre-construction
Noise	All works must be undertaken during standard work hours as specified in the ICNG (DECC, 2009) recommended standard: – 7:00am – 6:00pm Monday to Friday – 8:00am – 1:00pm Saturdays – No work on Sundays or Public Holidays. Work outside the above hours will only comprise: – the delivery of materials outside normal hours requested by police or other authorities for safety reasons – emergency work to avoid the loss of lives and/or property.	Contractor	Construction
Noise	Appropriate internal and external approvals must be obtained where required prior to any additional out of hours works being carried out in accordance with the Endeavour Energy Environmental Handbook. Should any longer than two nights of out of hours work be required, the construction manager must apply to Endeavour Energy Environmental Services Team to progress approval for those works	Contractor	Construction
Noise	Noisy plant and equipment will be located at the greatest possible distance from nearby residents and the work location will be managed to ensure plant and equipment does not spread into adjacent areas	Contractor	Construction
Noise	Plant and equipment will be switched off when not in use.	Contractor	Construction
Noise	Noise generating activities will be undertaken at appropriate times, avoiding early morning and late afternoon when background noise levels are lower.	Contractor	Construction
Noise	All plant and equipment will be maintained in good working order and regularly serviced. Where practical, plant and equipment will be fitted with noise abatement devices such as mufflers, silencers and screens.	Contractor	Construction

6.7 Hazard and risk

6.7.1 Existing environment

Bushfire

The project site is not designated as bushfire prone land. However, the nearest bushfire-prone land, categorised as Category 3 – Medium risk, is located 20 m from the southern boundary of the site, at the Maryland Link Road 2 intersection. Additionally, a small portion of land at the southern end of the site, near the Maryland Link Road 2 intersection, is mapped as a bushfire-prone vegetation buffer (NSW Government, 2025).

Electromagnetic fields

The existing overhead transmission lines are subject to electromagnetic fields however due to the height of the towers along the feeder, the lines unlikely to cause any risk to the public.

There are no other identified existing hazards in the vicinity of the project.

6.7.2 Potential impacts

The following hazards and risks may arise during construction:

– spills or leakage of contaminants such as fuels, chemicals and hazardous substances entering surface and groundwater or contaminating soils
– vehicle movements and interactions with the public
– open trenching and excavations
– encountering unexpected utilities or potential rupture of underground utilities
– encountering contaminated material during earthworks
– construction failures or incidents resulting in flooding, inundation or excavation collapse.

Safety precautions, including; progressively backfilling trenches, covering open excavations and the implementation of traffic control pans, would be implemented throughout the construction works for the protection of the surrounding community, the workforce, road users, pedestrians and local residents.

All components of the project would be designed and constructed in such a manner so as to meet all statutory safety requirements in accordance with the construction standards, and the relevant Australian Standards.

Other hazards would be managed in accordance with best practice fuel handling, erosion and sediment control, unexpected contaminated material and utilities procedures.

Electromagnetic fields

Electric and Magnetic Fields (EMF) are part of the natural environment and are produced wherever electricity or electrical equipment is in use. The higher the voltage, the stronger the electric field. Electric fields are strongest closest to the wires and electrical equipment and their level reduces quickly with distance.

The proposed substation and feeder would contain high voltage electrical infrastructure and therefore would produce EMF. Potential impacts to human health would be managed in accordance with the suggested mitigation measures. EMF can be managed in accordance with recommendations from the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which is a federal agency responsible for protecting human and environmental health from EMF.

ARPANSA has adopted the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines which set exposure limits for various types of electrical equipment and the nature of the exposure to that equipment. Exposure of EMF to the public will be managed through:

– restricting access to the substation by the security fence
– ensuring EMF emission from electrical infrastructure is compliant with the relevant standards and guidelines stipulated by:
    - International Commission on Non-Ionizing Radiation Protection (ICNIRP)
    - Guidelines for limiting exposure to EMF (ARPANSA, 2010).

The substation and its associated equipment have been designed such that EMF emissions are within acceptable standards. Outside of the substation, transmission feeders would be trenched and/ or directional drilled below ground thereby reducing the risk of EMF to the public.

Bushfire

Activities that may increase bushfire risk during construction include mulch stockpiling, hot work such as welding, fuel/chemical storage, and plant operation. These activities are not planned or would be of a minor nature for this

project. All roads would remain operational during while the work is carried out. All work would cease in the event of a bushfire.

6.7.3 Mitigation measures

General management and mitigation measures are recommended in relation to project hazards are provided in Table 6.15.

Table 6.15 Mitigation measures – hazards

Environmental aspect	Mitigation measure	Responsibility	Timing
Safety hazards	The CEMP for the project will include provisions for managing safety and hazards, including: – details of hazards and risks associated with construction – measures to be implemented during construction to minimise and manage these risks including site security, signage and management of open excavations – record keeping for materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials – provisions for monitoring and consultation and notifications requirements for different hazard – contingency measures to be implemented in the event of unexpected hazards, risks arising and emergency situations.	Contractor	Pre-construction / Construction
Bushfire hazard	No hot works will be undertaken on days of Total Fire Ban.	Contractor	Construction
Bushfire hazard	Hot works include all activities that generate a naked flame or spark and include welding and grinding. The status of Total Fire Bans will be checked regularly during the Bushfire Danger Period (NSW Rural Fire Services website or local media).	Contractor	Construction
Bushfire hazard	All activities undertaken during the Bushfire Danger Period (1 October to 31 March) are to be conducted in accordance with the requirements of regulatory and local fire authorities. The Rural Fire Service will be consulted on requirements for works during the Bushfire Danger Period.	Contractor	Construction
Bushfire hazard	Any works that have the potential to generate heat and sparks would be restricted on days of declared catastrophic fire danger.	Contractor	Construction
Bushfire hazard	All work will cease in the event of a bushfire.	Contractor	Construction

6.8 Biodiversity

6.8.1 Existing environment

The project is located within the Upper South River catchment and is within the Cumberland Plain landscape of the Sydney Basin bioregion of NSW. The project site consists of certified rural land and road corridor in the form of footpaths, road surface and exotic roadside plantings.

A desktop review was undertaken which included:

– the NSW DCCEEW BioNet Atlas of NSW Wildlife for *Biodiversity Conservation Act 2016* (BC Act) listed threatened entities within 200 m of the project

– existing vegetation mapping including the NSW State Vegetation Type Map (DPE 2025) within 500 m of the project
– the Cth DCCEEW Protected Matters Search Tool for *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed matters of national environmental significance using a buffer of 200 m of the project
– the NSW Department of Primary Industry (DPI) Spatial Data Portal *for Fisheries Management Act 1994* (FM Act) listed threatened species, populations and communities within 200 m of the project
– review of The Northern Road Upgrade Review of Environmental Factors – Biodiversity Assessment (SKM, 2012).

Threatened species

GHD conducted searches of the EPBC Protected Matters Search Tool on 28 January 2025. 38 threatened animal species and 26 threatened plant species have previously been recorded within 200 m of the project site, refer to Appendix A for a full list of threatened species.

A search of the NSW Department of Primary Industry (DPI) Spatial Data Portal for FM Act listed threatened species, populations and communities was undertaken on 28 January 2025. No records of aquatic threatened species, populations or communities are present within 500 m of the project site.

Native vegetation

The NSW State Vegetation Type Map was reviewed on 28 January 2025. No native vegetation is mapped within the project site. Two plant community types (PCT) are mapped within 300 m of the project site:

– PCT 3320 Cumberland Shale Plains Woodland. PCT 3320 is associated with the critically endangered (BC Act) Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.
– PCT 4025 Cumberland Red Gum River flat Forest. PCT 4025 is associated with the critically endangered ecological community (EPBC Act) Cumberland Plain Woodland in the Sydney Basin Bioregion which has had over 90% of its extent cleared.

A review of the Maryland Precinct land use plan (DPHI, 2021) and Camden LEP 2010 indicates that this area of mapped native vegetation has been rezoned as Environmental Management and Environmental Conservation.

A review of The Northern Road REF Biodiversity Assessment (SKM, 2012) was undertaken to determine the history of native vegetation removal for The Northern Road Upgrade. The assessment indicates that The Northern Road corridor was cleared of all native planting (formally Cumberland Plain Woodland) prior to the road being widened. This was confirmed during a site visit GHD undertook on 19 August 2024 which assessed the project site as certified rural land or State road corridor, which consists only of exotic roadside plantings (refer to Figure 6.1 and Figure 6.2).

Migratory species

The desktop review identified several migratory species with the potential to occur in the study area, based on the habitats present within the surrounding area. These species may forage within the study area on occasion however due to lack of vegetation present within the project site, they are unlikely to remain.

Fauna habitat and connectivity

The project site is not expected to provide any habitat for fauna due to lack of trees and suitable vegetation cover across the project site. The project site consists of rural land dissected by The Northern Road corridor which does not provide any habitat connectivity for native species.

Figure 6.1 Overview of the proposed substation site looking southwest

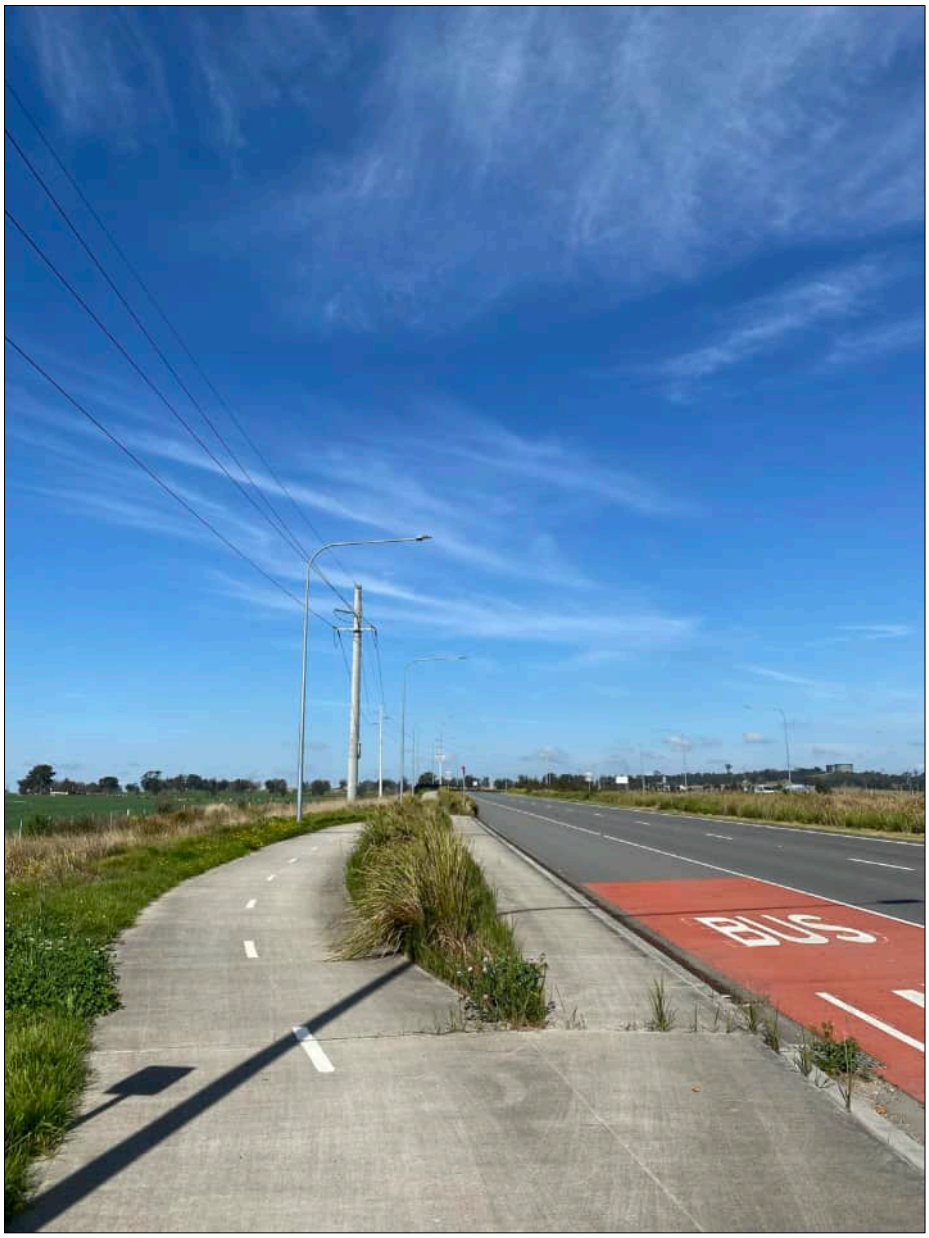

Figure 6.2 Proposed feeder route looking south along The Northern Road from Maryland Link Road 3

6.8.2 Potential impacts

Construction

The project would be carried out in a heavily altered rural farmland and road corridor, which has been significantly impacted by previous land uses and infrastructure projects, such as The Northern Road upgrade.

While threatened species may occur within the vicinity of the project, no impacts are expected as the work would be fully restricted to previously disturbed areas and no native vegetation would be removed. The feeders would be underbored beneath The Northern Road, waterways and aquatic riparian zones would not be impacted.

Operation

No ground disturbance is proposed during operation of the project, therefore impacts to biodiversity are not expected.

6.8.3 Mitigation measures

General management and mitigation measures are recommended in relation to biodiversity are provided in Table 6.16.

Table 6.16 Mitigation measures – biodiversity

Environmental aspect	Mitigation measure	Responsibility	Timing
Biodiversity	In the event that unexpected threatened flora or fauna species are identified during the course of works, all works will cease immediately and Endeavour Energy's Environmental Advisor will be consulted.	Contractor/ EE	Construction
Biodiversity	Vegetation clearance and disturbance will occur within the proposed ZS and Feeder alignment only and be minimised, where possible.	Contractor	Construction
Biodiversity	Vegetation removal will be undertaken in accordance with Endeavour Energy's Environmental Guidelines Handbook.	Contractor	Construction
Biodiversity	Pests, weeds and diseases will be managed in accordance with Endeavour Energy's Environmental Guidelines Handbook, specifically the Hygiene Protocol for Mitigating the Spread of Pests, Noxious Weeds and Diseases in company standard EMS0004- Managing Vegetation Near Electrical Infrastructure and Pest, Weed and Disease Mitigation.	Contractor	Construction

6.9 Water quality and hydrology

6.9.1 Existing environment

Surface water

The study area is located within the Upper South Creek catchment. The feeder and substation would not intersect any waterways. The nearest waterway to the project site is Lowes Creek, which traverses beneath The Northern Road 1.5 km north of the project site. Drainage paths run parallel 150 m from the substation boundary which drain north into Lowes Creek. A roadside drain is also present along the eastern extent of The Northern Road.

A culvert runs beneath The Northern Road 30 m to the north of the substation boundary. GHD observed no standing water during the site visit.

Groundwater

No groundwater bores are present within the project site, the nearest groundwater bore is located approximately 100 m north of the project site and is screened at a depth of 10 m (GW111629.1.1).

Flooding

A review of the Camden Council Upper South Creek Flood Study (Camden Council, 2022) was undertaken for the project site. Flood mapping indicates that the project site would not be inundated during any peak flood event which includes the 20%, 5%, 2%, 1% and 0.5% Annual Exceedance Probability (AEP) event.

6.9.2 Potential impacts

Construction

Direct impacts to the aquatic and riparian zones would be avoided as the feeders would not be underbored near any surface waterways.

The project would require excavation of material and there is potential work areas and stockpiles may be subject to erosion and release of sediment laden water. These impacts would be minor and short term and managed

through the implementation of standard erosion and sediment controls. The work to install the feeders would utilise a staggered approach, with sections installed, backfilled and surfaces reinstated in a sequential manner, ensuring the extent of exposed areas is minimised.

Groundwater may be encountered during trenching and excavation. If groundwater is encountered, dewatering may be required. Given the limited excavation, and short period between excavation and construction, any groundwater that may need to be extracted is unlikely to reach a volume requiring a licence (3 ML). As such, should the dewatering of excavations be required, this water would be discharged (or disposed) so that it does not cause pollution or erosion, and/or create any safety hazards.

Operation

The project includes the backfilling and reinstatement of surfaces associated with all trenches, joint bays and underbore pits and there would be no impacts to water quality, hydrology or groundwater during operation.

6.9.3 Mitigation measures

General management and mitigation measures are recommended in relation to water quality are provided in Table 6.17.

Table 6.17 Mitigation measures – water quality

Environmental aspect	Mitigation measure	Responsibility	Timing
Water quality	Excavation works will not be conducted during high rainfall periods. The weather will be monitored during the proposed works period and works will cease, and open areas will be stabilised, if heavy rainfall is forecast.	Contractor	Construction
Water quality	Impacts on groundwater during construction will be minimised as far as practicable by: – avoiding the need to extract groundwater – minimising groundwater inflows and volumes into excavations – managing any groundwater encountered during excavations in accordance with the Endeavour Energy Standard EMS 0014 – Dewatering worksites.	Contractor	Construction
Water quality	Drilling fluid/waste will be collected and stored in sealed holding tanks and recycled as appropriate. Excess fluid/waste will be removed from site via a licensed vacuum truck and disposed of at a licensed waste facility. No water will be released on to the ground.	Contractor	Construction
Water quality	Install construction erosion and sediment control measures before construction commences consistent with 'the Blue Book' (Managing Urban Stormwater, Soils and Construction Vol 1 and 2A (Landcom 2004 and DECC 2008)) in order to: – Minimise sediment moving off-site and sediment laden water entering drainage lines, or drain inlets; – Reduce water velocity and capture sediment on site; – Minimise the amount of material transported from site to surrounding pavement surfaces; – Minimise in-stream soil erosion and downstream water quality impacts; and – Divert clean water around the site.	Contractor	Construction

6.10 Land use and visual

6.10.1 Existing environment

The 132 kV feeder and substation would be located within in a site and road corridor which transverses areas of the following land uses:

– B5 Business development (Zone Substation)
– SP2 Infrastructure – Classified Road (132 kV feeder).

The new substation would be located within a designated land parcel (Lot 99 1302677) subdivided specifically for the purpose of electricity distribution for the approved Maryland precinct, as shown in the indicative land use plan on Figure 6.3.

The landscape character of the project area is generally defined by its rural setting.

6.10.2 Future land use

The substation would be situated within a dedicated land parcel (Lot 99 DP 1302677) that has been specifically created to accommodate electricity distribution infrastructure for the approved Maryland precinct. This allocation aligns with the indicative land use plan (refer to Figure 6.3), demonstrating a strategic approach to integrating essential services within the broader urban development framework.

The surrounding land primarily consists of:

– Emerging urban development, including planned residential, commercial, and community land uses associated with the Maryland precinct.
– Transport corridors, including The Northern Road, which serves as a major arterial route connecting Western Sydney's growth areas.
– Environmental and open space areas, which have been incorporated into the precinct's planning to balance development with conservation objectives.

6.10.3 Potential impacts

The project is not expected to result in significant long-term impacts on land use within the new easement during construction or operation. However, some temporary and minor land use impacts may occur, particularly in relation to vehicle movements and local access during construction.

Construction

Construction of the 132 kV feeder within The Northern Road may temporarily affect access for adjacent private landowners whose properties are connected via existing driveways at the Maryland Link Road 2 and 3 intersections. While these impacts are expected to be minimal, appropriate traffic management measures outlined in section 6.10.4 would be implemented to ensure continued access and minimise disruptions.

Visual impacts during construction would generally be associated with:

– positioning of plant and equipment along the proposed alignment of the feeder
– earthworks along the route of the feeder, including underboring and trenching
– establishment of any site compound and stockpile sites (if required)
– movement of construction staff and vehicles.

These have the potential to temporarily affect views for residents and local road users.

The visual impacts of construction would be temporary and relatively small-scale. The proposed works are unlikely to significantly change the visual character of the surrounding rural landscape. It is anticipated that reinstatement of road pavements, kerbs and nature strips will reduce the visual impacts in the short to medium term after construction.

Operation

The substation and 132 kV feeder infrastructure are consistent with the planned land use zoning and are essential to supporting urban development in the Maryland precinct. No direct, permanent land use conflicts are anticipated.

Some potential amenity impacts may arise, including:

– Noise: Temporary noise impacts during construction, with operational noise from the substation expected to be minimal and within regulatory limits.
– Visual Impacts: The proposal will be noticeable to existing visual receptors, and future receptors associated with the future redevelopment of the area. Landscaping is proposed which will soften the visual impact of the ZS by providing screening for visual receptors including residences and drivers. As such, the magnitude of change to visual amenity is low. As the feeder is underground, visual impact will not be affected once constructed. While the proposal would be noticeable within an agricultural landscape, the widespread construction development occurring in the region would result in a minor change to landscape character.
– Air Quality: Dust generation during construction is expected but would be managed through mitigation measures such as dust suppression and vehicle movement controls.

6.10.4 Mitigation measures

General management and mitigation measures are recommended in relation to land use and visual impacts are provided in Table 6.18.

Table 6.18 Mitigation measures – land use and visual

Environmental aspect	Mitigation measure	Responsibility	Timing
Visual	– The substation will be landscaped in accordance with Endeavour Energy's Substation Landscaping Document No. EMS 0005. – All construction plant, equipment, waste and excess materials will be contained within the designated boundaries of the work site and shall be removed from the site following the completion of construction. – The footprint for construction works will be kept to a minimum to minimise earthworks and maintain existing groundcover vegetation wherever possible. – Sites disturbed by earthworks will be reinstated and revegetated as soon as possible after construction. – The project site will be kept in a tidy condition, free of rubbish and waste materials.	Contractor	Construction

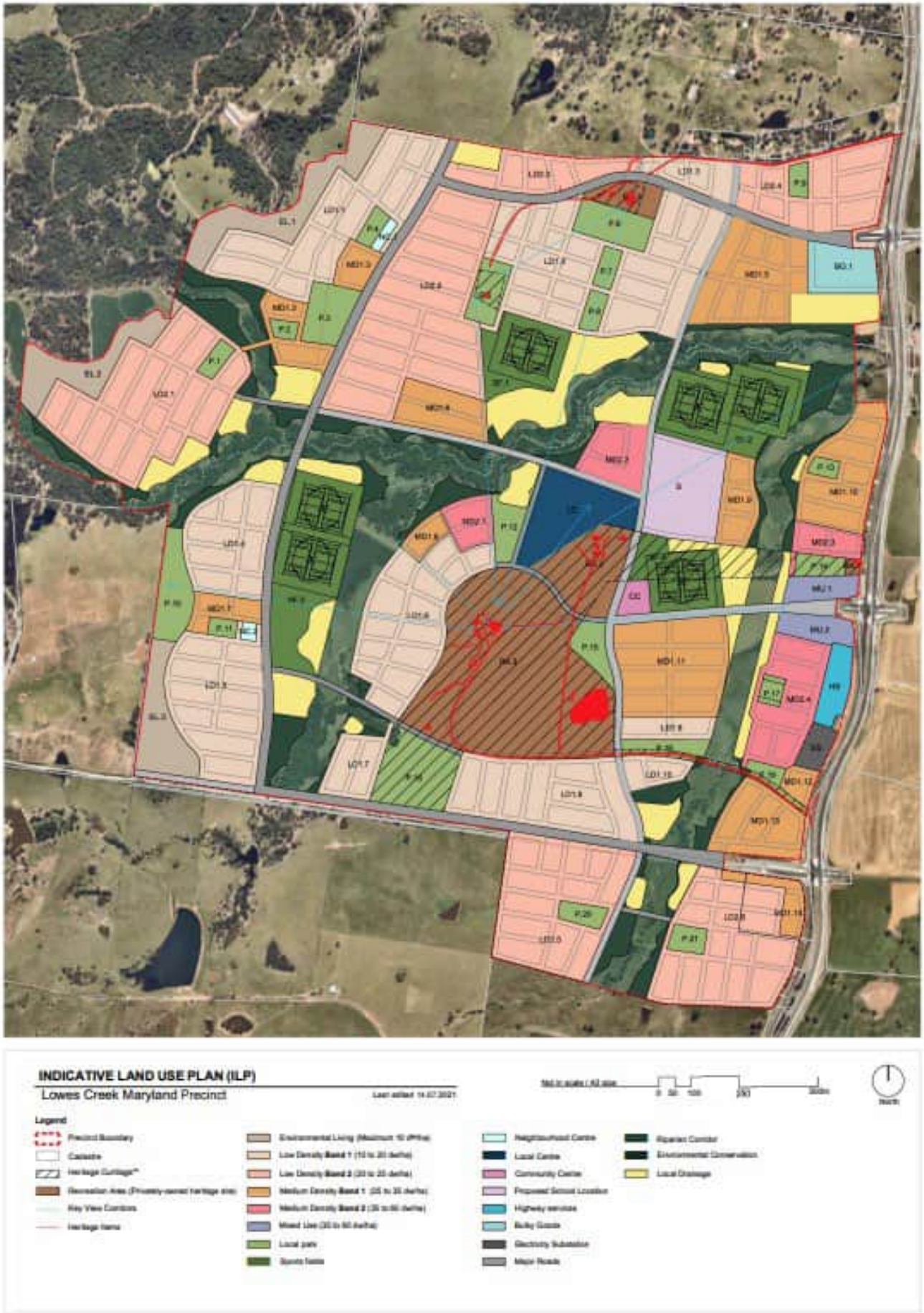

Figure 6.3 Maryland precinct indicative land use plan (NSW Government, 2021)

6.11 Other potential impacts

This section considers all other potential impacts that may occur as a result of the project, as provided in Table 6.19.

Table 6.19 Other potential impacts

Environmental factor	Existing environment	Potential impacts
Waste	The project would be undertaken within an existing road corridor and rural allotment. Minor waste may sporadically occur along the proposal site due to littering or dumping by the public or passing vehicles.	Expected waste streams and sources are detailed in section 3.4. The largest waste generating activity by volume would be the transmission corridor trenching and substation earthworks. All waste generated during construction would be reused if appropriate, or removed, transported and disposed from site in accordance with the NSW EPA's Waste Avoidance and Resource Recovery Strategy (EPA, 2014) and Waste Classification Guidelines (EPA, 2014), the POEO Act and relevant resource recovery orders (orders) and resource recovery exemptions (exemptions). Once constructed, the project would generate minimal waste, with the exception of any maintenance works that may be required throughout its operational life.
Air quality	The area surrounding the project site is characterised by rural farmland and isolated industrial / commercial sites. The nearest sensitive receivers are commercial and rural properties located on The Northern Road and Maryland Link Road 2, located between 150 – 600 m from the project site. A review of the National Pollutant Inventory revealed that there are no scheduled industries operating within the project site. The nearest scheduled industry is PGH Bricks & Pavers Bringelly which is a Ceramic Product Manufacturing facility located approximately 4 km north of the project site (DCCEEW, 2025). Existing air quality at the project site is likely to be representative of a rural area, with influence of fugitive emissions from local road traffic.	The project has potential to generate dust and other air emissions as a result of the construction works including trenching, excavation, underboring, vehicle emissions and stockpiling. Disturbed areas would be progressively stabilised as works are completed and stockpiles would be covered as required to minimise dust impacts. Exhaust emissions, such as exhaust emissions generated from construction plant and vehicles, would be temporary and are considered minor. No ongoing impacts are expected during operation.
Utilities and services	A Dial Before You Dig report was generated in August 2024 for the project site. Existing utilities within the construction footprint within the road reserve of The Northern Road include: – Existing Endeavor Energy overhead 11 kV, 33 kV and 132 kV feeder – Sydney Water potable water lateral – National broadband network fibre optic cable.	Construction has the potential to impact existing utilities within the project site. Above ground and underground utilities would be relocated or protected as required (in consultation with the utility owner/operator) to minimise impacts. There would be no impacts to utilities during operation.
Climate change and greenhouse gas	A desktop assessment of historical climate data and climate change projection from now publicly available databases and publication	Changes to climate has potential for higher frequency of extreme weather events such and could increase risks of flooding and fire. During construction extreme weather events could lead to localised flooding, erosion of exposed soils and mobilise

Environmental factor	Existing environment	Potential impacts
	was undertaken on 21 January 2025 which included the NSW Government AdaptNSW. The project is in the Metropolitan region of NSW. Temperature in the locality of the project will likely increase by an average of 0.7 degrees over the next 20 years and 1.8 degrees by 2050. Annual rainfall is projected to decrease by 7.2 per cent over the next 20 years with a decrease by 9 per cent by 2090. Fire danger days, which are defined as the number of days when the Forest Fire Danger Index is greater than 50, is projected to increase by 0.6 days per year by 2050 (NSW Government, 2024).	sediment into waterways. High temperature days could increase potential for generation of dust from excavation works or vehicle movements. It is expected that the greenhouse gases released during construction would consist of carbon dioxide and nitrous oxide generated from liquid fuel used in plant and vehicles (diesel, petrol) during construction, disposal and transport of materials. Other emissions during construction would mostly be associated with the materials used along the easement that is required to construct the new feeder and substation. No vegetation is proposed to be removed as part of the project, apart from pastoral grass. Therefore, the project is considered unlikely to result in a measurable increase in carbon dioxide in the atmosphere. Minimal emissions would be generated during operation as only infrequent maintenance works would occur.
Socio-economic	The feeder and substation would be constructed through a highly modified part of Western Sydney, consisting predominantly of rural land and road corridor. Camden City Council has a population of approximately 119,325 people and 39,588 private dwellings. The main occupations include professionals, clerical and administrative workers and machinery operators and drivers (Australian Bureau of Statistics, 2021).	The project may temporarily affect the local community as a result of minor increases in dust, noise, traffic and access and visual amenity. These impacts would be relatively short term as the feeders would be constructed in stages and have been considered in the REF and mitigation measures proposed in order to manage and/or mitigate these impacts. Economic benefits associated with the project include an increase in employment during the construction phase of the project.

6.11.1 Management and mitigation measures

General management and mitigation measures recommended are provided in Table 6.20.

Table 6.20 Mitigation measures – other impacts

Environmental aspect	Mitigation measure	Responsibility	Timing
Waste	– All waste is to be reused and recycled wherever possible. – Waste is to be managed in accordance with EE Standard EMS 0007 Waste Management. – Any soil suspected of being contaminated is to be stored and sampled separately, then disposed of to an appropriately licenced facility. – All waste is to be disposed of at a facility appropriately licenced to accept that waste. – Waste data records will be kept for the project. – Waste classification certificates and waste disposal dockets are to be retained for audit purposed.	Contractor	Construction

Environmental aspect	Mitigation measure	Responsibility	Timing
Air quality	– No materials will be burned on site – Dust generated during construction would be visually monitored by construction staff. If dust generation is evident, measures such as water sprays, minimising vehicle movements and reducing vehicle speed limits would be carried out to reduce dust emissions. – Stockpiles will be stabilised to minimise wind erosion and the generation of dust. – Stabilisation of disturbed areas will be undertaken as soon as practicable. – Any dust complaints will be investigated as soon as possible, and measures taken to manage any impacts identified. – During transportation, loads shall be adequately covered. – Maintain construction plant and equipment in good working condition – Turn off plant and machinery when not in use as much as practicable and fit with emission control devices complying with Australian design standards.	Contractor	Construction
Greenhouse gas emissions	– Recycled materials to be considered for use where cost effective and have no effect on engineering properties of the works. – Material supply and waste transport would be scheduled to optimise full loads and minimise required vehicle trips, where possible. Materials would be sourced from local supplies, where feasible. – Appropriately sized construction equipment, plant and vehicles would be used. – Use of alternative fuels and power sources would be investigated, where appropriate – All plant and equipment to be turned off when not in use. – Fulfil organisational reporting requirements to the Clean Energy Regulator.	Contractor	Construction
Safety hazards	The CEMP for the project will include provisions for managing safety and hazards, including: – details of hazards and risks associated with construction – measures to be implemented during construction to minimise and manage these risks including site security, signage and management of open excavations – record keeping for materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials – provisions for monitoring and consultation and notifications requirements for different hazard – contingency measures to be implemented in the event of unexpected hazards, risks arising and emergency situations.	Contractor	Pre-construction / Construction
Bushfire hazard	– No hot works will be undertaken on days of Total Fire Ban. Hot works include all activities that generate a naked flame or spark and include welding and grinding. The status of Total Fire Bans will be checked regularly during the Bushfire Danger Period (NSW Rural Fire Services website or local media). – All activities undertaken during the Bushfire Danger Period (1 October to 31 March, however, can vary in different areas) are to be conducted in accordance with the requirements of regulatory and local fire authorities. The Rural Fire Service will be consulted on requirements for works during the Bushfire Danger Period.	Contractor	Construction

Environmental aspect	Mitigation measure	Responsibility	Timing
	– Any works that have the potential to generate heat and sparks would be restricted on days of declared catastrophic fire danger. – All work will cease in the event of a bushfire.		

6.12 Cumulative impacts

6.12.1 Existing environment

A search of the Department of Planning and Environment Major projects map was undertaken on 9 July 2025 for the Camden LGA to determine the presence of any major projects in the vicinity of the project site. The major projects identified in the vicinity of the site is provided in Table 6.21.

Table 6.21 Major projects identified

Site ID	Name	Status	Approximate distance from site
SSD-7968-Mod-2	Oran Park Highschool and Public School – Mod 2	Determination	2 km south of the site
SSD-5684	Bringelly Brickworks Mod 2	Assessment	3 km northeast of the site
SSD-58287208	Regis Education, Sporting & Community Precinct - Oran Park	Prepare EIS	2.5 km southeast of the site
SSD-9477	New Catherine Field Primary School	Determination	4 km southeast of the site
SSD-67180469	Bringelly Quarry and Cumberland Plain Woodland Reserve	Prepare EIS	3.5 km northwest of the site
SSD-66919458	126 Kelvin Park Drive – Mixed use development	Prepare EIS	4 km northeast of the site
SSD-30759158	Minarah College	Assessment	3 km southeast of the site

6.12.2 Potential impacts

Construction

Due to the location of the project identified, there is potential for the developments in the locality to result in cumulative impacts.

There is potential for the proposal to result in minor increase in construction vehicles and light traffic during construction. There may also be an increase in air quality, visual, and noise impacts. These impacts are anticipated to be temporary and short term in nature.

Operation

No operational cumulative impacts are anticipated.

7. Environmental management

7.1 Ecologically sustainable development

Ecological sustainable development (ESD) is development that improves the total quality of life, both now and the future, in a way that maintains the ecological processes on which life depends. ESD involves the effective integration of economic and environmental consideration in the decision-making processes. The four main principles of ESD are discussed below and have been an integral consideration throughout the development of the project.

7.1.1 Precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

This principle was considered during the options assessment (refer to **C**hapter 2). The precautionary principle has guided the assessment of environmental impacts for this REF and the development of safeguards and management measures.

The project does not pose a risk of serious or irreversible environmental damage. Adverse impacts associated with the project would be short term and minor. Measures to reduce adverse impacts as far as practicable have also been identified within this REF.

Best available technical information, environmental standards and measures have been used to minimise environmental risks. These include several safeguards that have been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation of the project. No safeguards have been postponed because of lack of scientific certainty.

7.1.2 Inter-generational equality

Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of social, environmental and economic costs to future generations.

The project would not result in any impacts that are likely to adversely impact on the health, diversity or productivity of the environment for future generations. EE forecasted energy demand at the future Maryland Precinct is at risk of not meeting power requirements upon failure of a single network element. As such this project is to upgrade the electricity supply to improve network resilience to support future growth.

7.1.3 Conservation of biological diversity and ecological integrity

Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

The project would not have significant impacts on biological diversity and ecological integrity. An assessment of the biodiversity impact and appropriate site-specific safeguards are provided in section 6.6.

7.1.4 Improved valuation, pricing and incentive mechanism

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by the carrying out of a project, including air, water, land and living things. Environmental factors that should be in the valuation of assets and services such as:

– polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement

– the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
– environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

This REF examined the environmental consequences of the project and identified mitigation measures to manage the potential for adverse impacts. The requirement to implement these mitigation measures would result in an economic cost to EE. The implementation of mitigation measures would increase both the capital and operating maintenance costs of the project. This signifies those environmental resources have been given appropriate valuation.

The detailed design has been developed with an objective of minimising potential impacts on the surrounding environment. This indicates that the project is being developed with an environmental objective in mind.

7.1.5 Mitigation measures

Construction works will include notification prior to the start of the updates on any delays or changes to the construction period will also be communicated.

7.2 Summary of mitigation measures

Several mitigation measures have been identified in the REF to minimise adverse environmental impacts, which could potentially arise because of the project. Should the project proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction of the project.

A Construction Environmental Management Plan (CEMP) will be prepared to describe the safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP would be developed in accordance with relevant guidelines. Table 7.1 provides a summary of all the mitigation measures proposed in this REF.

Table 7.1 Summary of mitigation measures

Environmental aspect	Responsibility	Timing
Traffic		
The design will continue to be refined to avoid or minimise impacts on the surrounding road and transport network as far as reasonably practicable. Input will be sought from relevant stakeholders (including the Camden Council, Transport for NSW, emergency services, and utility service providers) prior to finalising the design of those aspects of the project that have the potential to affect the operation of infrastructure under the management of these stakeholders. This will include confirming ongoing operation and maintenance arrangements.	Contractor / EE	Pre-construction / Construction
A construction traffic and access management plan (CTMAP) will be prepared prior to construction and implemented as part of the Construction Environmental Management Plan (CEMP). The plan will detail processes and responsibilities to minimise traffic and access delays and disruptions and identify and respond to changes to road access. Appropriate traffic control measures in the vicinity of the study area will be adopted to ensure that the safety of all road users is not impacted by construction-related vehicles travelling to and from the project site. The plan will be developed in consultation with relevant stakeholders, including Camden Council, Transport for NSW, emergency services and utility service providers consulted as necessary. The plan will include a driver's code of conduct for haulage operations to define appropriate driver behaviour and safety requirements for drivers operating heavy vehicles on public roads.	Contractor	Pre-construction / Construction
Disruption to access to private properties and local roads will be minimised as far as practicable. Where temporary disruption to access cannot be avoided (such as during trenching), consultation will be undertaken with the owners, occupants and managers of affected properties and road infrastructure to confirm their access requirements and determine alternative arrangements. Alternative access arrangements, such as bypass tracks, detours or crossing plates, will be implemented during road crossings. The community should be updated with project changes during construction, including any temporary changes to access arrangements.	Contractor	Construction
Road condition surveys will be undertaken of the public roads proposed to be used, prior to and following the completion of construction, and provided to the relevant road authority. Condition monitoring will be carried out during construction. Rectification measures will be implemented as needed, during and/or following completion of construction, to address any damage caused during construction.	Contractor	Construction

Environmental aspect	Responsibility	Timing
The potential for cumulative construction transport and traffic impacts will be reviewed and coordinated with other projects, in consultation with relevant stakeholders, Camden Council, Transport for NSW and private developers. The review will include: – projects with the potential to affect access and capacity coordinating works and identifying efficient re-routing options as appropriate.	Contractor / EE	Pre-construction / Construction
Active transport facilities on the key roads in the study area have negligible use, however, should there be an alteration to active transport facilities, during construction, such works are to accommodate the active transport road user. This would be outlined in the construction traffic and access management plan (CTAMP) that will be prepared prior to construction.	Contractor	Pre-construction / Construction
Should lane closures be required, such will be in consultation with Transport for NSW and under their approval. Such works are likely to be required to be undertaken within the road network off peak periods. A construction traffic and access management plan (CTAMP) will be prepared prior to construction, including Traffic Guidance Schemes in line with Transport for NSW Traffic Control at Worksites Technical Manual to inform motorists of changed road conditions.	Contractor	Pre-construction / Construction
Heritage – Aboriginal		
An Unexpected Finds Procedures will be developed and implemented to ensure the appropriate management of Aboriginal objects or places within the study area.	Contractor	Construction
The NPW Act requires that, if a person finds an Aboriginal object on land and the object is not already recorded on AHIMS, they are legally bound under s.89A of the NPW Act to notify DECCW as soon as possible of the object's location. If a person finds an Aboriginal object which is not recorded on AHIMS, they should contact DECCW as soon as practicable.	Contractor	Construction
Heritage – Historic		
In the event that a site or artefact as defined by the *Heritage Act 1977* is identified during construction works, works must cease immediately at the location and no further harm to the object shall occur. The contractor will engage the Heritage Division, DCCEEW and a qualified heritage consultant, in accordance with Section 146 of the *Heritage Act 1977*, to determine an appropriate course of action prior to the recommencement of work in the area of the item. No work must commence in the vicinity of the find until any required approvals have been given by the Heritage Division.	Contractor	Construction
Soils and Contamination		
A construction environmental management plan (CEMP) for the works should include an unexpected finds protocol (UFP) to assist with the management of contaminated soil and/or groundwater if it is encountered during future site works.	Contractor/ EE	Pre-construction / Construction
Soil disturbance will be minimised by clearly demarcating the works footprint and marking all other areas as no-go zones prior to works commencing.	Contractor	Pre-construction
Erosion and sediment control measures are to be implemented and maintained to: – prevent sediment moving off site and sediment-laden water entering any water course, drainage lines, or drain inlets – reduce water velocity and capture sediment on site – minimise the amount of material transported from site to surrounding pavement surfaces – divert clean water around the site.	Contractor	Construction
Spoil and fill material management and dewatering of worksites will be managed in accordance with the following Endeavour Energy Standards and	Contractor	Construction

Environmental aspect	Responsibility	Timing
the Environmental Guidelines Handbook which are available on the Endeavour Energy standards and Accredited Service Provider (ASP) website: – EMS 0007 – Waste Management – EMS 0008 – Environmental Incidence Response and Management – EMS 0013 – Spoil management.		
An unexpected find protocol pertaining to contamination will be included in the CEMP for the proposed feeders. The protocol will include procedures for the assessment and management of unexpected contamination encountered (if any) during construction. Awareness training will be provided for all onsite staff to assist in the identification of potentially contaminated material.	Contractor	Construction
Works including vehicular movements will not be permitted during or immediately following heavy rain or inclement weather where disturbance of the subsoil is likely to occur within impervious or unsealed surface areas. However, construction works may be able to continue during or following inclement weather where those works are restricted to only along the road reserve section of the route or other impervious surfaces.	Contractor	Construction
Spill kits will be available at the construction site, and all persons undertaking construction works will be made familiar with their use and aware of incident response procedures.	Contractor	Construction
All areas disturbed by works will be progressively stabilised and rehabilitated to ensure stable surfaces are obtained as soon as practical (progressively where possible).	Contractor	Construction
All chemicals (fuels, concrete) will be stored in impervious bunded areas located at away from stormwater pits and waterways and in accordance with manufacturer's instructions.	Contractor	Construction
Refuelling will be in accordance with manufacturer's instructions and will only be in designated bunded refuelling areas.	Contractor	Construction
Biodiversity		
In the event that unexpected threatened flora or fauna species are identified during the course of works, all works will cease immediately and Endeavour Energy's Environmental Advisor will be consulted.	Contractor/ EE	Construction
Vegetation clearance and disturbance will be minimised, where possible. Vegetation clearance will be limited to trimming rather than the removal of whole plants where possible.	Contractor	Construction
Vegetation removal will be undertaken in accordance with Endeavour Energy's Environmental Guidelines Handbook.	Contractor	Construction
Pests, weeds and diseases will be managed in accordance with Endeavour Energy's Environmental Guidelines Handbook, specifically the Hygiene Protocol for Mitigating the Spread of Pests, Noxious Weeds and Diseases in company standard EMS0004- Managing Vegetation Near Electrical Infrastructure and Pest, Weed and Disease Mitigation.	Contractor	Construction
Water		
Excavation works will not be conducted during high rainfall periods. The weather will be monitored during the proposed works period and works will cease, and open areas will be stabilised, if heavy rainfall is forecast.	Contractor	Construction
Impacts on groundwater during construction will be minimised as far as practicable by: – avoiding the need to extract groundwater – minimising groundwater inflows and volumes into excavations – managing any groundwater encountered during excavations in accordance with the Endeavour Energy Standard EMS 0014 – Dewatering worksites.		

Environmental aspect	Responsibility	Timing
Drilling fluid/waste will be collected and stored in sealed holding tanks and recycled as appropriate. Excess fluid/waste will be removed from site via a licensed vacuum truck and disposed of at a licensed waste facility. No water will be released on to the ground.		
Install construction erosion and sediment control measures before construction commences consistent with 'the Blue Book' (Managing Urban Stormwater, Soils and Construction Vol 1 and 2A (Landcom 2004 and DECC 2008)) in order to: – Minimise sediment moving off-site and sediment laden water entering drainage lines, or drain inlets; – Reduce water velocity and capture sediment on site; – Minimise the amount of material transported from site to surrounding pavement surfaces; – Minimise in-stream soil erosion and downstream water quality impacts; and – Divert clean water around the site.	Contractor	Construction
Noise		
All sensitive receivers likely to be affected by high noise producing activities or out of-hours work will be notified in accordance with ICNG (DECC, 2009) at least five working days prior to commencement of the works. The notification will provide details of: – the project – the construction period and construction hours – contact information for project management staff – complaint and incident reporting – how to obtain further information.	Contractor	Pre-construction
All works must be undertaken during standard work hours as specified in the ICNG (DECC, 2009) recommended standard: – 7:00am – 6:00pm Monday to Friday – 8:00am – 1:00pm Saturdays – No work on Sundays or Public Holidays. Work outside the above hours will only comprise: – the delivery of materials outside normal hours requested by police or other authorities for safety reasons – emergency work to avoid the loss of lives and/or property.	Contractor	Construction
Appropriate internal and external approvals must be obtained where required prior to any additional out of hours works being carried out in accordance with the Endeavour Energy Environmental Handbook. Should any longer than two nights of out of hours work be required, the construction manager must apply to Endeavour Energy Environmental Services Team to progress approval for those works		
Noisy plant and equipment will be located at the greatest possible distance from nearby residents and the work location will be managed to ensure plant and equipment does not spread into adjacent areas		
Plant and equipment will be switched off when not in use.		
Noise generating activities will be undertaken at appropriate times, avoiding early morning and late afternoon when background noise levels are lower.		
All plant and equipment will be maintained in good working order and regularly serviced. Where practical, plant and equipment will be fitted with noise abatement devices such as mufflers, silencers and screens.		
Waste		

Environmental aspect	Responsibility	Timing
– All waste is to be reused and recycled wherever possible. – Waste is to be managed in accordance with EE Standard EMS 0007 Waste Management. – Any soil suspected of being contaminated is to be stored and sampled separately, then disposed of to an appropriately licenced facility. – All waste is to be disposed of at a facility appropriately licenced to accept that waste. – Waste data records will be kept for the project. – Waste classification certificates and waste disposal dockets are to be retained for audit purposed.	Contractor	Construction
Air quality		
No materials will be burned on site.	Contractor	Construction
Dust impacts will be minimised during construction through: – dust generated during construction would be visually monitored by construction staff. If dust generation is evident, measures such as water sprays, minimising vehicle movements and reducing vehicle speed limits would be carried out to reduce dust emissions. – stockpiles will be stabilised to minimise wind erosion and the generation of dust. – stabilisation and revegetation of disturbed areas will be undertaken as soon as practicable. – any dust complaints will be investigated as soon as possible, and measures taken to manage any impacts identified. – during transportation, loads shall be adequately covered.		
Maintain construction plant and equipment in good working condition.		
Turn off plant and machinery when not in use as much as practicable and fit with emission control devices complying with Australian design standards		
Land use		
Notification signage will be displayed onsite at least seven days prior to construction to notify pedestrian and cyclist users of any access restrictions.	Contractor	Pre-construction
– All work equipment and materials will be contained within the designated boundaries of the work site and compound site. – Construction areas will be maintained in a clean and tidy condition. – All waste generated during the course of the works will be removed from the work area as soon as practicable or at the end of each work day and disposed of in accordance with the measures identified in section 6.10.	Contractor	Construction
Greenhouse gas emissions		
– Recycled materials to be considered for use where cost effective and have no effect on engineering properties of the works. – Material supply and waste transport would be scheduled to optimise full loads and minimise required vehicle trips, where possible. Materials would be sourced from local supplies, where feasible. – Appropriately sized construction equipment, plant and vehicles would be used. – Use of alternative fuels and power sources would be investigated, where appropriate – Fulfil organisational reporting requirements to the Clean Energy Regulator.	Contractor	Construction
Hazards – Safety		
The CEMP for the project will include provisions for managing safety and hazards, including: – details of hazards and risks associated with construction	Contractor	Pre-construction / Construction

Environmental aspect	Responsibility	Timing
– measures to be implemented during construction to minimise and manage these risks including site security, signage and management of open excavations – record keeping for materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials – provisions for monitoring and consultation and notifications requirements for different hazard contingency measures to be implemented in the event of unexpected hazards, risks arising and emergency situations.		
Hazards – Bushfire		
– No hot works will be undertaken on days of Total Fire Ban. Hot works include all activities that generate a naked flame or spark, and include welding and grinding. The status of Total Fire Bans will be checked regularly during the Bushfire Danger Period (NSW Rural Fire Services website or local media). – All activities undertaken during the Bushfire Danger Period (1 October to 31 March) are to be conducted in accordance with the requirements of regulatory and local fire authorities. The Rural Fire Service will be consulted on requirements for works during the Bushfire Danger Period. – Any works that have the potential to generate heat and sparks would be restricted on days of declared catastrophic fire danger. – All work would cease in the event of a bushfire.	Contractor	Pre-construction / Construction
Visual		
– The substation will be landscaped in accordance with Endeavour Energy's Substation Landscaping Document No. EMS 0005. – All construction plant, equipment, waste and excess materials will be contained within the designated boundaries of the work site and shall be removed from the site following the completion of construction. – The footprint for construction works will be kept to a minimum to minimise earthworks and maintain existing groundcover vegetation wherever possible. – Sites disturbed by earthworks will be reinstated and revegetated as soon as possible after construction. – The project site will be kept in a tidy condition, free of rubbish and waste materials.	Contractor	Construction
Cumulative		
Construction works will include notification prior to the start of the updates on any delays or changes to the construction period will also be communicated.	Contractor / EE	Pre-construction / Construction

8. Conclusion

EE propose to construct a new 132/11 Kilovolt (kV) Zone Substation and install and operate a new 132 kV underground transmission feeder running between the new substation and the Orana Park and Bringelly Zone Substations

The assessment undertaken as part of this REF has determined that the proposed feeder, substation and associated ancillary works are unlikely to significantly affect the environment and should proceed subject to the mitigation measures outlined section 7.2 and in accordance with any other additional management and mitigation measures (or conditions) required by EE.

It is therefore concluded that:

– an EIS is not required
– EE makes a formal determination in relation to the project
– a separate environmental assessment will be prepared for any other works associated to this project that are not covered in this REF
– all works will be carried out in accordance with this REF, any conditions specified as part of the Notice of Determination issued in relation to this REF, the approved design, the associated CEMP and any other specific mitigation measures that have been specified.

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Appendices

Appendix A

Statutory Considerations

Clause 171 of the EP&A Regulation

Clause 171(2) of the EP&A Regulation details those factors that must be taken into account when consideration is given to the likely impact of any activity on the environment, for the purposes of Part 5 of the EP&A Act. The following provides a summary on how each of the Clause 171 factors has been considered.

Factor	Potential Impact
any environmental impact on a community.	There would be minor, short term, impacts to the community during construction associated with traffic changes. There would be no ongoing impacts once construction is complete.
any transformation of a locality.	The project would be constructed within existing disturbed areas. All construction areas would be backfilled and surfaces reinstated and there would be no ongoing impacts to the locality.
any environmental impact on the ecosystems of the locality.	Vegetation impacts would be limited to modified nature strips, road reserves and certified land and is unlikely to have any significant impacts.
any reduction of the aesthetic, recreational, scientific or other environmental quality.	The project is restricted to the installation of two underground feeders and substation. Once complete all feeder locations would be backfilled and surfaces reinstated. There would be no long-term reduction of the aesthetic, recreational, scientific or other environmental quality.
any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations.	The project would not impact the locality, places or buildings. All work would be restricted to existing disturbed areas with work areas backfilled and surfaces reinstated. Impacts to values for present or future generations are not expected.
any impact on the habitat of protected animals (within the meaning of the Biodiversity Conservation Act 2016).	Vegetation removal would be restricted to the disturbance of modified nature strips and reserves within a rural setting. No impacts to the habitat of protected animals is expected.
any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air.	The project would not endanger any species of animal, plant or other form of life.
any long-term effects on the environment.	The project would not have any long-term effects on the environment, excavations associated with the underground feeders would be backfilled and surfaces reinstated.
any degradation of the quality of the environment.	During construction, there would be potential minor degradation of the quality of the environment due to ground disturbance, traffic, noise, dust, and visual impacts. These impacts would be short term and managed appropriately through the implementation of mitigation measures summarised in section 7.
any risk to the safety of the environment.	There would be a minor risk to the environment from potential oil and chemical spills used during construction and the potential for contaminated material to be discovered. These risks would be minimised through the implementation of mitigation measures summarised in section 7.
any reduction in the range of beneficial uses of the environment.	There would be no reduction in the range of beneficial uses of the environment as a result of the project.
any pollution of the environment.	There would be potential for pollution from sediments, vehicle emissions, noise, dust and oil and chemical spills to occur during construction. These impacts would be managed through the implementation of mitigation measures summarised in section 7.
any environmental problems associated with the disposal of waste.	There is not expected to result in any environmental problems associated with the disposal of waste during construction or operation, providing all waste is adequately classified and managed in accordance with the mitigation measures summarised in section 7.

Factor	Potential Impact
any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply.	There would be no increase in demand on resources that are, or are likely to become, in short supply.
any cumulative environmental effect with other existing or likely future activities.	The project would not contribute to any significant potential cumulative impacts when considered in conjunction with other existing or likely future activities.
any impact on coastal processes and coastal hazards, including those under projected climate change conditions.	N/A – the project is not located in a coastal area.
applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1.	The project is consistent with local strategic planning statements, regional strategic plans and existing land uses.
other relevant environmental factors.	N/A – this REF has considered all relevant environmental factors, and the project is unlikely to cause significant impacts. Mitigation measures are provided in section 7.

Matters of National Environmental Significance under the EPBC Act

Under the EPBC Act, Endeavour Energy is required to consider matters of national environmental significance (MNES), to assist in determining whether the proposal should be referred to the Commonwealth Department of Agriculture, Water and the Environment. A report was generated from the Department of Climate Change, Energy, the Environment and Water's protected matters search tool (PMST) on 9 December 2024. using a 200 m buffer around the project site. A summary of how MNES have been considered is provided below and the full list provided in this Appendix.

MNES / Commonwealth land	Potential impact
Any impact on a World heritage property?	There are no World Heritage Properties located within the study area of the project.
Any impact on a National heritage place?	No National heritage places are located within the study area of the project.
Any impact on a Commonwealth listed threatened species or ecological communities?	The PMST report identified 64 threatened species and 4 TECs as potentially occurring in the works area. Threatened species and TECs have been discussed and addressed for likelihood of impact in section 6.6. The project is unlikely to result in a significant impact on any listed threatened species or TEC protected under the EPBC Act.
Any impacts on a Commonwealth listed migratory species?	The PMST report identified 4 migratory species as potentially occurring in the works area. Migratory species have been discussed and addressed for likelihood of impact in section 6.6. The project is unlikely to result in a significant impact on any listed migratory species protected under the EPBC Act.
Any impact on a Commonwealth marine area?	The Commonwealth marine area is not located within the study area of the project.
Any impact on the Great Barrier Reef Marine Park?	The study area of the project is not located in the Great Barrier Reef.
Does the proposed activity involve a nuclear action (including uranium mines)?	The project does not involve a nuclear action.
Does the proposed activity involve a water resource, in relation to coal seam gas development and large coal mining development?	The project is not associated with a coal seam gas or mining development.

MNES / Commonwealth land	Potential impact
The proposed activity is not associated with a coal seam gas or mining development.	The study area of the project is not located on or near any Commonwealth lands.

Protected matters search results

Species	Scientific name	Common name	NSW BC Act	Commonwealth EPBC Act
Fauna				
Bird	*Anthochaera phrygia*	Regent Honeyeater	CE	CE
Bird	*Lathamus discolor*	Swift Parrot	E	CE
Bird	*Calidris ferruginea*	Curlew Sandpiper	CE	CE
Bird	*Numenius madagascariensis*	Eastern Curlew, Far Eastern Curlew	CE	CE
Mammal	*Petauroides volans*	Greater Glider (southern and central)	E	E
Bird	*Callocephalon fimbriatum*	Gang-gang Cockatoo	E	E
Mammal	*Dasyurus maculatus maculatus* (SE mainland population)	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	V	E
Bird	*Melanodryas cucullata cucullata*	South-eastern Hooded Robin, Hooded Robin (south-eastern)	E	E
Frog	*Litoria littlejohni*	Northern Heath Frog, Littlejohn's Tree Frog	E	E
Reptile	*Hoplocephalus bungaroides*	Broad-headed Snake	E	E
Bird	*Tringa nebularia*	Common Greenshank, Greenshank	E	E
Mammal	*Isoodon obesulus obesulus*	Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern)	E	E
Fish	*Macquaria australasica*	Macquarie Perch	E	E
Bird	*Dasyornis brachypterus*	Eastern Bristlebird	E	E
Mammal	*Phascolarctos cinereus* (combined populations of Qld, NSW and the ACT)	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	E	E
Bird	*Botaurus poiciloptilus*	Australasian Bittern	E	E
Bird	*Erythrotriorchis radiatus*	Red Goshawk	E	E
Bird	*Rostratula australis*	Australian Painted Snipe	E	E
Mammal	*Chalinolobus dwyeri*	Large-eared Pied Bat, Large Pied Bat	E	E
Mammal	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V
Bird	*Pycnoptilus floccosus*	Pilotbird	V	V
Mammal	*Pseudomys novaehollandiae*	New Holland Mouse, Pookila	Not listed	V
Bird	*Climacteris picumnus victoriae*	Brown Treecreeper (south-eastern)	V	V
Plant	*Mixophyes balbus*	Stuttering Frog, Southern Barred Frog (in Victoria)	E	V

Species	Scientific name	Common name	NSW BC Act	Commonwealth EPBC Act
Bird	*Charadrius leschenaultii*	Greater Sand Plover, Large Sand Plover	V	V, Migratory
Bird	*Calidris acuminata*	Sharp-tailed Sandpiper	Not listed	V, Migratory
Bird	*Neophema chrysostoma*	Blue-winged Parrot	V	V,
Frog	*Litoria aurea*	Green and Golden Bell Frog	E	V
Bird	*Hirundapus caudacutus*	White-throated Needletail	V	V, Migratory
Bird	*Grantiella picta*	Painted Honeyeater	V	V
Bird	*Falco hypoleucos*	Grey Falcon	V	V
Frog	*Heleioporus australiacus*	Giant Burrowing Frog	V	V
Mammal	*Petaurus australis australis*	Yellow-bellied Glider (south-eastern)	Not listed	V
Bird	*Gallinago hardwickii*	Latham's Snipe, Japanese Snipe	V	V, Migratory
Bird	*Calyptorhynchus lathami lathami*	South-eastern Glossy Black-Cockatoo	V	V
Mammal	*Notamacropus parma*	Parma Wallaby	V	V
Bird	*Stagonopleura guttata*	Diamond Firetail	V	V
Mammal	*Petrogale penicillata*	Brush-tailed Rock-wallaby	E	V
Flora				
Plant	*Thelymitra kangaloonica*	Kangaloon Sun Orchid	CE	CE
Plant	*Rhodamnia rubescens*	Scrub Turpentine, Brown Malletwood	CE	CE
Plant	*Rhodomyrtus psidioides*	Native Guava	CE	CE
Plant	*Rhizanthella slateri*	Eastern Underground Orchid	V	E
Plant	*Allocasuarina glareicola*	null	E	E
Plant	*Acacia baueri subsp. aspera*	null	E	E
Plant	*Persoonia nutans*	Nodding Geebung	E	E
Plant	*Pterostylis saxicola*	Sydney Plains Greenhood	E	E
Plant	*Cynanchum elegans*	White-flowered Wax Plant	E	E
Plant	*Genoplesium baueri*	Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid	E	E
Plant	*Persoonia hirsuta*	Hairy Geebung, Hairy Persoonia	E	E
Plant	*Acacia terminalis subsp. Eastern Sydney* (G.P.Phillips 126)	Sunshine Wattle (Sydney region)	E	Endangered (listed as Acacia terminalis subsp. terminalis MS)
Plant	*Cryptostylis hunteriana*	Leafless Tongue-orchid	V	V
Plant	*Melaleuca biconvexa*	Biconvex Paperbark	V	V
Plant	*Pimelea curviflora var. curviflora*	null	V	V
Plant	*Melaleuca deanei*	Deane's Melaleuca	V	V
Plant	*Caladenia tessellata*	Thick-lipped Spider-orchid, Daddy Long-legs	V	V

Species	Scientific name	Common name	NSW BC Act	Commonwealth EPBC Act
Plant	*Thesium australe*	Austral Toadflax, Toadflax	V	V
Plant	*Eucalyptus camfieldii*	Camfield's Stringybark	V	V
Plant	*Pomaderris brunnea*	Rufous Pomaderris, Brown Pomaderris	E	V
Plant	*Acacia pubescens*	Downy Wattle, Hairy Stemmed Wattle	V	V
Plant	*Syzygium paniculatum*	Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry	E	V
Plant	*Persicaria elatior*	Knotweed, Tall Knotweed	V	V
Plant	*Leucopogon exolasius*	Woronora Beard-heath	V	V
Plant	*Acacia bynoeana*	Bynoe's Wattle, Tiny Wattle	E	V
Plant	*Pultenaea aristata*	null	V	V

Appendix B

Traffic and Transport Assessment

Lowes Creek Zone Substation

Traffic and Transport Impact Assessment

Endeavour Energy

2 September 2025

The Power of Commitment

Project name		132/11 kV Lowes Creek Zone Substation					
Document title		Lowes Creek Zone Substation | Traffic and Transport Impact Assessment					
Project number		12641966					
File name		12641966_REP-0_132 11 kV Lowes Creek Zone Substation Traffic and Transport Impact Assessment.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S4	0	S. Clarke	M. Lucas		K. Rosen		02/09/25

GHD Pty Ltd ABN 39 008 488 373
Contact: Sean Clarke, Technical Director – Traffic Engineering and Transport Planning | GHD Pty Ltd
Level 15, 133 Castlereagh Street
Sydney, NSW 2000, Australia
T +61 2 9239 7100 | **F** +61 2 9239 7199 | **E** sydmail@ghd.com | **www.ghd.com**

Key terms, acronyms and abbreviations

Abbreviation/term	Definition
AS	Australian Standard
CEMP	Construction environmental management plan
CTAMP	Construction traffic and access management plan
DPHI	Department of Planning, Housing and Infrastructure
EE	Endeavour Energy
EIS	Environmental impact statement
EPA	Environmental Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
GIS	Gas insulated switchgear
HDD	Horizontal directional drilling
km	Kilometres
km/h	Kilometres per hour
kV	Kilovolt
Level of service (LoS)	A measure of the average delay at an intersection or individual road at an intersection.
m	Metres
LGA	Local Government Area
NHVAS	National Heavy Vehicle Accreditation Scheme
NHVR	National Heavy Vehicle Regulator
NSW	New South Wales
OSOM	Oversize and/or overmass
PBS	Performance Based Standard
PCE	Per car equivalent
pcu	Passenger car unit
Project	Construction and operation of the new 132 kV underground transmission feeder between the new substation (Lowes Creek) and the Oran Park and Bringelly Zone Substations, comprising of open trench installation in The Northern Road reserve Horizontal Directional Drilling (HDD) beneath The Northern Road to provide connection to the new substation
Project site	The area that would be directly disturbed by the construction of the project (for example, because of ground disturbance and trenching to install the feeder) plus land within the future Maryland Precinct within Lot 99 DP 1302677 containing the future substation
RAV	Restricted Access Vehicle
REF	Review of Environmental Factors
RUM	Road User Movement
Study area	For the purpose of the traffic and transport impact assessment, the study area generally comprises the area on The Northern Road between Maryland Link Road 2 and Maryland Link Road 3 in the suburb of Bringelly. The study area is shown in Figure 1.1.
VCR	Volume to capacity ratio
veh/day	Vehicles per day
veh/h	Vehicles per hour

Executive summary

The project

The project involves building a new 132/11 kV Zone Substation at Lowes Creek located in New South Wales, Australia and the installation and operation of a new 132kV underground transmission feeder between Endeavour Energy Oran Park Zone Substation and Bringelly Zone Substation (the project).

The total length of the feeder would be approximately 1 kilometre (km). The majority of the route would be beneath The Northern Road Reserve adjacent to the existing 132 kV overhead transmission infrastructure.

The transmission feeder would be installed primarily via open trenching in The Northern Road reserve. The remaining section of the route beneath (approximately 10 per cent) would be installed using Horizontal Directional Drilling (HDD) techniques beneath The Northern Road corridor.

The proposed works involve the following key stages:

– Site establishment, including construction of laydown areas and delivery of HDD machinery and equipment
– Excavation of HDD entry/exit pits and installation of HDD machinery
– Boring the feeder between HDD entry/exit pits under The Northern Road to minimise impacts to existing infrastructure and disruption to traffic
– Trenching sections of the feeder in locations where underboring is not required
– Installation of joint bays and other permanent infrastructure
– Removal of HDD equipment, backfilling of entry/exit pits and revegetation of disturbed areas
– Commissioning and operation of the new infrastructure.

This report

This report has been prepared by GHD Pty Ltd (GHD) as part of the Review of Environmental Factors (REF) for the project. The REF supports an application for approval of the project in accordance with Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This traffic and transport impact assessment examines the potential increase in traffic movements, pedestrian, cyclist and public transport impacts on the road network during and after the construction of the proposed 132/11 kV Zone Substation and install and operate a new 132 kV underground transmission feeder running along The Northern Road between Maryland Link Road 2 and Maryland Link Road 3 and the HDD under The Northern Road providing connection to the new Lowes Creek Substation.

Existing environment

The study area for the assessment includes the project site and sections of The Northern Road that have the potential to be directly or indirectly affected by the construction and operation of the project.

Traffic count information collected as part of the assessment indicated that the mid-block capacity currently operates with traffic volumes within their maximum capacity in the peak hour and throughout the rest of the day.

The Transport for NSW Interactive Restricted Access Vehicle Map identifies the network of routes that are approved to be used by heavy vehicles of various sizes. The map identifies The Northern Road is approved to accommodate vehicles up to 26 metre B-double trucks and oversize overmass vehicles.

Crash incident data was collected from statistics published by the Transport for NSW Centre for Road Safety. There have been two recorded crashes in the past five years within the study area (the intersections of The Northern Road and Maryland Link Roads 2 and 3). Neither of the crashes resulted in injuries.

No public transport services operate within the study area. Although The Northern Road currently has a shared path on the eastern kerb and a short length (approximately 80 m) of shared path on the western kerb north of the intersection with Maryland Link Road 2 and the intersections with Maryland Link Road 2 and 3 are signalised, with

both pedestrian and cycle lanterns for the crosswalk, with a stage crossing across The Northern Road, active transport road use is negligible.

The Northern Road provides access to Maryland Link Road 2 and 3. Maryland Link Road 2 provides access to a rural residential property east of The Northern Road, whereas Maryland Link Road 3 provides access to a resource recovery facility west of The Northern Road and a rural residential dwelling east of The Northern Road. Additionally, there are currently No Stopping restrictions along The Northern Road.

Impacts from the project during construction

For the purposes of assessing traffic and transport impacts, a conservative 'worst-case' construction scenario during the peak hour was developed comprising the following traffic movements:

– Workers private vehicle arrival and departure
– Heavy vehicle arrival and departure.

Analysis of future traffic network conditions was undertaken for the assumed construction year (until 2028), accounting for the expected construction trips and ten per cent traffic growth from the 2024 traffic data. The analysis indicated The Northern Road would continue to operate within mid-block capacity limits and maintain acceptable road network operations during the peak period of construction activity.

A secondary assessment was undertaken, should there be a potential need to close the southbound kerbside lane to facilitate the open trench construction works. The analysis was undertaken utilising the 2024 traffic survey data with the maximum weekday average traffic flow during the road network off peak period and ten per cent traffic growth for the assumed construction year (until 2028). The analysis indicated The Northern Road would continue to operate within mid-block capacity limits and maintain good road network operations during construction activity of single lane operation during off peak road network periods.

Other impacts on transport infrastructure, including parking facilities, public and active transport and road safety, are expected to be negligible following the implementation of the mitigation and management measures provided in section 9.

Impacts from the project during operation and decommissioning

Given the low intensity of activities and small number of staff associated with the operation (including maintenance activities), the traffic impacts associated with the operation and maintenance of the project are expected to be negligible.

Cumulative impacts

The assessment outlined potential future developments currently in various planning stages within proximity to the subject site. Some of these projects' traffic generation may interface during the construction of the proposed substation if they are constructed concurrently, however it is noted that the surrounding impacts do not directly impact the subject site. As the assessment found there would be a low risk of operational impacts from the project, cumulative (operational) impacts are not considered likely. It should be noted that the traffic volumes associated with any projects currently being constructed or operating in 2024 have inherently been included into the baseline traffic volumes as part of the traffic surveys conducted for this project.

Recommended mitigation measures

A range of mitigation and management measures are proposed to minimise and avoid the potential impacts identified. This will include implementing a construction traffic and access management plan (including a drivers' code of conduct) as part of the construction environmental management plan.

Conclusion

Based on the assessment conducted, with the implementation of the proposed mitigation and management measures, the project is expected to result in temporary, minor impacts on traffic and transport infrastructure and facilities during construction. Potential impacts on traffic and transport infrastructure and facilities during operation and decommissioning would be lower than peak construction and are expected to be negligible.

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1. Introduction

1.1 Project overview

Endeavour Energy (EE) propose to construct a new 132/11 (kilovolt) kV Zone Substation and install and operate a new 132 kV underground transmission feeder running between the new substation and the Oran Park and Bringelly Zone Substations.

The total length of the feeder would be approximately 1 kilometre (km). The majority of the route would be beneath the Northern Road Reserve adjacent to the existing 132 kV overhead transmission infrastructure.

The transmission route would be installed primarily via open trenching in The Northern Road reserve. The remaining section of the route beneath (approximately 10 per cent) would be installed using Horizontal Directional Drilling (HDD) techniques beneath The Northern Road corridor.

The route of the permanent feeder and the location of the new substation are shown in Figure 1.1.

The majority of construction works would be undertaken during standard construction hours as defined in the *Interim Construction Noise Guideline* (DECC 2009).

Subject to receipt of planning approvals, it is anticipated that construction could commence in November 2025 with the commissioning of the new infrastructure occurring in the third quarter of 2028.

1.1.1 Location

The project is located in the Camden Council Local Government Area (LGA) within the suburbs of Oran Park and Bringelly, in Western Sydney. The location is approximately 7 km north of the City of Camden central business district.

The study area includes land within the future Maryland Precinct within Lot 99 DP 1302677 and The Northern Road corridor, which is a State Road between Maryland Link Roads 2 and 3.

From the new substation, the proposed feeders would be underbored to the eastern side of The Northern Road and would then run north to the Bringelly Zone Station and south to the Oran Park Zone Substation within The Northern Road corridor.

For the purpose of the traffic and transport impact assessment, the study area generally comprises the area on The Northern Road between Maryland Link Road 2 and Maryland Link Road 3 in the suburb of Bringelly, as shown in Figure 1.1.

1.1.2 Key project features

Construction of the project would involve the following key stages:

– Site establishment, including construction of laydown areas and delivery of HDD machinery and equipment
– Excavation of HDD entry/exit pits and installation of HDD machinery
– Boring the feeder between HDD entry/exit pits under The Northern Road to minimise impacts to existing infrastructure and disruption to traffic
– Trenching sections of the feeder in locations where underboring is not required
– Installation of joint bays and other permanent infrastructure
– Removal of HDD equipment, backfilling of entry/exit pits and revegetation of disturbed areas
– Commissioning and operation of the new infrastructure.

The substation would consist of the following major equipment:

– 1 x 11/0.415 kV outdoor padmount substation
– 1 x relay room
– One substation building, comprising the following:

- 132 kV switch room with 1 x 132 kV gas insulated switchgear
- 11 kV switch room with 3 x 11 kV switchgear
- Two 45 mega volt-amperes (MVA) power transformers
- Two protection and control rooms with the corresponding protection and controls equipment
- Amenities room.

1.2 Construction methodology

1.2.1 Horizontal directional drilling

The proposed methodology for horizontal direct drilling (HDD) includes:

– Establish site facilities, material storage and stockpile locations
– Install temporary fencing to secure work and storage areas
– Locate HDD rig, fluid delivery system, and down hole tooling and drill rods in a fenced area
– Excavate entry hole and exit pits
– Underbore pilot hole from entry to exit
– Enlarge pilot hole to full diameter to accommodate HDPE underbore pipe. Several passes may be required
– Deliver and offload underbore pipe
– Pull pipe through underbore
– Pull rope with mandrel attached through each of the conduits at the underbore entry and exit pits to prove they are fit for installation of transmission cables.

1.2.2 Open trenching

The proposed methodology for open trenching includes:

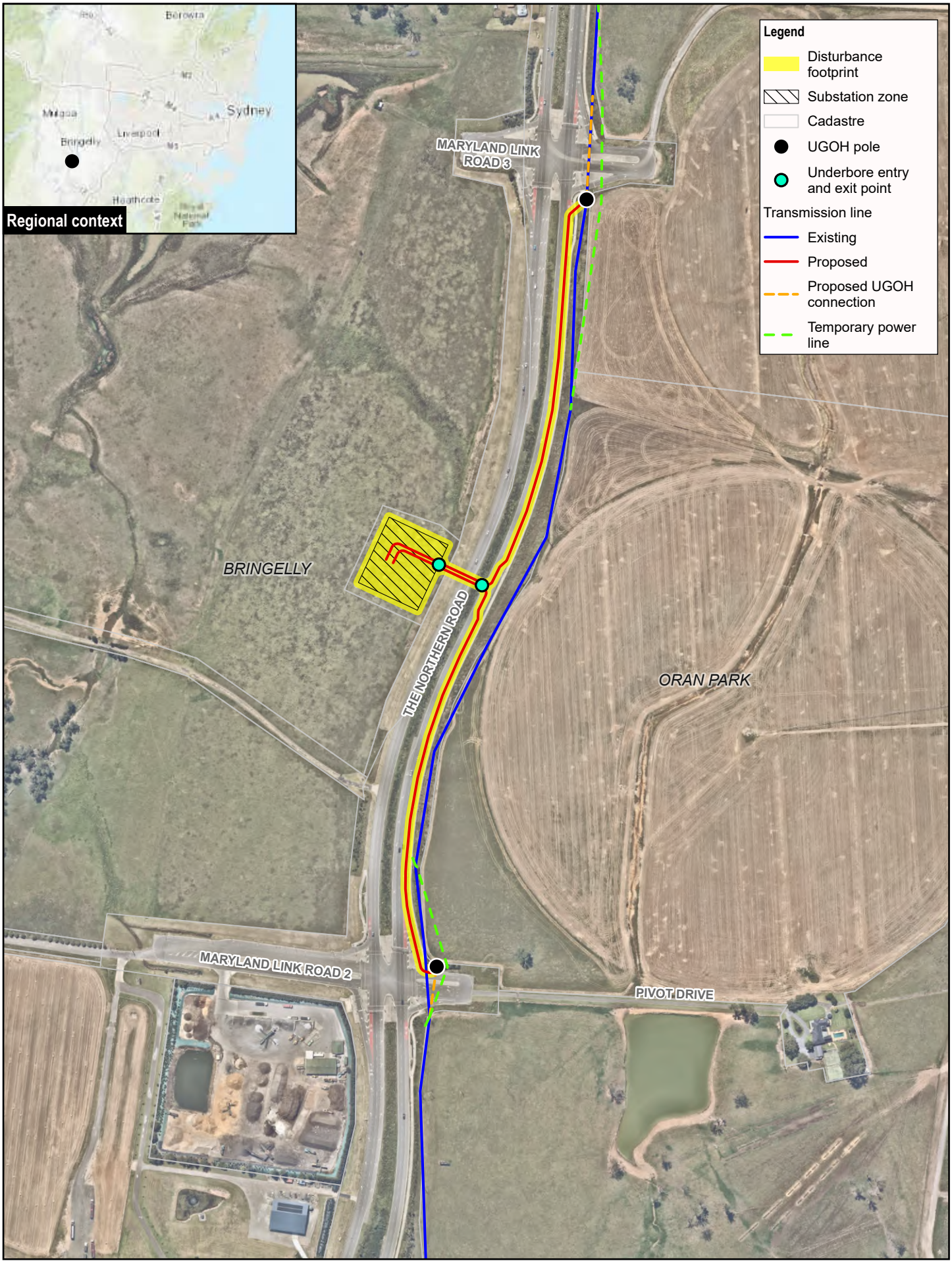
– Establish site facilities, material storage and stockpile locations
– Remove road surface or grass cover
– Excavate trenches to 0.9 m width and 1.2 m depth (approximately)
– Stockpile suitable backfill material if permitted and remove remaining excavated material from site
– Install conduits and backfill
– Restore road surface or seed/returf as applicable
– Road plates to be installed over open points at each end of the excavation
– Install jet line from end to end of completed conduit installation to facilitate pulling of cables.

It is estimated that approximately 1,080 m^3 of spoil would be generated through trenching construction works. This spoil would be disposed of at a facility approved to receive this material.

1.2.3 132/ 11kV substation

The proposed methodology for the substation works includes:

– Site establishment – install builders site amenities, including site office
– Excavation works within the transformer bay
– Install support structures for transformers, i.e. concrete foundation, steelwork and steel column supports
– Excavate trench and install 11kV conduits
– Backfill and restore surface
– Install two new 45 MVA power transformers using 220 tonne and 25 tonne cranes
– Connect, test and commission transformers.



Paper Size ISO A4

0 50 100 150 200

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

Endeavour Energy
132/11 kV Lowes Creek Zone Substation

Project layout

Project No. **12641966**
Revision No. **A**
Date **26/02/2025**

FIGURE 1.1

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Print date: 12 Mar 2025 - 10:04

Data source: Imagery - Nearmap: World Topographic Map: Esri, HERE, Garmin, FAO, USGS, NGA; General topographic data - NSWSS, 2024. Created by: pfernandes

1.3 Statutory and planning context

1.3.1 Roads Act 1993

The objects of the *Roads Act 1993* (Roads Act) are to govern the use and access to public roads, manage opening and closing of public roads, provide classification of roads, and identify the functions of road authorities. The Roads Act states that a road authority (which includes Transport for NSW) may carry out road work on any public road for which it is the relevant road authority and on any other land under its control (Division 1, Section 71). If the road is not under the control of the authority undertaking the works, then consent is required.

Section 138 of the Roads Act requires consent to be obtained from the appropriate road authority for works to:

– erect a structure or carry out a work in, on or over a public road
– dig up or disturb the surface of a public road
– remove or interfere with a structure, work or tree on a public road
– pump water into a public road from any land adjoining the road
– connect a road (whether public or private) to a classified road.

The project is, in part, located on a classified road that is managed by Transport for NSW (The Northern Road) and would affect local roads that are managed by Camden Council. A Road Occupancy Licence would be required from Transport for NSW prior to any activity likely to impact on traffic flows.

1.4 Purpose of this report

This traffic and transport impact assessment examines the potential impacts on traffic movements, pedestrian, cyclist and public transport on the road network during and after the construction of the proposed 132/11 kV Zone Substation and install and operate a new 132 kV underground transmission feeder running along The Northern Road between Maryland Link Road 2 and Maryland Link Road 3 and the HDD under The Northern Road providing connection to the new Lowes Creek Substation.

The structure and content of this report are outlined in Table 1.1.

Table 1.1 Structure and content

Section	Description
Section 1 – Introduction	Outlines the key elements of the project and the purpose of this report (this section).
Section 2 – Methodology	Describes the study area and methodology for the assessment.
Section 3 – Existing environment	Describes the existing environmental values of the study area and project site relevant to traffic and transport, including the results of desktop assessments and traffic survey data.
Section 4 – Basis of assessment	Details the key assumptions on which the assessment has been based.
Section 5 – Construction impacts	Examines the potential for traffic and transport impacts during construction.
Section 6 – Operation impacts	Examines the potential for traffic and transport impacts during operation (which includes maintenance).
Section 7 – Cumulative impacts	Provides an assessment of cumulative impacts.
Section 8 – Decommissioning impacts	Examines the potential for traffic and transport impacts during decommissioning.
Section 9 – Recommended mitigation and management measures	Recommends measures to mitigate and manage the potential impacts identified.
Section 10 – Conclusion	Provides the key findings of the assessment.
Section 11 – References	Lists the documents and websites referenced in this study.

1.5 Disclaimer

This report: has been prepared by GHD for Endeavour Energy and may only be used and relied on by Endeavour Energy for the purpose agreed between GHD and Endeavour Energy as set out in section 1.4 of this report.

GHD otherwise disclaims responsibility to any person other than Endeavour Energy arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Endeavour Energy and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

2. Methodology

2.1 Assessment approach

This traffic and transport assessment was undertaken with reference to the *Guide to Transport Impact Assessment* (Transport for NSW, 2024) and *Guide to Traffic Management Part 12 Integrated Transport Assessments for Development* (Austroads, 2020).

In the preparation of this traffic and transport assessment, the following tasks were undertaken:

- Research the characteristics of the existing environment, including desktop inspection of aerial imagery, traffic surveys (counts) and stakeholder feedback provided.
- Review the proposed construction activities and staging with respect to proposed workforce resources, potential construction traffic management, haulage and site access.
- Identify the potential impacts of the project during construction based on expected peak activities, including impacts on traffic volumes in the road network, disruption to property access and construction workforce parking.
- Review conditions expected during operation (including maintenance) and decommissioning of the project
- Assess the potential for cumulative impacts with other existing and proposed developments.
- Recommend measures that could avoid, reduce and/or mitigate the likelihood, extent and/or duration of the impacts identified.

The approach to key tasks is described in the following sections.

2.1.1 Desktop review of existing conditions

A desktop review was undertaken to understand the general characteristics of the study area and to supplement site observations. The desktop review utilised publicly available information, including:

- Aerial photography by Google Maps / NSW SIX Maps / Nearmaps
- Street view images by Google Maps
- Traffic Volume Viewer published by Transport for NSW (**https://maps.transport.nsw.gov.au/egeomaps/traffic-volumes/index.html#/?z=6**)
- Public transport routes and schedules from Transport for NSW Trip Planner (**transportnsw.info/routes/bus)**
- Road crash data published by the Transport for NSW Centre for Road Safety (**transport.nsw.gov.au/roadsafety**)
- Restricted heavy vehicle routes published by Transport for NSW (**maps.transport.nsw.gov.au/egeomaps/restricted-access-vehicles-map/index**)
- NSW Road Network Classification Map published by Transport for NSW (**https://maps.transport.nsw.gov.au/egeomaps/road-network-classification/index.html**)
- NSW Oversize Overmass Load Carrying Vehicles and Road Train map published by National Heavy Vehicle Regulator (NHVR) (**https://maps.nhvr.gov.au/?networkLayerContext=NATIONAL_MAP&view=Category&exemptionSetId=-2&networkIds=%5B2157%5D**).

2.1.2 Data collection

There are no long-term Transport for NSW (TfNSW) traffic counting stations on The Northern Road within proximity of the Project site, with a temporary recording station (ID 85026 – 1.22 km South of Carrington Road) located approximately 1.1 km north of the project site. This station identified southbound traffic flow only between 24 November 2009 and 2 December 2009, as summarised in Table 2.1.

Table 2.1 TfNSW Traffic Counter Station ID 85026 Traffic data (2009) - Southbound

Data Element	Quantity
Average weekday traffic flow	7,387 veh/day
AM peak period	8 am to 9 am Maximum 474 veh/h
PM peak period	5 pm to 6 pm Maximum 960 veh/h
Saturday traffic flow	5,750 veh/day
Sunday traffic flow	5,439 veh/day
Weekend Peak period	11 am to 12 pm Maximum 533 veh/h (Sunday)

Notes:

– *veh/day = Vehicles per day*

– *veh/h = Vehicles per hour*

As part of the traffic and transport impact assessment, traffic counts were undertaken for a week between 7 December 2024 and 14 December 2024 on The Northern Road, between Maryland Link Road 2 and 3 (outside the proposed Lowes Creek substation site). Traffic survey details are contained in Appendix A.

The traffic count information provides a current estimate of the number of vehicles using The Northern Road, including separate counts of light and heavy vehicles, which was used to determine the existing 'baseline' traffic conditions in 2024 (refer to section 3.3.1).

2.1.3 Impact assessment

Construction traffic generation was estimated and identified on a first principles basis, accounting for the:

– location of the project site and proposed construction access

– location of the work areas on The Northern Road for installation of conduit via the open trench and HDD

– peak number of workers and expected travel routes

– number of heavy vehicles and expected travel routes.

Following the determination of baseline traffic volumes in 2024, baseline traffic conditions for a future project year used in the impact assessment were identified by applying a growth factor to the 2024 traffic volumes. A traffic growth of ten per cent was assumed to apply to the study area to account for the background growth of vehicle trips between 2024 and the expected end of the construction period in 2028.

The estimated construction traffic volumes, comprising both light and heavy vehicles, were added to the estimated background traffic volumes in 2028 to assess the potential impact of the project against the adopted assessment criteria outlined in section 2.2.

A secondary assessment was undertaken on the predicted traffic volumes in 2028 during the highest hourly traffic volume during the off peak period, should there be a requirement to close a kerbside lane of The Northern Road for the open trench works with the verge area. It is assumed that lane closures of a state road would only occur in road networks off peak periods to minimise impacts during peak periods of vehicle activity.

In accordance with methods outlined in the *Guide to Traffic Management Part 3: Traffic Studies and Analysis Methods* (Austroads, 2020a), a mid-block traffic assessment was used to assess potential changes to road network operation as a result of the project's construction traffic. The mid-block assessment is based on hourly traffic volumes along a road and lane capacity limits.

Potential impacts on other aspects of traffic and transport environment, e.g. at road crossings, on local roads and private accesses, parking facilities, public transport, pedestrians and cyclists, etc., were qualitatively assessed by considering how the construction traffic generated by the project would potentially interact with existing infrastructure.

The results of the assessment of potential impacts during construction are summarised in section 5.

Due to the low volume of operation and maintenance staff and associated vehicle movements (i.e. up to two vehicles one day per month), a quantitative assessment was not undertaken for this project stage.

At project closure, the substation could be decommissioned or reused in consultation with relevant regulatory authorities and other land users. Given the lengthy design life of the project and the likelihood that large sections of the feeder may be left in-situ, including sections under major road corridor (The Northern Road), the corresponding traffic impacts are likely to be lower than the construction impacts and readily accommodated by the existing transport infrastructure (refer to section 8).

2.1.4 Key assumptions

The assessment adopts a series of conservative assumptions designed to support robust analysis and one which is unlikely to be exceeded during the project delivery and future assessment. These assumptions include:

- Existing traffic signals on The Northern Road and Maryland Link Roads 2 and 3 remain unchanged from the current configuration, which maintains a green phase for northbound and southbound movement on The Northern Road unless activated by a vehicle utilising Maryland Link Roads 2 and 3 as a turning area to re-enter. The Northern Road in the opposite direction previously travelling and such low occurrence has an insignificant adverse impact on general traffic flow along The Northern Road.
- Assuming the road network peak period coincides with the peak movements of construction workers to the site for a worst case scenario. Noting that temporary lane closures on the State road network may only be permitted in off peak periods.
- Applying a 10% growth rate to 2024 traffic volumes to determine the predicted background traffic volumes in 2028.
- Traffic survey data, as provided by Trans Traffic Survey, depicts a sample of existing traffic flow, speed and vehicle classification on The Northern Road.
- Construction works may require the temporary closure of the kerbside lane on The Northern Road, with single lane operating in the southbound carriageway during the open trench works in the road reserve adjacent to the carriageway. Any lane closures on the state road network, should they be required, would occur in road network off-peak periods.

2.2 Assessment criteria

2.2.1 Mid-block assessment

Mid-block analysis provides a quantitative measure of the effectiveness of the ability of a network to move traffic and is a function of vehicle demand and lane capacity.

2.2.1.1 Vehicle demand

Vehicle demand is a measure of the volume of activity a road experiences.

To account for the different impacts of light and heavy vehicles in the traffic mix, traffic volumes have been converted from ‘vehicle units’ to ‘passenger car units’ (pcu) using multipliers called passenger car equivalent (PCE) factors. This allows for the assessment of traffic volumes using one homogenised unit for all vehicle types. A PCE factor of two has been adopted for heavy vehicles to obtain a conservative assessment of the impacts of the project, which is consistent with transport planning principles and the criteria included in the *Traffic Modelling Guidelines* (Roads and Maritime Services, 2013).

2.2.1.2 Lane capacity

Lane capacity is a measure of a road’s ability to accommodate the volumes of vehicles that traverse it during peak periods of road network activity.

A road in which fixed elements influence traffic flow conditions (e.g. traffic signals, stop signs, give-way signs, roundabouts or other controls) that cause traffic to stop periodically is referred to as an interrupted flow facility. The

lane capacity of a road with interrupted flow varies depending on the type of lane (Austroads, 2020a). The typical mid-block capacity for roads with interrupted flow, stipulated by Austroads, is provided in Table 2.2.

Table 2.2 Typical mid-block capacity for roads with interrupted flow

Type of lane	One-way mid-block capacity (pcu/hr)
Median or inner lane	
Divided road	1,000
Undivided road	900
Middle lane (of a 3 lane carriageway)	
Divided road	900
Undivided road	1,000
Kerb lane	
Adjacent to parking lane	900
Occasional parked vehicles	600
Clearway conditions	900

Source: Table 6.1, *Austroads Guide to Traffic Management Part 3 – Traffic Studies and Analysis Methods* (Austroads, 2020a)

It is noted that:

– The Austroads Guide specifies that peak period mid-block volumes could increase to 1,200 to 1,400 passenger car units (pcu) per hour per lane for roads with uninterrupted flows.
– To support a conservative analysis, 1,200 pcu per hour per lane capacity was used to calculate the Volume to Capacity Ratio (VCR) for The Northern Road as divided roads with clearway conditions (i.e. no stopping within the road shoulders) and free flowing road network conditions with nearby intersections generally operating with a green phase on the major road, except when a vehicle is required to perform a U-Turn manoeuvre at the terminating side roads, which is assumed to be low occurrence.

2.2.1.3 Volume to capacity ratio

The VCR is the ratio of the volume of vehicles relative to the capacity of the road. The ratio gives an indication of the road's degree of saturation and its ability to accommodate additional traffic. A lower VCR indicates low traffic volumes and typically translates to a better quality of service for road users. A ratio greater than one suggests that the road is oversaturated with users, leading to congestion, queueing and possible accidents.

Austroads suggests a practical degree of saturation of 0.90 is adopted.

3. Existing environment

3.1 Road network

The key roads considered for the assessment are described below, as shown in Figure 1.1.

3.1.1 The Northern Road

The Northern Road is a State road in western Sydney regions that connects Narellan in the south and Cranebrook in the north, a distance of approximately 44 km. The Northern Road is sealed with typically two lanes each way divided carriageway. At the signalised intersections with Maryland Link Road 2 (south of the site) and Maryland Link Road 3 (north of the site), there is a designated right turn lane and left turn slip lane.

The Northern Road provides a key connection to the future Western Sydney Airport, which is expected to commence operation in 2026.

The key features of The Northern Road in the vicinity of the site area are summarised in Table 3.1 and shown in Figure 3.1.

Table 3.1 The Northern Road key features

Feature	Description
Carriageway	A sealed divided carriageway with two lanes in each direction. Lane widths width of approximately 3.5 m plus a sealed shoulder of 3.7 m (bus lane). Vegetated central median width of approximately 12 m. Kerb and gutter road edge.
Road owner	State Road
Parking	No Stopping restriction in both directions.
Speed limit	80 kilometres per hour.
Pedestrian facilities	Shared path on the eastern kerb. Short length (approximately 80 m) of shared path on the western kerb north of the intersection with Maryland Link Road 2. Signalised intersection pedestrian cross walk lanterns. Staged signalised stage crossing.
Bicycle facilities	Shared path on the eastern kerb. Short length (approximately 80 m) of shared path on the western kerb north of the intersection with Maryland Link Road 2.
Public transport	No public transport services or bus stops, however as there are future bus services, there are bus jumps at the intersection approaches.
Freight route	Located within an approved route area for GML, HML and CML 25/26m B-double Restricted Access Vehicle (RAV) and designated Oversize/Overmass (OSOM) route.
Roadside infrastructure	Central median and verge vegetation. Utility lighting poles on both sides of the road. General traffic/parking signage. Pedestrian fencing at the rear of the eastern shared path for a distance of approximately 180 m north of Maryland Link Road 2.

Figure 3.1 The Northern Road

Source: Google Maps Street View (dated May 2022 (northbound) January 2024 (southbound))

3.1.2 Maryland Link Road 2 and 3

Maryland Link Road 2 is located approximately 450 m south of the substation site and at the southern extent of the study area, with Maryland Link/ Road 3 located approximately 400 m north of the substation site and at the northern extent of the study area, with both roads orientated in an east-west alignment.

Maryland Link Road 2 and 3 are terminating roads, which currently provide a U-Turn facility for The Northern Road under signal control. Each road contains designated right turn lane(s) onto The Northern Road.

Maryland Link Road 2 provides access to a rural residential property east of The Northern Road, where as Maryland Link Road 3 provides access to a resource recovery facility west of The Northern Road and a rural residential dwelling east of The Northern Road.

Maryland Link Road 2 and 3 will be extended as developments in the growth corridor are constructed.

The key features of Maryland Link Road 2 and 3 in the vicinity of the site area are summarised in Table 3.2 and Figure 3.2.

Table 3.2 Maryland Link Road 2 and 3 Road key features

Feature	Description
Carriageway	A sealed divided carriageway with two lanes in each direction approximately 3.5 m wide. Two designated right turn lanes onto The Northern Road (Maryland Link Road 2 and 3) with the exception of Maryland Link Road 3 westbound right turn where there is a single right turn lane. Left slip lanes onto The Northern Road. Signalised intersections with The Northern Road. Concrete central median. Kerb and gutter road edge.
Road owner	State Road
Parking	No Stopping restriction in both directions.
Speed limit	Unposted.
Pedestrian facilities	No designated pedestrian facilities, with the exception of the signalised intersection pedestrian cross walk lanterns.
Bicycle facilities	No designated cycle facilities, with the exception of the signalised intersection pedestrian cross walk lanterns.
Public transport	No public transport services or bus stops.
Freight route	No heavy vehicle designation route at this stage.
Roadside infrastructure	Verge vegetation. Utility lighting poles on both sides of the road. General traffic/parking signage.

Figure 3.2 Maryland Link Road 2 and 3 Road

Source: Nearmap (dated 2 December 2024)

3.2 Transport network

3.2.1 Road classification

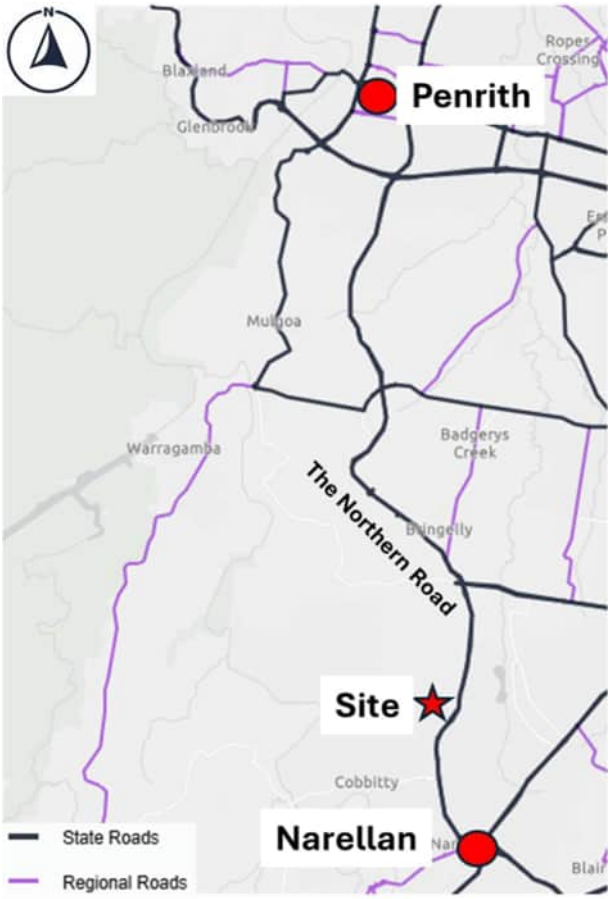
Roads are classified (as defined by the *Roads Act 1993*) based on their importance to the movement of people and goods within NSW (as a primary means of communication).

The classification of a road allows Transport for NSW to exercise authority of all or part of the road. Classified roads include Main Roads, State Highways, Tourist Roads, Secondary Roads, Tollways, Freeways and Transitways.

For management purposes, Transport for NSW has three administrative classes of roads. These are:

- **State Roads –** Major arterial links through NSW and within major urban areas. They are the principal traffic carrying roads and fully controlled by Transport for NSW, with maintenance fully funded by Transport for NSW. State Roads include all Tollways, Freeways and Transitways; and all or part of a Main Road, Tourist Road or State Highway.
- **Regional Roads** – Roads of secondary importance between State Roads and Local Roads which, with State Roads provide the main connections to and between smaller towns and perform a sub arterial function in major urban areas. Regional roads are the responsibility of councils for maintenance funding, though Transport for NSW funds some maintenance based on traffic and infrastructure. Traffic management on Regional Roads is controlled under the delegations to local government from Roads and Maritime. Regional Roads may own all or part of a Main Road, Secondary Road, Tourist Road or State Highway; or other roads as determined by Transport for NSW.
- **Local Roads** – The remainder of the council controlled roads. Local Roads are the responsibility of councils for maintenance funding. Transport for NSW may fund some maintenance and improvements based on specific programs (e.g. urban bus routes, road safety programs). Traffic management on local roads is controlled under the delegations to local government from Transport for NSW.

The surrounding road network (including their administrative class) is shown in Figure 3.3.



Source: TfNSW Road Classification map – modified by GHD

Figure 3.3 Road classification map

3.2.2 Heavy vehicle routes

The National Heavy Vehicle Regulator is responsible for administering the Heavy Vehicle National Law across Australia. The Heavy Vehicle National Law regulates the use of heavy vehicles on roads to ensure that roads remain safe for all road users, protect road infrastructure, and ensure that goods and passengers are transported efficiently. To do this, heavy vehicles are classified depending on their mass, size, configuration, or a combination of these.

A Restricted Access Vehicle is defined as any single motor vehicle or combination with a combined load that exceeds the general access overall dimensions as defined in the Heavy Vehicle National Regulation. This includes articulated vehicles longer than 19 m.

Oversize and/or overmass (OSOM) vehicles are defined by Transport for NSW as a heavy vehicle or combination that alone or together with its load, exceeds prescribed mass or dimension requirements. All OSOM vehicles need to be escorted.

3.2.2.1 Approved heavy vehicle routes

The Transport for NSW Interactive Restricted Access Vehicle Map identifies the network of routes that are approved to be used by heavy vehicles of various sizes, including vehicles up to the size of a 26 m B-double.

The Transport for NSW Oversize Overmass Load Carrying Vehicles Network Map (**maps.nhvr.gov.au**) identifies the network of routes that are approved to be used by OSOM vehicles of various sizes.

Figure 3.4 shows the Restricted Access Vehicle routes in the study area. The Northern Road is approved to accommodate vehicles up to 26 m B-double trucks and is a designated OSOM vehicle route.

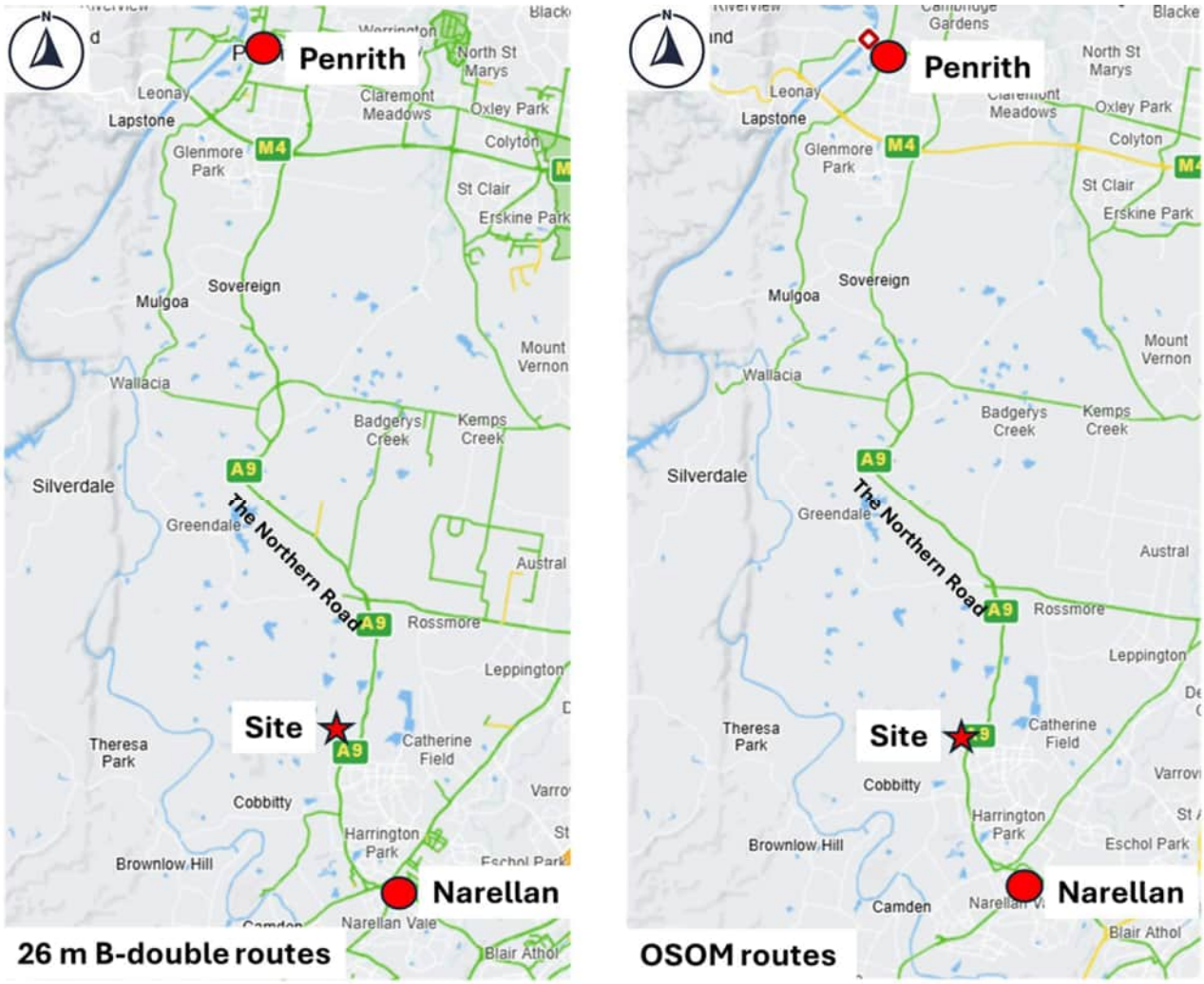


Figure 3.4 Approved Restricted Access Vehicle routes (26 m B-Double and OSOM)

Source: TfNSW RAV map – modified by GHD

3.2.3 Public transport

A review of the existing public transport services and active transport facilities in the study area was conducted to determine any potential conflicts with these road users in terms of safety and amenity.

3.2.3.1 Bus services

There are no bus services currently operating on The Northern Road within proximity of the site, with the closest bus stops located on Catherin Field Road (approximately 2 km west of the site), Bringelly Road (approximately 3.5 km north of the site) and in Oran Park (approximately 3 km south of the site).

3.2.3.2 Freight and passenger rail

This are currently no rail services within proximity to the site, with the closest rail services being the future Sydney Metro Aerotropolis at the Bradfield City Centre, located approximately 5 km north of the site, due to be operational in 2030.

While there are currently no public transport services or bus stops, there are likely to be future bus services, with bus jump of lanes at the intersection approaches with Maryland Link Road 2 and 3.

3.2.4 Active transport

The Northern Road currently has a shared path on the eastern kerb and a short length (approximately 80 m) of shared path on the western kerb north of the intersection with Maryland Link Road 2. The intersections with Maryland Link Road 2 and 3 are signalised, with both pedestrian and cycle lanterns for the crosswalk, with a stage crossing across The Northern Road.

3.2.5 Parking

There are currently No Stopping restrictions along The Northern Road.

3.2.6 Property access

The Northern Road provides access to Maryland Link Road 2 and 3.

Maryland Link Road 2 provides access to a rural residential property east of The Northern Road, whereas Maryland Link Road 3 provides access to a resource recovery facility west of The Northern Road and a rural residential dwelling east of The Northern Road.

3.3 Existing traffic performance

3.3.1 Traffic volumes

3.3.1.1 Automatic traffic counts

Based on the surveys conducted (see section 2.1.2 and Appendix A), the weekday traffic volumes obtained for The Northern Road indicate that the peak traffic volumes are predominantly northbound in the AM and southbound in the PM peak hours. Figure 3.5 shows the average hourly volume profile, while Figure 3.6 shows the daily volume profile and Table 3.3 provides a summary of key survey data, with the survey indicating:

- AM peak hour (6 am to 7 am): weekday average of approximately 2,301 vehicles (1,480 northbound and 821 southbound).
- PM peak hour (5 pm to 6 pm): weekday average of approximately 2,432 vehicles (834 northbound and 1,598 southbound).
- Saturday peak hour (11 am and 12 pm): 1,608 vehicles (784 northbound and 824 southbound).
- Sunday peak hour (11 am and 12 pm): 1,467 vehicles (725 northbound and 724 southbound).
- Friday had the highest daily traffic volume, with 29,836 vehicles.
- Average weekend traffic was approximately 70% of the average weekday traffic.
- A higher quantity of heavy vehicles on weekdays (average 13.5%) compared to the weekend (approximately 7.9%).
- The 85 percentile speeds are higher in the northbound direction (88.5 km/h) compared to the southbound direction (85.9 km/h), both of which are over the speed limit of 80 km/h.

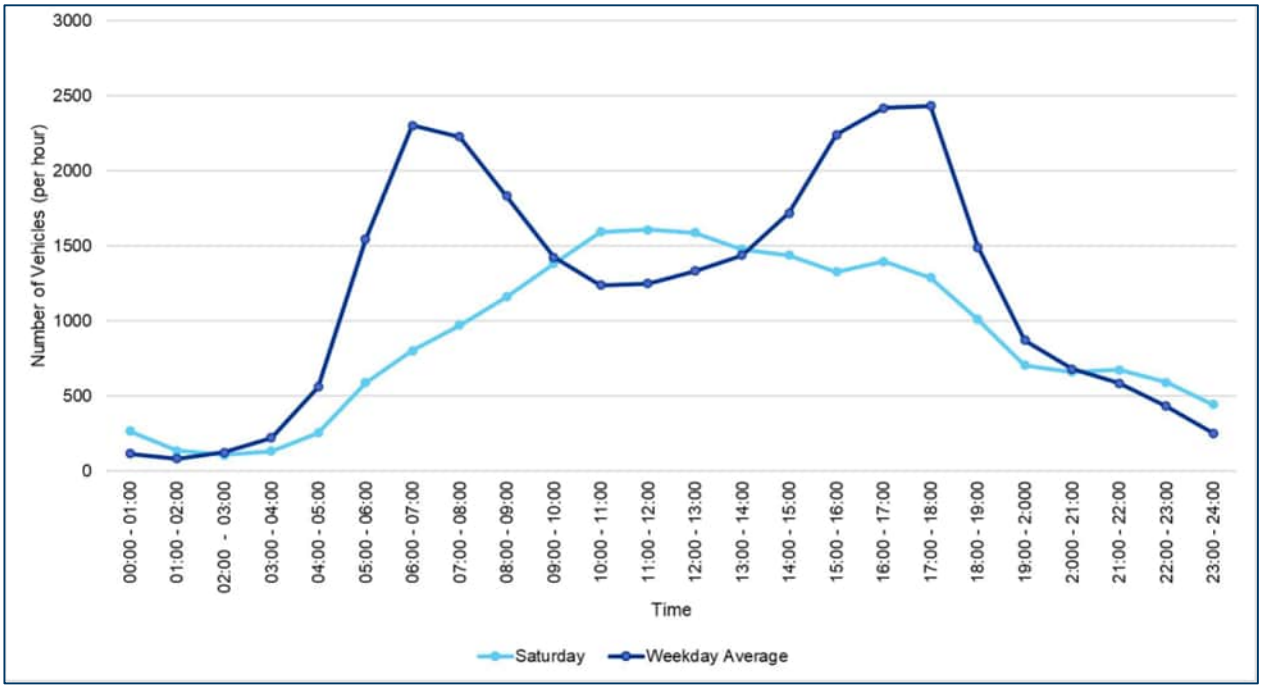


Figure 3.5 *The Northern Road: Hourly traffic volume profile*

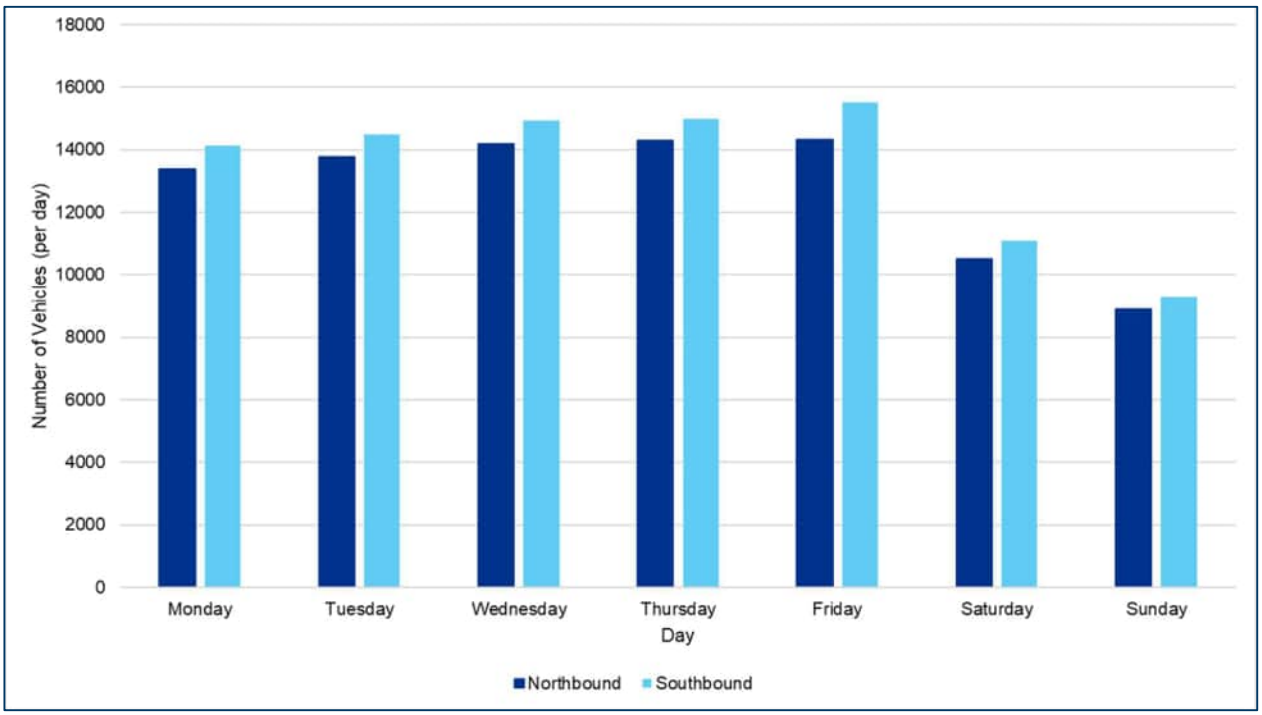


Figure 3.6 *The Northern Road: Daily traffic volume profile*

Table 3.3 The Northern Road: Automatic tube count data summary

Key Data Description	Data Summary			
Traffic volume				
		Maximum AM Peak Hour (veh/h)*	Maximum PM Peak Hour (veh/h)*	Maximum Saturday Peak Hour (veh/h)*
Peak Hour **	Northbound	1,546	961	784
	Southbound	880	1,700	824
5 Day (Weekday) Average Daily Volume (two-way)	(veh/day)^	28,799		
Weekend Average Daily Volume (two-way)	(veh/day)^	19,894		
Vehicle classification				
	5 Day Weekday Average		Weekend Average	
Light	86.5%		92.1%	
Medium	7.1%		5.3%	
Heavy	6.3%		2.8%	
Unclassifiable	0%		0%	
Vehicle Speed				
85% Speed (km/h)#	Northbound	88.5 km/h		
	Southbound	85.9 km/h		

3.3.2 Mid-block performance

Table 3.4 presents the VCR of The Northern Road during the peak hour in accordance with the outputs of the automatic traffic counts and the criteria in section 2.2.1. The data in Table 3.4 indicates that The Northern Road operates with traffic volumes within maximum capacity at peak times and, as such, also within the remainder of the day and night periods.

Table 3.4 Peak hour mid-block VCR – base case 2024

Road name	Direction	Number of lanes	Capacity per lane[1]	Existing traffic (2024) (passenger car units)		Volume capacity ratio (2024)	
				Average Weekday AM Peak	Average Weekday PM Peak	AM Peak	PM Peak
The Northern Road	Northbound	2	1,200	1,678	946	0.70	0.39
	Southbound	2	1,200	931	1,811	0.39	0.75

Notes: 1. Austroads Guide to Traffic Management Part 3 – Traffic Studies and Analysis Methods - Table 6.1
2. 1 light vehicle = 1 pcu, 1 heavy vehicle = 2 pcu (note: inclusive of both medium and heavy vehicles)

3.3.3 Crash data

Crash incident data was collected from statistics published by the NSW Centre for Road Safety for the most recent five year period (2019 and 2023). The following summarises the crash incidents recorded during this period on The Northern Road within the vicinity of the study area and depicted in Figure 3.7:

– One crash in 2020 during daylight hours at the intersection of Maryland Link Road 2 and The Northern Road consisted of a “other on path” (RUM code 69) crash type. The crash did not result in any injuries.
– One crash in 2023 during daylight hours approximately 120 m north of the intersection of Maryland Link Road 3 and The Northern Road consisted of a “other same direction” (RUM code 39) crash type. The crash did not result in any injuries.

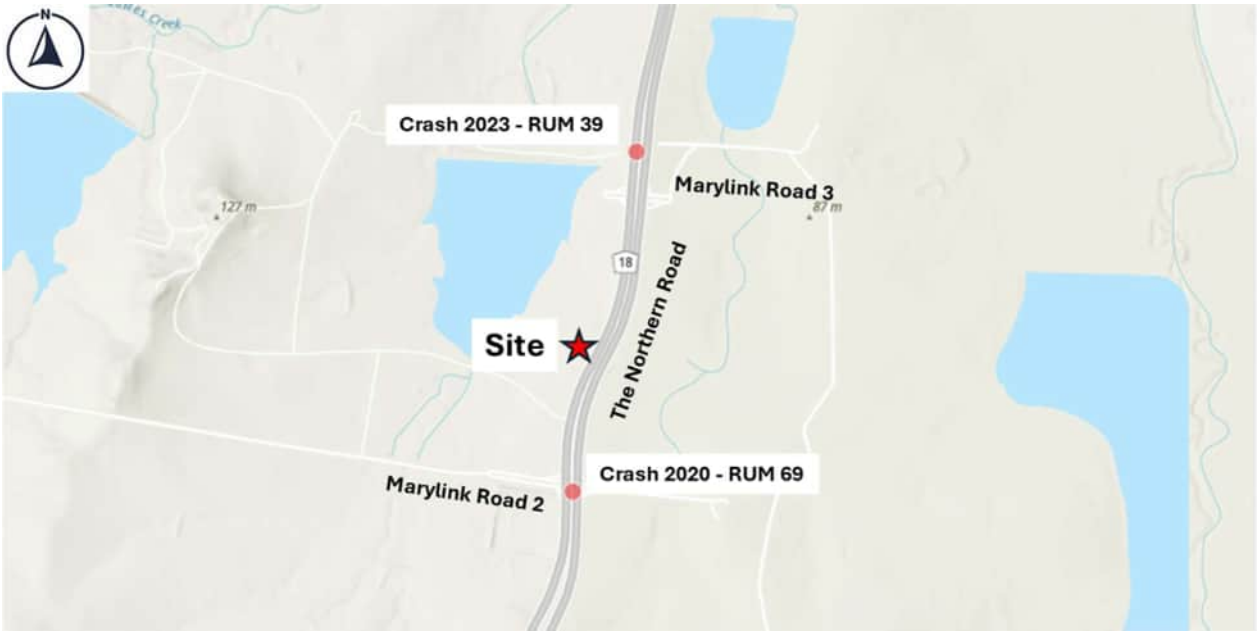


Figure 3.7 Crash data on The Northern Road

Source: TfNSW Crash data – modified by GHD

4. Basis of assessment

4.1 Key construction arrangements

4.1.1 General

The 132 kV feeder utility service works would be predominantly constructed using open trenching methods on the eastern kerbside of The Northern Road, with underboring occurring beneath The Northern Road to access the Zone Substation site to minimise impact on the road environment. Building site construction works on the western side of The Northern Road.

Construction works for the project are anticipated to commence in November 2025 and be completed in July 2028, with commissioning in May 2028. The project program is subject to all approvals being received. The overall duration of the project would be confirmed with the selected contractor and their preferred construction methodologies.

Further information about the project, including the proposed infrastructure, indicative construction methods and facilities, working hours and land requirements, is provided in the REF.

Key aspects of the construction methodology that are relevant to the assessment are outlined in the following sections.

4.1.2 Site access

The projects Zone Substation site is located on the western side of The Northern Road between Maryland Link Road 2 and 3. Access to the building site is proposed to be via Maryland Link Road 3, with a site access track provided within the private lane west of The Northern Road.

Direct access to the western section of Maryland Link Road 3 is proposed to utilise the designated left slip at the signalised intersection from the south. From the north, it is proposed to utilise the designated right turn lane on The Northern Road into the western section of Maryland Link Road under the signal control, as shown in Figure 4.1.

4.1.3 Potential ancillary facility

A potential laydown facility area could be utilised on the eastern section of Maryland Link Road 3 to provide access to the open trench work on the eastern side of The Northern Road. This may be accessed from the southbound carriageway of The Northern Road as shown in Figure 4.1. This ancillary facility, if adopted, should be located so as not to obstruct access to the adjacent property or the U-turn area within the terminating Maryland Link Road 3.

4.1.4 Workforce resources

The construction workforce is expected to comprise of up to 10 to 20 workers for each day at peak construction. The final number of construction workers would be confirmed by the construction contractor during construction planning.

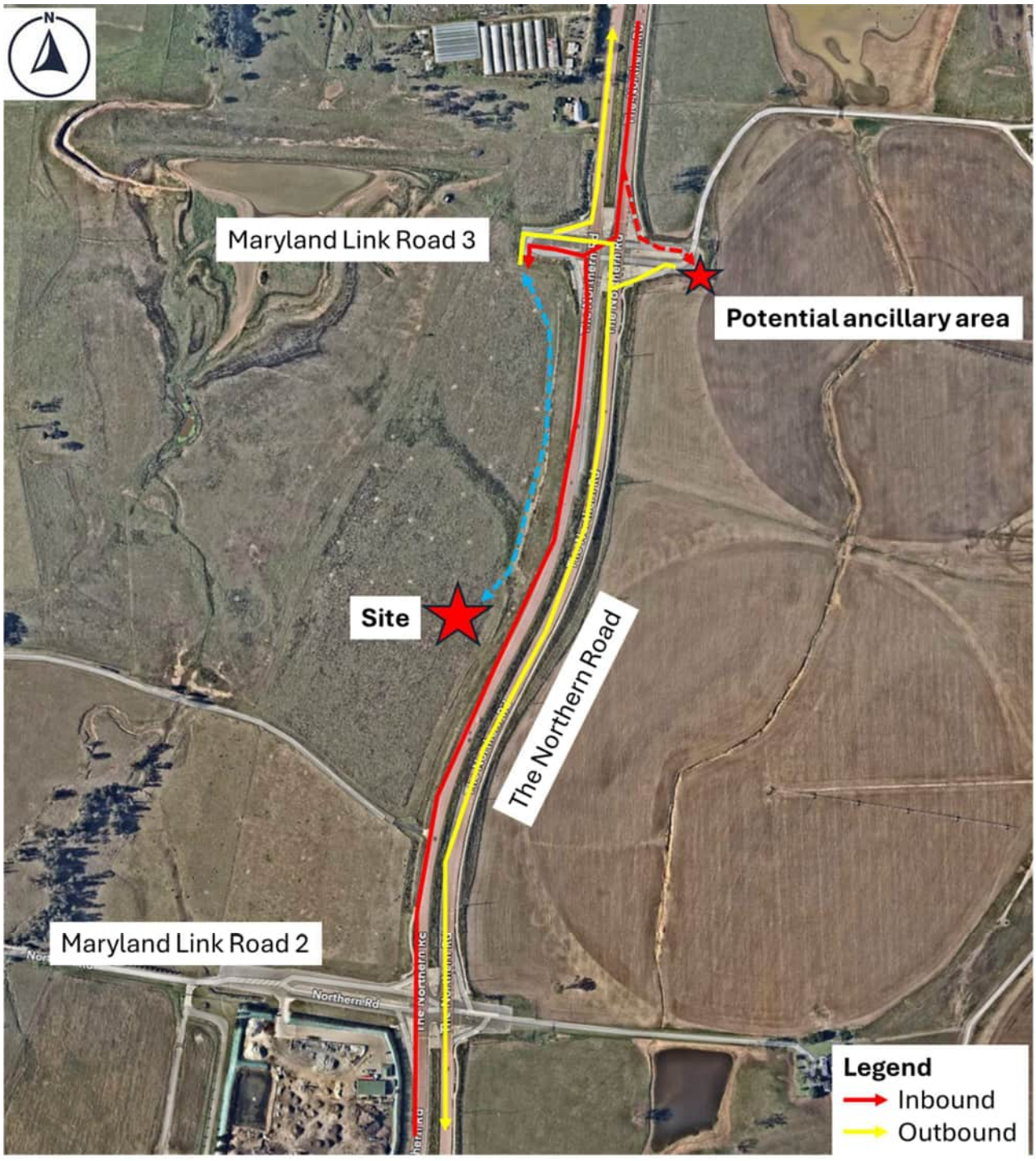


Figure 4.1 Site access on The Northern Road

Source: Nearmap (dated 2 December 2024) – Modified by GHD

4.2 Traffic generation

The trip generation assumptions detailed below support a conservative impact assessment. In practice, the vehicle activity is expected to be less than the volumes of vehicles identified below.

4.2.1 Light vehicles

For assessment purposes, it has been assumed that the entire construction workforce (up to 20 workers) would drive to the site. It has also been assumed that:

– Workers may carshare to the site via private light vehicles.
– The peak movement of workers to the project site would coincide with the road network weekday AM and PM peak hours.

For assessment purposes, it has been assumed that there are up to 20 vehicle trips during the road network peak hour periods, noting this is the anticipated peak number of workers, and no reduction has been made to account for potential carsharing.

4.2.2 Heavy vehicles

The delivery of equipment to the project site would generate heavy vehicle activity. The plant and equipment proposed to be used for each stage of construction works are outlined in Table 4.1.

Table 4.1 Plant and equipment requirements

Stage of work	Plant and equipment
132/11 kV Substation	– Tilt tray – Heavy rigid truck with crane – Demolition saw – 5 tonne excavator – Non-destructive examination (NDE) truck – 10 tonne excavator – 25 tonne crane – 220 tonne crane – Flatbed truck – Tipper – Asphalt truck – Low loader – Cable winch – Pantech truck
Trenching	– Tilt tray – Demolition saw – 5 tonne excavator – 10 tonne excavator – Tip truck – Asphalt truck – 12 tonne Franna crane – Pneumatic pump
HDD	– Heavy rigid truck with crane – 3 x semi-trailers – 5 tonne excavator – HDD rig – Fluid delivery system – Drill rods and down hole tooling

Stage of work	Plant and equipment
	– Vacuum truck

It is estimated that, on average, up to four heavy vehicles would be used to access various areas of the project site during each day of construction, as detailed in Table 4.2. For assessment purposes, it has been assumed one truck movement would occur during the road network peak hour periods.

Table 4.2 Construction traffic volumes and frequency

Vehicle type	Quantity and frequency	Date range	Total
Piling rig	1 / month	December 2025 – May 2026	6
48 foot flat deck	2 / month	June 2026 – June 2027	24
15 tonne tipper truck	25 / month	September 2025 – February 2026	75
Concrete truck	20 / month	March 2026 – May 2026	60
Light car/ truck	100 / month or 5 per day	October 2025 – July 2028	2,200

4.2.3 Background traffic growth

A ten per cent growth rate to 2024 traffic volumes to determine the predicted background traffic volumes in 2028 has been assumed.

4.2.4 Alterations to road network conditions

It is assumed that if temporary lane closure is required on the state road network (The Northern Road), it would only be permitted in off peak road network periods.

5. Construction impacts

5.1 Mid-block assessment

5.1.1 Road network peak hour assessment

The predicted peak hour 2028 traffic volumes on The Northern Road (combined light and heavy vehicles) and associated mid-block capacities are summarised in Table 5.1.

The data in Table 5.1 indicates that in the 2028 AM and PM peak hours during construction:

– Minimal change in mid block volume capacity ratio from baseline 2028 to construction scenario 2028.
– All roads will continue to operate within their mid-block capacities.
– The highest VCR on The Northen Road is 0.84 (PM peak Southbound).
– Approximately up to 2% of vehicles on The Northern Road will consist of project construction trips.
– Based on a capacity of 1,200 pcu per hour per lane, the project construction trips constitute less than one per cent of the overall capacity of The Northern Road.

Table 5.1 Peak hour 2028 traffic volume midblock volume to capacity ratio

Road name	Direction	2028 base case (passenger car units)		2028 Construction trips ^				Volume capacity ratio (2028)	
		Average Weekday AM Peak	Average Weekday PM Peak	Average Weekday AM Peak	Average Weekday PM Peak	pcu Average Weekday AM Peak	pcu Average Weekday PM Peak	AM Peak	PM Peak
The Northern Road	Northbound	1846	1041	21	21	22	22	0.78	0.44
	Southbound	1025	1993	21	21	22	22	0.44	0.84

Notes:
- 2027 volumes based on 2024 traffic surveys and background annual growth of three percent (Refer to Table 3.4 for 2024 data)
- Number of lanes = 2 in each direction with a capacity of 1,200 pcu per lane
- 1 light vehicle = 1 pcu, 1 heavy vehicle = 2 pcu (note: inclusive of both medium and heavy vehicles)

^ *Construction vehicle trip based on 20 light vehicles plus 1 heavy vehicle during the peak hour (refer section 4.2)*

5.1.2 Road network off peak assessment

The following assessment has been carried out in the event of the potential closure of the southbound kerbside traffic lane on The Northern Road for the open trench installation of the utility services. It has been assumed that such lane closure would be carried out outside road network peak periods and likely between 7:00pm and 5:00am on weekdays. Based on the outputs of the traffic surveys (refer to Section 2.1), during this period the peak hour was between 7:00pm and 8:00pm.

In reference to the 2024 traffic survey hourly profile (refer to Figure 3.5), the maximum average traffic volume between 7:00pm and 5:00am weekday and the corresponding single lane VCR assessment is summarised in Table 5.2.

The data in Table 5.2 indicates that The Northern Road operates with traffic volumes within maximum capacity at the peak of off peak times with available capacity under a single lane operation, should the open trench works require a kerbside lane closure.

Table 5.2 Off peak single lane mid-block VCR

Road name	Direction	Number of lanes	Capacity per lane[1]	Existing traffic (2024) Average Weekday maximum off peak		2028 base case	Volume capacity ratio (2027)
				Survey traffic flow	passenger car units	passenger car units	
The Northern Road	Southbound	1	1,200	520	590	649	0.54

Notes: 1. Austroads Guide to Traffic Management Part 3 – Traffic Studies and Analysis Methods - Table 6.1
2. 1 light vehicle = 1 pcu, 1 heavy vehicle = 2 pcu (note: inclusive of both medium and heavy vehicles)

5.2 Public and active transport facilities

With respect to public transport infrastructure:

– No existing public transport (i.e. buses or trains) operate within the vicinity of the construction site.
– The 132 kV feeder crossing of The Northern Road would be undertaken using a trenchless crossing method, and existing road network operations are not expected to be impacted.
– Open trench works are to occur on the western verge. If lane closure is required to complete this works, this would be undertaken during off peak periods as per any directions from Transport for NSW.

With respect to active transport facilities infrastructure:

– The Northern Road currently has a shared path on the eastern kerb and a short length (approximately 80 m) of shared path on the western kerb north of the intersection with Maryland Link Road 2 and the intersections with Maryland Link Road 2 and 3 are signalised, with both pedestrian and cycle lanterns for the crosswalk, with a stage crossing across The Northern Road.
– Pedestrian and cycle activity is negligible, and no designated attractors are within the study area. Notwithstanding this, pedestrian and cycle access should be maintained with a safe path of travel around the site access and open trench areas, if required.

Therefore, the project is expected to have a negligible impact on active transport and public transport facilities.

5.3 Road safety

With respect to road safety:

– There have been only two recorded crashes within the study area in the past five years (at the intersections of The Northern Road and Maryland Link Roads 2 and 3), but neither of which resulted in any injuries.
– Construction traffic volumes generated by the project are relatively small and will have a negligible impact on road safety, with drivers utilising the existing signalised intersections and designated turn and slip lanes on The Northern road to access Maryland Link Road 3.
– Should lane closure be required to facilitate the open trench installation, it is assumed such would occur in off peak road network periods under the approval of Transport for NSW, with applicable traffic management control in place to advise drivers of the of the change in road conditions in advance of the works area and safety direct drivers past the works area.

5.4 Parking

With respect to impacts to parking, the following is noted:

– On-street parking is not typically available on the roads in the vicinity of the study area.
– Parking for construction workers would be provided within the construction compound.

Accordingly, the impacts on parking associated with the construction of the project are expected to be negligible.

6. Operation impacts

Operation of the project would be undertaken in accordance with the relevant statutory approvals.

Operation of the substation would require access for up to two light vehicles for one day each month.

Given the very small number of vehicle movements required for operation and maintenance activities, the traffic impacts associated with the operation and maintenance of the project are expected to be negligible.

7. Cumulative impacts

Cumulative impacts can be defined as the successive, incremental, and combined effect of multiple impacts, which may in themselves be minor, but could become significant when considered together. The methodology and projects considered for the cumulative impact assessment are provided in the REF report.

Key projects relevant to the potential for traffic and transport impacts are considered in Table 7.1. These projects have been selected as the key major projects that may result in cumulative traffic impacts within proximity to the project site. Some of these projects traffic generation may interface during the construction of the proposed substation if they are constructed concurrently, however it is noted that the surrounding impacts do not directly impact the subject site. As the assessment found there would be a low risk of operational impacts from the project, cumulative (operational) impacts are not considered likely.

It should be noted that the traffic volumes associated with any projects currently being constructed or operating in 2024, have inherently been included in the traffic surveys conducted for this project.

Table 7.1 Major projects identified

Site ID	Name	Status	Approximate distance from the site	Potential traffic impacts
SSD-7968-Mod-2	Oran Park Highschool and Public School – Mod 2	Determination	2 km south of the site	The project would be expected to increase traffic movement during peak school hours due to the student and staff population.
SSD-5684	Bringelly Brickworks Mod 1	Prepare EIS	3 km northeast of the site	Current conditions on SSD 5684 limit the development to receive no more than 90 trucks per day or no more than 18 trucks per hour and dispatch the same number of trucks. This may change in the future submission
SSD-58287208	Regis Education, Sporting & Community Precinct - Oran Park	Prepare EIS	2.5 km southeast of the site	The project would be expected to increase traffic movement during peak school hours due to the student and staff population and on the weekend period to support the community and sporting fixtures.
SSD-9477	New Catherine Field Primary School	Determination	4 km southeast of the site	The project would be expected to increase traffic movement during peak school hours due to the student and staff population.
SSD-67180469	Bringelly Quarry and Cumberland Plain Woodland Reserve	Prepare EIS	3.5 km northwest of the site	The project would be expected to increase truck movements during operational hours.
SSD-66919458	126 Kelvin Park Drive – Mixed use development	Prepare EIS	4 km northeast of the site	The project would be expected to increase traffic movement during general road network peak periods.
SSD-30759158	Minarah College	Response to submissions	3 km southeast of the site	The project would be expected to increase traffic movement during peak school hours due to the student and staff population.

8. Decommissioning impacts

At project closure, the Zone Substation could be decommissioned or reused in consultation with regulatory authorities and other potential users.

Decommissioning (including removal if required) would be undertaken in accordance with a decommissioning plan, which would be prepared in advance of decommissioning in consultation with the relevant regulatory authorities and landholders, and in accordance with the requirements of applicable legislative requirements and best practice guidelines existing at that time, including any current version of the APGA Code of Environmental Practice.

It is assumed vehicles would likely use the constructed driveway access on the western side of The Northern Road in lieu of Maryland Link Road 3 that was used primarily during the construction stage.

Given the lengthy design life of the project and the likelihood that large sections of the feeder may be left in-situ, including sections under major road corridor (The Northern Road), the corresponding traffic impacts are likely to be lower than the construction impacts and readily accommodated by the existing transport infrastructure.

9. Recommended mitigation and management measures

9.1.1 Approach to mitigation

The assessment identified that the main potential for impacts resulting from the project would be during the construction phase and would be associated with managing the safe movement of heavy vehicles to and from the site area. The other key issue would be maintaining property access, with consideration to the existing shared path on The Northern Road and the trafficability of roads during trenching works (noting that the use of the shared path is low/negligible).

The key approach to managing these and other impacts would be through the preparation of a construction traffic and access management subplan of the CEMP. The plan would define the processes, responsibilities and management measures to minimise potential impacts on traffic and access and also include a drivers' code of conduct.

Consultation with landowners, infrastructure owners and operators will also be essential to understand design and construction requirements, which need to be considered and integrated in the subsequent design and construction stages of the project.

9.1.2 Recommended mitigation measures

Table 9.1 provides measures to avoid, minimise and mitigate the identified impacts to traffic and access.

Table 9.1 Mitigation measures – traffic and transport

Impact/issue	Mitigation measure	Timing
Impacts on roads, utilities, transport, emergency access and parking.	The design will continue to be refined to avoid or minimise impacts on the surrounding road and transport network as far as reasonably practicable. Input will be sought from relevant stakeholders (including the Camden Council, Transport for NSW, emergency services, and utility service providers) prior to finalising the design of those aspects of the project that have the potential to affect the operation of infrastructure under the management of these stakeholders. This will include confirming ongoing operation and maintenance arrangements.	Design
Potential for traffic, transport, access and parking impacts during construction.	A construction traffic and access management plan (CTMAP) will be prepared prior to construction and implemented as part of the Construction Environmental Management Plan (CEMP). The plan will detail processes and responsibilities to minimise traffic and access delays and disruptions and identify and respond to changes to road access. Appropriate traffic control measures in the vicinity of the study area will be adopted to ensure that the safety of all road users is not impacted by construction-related vehicles travelling to and from the project site. The plan will be developed in consultation with relevant stakeholders, including Camden Council, Transport for NSW, emergency services and utility service providers consulted as necessary. The plan will include a driver's code of conduct for haulage operations to define appropriate driver behaviour and safety requirements for drivers operating heavy vehicles on public roads.	Pre-construction, construction
Access impacts	Disruption to access to private properties and local roads will be minimised as far as practicable. Where temporary disruption to access cannot be avoided (such as during trenching), consultation will be undertaken with the owners, occupants and managers of affected properties and road infrastructure to confirm their access requirements and determine alternative arrangements. Alternative access arrangements, such as bypass tracks, detours or crossing plates, will be implemented during road crossings. The community should be updated with project changes during construction, including any temporary changes to access arrangements.	Construction

Impact/issue	Mitigation measure	Timing
Impacts on roads	Road condition surveys will be undertaken of the public roads proposed to be used, prior to and following the completion of construction, and provided to the relevant road authority. Condition monitoring will be carried out during construction. Rectification measures will be implemented as needed, during and/or following completion of construction, to address any damage caused during construction.	Construction
Managing the potential for cumulative transport and traffic impacts	The potential for cumulative construction transport and traffic impacts will be reviewed and coordinated with other projects, in consultation with relevant stakeholders, Camden Council, Transport for NSW and private developers. The review will include: – projects with the potential to affect access and capacity – coordinating works and identifying efficient re-routing options as appropriate.	Construction
Impacts to active transport	Active transport facilities on the key roads in the study area have negligible use, however should there be an alteration to active transport facilities, during construction, such works are to accommodate the active transport road user. This would be outlined in the construction traffic and access management plan (CTAMP) that will be prepared prior to construction.	Construction
Potential lane closures	Should lane closures be required, such will be in consultation with Transport for NSW and under their approval. Such works are likely to be required to be undertaken within the road network off peak periods. A construction traffic and access management plan (CTAMP) will be prepared prior to construction, including Traffic Guidance Schemes in line with Transport for NSW Traffic Control at Worksites Technical Manual to inform motorists of changed road conditions.	Construction

9.1.2.1 Construction traffic and access management plan outline

A construction traffic and access management plan (CTAMP) will be prepared by the engaged construction contractor prior to commencing construction. The primary objectives of the plan will be to:

– Minimise the impact of vehicular traffic (particularly heavy vehicle traffic) on the operation of the road network
– Facilitate the continuous, safe, and efficient movement of traffic for both the general public and site personnel/ workers
– Provide a description of the types of vehicles and estimated vehicle volumes during each stage of construction
– Provide information regarding the access arrangement and a description of the proposed routes for vehicles accessing and egressing the proposal site.

The plan should include the following:

– Vehicle approach and departure routes to the site that will minimise the impacts of heavy vehicles and equipment on the adjacent road network
– Vehicle types and mobile equipment to be used
– Areas of parking for site personnel, which should preferably be within site premises where possible
– Transport options for workers to the site that will maximise safety and minimise potential access and traffic impacts
– Site access constraints such as vehicle restrictions (e.g. road network load limits/height restrictions) on haulage routes
– Areas of vulnerable road users (pedestrians and bicycle riders) and areas of high potential pedestrian activity
– Preparation of traffic guidance schemes
– A driver's code of conduct.

10. Conclusion

Based on a review of traffic and transport infrastructure and facilities in the vicinity of the study area, including road hierarchy, road network operation, freight routes, active transport and public transport, crash data, current traffic volumes, and a conservative analysis of construction traffic generation and routes for the project, it is expected that the project would have a negligible impact on the adjoining road transport network and infrastructure. This is on the basis that:

– The key roads continue to have adequate capacity for additional traffic and perform at an acceptable level of service during peak construction conditions.
– Should there be any works that require the closure of a traffic lane on The Northern Road, such would be undertaken under the approval and conditions outlined by Transport for NSW and occur in the road network off peak periods.
– The potential ancillary laydown facility, if adopted, should be located so as not to obstruct access to the adjacent property or the U-turn area within the terminating Maryland Link Road 3.
– Active transport facilities on the key roads in the study area have negligible use, however should there be an alteration to active transport facilities, during construction, such works are to accommodate the active transport road user. The project is expected to have a negligible impact on walking and cycling.
– There are no public transport services in the vicinity of the project study area and the project would have a negligible impact on them.
– Sufficient parking would be provided within the site compound to accommodate the peak worker parking demand associated with the construction of the project.
– Cumulative construction impacts resulting from other major developments in the vicinity of the project are not expected.

Potential impacts during operation and decommissioning are expected to be lower than peak construction and/or negligible.

Mitigation and management measures have been proposed to avoid and minimise potential impacts on traffic and transport infrastructure and facilities. These measures include:

– Development of a construction traffic and access plan in consultation with relevant authorities prior to construction commencing to support the safe operation of workers and the road user.
– The design will continue to be refined to avoid or minimise impacts on the surrounding road and transport network as far as reasonably practicable.

With the implementation of the proposed mitigation and management measures outlined in this report and the REF, the project is expected to result in temporary, minor impacts on traffic and transport infrastructure and facilities, and negligible impacts during operation and decommissioning.

11. References

Austroads (2020a), *Guide to Traffic Management Part 3: Traffic Studies and Analysis Methods*

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Austroads (2020c), *Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments*

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Transport for NSW Network Classifications, Available at: **maps.transport.nsw.gov.au/egeomaps/road-network-classification/index.html**

Transport for NSW, NSW Combined Higher Mass Limits and Restricted Access Vehicle Map, Available at **https://roads-waterways.transport.nsw.gov.au/business-industry/heavy-vehicles/maps/restricted-access-vehicles-map/map/index.html**

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Transport for NSW Trip Planner. Available at: **transportnsw.info/routes/bus**

Transport for NSW (2022), *Traffic Control at Worksites Manual*

Appendix A

Traffic Count Data

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

T. 1300 82 88 82 - F. 1300 83 88 83 - E. traffic@trafficsurvey.com.au - W. www.trafficsurvey.com.au

AUTOMATIC COUNT SUMMARY

Street Name :	The Northern Rd	**Location :**	Between Maryland Link Rd No.2 and No.3
Suburb :	Bringelly	**Start Date :**	00:00 Sat 07/December/2024
Machine ID:	YD07XPS5	**Finish Date :**	00:00 Sat 14/December/2024
Site ID:	3627	**Speed Zone :**	80 km/h
Prepared By :	Vo Son Binh	**Email:**	binh@trafficsurvey.com.au

GPS information	Lat 33° 58' 21.90 South Long 150° 44' 12.30 East		Direction of Travel		
			Both directions	**Northbound**	**Southbound**
Traffic Volume :		Weekdays Average	28,800	13,990	14,810
(Vehicles/Day)		7 Day Average	26,252	12,762	13,490
Weekday	**AM**	06:00	2301	1480	821
Peak hour starts	**PM**	17:00	2432	834	1597
Speeds :		85th Percentile	87.2	88.5	85.9
(Km/Hr)		Average	79.3	80.1	78.4
Classification % :		Light Vehicles up to 5.5m	87.7%	87.6%	87.8%

Location

GPS Information	Load Google Map (internet required)
(Latitude, Longitude)	-33.972750, 150.736750

Speed Data	Speed Graph	Speed Bin
Volume Data	Volume Graph	Classification

QUALITY ASSURED COMPANY BY ISO 9001:2015
OH&S SYSTEM CERTIFIED TO ISO 4801:2001
ENVIRONMENT MANAGEMENT SYSTEM CERTIFIED TO ISO14001:2015

Status of movement – Covid 19

"Traffic behaviour is not the same as pre-pandemic (traditional morning/afternoon peak is much less pronounced and school start/finish times are much more pronounced), the current patterns are close enough to what probably is going to be a 'COVID normal' situation for at least the next year or two. Workplaces are currently not all yet open.
These results should be used for indicative assessment only."

TRANS TRAFFIC SURVEY
trafficsurvey.com.au

Site

Back to Site Summary Page

Direction Northbound

Day Weekdays (Monday to Friday)

Note: #N/A "Modal Speed" means too few data points

Hour Start	Total Vehicles	Avgerage Speed	85th percentile	Modal Speed	Minimum Speed	Maximum Speed	Standard Deviation
00:00	47	76.5	87.6	62	22.0	111.1	9.2
01:00	35	77.7	88.6	65	22.5	116.1	8.9
02:00	67	79.3	89.6	68	22.5	114.7	8.2
03:00	129	80.5	90.7	67	22.6	116.4	7.8
04:00	384	82.7	91.9	82	19.1	115.9	7.0
05:00	1106	82.5	91.0	82	16.9	116.3	7.1
06:00	1481	81.4	89.6	80	14.9	119.0	7.9
07:00	1410	80.9	88.9	79	17.3	120.2	8.2
08:00	977	79.7	87.7	78	17.1	115.7	8.1
09:00	717	79.3	87.0	78	17.8	117.1	8.1
10:00	608	79.8	87.1	78	17.7	116.6	8.2
11:00	630	79.9	87.5	79	17.5	119.5	8.1
12:00	644	80.2	88.1	78	16.8	115.4	8.3
13:00	683	80.6	88.6	78	17.0	117.5	8.8
14:00	756	80.6	88.9	79	17.2	121.0	8.2
15:00	884	80.2	88.5	78	16.7	116.3	7.5
16:00	849	80.2	88.6	78	16.8	117.1	8.0
17:00	833	80.7	88.9	78	19.7	116.8	8.0
18:00	537	80.8	89.1	77	22.5	115.7	7.3
19:00	350	80.0	88.1	77	23.1	115.1	7.2
20:00	323	78.5	86.1	77	23.2	117.5	7.6
21:00	268	78.4	85.3	77	22.7	117.3	7.3
22:00	171	77.9	85.7	72	22.0	117.3	6.7
23:00	97	78.4	87.1	71	16.8	120.3	7.2
Summary	**13986**	**79.9**	**88.4**	**76**	**14.9**	**121.0**	**7.9**

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Direction Northbound

Day Weekends (Saturday and Sunday)

Note: #N/A "Modal Speed" means too few data points

Hour Start	Total Vehicles	Avgerage Speed	85th percentile	Modal Speed	Minimum Speed	Maximum Speed	Standard Deviation
00:00	116	78.8	86.7	78	29.7	112.1	6.4
01:00	52	79.7	88.7	77	45.7	111.2	7.4
02:00	38	79.2	89.5	78	59.6	109.3	8.0
03:00	49	79.4	89.4	80	53.1	113.7	7.0
04:00	110	81.6	90.6	80	54.8	111.2	7.6
05:00	262	80.4	90.2	79	47.1	110.6	7.7
06:00	330	78.5	89.1	81	28.5	115.0	6.6
07:00	364	79.8	88.0	80	28.7	117.0	6.6
08:00	499	80.4	86.8	78	28.4	117.0	7.5
09:00	607	79.8	86.7	79	27.9	118.2	7.7
10:00	698	79.5	86.6	79	33.9	118.1	7.4
11:00	758	80.3	87.5	80	32.1	118.9	7.8
12:00	758	80.9	88.0	79	44.1	109.5	8.5
13:00	674	80.7	88.0	77	55.3	104.5	8.8
14:00	666	81.0	88.5	77	51.2	113.0	8.7
15:00	661	82.1	90.3	80	46.6	114.5	8.7
16:00	698	83.7	91.7	84	36.3	116.5	8.5
17:00	658	84.4	91.6	83	47.1	118.4	7.8
18:00	465	84.0	91.3	83	45.0	116.0	7.7
19:00	348	82.9	90.0	81	42.6	111.5	7.4
20:00	315	81.8	88.8	80	52.9	113.0	7.5
21:00	308	80.0	87.4	78	53.9	108.6	8.1
22:00	210	78.7	86.0	77	49.2	106.9	7.8
23:00	129	79.8	87.3	78	37.5	117.9	7.6
Summary	**9773**	**80.7**	**88.7**	**79**	**27.9**	**118.9**	**7.7**

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Direction Southbound

Day Weekdays (Monday to Friday)

Note: #N/A "Modal Speed" means too few data points

Hour Start	Total Vehicles	Avgerage Speed	85th percentile	Modal Speed	Minimum Speed	Maximum Speed	Standard Deviation
00:00	67	77.2	85.2	72	35.3	110.5	8.3
01:00	45	77.4	85.5	72	22.4	117.5	8.4
02:00	56	76.9	84.0	76	22.8	119.5	8.3
03:00	90	75.7	83.0	74	22.0	112.0	7.8
04:00	176	76.8	85.4	75	21.8	118.4	8.0
05:00	438	78.6	87.5	78	17.2	112.7	8.5
06:00	820	78.6	87.1	79	15.9	117.0	7.9
07:00	813	77.6	85.5	77	22.0	115.9	7.5
08:00	856	76.8	84.1	76	20.7	115.4	7.7
09:00	704	76.7	83.5	76	26.9	113.1	7.6
10:00	628	76.9	83.8	76	20.3	113.2	7.6
11:00	620	77.7	85.0	76	20.8	112.3	7.9
12:00	689	78.1	85.6	77	25.1	113.0	8.2
13:00	756	78.8	86.3	78	26.3	117.4	8.4
14:00	964	79.6	87.0	78	30.5	118.3	8.0
15:00	1354	79.5	86.5	78	21.7	118.9	7.8
16:00	1571	79.6	86.4	79	16.7	118.2	7.5
17:00	1598	80.1	87.1	79	22.1	119.6	7.5
18:00	953	80.3	87.6	77	23.0	115.8	8.1
19:00	518	79.1	86.2	77	22.9	116.3	8.2
20:00	355	77.7	84.4	76	36.6	112.7	7.4
21:00	316	77.5	83.8	77	40.7	115.9	6.9
22:00	260	77.5	83.9	77	34.2	107.2	7.6
23:00	153	77.8	84.7	77	17.7	114.2	8.0
Summary	**14800**	**78.0**	**85.4**	**77**	**24.4**	**115.2**	**7.9**

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Direction Southbound

Day Weekends (Saturday and Sunday)

Note: #N/A "Modal Speed" means too few data points

Hour Start	Total Vehicles	Avgerage Speed	85th percentile	Modal Speed	Minimum Speed	Maximum Speed	Standard Deviation
00:00	177	77.7	84.0	77	36.8	107.3	6.4
01:00	94	78.4	87.2	80	31.6	110.5	6.2
02:00	55	81.7	90.5	83	50.2	114.5	7.1
03:00	52	85.3	92.1	84	57.7	113.0	7.4
04:00	75	84.0	92.2	85	58.1	111.9	7.5
05:00	145	80.8	90.9	81	36.1	111.2	7.6
06:00	264	78.6	88.4	79	18.8	111.0	7.5
07:00	393	77.6	86.6	78	19.3	115.5	7.3
08:00	531	78.5	86.5	79	20.4	111.9	7.2
09:00	673	79.6	87.2	79	19.9	111.4	7.6
10:00	763	79.4	86.8	79	19.9	112.9	7.0
11:00	785	79.4	87.1	79	42.8	115.9	6.5
12:00	786	79.5	87.2	79	38.7	113.2	6.7
13:00	738	79.6	86.9	79	17.9	111.5	7.0
14:00	706	80.1	87.3	79	38.7	119.2	6.8
15:00	692	79.7	87.1	78	54.9	116.7	6.6
16:00	716	79.5	86.7	78	37.9	116.2	6.9
17:00	662	79.5	87.1	78	22.4	114.7	7.8
18:00	519	79.4	87.5	79	22.7	116.0	7.6
19:00	372	78.1	86.0	79	22.5	112.8	7.0
20:00	310	76.8	84.6	78	22.6	114.1	7.9
21:00	308	77.6	84.6	78	35.2	117.9	8.0
22:00	255	78.2	84.7	77	34.5	110.0	7.6
23:00	188	78.7	85.9	78	17.7	117.3	7.4
Summary	**10259**	**79.5**	**87.3**	**79**	**17.7**	**119.2**	**7.2**

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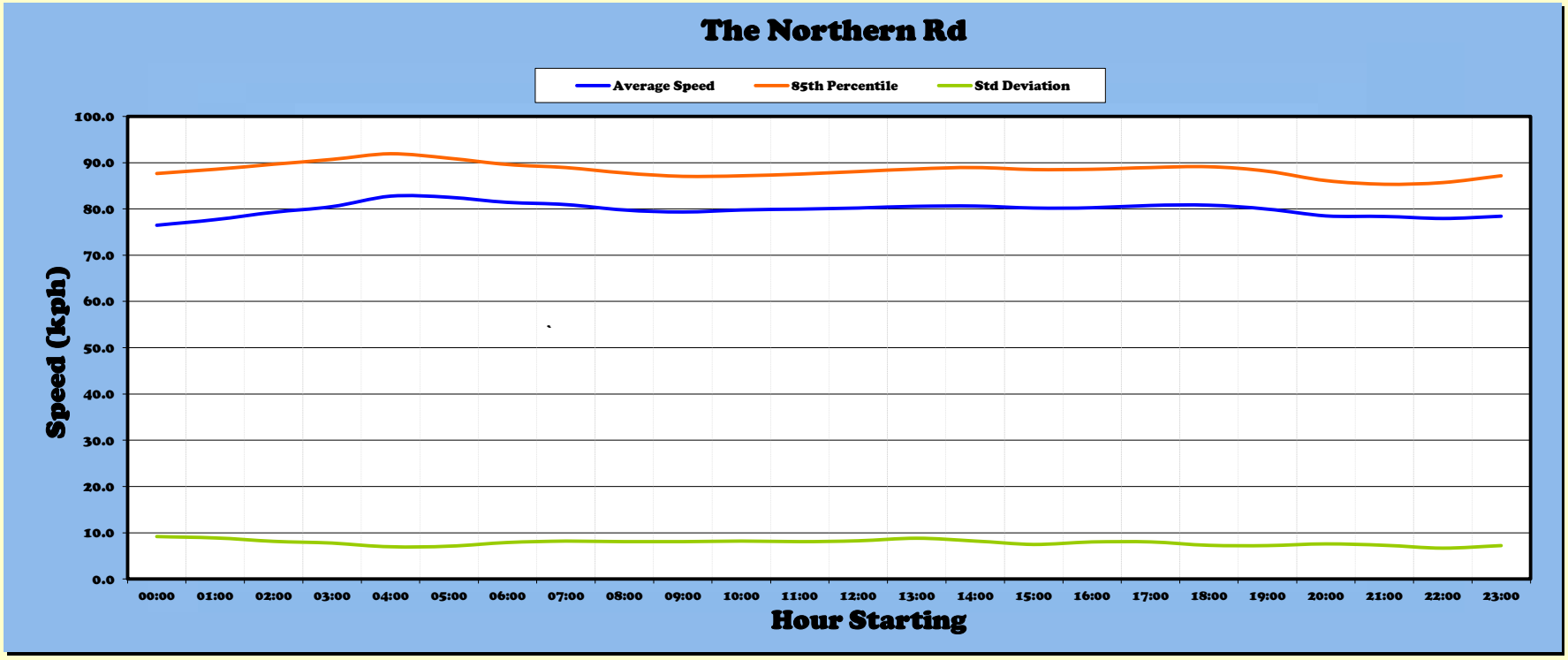
Day Weekdays (Monday to Friday)



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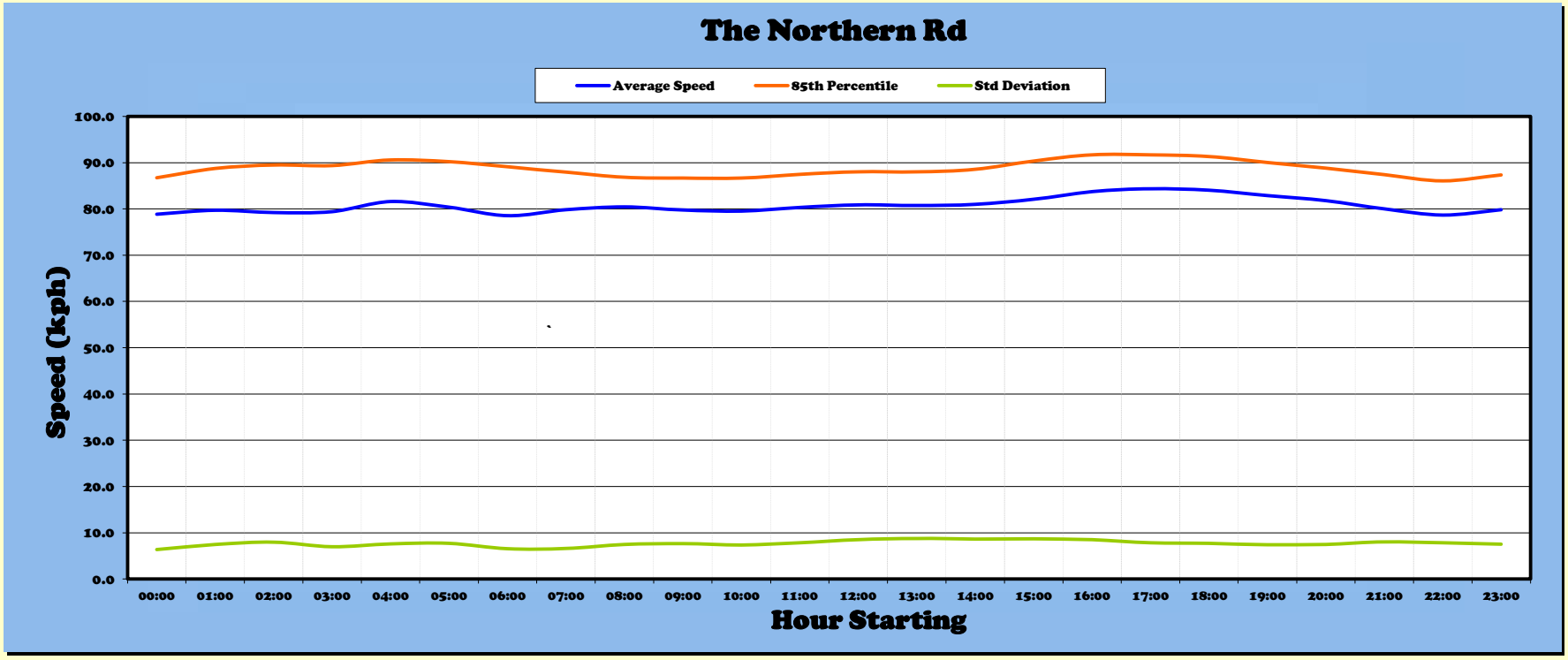
Direction Northbound

Day Weekends (Saturday and Sunday)



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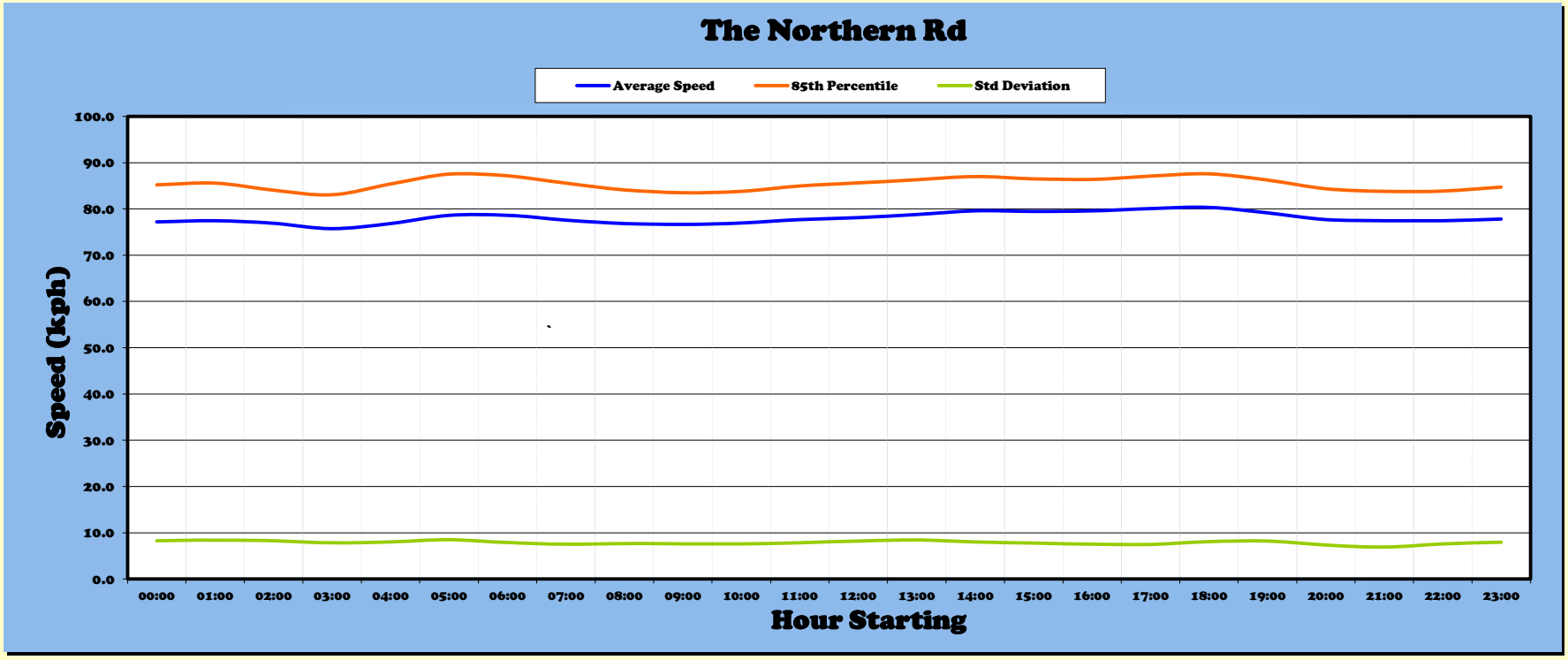
Day Weekdays (Monday to Friday)



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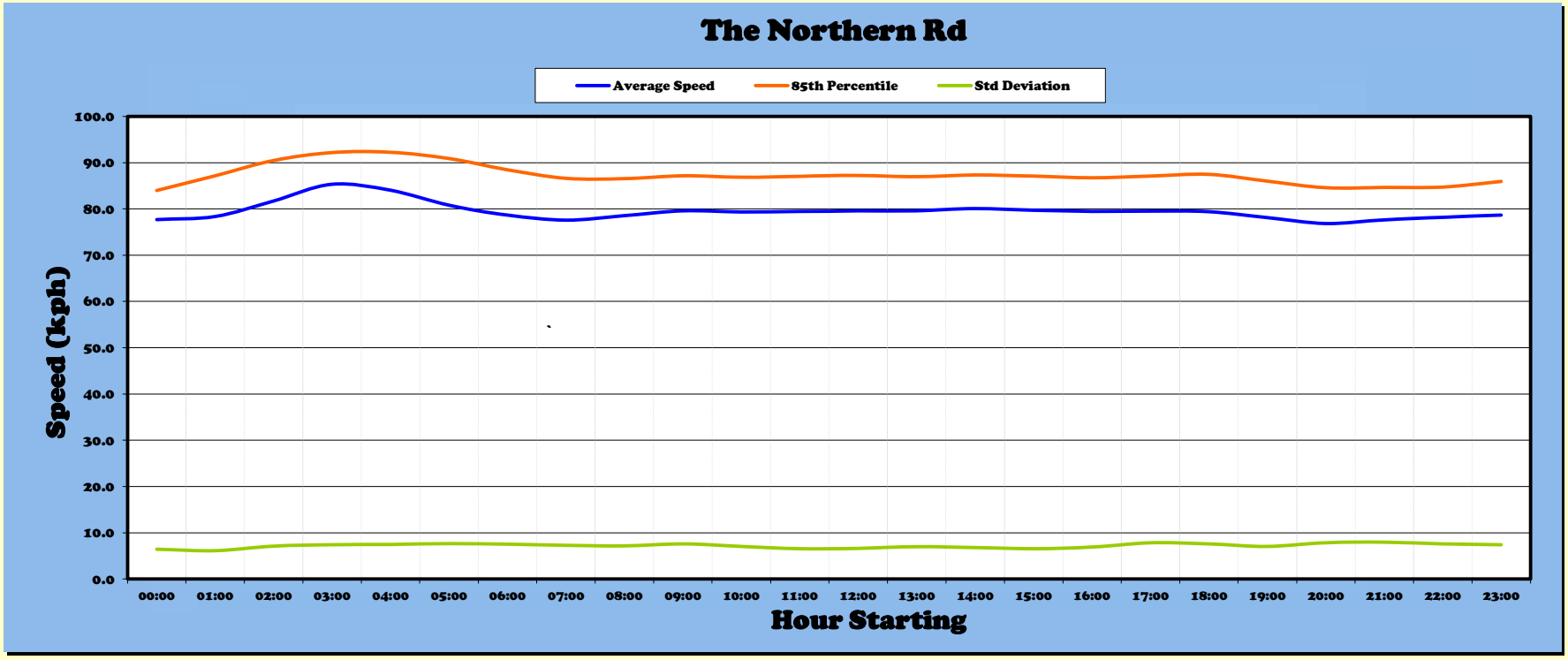
Day Weekends (Saturday and Sunday)



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Direction Northbound

Day Weekdays (Monday to Friday)

10km/h Speed Bin	
> 40 km/hr	98.76%
> 50km/hr	98.30%
> 60 km/hr	97.98%
> 70 km/hr	93.73%
> 80 km/hr	53.20%
> 90 km/hr	12.89%
> 100 km/hr	1.69%
> 110 km/hr	0.28%

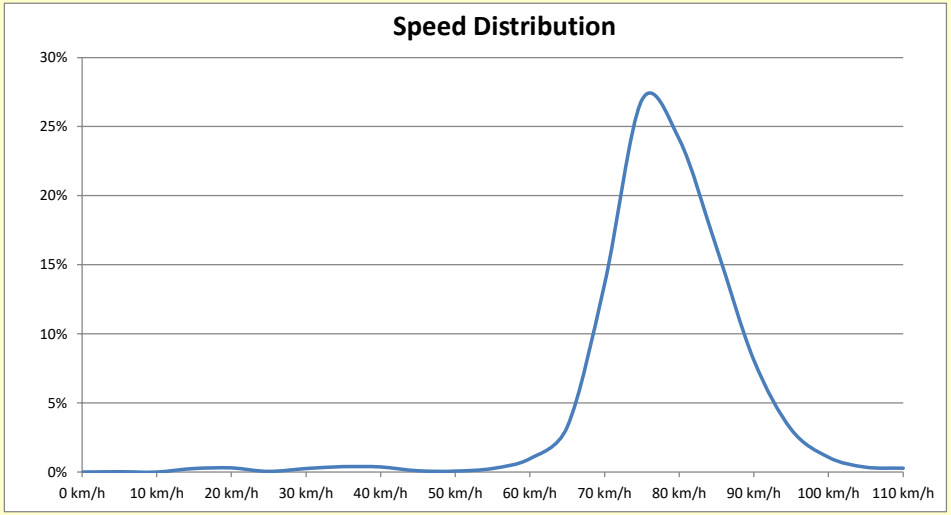
Ave Traffic Composition	
Cars	86.45%
Trucks	6.99%
Heavy Trucks	6.56%

Ave Speed Data	
85% P'tile	88.4 km/h
Mean Speed	75.7 km/h
Min. Speed	14.9 km/h
Max. Speed	121.0 km/h
Deviation	7.9 km/h

Suggestive Speed Zone
90 km/h

5km/h Speed Bin	
> 0 km/h	100.00%
> 5 km/h	100.00%
> 10 km/h	99.98%
> 15 km/h	99.98%
> 20 km/h	99.73%
> 25 km/h	99.44%
> 30 km/h	99.39%
> 35 km/h	99.14%
> 40 km/h	98.76%
> 45 km/h	98.40%
> 50 km/h	98.30%
> 55 km/h	98.24%
> 60 km/h	97.98%
> 65 km/h	97.00%
> 70 km/h	93.73%
> 75 km/h	80.11%
> 80 km/h	53.20%
> 85 km/h	29.11%
> 90 km/h	12.89%
> 95 km/h	4.78%
> 100 km/h	1.69%
> 105 km/h	0.63%
> 110 km/h	0.28%

Speed Range Distribution (5km/h bin)	
> 0 km/h & ≤ 5 km/h	0.00%
> 5 km/h & ≤ 10 km/h	0.02%
> 10 km/h & ≤ 15 km/h	0.00%
> 15 km/h & ≤ 20 km/h	0.25%
> 20 km/h & ≤ 25 km/h	0.29%
> 25 km/h & ≤ 30 km/h	0.05%
> 30 km/h & ≤ 35 km/h	0.25%
> 35 km/h & ≤ 40 km/h	0.38%
> 40 km/h & ≤ 45 km/h	0.36%
> 45 km/h & ≤ 50 km/h	0.10%
> 50 km/h & ≤ 55 km/h	0.06%
> 55 km/h & ≤ 60 km/h	0.26%
> 60 km/h & ≤ 65 km/h	0.98%
> 65 km/h & ≤ 70 km/h	3.26%
> 70 km/h & ≤ 75 km/h	13.63%
> 75 km/h & ≤ 80 km/h	26.91%
> 80 km/h & ≤ 85 km/h	24.09%
> 85 km/h & ≤ 90 km/h	16.22%
> 90 km/h & ≤ 95 km/h	8.12%
> 95 km/h & ≤ 100 km/h	3.09%
> 100 km/h & ≤ 105 km/h	1.06%
> 105 km/h & ≤ 110 km/h	0.35%
> 110 km/h	0.28%



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Direction Northbound

Day Weekends (Saturday and Sunday)

10km/h Speed Bin	
> 40 km/hr	99.65%
> 50km/hr	99.60%
> 60 km/hr	99.43%
> 70 km/hr	94.52%
> 80 km/hr	52.46%
> 90 km/hr	13.00%
> 100 km/hr	2.61%
> 110 km/hr	0.81%

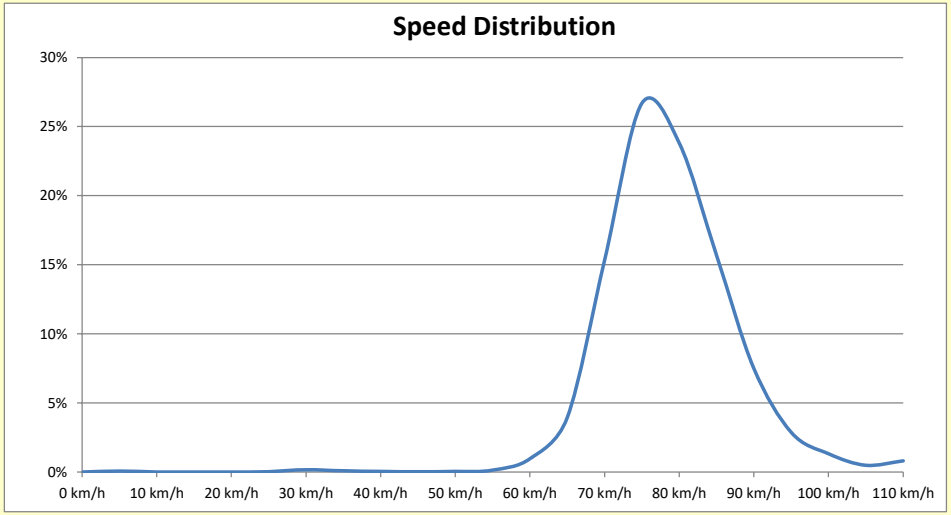
Ave Traffic Composition	
Cars	91.17%
Trucks	5.57%
Heavy Trucks	3.26%

Ave Speed Data	
85% P'tile	88.7 km/h
Mean Speed	79.3 km/h
Min. Speed	27.9 km/h
Max. Speed	118.9 km/h
Deviation	7.7 km/h

Suggestive Speed Zone
90 km/h

5km/h Speed Bin	
> 0 km/h	100.00%
> 5 km/h	100.00%
> 10 km/h	99.93%
> 15 km/h	99.93%
> 20 km/h	99.93%
> 25 km/h	99.93%
> 30 km/h	99.90%
> 35 km/h	99.74%
> 40 km/h	99.65%
> 45 km/h	99.61%
> 50 km/h	99.60%
> 55 km/h	99.56%
> 60 km/h	99.43%
> 65 km/h	98.46%
> 70 km/h	94.52%
> 75 km/h	79.15%
> 80 km/h	52.46%
> 85 km/h	28.65%
> 90 km/h	13.00%
> 95 km/h	5.48%
> 100 km/h	2.61%
> 105 km/h	1.30%
> 110 km/h	0.81%

Speed Range Distribution (5km/h bin)	
> 0 km/h & ≤ 5 km/h	0.00%
> 5 km/h & ≤ 10 km/h	0.07%
> 10 km/h & ≤ 15 km/h	0.00%
> 15 km/h & ≤ 20 km/h	0.00%
> 20 km/h & ≤ 25 km/h	0.00%
> 25 km/h & ≤ 30 km/h	0.03%
> 30 km/h & ≤ 35 km/h	0.16%
> 35 km/h & ≤ 40 km/h	0.08%
> 40 km/h & ≤ 45 km/h	0.04%
> 45 km/h & ≤ 50 km/h	0.02%
> 50 km/h & ≤ 55 km/h	0.04%
> 55 km/h & ≤ 60 km/h	0.13%
> 60 km/h & ≤ 65 km/h	0.97%
> 65 km/h & ≤ 70 km/h	3.94%
> 70 km/h & ≤ 75 km/h	15.36%
> 75 km/h & ≤ 80 km/h	26.69%
> 80 km/h & ≤ 85 km/h	23.81%
> 85 km/h & ≤ 90 km/h	15.65%
> 90 km/h & ≤ 95 km/h	7.51%
> 95 km/h & ≤ 100 km/h	2.87%
> 100 km/h & ≤ 105 km/h	1.31%
> 105 km/h & ≤ 110 km/h	0.49%
> 110 km/h	0.81%



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Direction Southbound

Day Weekdays (Monday to Friday)

10km/h Speed Bin	
> 40 km/hr	99.27%
> 50km/hr	99.22%
> 60 km/hr	98.83%
> 70 km/hr	90.22%
> 80 km/hr	39.60%
> 90 km/hr	6.90%
> 100 km/hr	1.07%
> 110 km/hr	0.29%

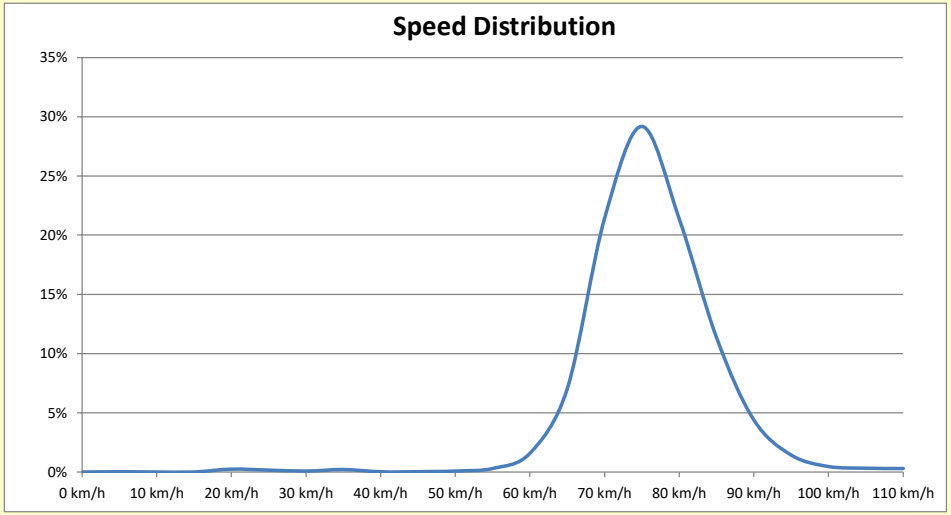
Ave Traffic Composition	
Cars	86.74%
Trucks	7.21%
Heavy Trucks	6.05%

Ave Speed Data	
85% P'tile	85.4 km/h
Mean Speed	76.5 km/h
Min. Speed	24.4 km/h
Max. Speed	115.2 km/h
Deviation	7.9 km/h

Suggestive Speed Zone
90 km/h

5km/h Speed Bin	
> 0 km/h	100.00%
> 5 km/h	100.00%
> 10 km/h	99.97%
> 15 km/h	99.97%
> 20 km/h	99.96%
> 25 km/h	99.73%
> 30 km/h	99.56%
> 35 km/h	99.48%
> 40 km/h	99.27%
> 45 km/h	99.25%
> 50 km/h	99.22%
> 55 km/h	99.14%
> 60 km/h	98.83%
> 65 km/h	97.24%
> 70 km/h	90.22%
> 75 km/h	68.78%
> 80 km/h	39.60%
> 85 km/h	18.22%
> 90 km/h	6.90%
> 95 km/h	2.50%
> 100 km/h	1.07%
> 105 km/h	0.60%
> 110 km/h	0.29%

Speed Range Distribution (5km/h bin)	
> 0 km/h & ≤ 5 km/h	0.00%
> 5 km/h & ≤ 10 km/h	0.03%
> 10 km/h & ≤ 15 km/h	0.00%
> 15 km/h & ≤ 20 km/h	0.01%
> 20 km/h & ≤ 25 km/h	0.23%
> 25 km/h & ≤ 30 km/h	0.17%
> 30 km/h & ≤ 35 km/h	0.08%
> 35 km/h & ≤ 40 km/h	0.21%
> 40 km/h & ≤ 45 km/h	0.01%
> 45 km/h & ≤ 50 km/h	0.03%
> 50 km/h & ≤ 55 km/h	0.08%
> 55 km/h & ≤ 60 km/h	0.31%
> 60 km/h & ≤ 65 km/h	1.60%
> 65 km/h & ≤ 70 km/h	7.01%
> 70 km/h & ≤ 75 km/h	21.44%
> 75 km/h & ≤ 80 km/h	29.19%
> 80 km/h & ≤ 85 km/h	21.38%
> 85 km/h & ≤ 90 km/h	11.32%
> 90 km/h & ≤ 95 km/h	4.40%
> 95 km/h & ≤ 100 km/h	1.42%
> 100 km/h & ≤ 105 km/h	0.47%
> 105 km/h & ≤ 110 km/h	0.32%
> 110 km/h	0.29%



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Direction Southbound

Day Weekends (Saturday and Sunday)

10km/h Speed Bin	
> 40 km/hr	99.55%
> 50km/hr	99.51%
> 60 km/hr	99.35%
> 70 km/hr	95.31%
> 80 km/hr	47.75%
> 90 km/hr	8.90%
> 100 km/hr	1.21%
> 110 km/hr	0.21%

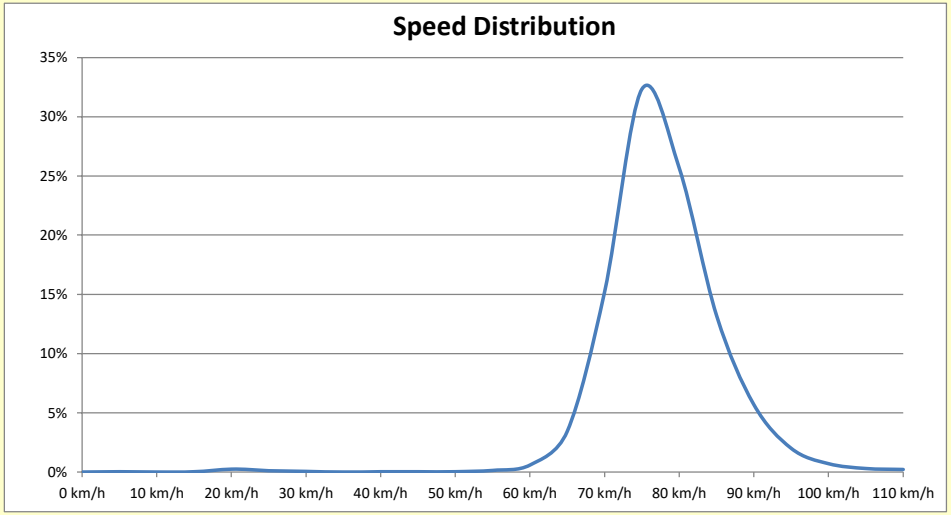
Ave Traffic Composition	
Cars	91.58%
Trucks	5.48%
Heavy Trucks	2.94%

Ave Speed Data	
85% P'tile	87.3 km/h
Mean Speed	79.1 km/h
Min. Speed	17.7 km/h
Max. Speed	119.2 km/h
Deviation	7.2 km/h

Suggestive Speed Zone
90 km/h

5km/h Speed Bin	
> 0 km/h	100.00%
> 5 km/h	100.00%
> 10 km/h	99.98%
> 15 km/h	99.98%
> 20 km/h	99.96%
> 25 km/h	99.72%
> 30 km/h	99.60%
> 35 km/h	99.55%
> 40 km/h	99.55%
> 45 km/h	99.53%
> 50 km/h	99.51%
> 55 km/h	99.48%
> 60 km/h	99.35%
> 65 km/h	98.74%
> 70 km/h	95.31%
> 75 km/h	80.06%
> 80 km/h	47.75%
> 85 km/h	22.09%
> 90 km/h	8.90%
> 95 km/h	3.20%
> 100 km/h	1.21%
> 105 km/h	0.51%
> 110 km/h	0.21%

Speed Range Distribution (5km/h bin)	
> 0 km/h & ≤ 5 km/h	0.00%
> 5 km/h & ≤ 10 km/h	0.02%
> 10 km/h & ≤ 15 km/h	0.00%
> 15 km/h & ≤ 20 km/h	0.01%
> 20 km/h & ≤ 25 km/h	0.25%
> 25 km/h & ≤ 30 km/h	0.12%
> 30 km/h & ≤ 35 km/h	0.05%
> 35 km/h & ≤ 40 km/h	0.00%
> 40 km/h & ≤ 45 km/h	0.01%
> 45 km/h & ≤ 50 km/h	0.02%
> 50 km/h & ≤ 55 km/h	0.02%
> 55 km/h & ≤ 60 km/h	0.14%
> 60 km/h & ≤ 65 km/h	0.60%
> 65 km/h & ≤ 70 km/h	3.44%
> 70 km/h & ≤ 75 km/h	15.24%
> 75 km/h & ≤ 80 km/h	32.31%
> 80 km/h & ≤ 85 km/h	25.66%
> 85 km/h & ≤ 90 km/h	13.19%
> 90 km/h & ≤ 95 km/h	5.70%
> 95 km/h & ≤ 100 km/h	1.99%
> 100 km/h & ≤ 105 km/h	0.70%
> 105 km/h & ≤ 110 km/h	0.30%
> 110 km/h	0.21%



TRANS TRAFFIC SURVEY
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Site The Northern Rd

Direction Northbound

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Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	7 days		Weekday		Weekend	
Date	9/12/2024	10/12/2024	11/12/2024	12/12/2024	13/12/2024	7/12/2024	8/12/2024	Total	Average	Total	Average	Total	Average
AM Peak	06:00	06:00	06:00	06:00	06:00	11:00	11:00	N/A	06:00	N/A	06:00	N/A	11:00
PM Peak	15:00	17:00	15:00	17:00	15:00	12:00	12:00	N/A	15:00	N/A	15:00	N/A	12:00
00:00	38	39	44	52	62	104	124	463	66	235	47	228	114
01:00	30	41	35	39	28	46	54	273	39	173	35	100	50
02:00	75	56	72	67	68	40	31	409	58	338	68	71	36
03:00	123	126	147	125	131	59	33	744	106	652	130	92	46
04:00	383	389	372	385	388	151	65	2133	305	1917	383	216	108
05:00	1077	1141	1119	1140	1052	395	124	6048	864	5529	1106	519	260
06:00	1477	1546	1543	1511	1322	448	206	8053	1150	7399	1480	654	327
07:00	1409	1503	1451	1445	1248	450	272	7778	1111	7056	1411	722	361
08:00	1023	1033	1022	953	851	528	464	5874	839	4882	976	992	496
09:00	764	747	722	697	653	623	586	4792	685	3583	717	1209	605
10:00	576	573	656	606	639	768	621	4439	634	3050	610	1389	695
11:00	594	610	606	631	706	784	725	4656	665	3147	629	1509	755
12:00	661	581	624	643	707	770	738	4724	675	3216	643	1508	754
13:00	637	646	682	716	729	699	639	4748	678	3410	682	1338	669
14:00	731	703	742	765	836	674	653	5104	729	3777	755	1327	664
15:00	844	835	961	883	902	657	659	5741	820	4425	885	1316	658
16:00	802	828	840	874	899	703	685	5631	804	4243	849	1388	694
17:00	729	851	827	886	878	686	623	5480	783	4171	834	1309	655
18:00	469	483	552	540	641	484	438	3607	515	2685	537	922	461
19:00	300	302	362	385	404	326	365	2444	349	1753	351	691	346
20:00	261	306	321	357	369	328	298	2240	320	1614	323	626	313
21:00	204	194	260	323	366	339	270	1956	279	1347	269	609	305
22:00	109	141	139	183	286	266	150	1274	182	858	172	416	208
23:00	75	93	84	88	149	177	77	743	106	489	98	254	127
Total	13391	13767	14183	14294	14314	10505	8900	89354	12765	69949	13990	19405	9703
% Heavy	13.37%	13.79%	14.20%	13.75%	12.60%	10.45%	5.73%	12.40%		13.54%		8.29%	

TRANS TRAFFIC SURVEY
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Site The Northern Rd

Direction Southbound

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Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	7 days		Weekday		Weekend	
Date	9/12/2024	10/12/2024	11/12/2024	12/12/2024	13/12/2024	7/12/2024	8/12/2024	Total	Average	Total	Average	Total	Average
AM Peak	07:00	07:00	08:00	08:00	08:00	10:00	11:00	N/A	08:00	N/A	08:00	N/A	11:00
PM Peak	17:00	17:00	17:00	17:00	16:00	12:00	12:00	N/A	17:00	N/A	17:00	N/A	12:00
00:00	48	54	71	60	103	161	190	687	98	336	67	351	176
01:00	39	47	51	49	47	89	94	416	59	233	47	183	92
02:00	53	51	59	61	59	66	39	388	55	283	57	105	53
03:00	72	110	97	84	86	72	29	550	79	449	90	101	51
04:00	192	196	154	167	173	102	44	1028	147	882	176	146	73
05:00	461	443	410	417	453	194	91	2469	353	2184	437	285	143
06:00	851	809	806	839	802	354	167	4628	661	4107	821	521	261
07:00	860	879	812	819	701	520	259	4850	693	4071	814	779	390
08:00	855	874	880	851	815	633	421	5329	761	4275	855	1054	527
09:00	663	709	723	699	736	759	580	4869	696	3530	706	1339	670
10:00	609	585	621	640	684	824	696	4659	666	3139	628	1520	760
11:00	580	582	606	635	701	824	742	4670	667	3104	621	1566	783
12:00	691	639	624	668	822	818	745	5007	715	3444	689	1563	782
13:00	797	650	717	751	865	777	693	5250	750	3780	756	1470	735
14:00	873	927	968	941	1110	765	639	6223	889	4819	964	1404	702
15:00	1276	1330	1390	1353	1431	669	707	8156	1165	6780	1356	1376	688
16:00	1494	1562	1580	1590	1623	692	732	9273	1325	7849	1570	1424	712
17:00	1580	1632	1700	1656	1419	601	716	9304	1329	7987	1597	1317	659
18:00	858	960	1041	985	925	525	509	5803	829	4769	954	1034	517
19:00	459	468	585	550	539	379	361	3341	477	2601	520	740	370
20:00	300	333	349	367	432	333	282	2396	342	1781	356	615	308
21:00	236	279	323	375	370	335	277	2195	314	1583	317	612	306
22:00	174	232	238	283	370	325	180	1802	257	1297	259	505	253
23:00	108	124	127	150	256	265	108	1138	163	765	153	373	187
Total	14129	14475	14932	14990	15522	11082	9301	94431	13490	74048	14810	20383	10192
% Heavy	13.29%	13.64%	13.70%	13.62%	12.38%	9.38%	6.24%	12.16%		13.32%		7.95%	

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Site The Northern Rd

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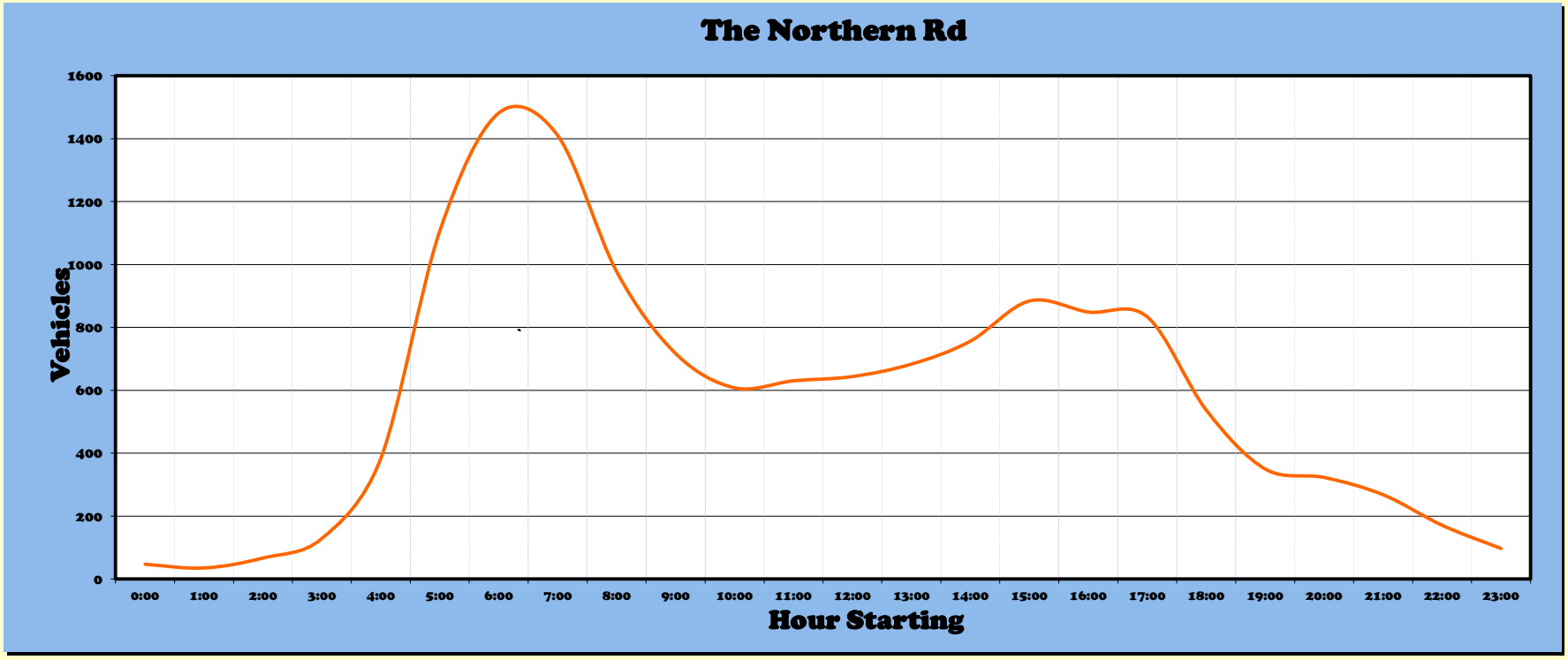
Direction Northbound

Day Weekdays (Monday to Friday)



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Site The Northern Rd

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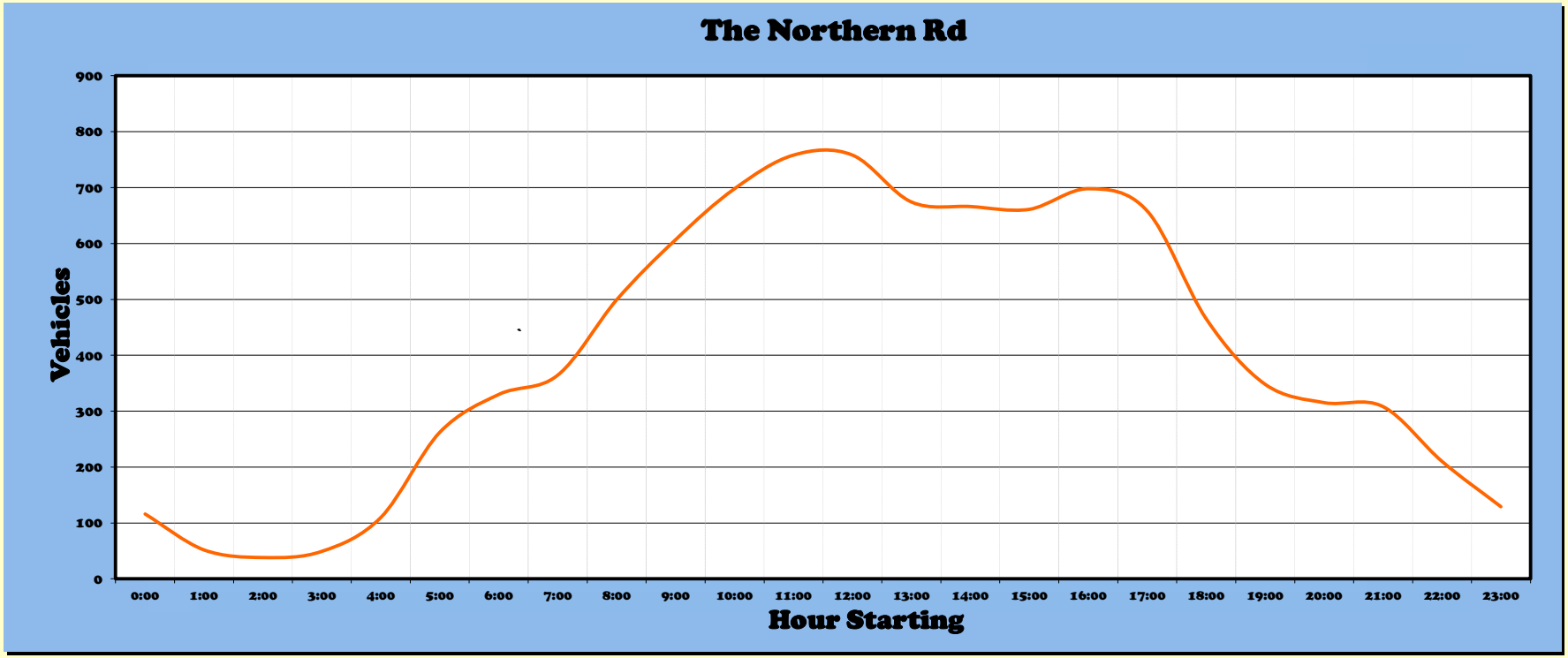
Direction Northbound

Day Weekends (Saturday and Sunday)



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Site The Northern Rd

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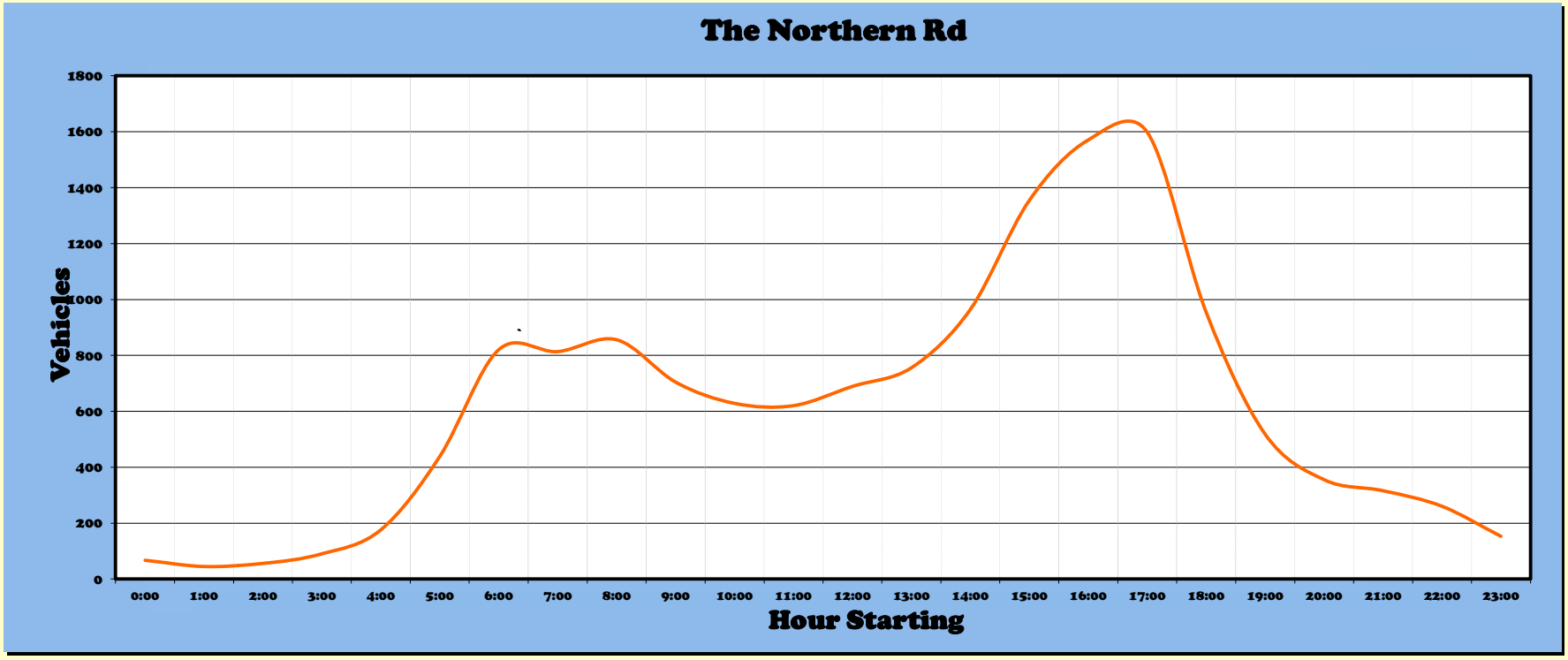
Direction Southbound

Day Weekdays (Monday to Friday)



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Site The Northern Rd

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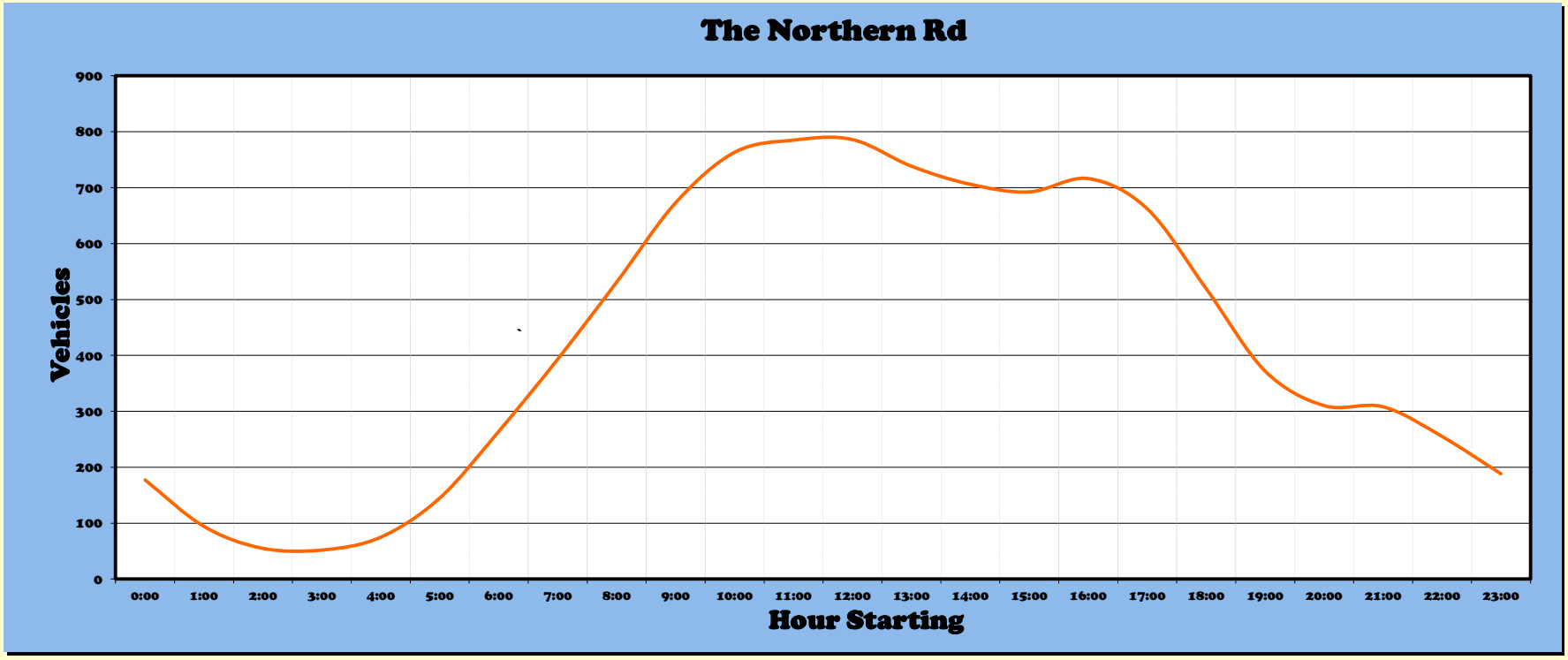
Direction Southbound

Day Weekends (Saturday and Sunday)



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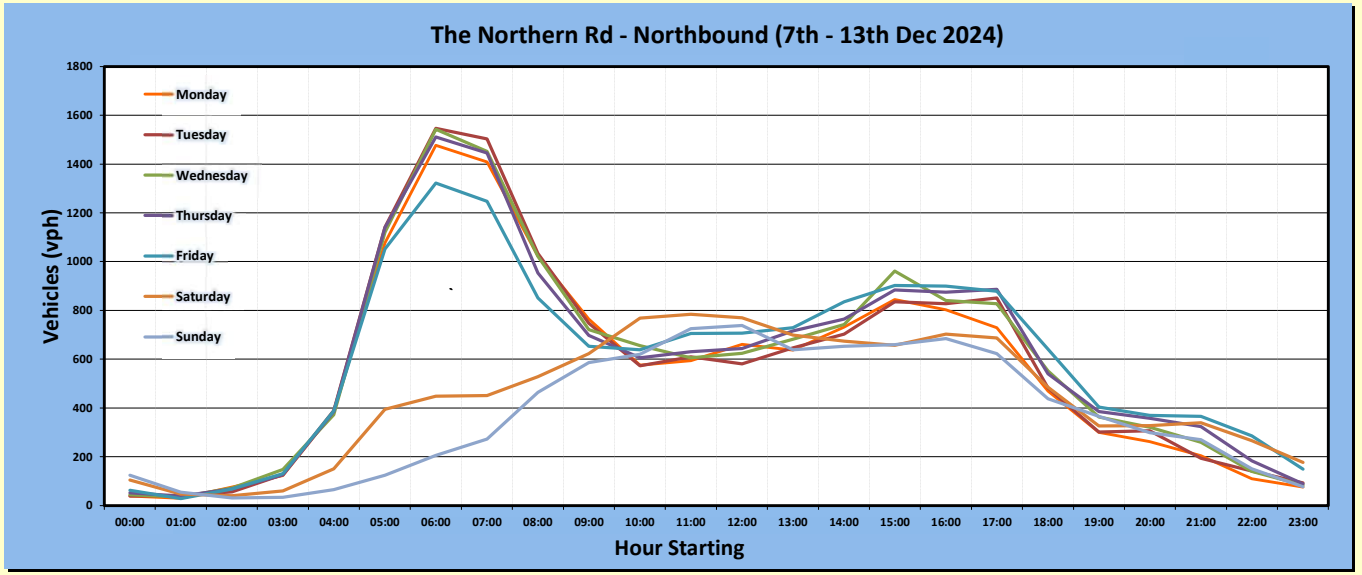
Site The Northern Rd - Northbound (7th - 13th Dec 2024) Back to Site Summary Page

Direction Northbound



Volume Sumary

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Date	9/12/2024	10/12/2024	11/12/2024	12/12/2024	13/12/2024	7/12/2024	8/12/2024
AM Peak	06:00	06:00	06:00	06:00	06:00	11:00	11:00
PM Peak	15:00	17:00	15:00	17:00	15:00	12:00	12:00
00:00	38	39	44	52	62	104	124
01:00	30	41	35	39	28	46	54
02:00	75	56	72	67	68	40	31
03:00	123	126	147	125	131	59	33
04:00	383	389	372	385	388	151	65
05:00	1077	1141	1119	1140	1052	395	124
06:00	1477	1546	1543	1511	1322	448	206
07:00	1409	1503	1451	1445	1248	450	272
08:00	1023	1033	1022	953	851	528	464
09:00	764	747	722	697	653	623	586
10:00	576	573	656	606	639	768	621
11:00	594	610	606	631	706	784	725
12:00	661	581	624	643	707	770	738
13:00	637	646	682	716	729	699	639
14:00	731	703	742	765	836	674	653
15:00	844	835	961	883	902	657	659
16:00	802	828	840	874	899	703	685
17:00	729	851	827	886	878	686	623
18:00	469	483	552	540	641	484	438
19:00	300	302	362	385	404	326	365
20:00	261	306	321	357	369	328	298
21:00	204	194	260	323	366	339	270
22:00	109	141	139	183	286	266	150
23:00	75	93	84	88	149	177	77
Total	13391	13767	14183	14294	14314	10505	8900
% Heavy	13.37%	13.79%	14.20%	13.75%	12.60%	10.45%	5.73%

TRANS TRAFFIC SURVEY
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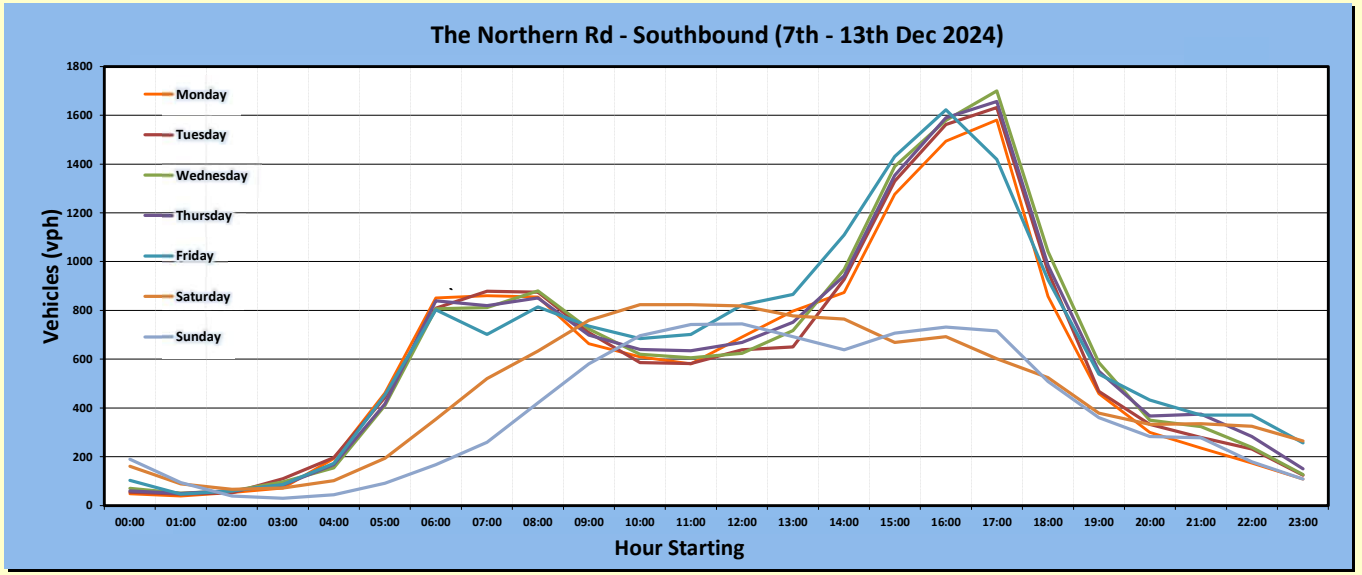
Site The Northern Rd - Southbound (7th - 13th Dec 2024) Back to Site Summary Page

Direction Southbound



Volume Sumary

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Date	9/12/2024	10/12/2024	11/12/2024	12/12/2024	13/12/2024	7/12/2024	8/12/2024
AM Peak	07:00	07:00	08:00	08:00	08:00	10:00	11:00
PM Peak	17:00	17:00	17:00	17:00	16:00	12:00	12:00
00:00	48	54	71	60	103	161	190
01:00	39	47	51	49	47	89	94
02:00	53	51	59	61	59	66	39
03:00	72	110	97	84	86	72	29
04:00	192	196	154	167	173	102	44
05:00	461	443	410	417	453	194	91
06:00	851	809	806	839	802	354	167
07:00	860	879	812	819	701	520	259
08:00	855	874	880	851	815	633	421
09:00	663	709	723	699	736	759	580
10:00	609	585	621	640	684	824	696
11:00	580	582	606	635	701	824	742
12:00	691	639	624	668	822	818	745
13:00	797	650	717	751	865	777	693
14:00	873	927	968	941	1110	765	639
15:00	1276	1330	1390	1353	1431	669	707
16:00	1494	1562	1580	1590	1623	692	732
17:00	1580	1632	1700	1656	1419	601	716
18:00	858	960	1041	985	925	525	509
19:00	459	468	585	550	539	379	361
20:00	300	333	349	367	432	333	282
21:00	236	279	323	375	370	335	277
22:00	174	232	238	283	370	325	180
23:00	108	124	127	150	256	265	108
Total	14129	14475	14932	14990	15522	11082	9301
% Heavy	13.29%	13.64%	13.70%	13.62%	12.38%	9.38%	6.24%

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Site The Northern Rd

Direction Northbound

Day Weekdays (Monday to Friday)

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	Vehicles Classifications												
Hour Start	SV	SVT	TB2	TB3	T4	ART3	ART4	ART5	ART6	BD	DRT	TRT	UC
	1	2	3	4	5	6	7	8	9	10	11	12	13
12:00 AM	41	1	1	0	0	0	0	0	3	1	0	0	0
01:00 AM	29	0	0	1	1	0	0	1	2	1	0	0	0
02:00 AM	55	0	0	2	0	0	0	0	4	6	0	0	0
03:00 AM	116	1	3	1	2	0	1	0	2	3	0	0	0
04:00 AM	345	3	9	5	6	0	3	1	5	6	1	0	0
05:00 AM	946	28	46	20	13	1	19	3	14	5	8	3	0
06:00 AM	1222	40	72	20	22	3	35	8	24	10	15	10	0
07:00 AM	1205	35	44	19	19	3	31	4	19	13	12	6	0
08:00 AM	831	20	33	12	16	2	19	2	19	14	6	3	0
09:00 AM	583	15	35	13	19	1	10	3	18	13	5	2	0
10:00 AM	483	16	31	12	19	1	6	3	17	14	5	1	0
11:00 AM	506	16	26	14	16	1	7	4	19	14	6	1	0
12:00 PM	512	17	32	14	14	2	11	4	20	12	5	1	0
01:00 PM	531	22	39	16	17	0	12	4	19	14	6	3	0
02:00 PM	605	19	39	13	18	2	14	3	19	14	7	3	0
03:00 PM	719	25	45	16	12	1	17	3	19	11	12	4	0
04:00 PM	712	23	31	12	11	1	19	5	19	8	6	2	0
05:00 PM	728	20	24	10	6	1	17	3	9	8	4	3	0
06:00 PM	478	15	15	5	2	1	6	2	7	4	1	1	0
07:00 PM	318	7	9	3	2	0	2	1	5	2	1	0	0
08:00 PM	297	7	6	3	0	0	3	0	4	2	1	0	0
09:00 PM	250	4	5	1	0	0	2	0	3	3	0	0	0
10:00 PM	156	2	2	1	0	0	1	0	4	5	0	0	0
11:00 PM	86	1	2	0	0	0	0	0	3	5	0	0	0
Summary	**11754**	**337**	**549**	**213**	**215**	**20**	**235**	**54**	**277**	**188**	**101**	**43**	**0**

TRANS TRAFFIC SURVEY
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Site The Northern Rd

Direction Southbound

Day Weekdays (Monday to Friday)

Back to Site Summary Page

Hour Start	Vehicles Classifications												
	SV	SVT	TB2	TB3	T4	ART3	ART4	ART5	ART6	BD	DRT	TRT	UC
	1	2	3	4	5	6	7	8	9	10	11	12	13
12:00 AM	62	0	1	2	0	0	0	0	1	1	0	0	0
01:00 AM	42	0	0	1	0	0	0	0	1	1	0	0	0
02:00 AM	47	0	2	2	1	0	0	0	2	2	0	0	0
03:00 AM	67	1	5	2	2	0	0	0	4	7	2	0	0
04:00 AM	132	2	10	3	5	0	0	1	10	11	2	0	0
05:00 AM	359	8	17	16	9	1	5	4	11	6	2	0	0
06:00 AM	643	18	47	29	21	2	12	7	24	8	7	2	0
07:00 AM	673	18	37	18	17	2	9	4	18	9	6	2	0
08:00 AM	712	19	33	18	20	1	10	3	20	11	6	3	0
09:00 AM	571	17	37	17	13	1	9	4	20	11	3	1	0
10:00 AM	495	14	36	14	16	0	8	4	20	14	6	1	0
11:00 AM	500	15	36	11	16	1	6	2	16	12	4	1	0
12:00 PM	548	19	40	14	16	0	9	3	21	12	6	1	0
01:00 PM	600	22	40	17	18	1	11	3	21	18	4	1	0
02:00 PM	809	21	40	14	13	1	19	5	17	15	7	3	0
03:00 PM	1169	35	44	14	16	2	26	4	19	10	10	5	0
04:00 PM	1350	39	51	22	18	2	39	4	18	13	9	6	0
05:00 PM	1404	37	40	19	13	2	39	5	16	6	10	7	0
06:00 PM	854	20	24	8	9	0	20	1	7	6	3	1	0
07:00 PM	471	11	13	7	2	0	5	1	4	3	1	0	0
08:00 PM	325	5	6	7	1	0	2	0	3	5	1	0	0
09:00 PM	291	5	5	3	2	0	2	0	4	3	1	0	0
10:00 PM	239	4	4	5	1	0	2	1	2	2	0	0	0
11:00 PM	143	1	3	3	1	0	0	0	1	1	0	0	0
Summary	**12506**	**331**	**571**	**266**	**230**	**16**	**233**	**56**	**280**	**187**	**90**	**34**	**0**

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Site The Northern Rd

Direction Northbound

Day Weekdays (Monday to Friday)

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AM Peak 6:00 AM
PM Peak 3:00 PM

Hour Start	Vehicle Classification Summary					
	Light Vehicles (1-2)	Small Trucks (3)	Medium Trucks (4-5)	Large Trucks (6-12)	Unclassified (13)	Hour Total
0:00	42	1	0	4	0	47
1:00	29	0	2	4	0	35
2:00	55	0	2	10	0	67
3:00	117	3	3	6	0	129
4:00	348	9	11	16	0	384
5:00	974	46	33	53	0	1106
6:00	1262	72	42	105	0	1481
7:00	1240	44	38	88	0	1410
8:00	851	33	28	65	0	977
9:00	598	35	32	52	0	717
10:00	499	31	31	47	0	608
11:00	522	26	30	52	0	630
12:00	529	32	28	55	0	644
13:00	553	39	33	58	0	683
14:00	624	39	31	62	0	756
15:00	744	45	28	67	0	884
16:00	735	31	23	60	0	849
17:00	748	24	16	45	0	833
18:00	493	15	7	22	0	537
19:00	325	9	5	11	0	350
20:00	304	6	3	10	0	323
21:00	254	5	1	8	0	268
22:00	158	2	1	10	0	171
23:00	87	2	0	8	0	97
Summary	**12091**	**549**	**428**	**918**	**0**	**13986**

TRANS TRAFFIC SURVEY
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Site The Northern Rd

Direction Northbound

Day Weekends (Saturday and Sunday)

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Hour Start	Vehicles Classifications												
	SV	SVT	TB2	TB3	T4	ART3	ART4	ART5	ART6	BD	DRT	TRT	UC
	1	2	3	4	5	6	7	8	9	10	11	12	13
12:00 AM	107	1	2	1	1	0	1	1	1	1	0	0	0
01:00 AM	47	0	1	1	1	0	0	0	1	1	0	0	0
02:00 AM	33	0	1	1	0	0	0	1	1	1	0	0	0
03:00 AM	41	1	0	2	0	0	0	1	1	2	1	0	0
04:00 AM	101	1	3	1	1	0	1	0	1	0	0	1	0
05:00 AM	232	4	13	4	2	1	3	0	1	2	0	0	0
06:00 AM	283	8	16	8	3	1	3	1	4	2	1	0	0
07:00 AM	322	10	8	8	5	0	2	2	3	2	2	0	0
08:00 AM	446	9	14	8	6	0	6	1	4	1	3	1	0
09:00 AM	538	19	9	9	3	0	10	2	10	3	3	1	0
10:00 AM	619	17	16	13	5	1	11	2	8	3	2	1	0
11:00 AM	676	23	17	11	3	1	12	2	6	3	3	1	0
12:00 PM	681	23	14	11	4	1	11	1	6	2	2	2	0
01:00 PM	602	17	18	14	5	1	8	2	4	1	1	1	0
02:00 PM	600	18	15	10	4	0	9	3	5	0	1	1	0
03:00 PM	596	16	14	11	3	1	9	3	4	1	0	3	0
04:00 PM	615	18	36	7	2	2	10	3	4	0	0	1	0
05:00 PM	577	12	37	11	4	1	8	0	6	0	1	1	0
06:00 PM	396	6	30	15	1	2	7	1	2	3	1	1	0
07:00 PM	307	5	18	8	1	2	3	1	2	0	1	0	0
08:00 PM	277	5	17	8	1	1	3	0	2	1	0	0	0
09:00 PM	279	3	12	4	2	1	2	0	3	1	1	0	0
10:00 PM	197	2	2	3	0	0	1	1	3	1	0	0	0
11:00 PM	119	1	3	2	0	0	1	0	3	0	0	0	0
Summary	**8691**	**219**	**316**	**171**	**57**	**16**	**121**	**28**	**85**	**31**	**23**	**15**	**0**

TRANS TRAFFIC SURVEY
trafficsurvey.com.au

Site The Northern Rd

Direction Southbound

Day Weekdays (Monday to Friday)

Back to Site Summary Page

AM Peak 8:00 AM
PM Peak 5:00 PM

Hour Start	Vehicle Classification Summary					
	Light Vehicles (1-2)	Small Trucks (3)	Medium Trucks (4-5)	Large Trucks (6-12)	Unclassified (13)	Hour Total
0:00	62	1	2	2	0	67
1:00	42	0	1	2	0	45
2:00	47	2	3	4	0	56
3:00	68	5	4	13	0	90
4:00	134	10	8	24	0	176
5:00	367	17	25	29	0	438
6:00	661	47	50	62	0	820
7:00	691	37	35	50	0	813
8:00	731	33	38	54	0	856
9:00	588	37	30	49	0	704
10:00	509	36	30	53	0	628
11:00	515	36	27	42	0	620
12:00	567	40	30	52	0	689
13:00	622	40	35	59	0	756
14:00	830	40	27	67	0	964
15:00	1204	44	30	76	0	1354
16:00	1389	51	40	91	0	1571
17:00	1441	40	32	85	0	1598
18:00	874	24	17	38	0	953
19:00	482	13	9	14	0	518
20:00	330	6	8	11	0	355
21:00	296	5	5	10	0	316
22:00	243	4	6	7	0	260
23:00	144	3	4	2	0	153
Summary	**12837**	**571**	**496**	**896**	**0**	**14800**

TRANS TRAFFIC SURVEY
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Site The Northern Rd

Direction Southbound

Day Weekends (Saturday and Sunday)

Back to Site Summary Page

Hour Start	Vehicles Classifications												
	SV	SVT	TB2	TB3	T4	ART3	ART4	ART5	ART6	BD	DRT	TRT	UC
	1	2	3	4	5	6	7	8	9	10	11	12	13
12:00 AM	168	2	3	2	1	0	0	0	0	1	0	0	0
01:00 AM	86	2	1	1	1	0	1	0	0	1	1	0	0
02:00 AM	40	1	7	2	2	0	0	0	1	1	1	0	0
03:00 AM	31	0	12	1	1	0	0	0	3	4	0	0	0
04:00 AM	42	1	18	2	2	1	1	0	2	6	0	0	0
05:00 AM	98	4	27	4	2	1	3	1	4	1	0	0	0
06:00 AM	219	5	17	8	3	1	4	1	3	2	1	0	0
07:00 AM	339	10	20	7	4	0	3	1	6	1	1	1	0
08:00 AM	475	9	22	7	5	1	4	0	4	3	1	0	0
09:00 AM	593	13	29	10	7	2	7	2	4	4	1	1	0
10:00 AM	685	19	31	4	4	1	10	1	4	3	1	0	0
11:00 AM	703	20	28	6	6	1	10	0	7	1	2	1	0
12:00 PM	695	25	33	7	3	0	11	2	3	2	4	1	0
01:00 PM	663	18	24	6	3	1	11	2	6	1	1	2	0
02:00 PM	633	19	28	4	5	1	10	1	2	2	1	0	0
03:00 PM	617	21	22	7	4	1	11	1	5	2	1	0	0
04:00 PM	652	16	11	11	2	1	12	3	4	2	1	1	0
05:00 PM	607	15	10	5	2	1	13	1	3	1	3	1	0
06:00 PM	490	8	5	5	2	1	4	1	1	0	2	0	0
07:00 PM	345	8	5	4	2	1	4	1	1	0	1	0	0
08:00 PM	287	4	4	6	3	0	4	0	1	1	0	0	0
09:00 PM	285	3	7	5	2	0	1	0	3	1	1	0	0
10:00 PM	236	3	5	5	1	0	1	0	2	1	1	0	0
11:00 PM	179	1	4	3	0	0	0	1	0	0	0	0	0
Summary	**9168**	**227**	**373**	**122**	**67**	**15**	**125**	**19**	**69**	**41**	**25**	**8**	**0**

AustRoads94

Austroads94 replaced NAASRA in Australia in 1994. It is an improved system using information from the spacings of the first three axles, the total number of axles and the number of axle groups. There are 13 classes.

- **Units:** Metric (m)
- **Car class:** 1
- **Unclassifiable vehicle class:** 13

Axles	Groups	Description	Class		Parameters	Dominant Vehicle	Aggregate
2	1 or 2	Short - Sedan, Wagon, 4WD, Utility, Light Van	SV	1	d(1)>=1.7m, d(1)<=3.2m & axles=2		1 (Light)
3, 4 or 5	3	Short Towing - Trailer, Caravan, Boat, etc.	SVT	2	groups=3, d(1)>=2.1m, d(1)<=3.2m, d(2)>=2.1m & axles=3,4,5		
2	2	Two axle truck or Bus	TB2	3	d(1)>3.2m & axles=2		2 (Medium)
3	2	Three axle truck or Bus	TB3	4	axles=3 & groups=2		
>3	2	Four axle truck	T4	5	axles>3 & groups=2		
3	3	Three axle articulated vehicle or Rigid vehicle and trailer	ART3	6	d(1)>3.2m, axles=3 & groups=3		3 (Heavy)
4	>2	Four axle articulated vehicle or Rigid vehicle and trailer	ART4	7	d(2)<2.1m or d(1)<2.1m or d(1)>3.2m axles = 4 & groups>2		
5	>2	Five axle articulated vehicle or Rigid vehicle and trailer	ART5	8	d(2)<2.1m or d(1)<2.1m or d(1)>3.2m axles=5 & groups>2		
>=6	>2	Six (or more) axle articulated vehicle or Rigid vehicle and trailer	ART6	9	axles=6 & groups>2 or axles>6 & groups=3		
>6	4	B-Double B-Double or Heavy truck and trailer	BD	10	groups=4 & axles>6		
>6	5 or 6	Double road train or Heavy truck and two trailers	DRT	11	groups=5 or 6 & axles>6		
>6	>6	Triple road train or Heavy truck and three trailers	TRT	12	groups>6 & axles>6		

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Appendix C

Soil and Contamination Assessment

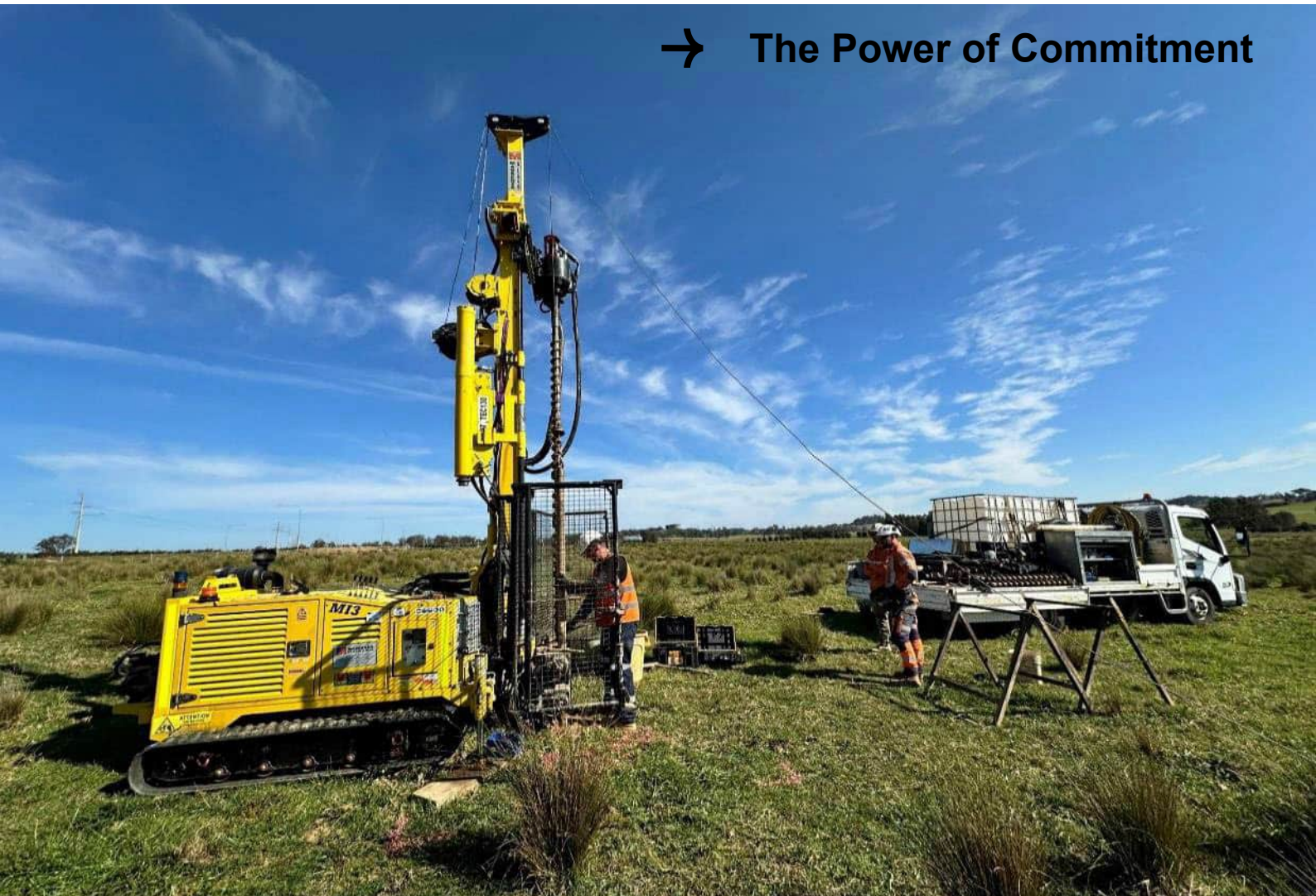
132/11 kV Lowes Creek Zone Substation

Soil Contamination Assessment

Endeavor Energy

23 June 2025

→ The Power of Commitment



GHD Pty Ltd ABN 39 008 488 373
Level 15, 133 Castlereagh Street
Sydney, NSW 2000, Australia
T +61 2 9239 7100 | **F** +61 2 9239 7199 | **E** sydmail@ghd.com | **ghd.com**

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Project manager	Barry Houston
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Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	0	Malachi Hurley	Barry Houston		S. Nair		

Contents

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Appendices

1. Introduction

1.1 Background

GHD understands that Endeavour Energy (EE) is proposing to construct a 132/11 kV zone substation (SS) with two 45 MVA transformers adjacent to The Northern Road, Bringelly, NSW 2556 (the site). The electrical supply will feed in from the existing 132 kilovolt (kV) feeder 9L6 between Oran Park ZS and Bringelly ZS, via two new 132 kV high voltage (HV) underground overhead (UGOH) and new 132 kV cable crossing The Northern Road.

The length of the proposed UGOH alignment is approximately 800 m along the eastern lane of The Northern Road as shown on Figure 1, Appendix A which was the focus of the soil contamination assessment (the site). The proposed zone substation site, which is situated on the western side of The Northern Road, was not included in the assessment as this was investigated by others on behalf of EE.

The soil contamination assessment was undertaken to assess the potential for contamination to be present that may impact construction works, as well as provide a preliminary in-situ waste classification of soils that may require offsite disposal as part of construction works at the site.

The soil contamination assessment was undertaken in conjunction with the geotechnical investigation between 4 to 13 September 2024. The outcome of the geotechnical investigation is presented under separate cover (*132/11 kV Lowes Creek Zone Substation, Geotechnical Investigation Repor*t*, 31 March 2025*).

1.2 Objectives

The objectives of the soil contamination assessment are to:

– To provide an in-situ preliminary waste classification of material that may be excavated as part of construction works in accordance with the NSW EPA Waste Classification Guidelines Part 1 (2014).
– To provide a contamination assessment of the site to the potential risks to future users in general accordance with the NSW EPA Consultants reporting on contaminated land (2020).

1.3 Purpose of the report

The purpose of the assessment is to provide EE with an understanding of the contamination status of the soils underlying the site with regard to the protection of human health and the environment as well as provide a preliminary in-situ waste classification to assist with management during construction.

1.4 Scope of works

This scope of works completed during the soil contamination investigation is as follows:

– Completion of a site inspection of the proposed UGOH alignment to provide a visual assessment for potential contamination sources.
– Undertake a limited desktop study, a review of site history, previous environmental investigation, environmental setting information (e.g., geology, groundwater bore database search, acid sulfate soils (ASS) maps and soil landscapes).
– Site attendance to collect soil samples from a selected boreholes that were drilled during the site investigation (concurrently with the geotechnical investigation).
– Dispatch of collected samples to a National Association of Testing Authorities (NATA) accredited laboratory for analysis of a suite of parameters.
– Undertake field borehole logging to identify the underlying stratigraphy (fill and geology) and potential indicators of contamination i.e., staining of soils, observed odours.
– Completion of quality assurance / quality control (QA/QC) program which included the following:
    - Analysis of field intra-laboratory duplicates and field inter-laboratory triplicates for quality control / quality assurance (QA/QC) purposes.

- Analysis of trip blank, trip spike samples, collection and analysis of rinsate blank samples.

– Analysis of the field data and analytical data.

– Preparation of this report including the preliminary in-situ waste classification.

1.5 Limitations

This report: has been prepared by GHD for Endeavor Energy and may only be used and relied on by Endeavor Energy for the purpose agreed between GHD and Endeavor Energy as set out in Section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than Endeavor Energy arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

Except as otherwise expressly stated in this Report, GHD makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials ("ACM") on the site. If fill material has been imported on to the site at any time, or if any buildings have been demolished on the site or material from such buildings disposed of on the site (particularly if the buildings were constructed prior to 1970), the site may contain asbestos or ACM.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

GHD has prepared this report on the basis of information provided by Endeavor Energy and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Site environmental setting

The site is situated approximately 43 km southwest of the Sydney Central Business District (CBD) within the eastern lane of The Northern Road corridor, Bringelly, 2556 NSW. It is noted that the site is situated close to the boundary with Oran Park, 2570 NSW. The location of the site is shown on Figure 1, Appendix A.

The environmental setting of the site is presented in Table 1.

Table 1 Environmental setting summary

Information	Details
Current land use	The Northern Road (public infrastructure).
Current land zoning	Currently zoned as 'SP2' Infrastructure (Camden Council Local Environmental Plan ((LEP)), 2010).
Geology	The geological data, sourced from the 1:100,000 Penrith 9030 geological maps, indicates that the site is underlain by alluvium soil consisting of fine-grained sand, silt, and clay. Beneath this alluvial layer, the geology is characterized by formations of the Wianamatta Group, which includes the Bringelly Shale. This geological formation comprises shale, carbonaceous claystone, laminite, lithic sandstone, and occasional coal seams.
Hydrology	With reference to the NSW Government MinView website (accessed 15 July 2024), the nearest surface water features to the site is Lowes Creek which is situated approximately 790 m to the north of the site. Several manmade dams are located in the surrounding area with a large dam (assumed to be used for agricultural purposes) situated 170 m to the west and another situated 210 m to the north east of the site. The land surrounding the dam to the west appears to be swampy which is fed by a main channel running north to south that fans out into a wider dam. The dam to the east appears to be associated with a dairy farm and possible effluent disposal to land.
Hydrogeology	A search of the NSW Government's Water NSW website (accessed 29 August 2024) indicated that no registered groundwater bores were located on or within a 500 m radius of the site. One groundwater bore (monitoring well) is located approximately 860 m to the north of the site which was drilled to 10 m below ground level (bgl) in 2011. The underlying geology was described as layers consisting of topsoil, silty clay/sandy clay to 5.37 m bgl, into brown shale and dark grey shale from 5.37 m bgl to final depth. There was no detail provided on depth to groundwater at this location.
Soil landscapes	A review of the eSPADE website[1] indicates that the site is situated within an area which is characterised by 'Blacktown' soil landscape, described as: – Gently undulating rises on Wianamatta Group shales, with local relief to 30 m, with slopes of usually less than 5%, broad rounded crests and ridges with gently inclined slopes. – The soils are described as shallow to moderately deep hard setting mottled textured contrast red and brown podzolic soils on crests. Described as being completely cleared of open forest and open woodland with horticulture dominating the area surrounding Lowes Creek.
Acid sulfate soils	Based on a review of the Australian Soil Resource Information System (ASRIS)[2] atlas for Acid Sulfate Soils (ASS), it is indicated that the site is located within an area mapped as having a '*low to very low probability of occurrence*' of the presence of ASS. Consequently, ASS are not considered to be a risk for the proposed construction works.
Surrounding land use	The immediate surrounding area is primarily compromised of agricultural and paddocks, with The Northern Road and some residences with associated infrastructure close by. Further to the south a major redevelopment for residential land use is underway.

[1] eSPADE v2.2
[2] A S R I S (csiro.au)

2.1 Site Inspection

An experienced environmental scientist from GHD competed a site inspection on 9 September 2024. A photographic record of the site inspection is provided in Appendix B. Weather conditions at the time of the site inspection were clear, warm (25 °C) with moderate winds. Key observations made during the site inspection are as follows:

- The site was characterised as a main road, with asphalt at surface.
- Swales and a drainage channel was observed along the eastern side of The Northern Road which ran along its entirety.
- The road gently undulated along its length with the highest section in the northern portion of the site and sloping gently to the south. It was observed that the road way was elevated compared to the surrounding land and it is likely that it has been built up as part of its construction.
- There were street lighting and hand rails observed at various points along the road. The street lighting appeared to be powered via underground electrical cables with manholes observed in the roadside.
- There was no evidence of contamination at or within close proximity to the proposed UGOH alignment.
- Manure type odours were noted during the site inspection, the source of which was not clear, however, the general area appeared to be used mainly for agriculture with large dams observed as well as cattle at a nearby farm located to the east of the site.
- There were no buildings or structures present on or within close proximity to the site.
- A recycling facility was observed approximately 90 m to the south west of the southern portion of the site. This was confirmed using aerial photography and an online search where this facility is used to recycle garden waste.

Overall, there was no evidence of contamination or contaminating activities observed at the site during the site inspection.

3. Aerial photography review

A review of historical and recent aerial imagery was undertaken covering from 1943 to 2013 and is summarised in Table 2. Overall, the aerial assessment over the last 80 years appears to indicate minimal topography or land use changes at the site. A copy of the aerial imagery is provided in Appendix C.

Table 2 Historical aerial imagery review

Historical Aerial Imagery
1949
– The site consists of a roadway with trees on the sides. – The surrounding area is agricultural land (likely paddocks) with some creeks and tracks present. A dam is located approximately 200 m to the west of the proposed substation location.
1955
– No significant changes observed on the site. – The land to the west appears a different colour which may be related to grass cutting or some form of preparation for grazing. A large dam is present to the east of the northern portion of the site.
1965
– No significant changes observed on the site. – There is a large water feature or dam which has formed to the west and north west, which appears to extend from the dam identified in 1949. A dam appears to have been constructed approximately 150 m to the east with embankments constructed and vegetation clearance observed.
1978
– No significant changes observed on the site. – The dam to the west covers a significant portion of the land, extending towards the site and to the south. – The dam constructed by 1965 has extended to the south. No other significant changes are noted.
1986
No significant changes observed on the site or surrounding area.
1994
– No significant changes on the site. – Development has occurred to the south west of the site with a facility constructed approximately 30 m from the site boundary. No other significant changes are noted.
2014
No significant changes observed on the site or surrounding area.
2024
– The site consists of a four lane roadway with a median strip. Two junctions have been constructed on either end of the site boundary. – The surrounding area is generally the same as previously observed, predominantly agricultural land use. A drainage channel / pathway is observed from the northern end of the proposed substation location. This appears to lead into the dam to the north west.

4. Regulatory review

4.1 Contaminated sites notified to the NSW EPA

The NSW EPA maintains a "List of NSW contaminated sites notified to the EPA" under Section 60 of the *CLM Act*. Inclusion on this list indicates that the notifiers consider a site are contaminated and warrant reporting to NSW EPA. The contamination at a given site may or may not be significant enough to warrant regulation by the NSW EPA and following review of relevant site information, the NSW EPA makes a determination as to whether or not the site warrants regulation. A search of this list indicated that there are no premises within 1 km of the site that have been notified to the NSW EPA.

4.2 Contaminated land record of notices

The NSW EPA maintains a list of sites that appear on the register for Contaminated Land: Record of Notices which are issued under the *CLM Act.* A search of this register did not identify any premises within 1 km of the site as being subject to current or prior notice.

4.3 POEO Act registered sites

The NSW EPA maintains a public register of premises subject to an Environment Protection Licence (EPL) issued under the *Protection of the Environment Operations Act 1997* (*POEO Act*). The register includes current, former, and delicenced premises as well as enforcement notices (i.e., penalty, clean-up notices). As part of this assessment the register was searched and the results are summarised below.

4.3.1 Current

A search indicated that there is one premises currently operating under an EPL within 500 m of the Site which is summarised in Table 3. This premises was observed during the site inspection and from a review of the information provided on the NSW EPA website the EPL for this premises was transferred to VE Resource Recovery Pty Ltd (VERR) from HI-Quality Waste Management Pty Ltd.

There have been clean-up notices issued to this premises, the most recent of which (# 3508037, February 2024) related to asbestos containing materials present in mulch which originated from this premises. The NSW EPA collected samples from sites in Rozelle and Blacktown where asbestos was positively identified and sourced to the premises. The NSW EPA issued a clean-up notice to VERR as a pollution incident had occurred due to the asbestos in the mulch.

There has been other incidences of fill material and asbestos fragments found on the premises with other clean-up and penalty notices issued. It is reported by the NSW EPA that remediation and validation has been completed at the premises which was under assessment by a NSW EPA Site Auditor.

Table 3 Current licensed activities under the POEO act 1997 within 500 m of the Site

Site	EPL Reference	Activity	Distance/ direction from site
761 The Northern Road, Bringelly, NSW 255	11233	Composting Resource recovery Waste storage	90 m to the south west

Based on the information reviewed it is considered that there is a low risk of exposure to contamination originating from this premises for human heath and the environment at the site.

4.3.2 Former

There is one premises within 500 m of the Site that had former licensed activities under the POEO act 1997 which is now surrendered. Details of this is shown in Table 4.

Table 4 Former licensed activities under the POEO act 1997 within 500 m of the Site

Site	EPL Reference	Activity	Distance/ direction from site
The Northern Road and Bringelly Road Upgrade Stage 2	20864	Crushing, grinding or separating Land based extractive activity Road construction	On the site

The risk of contamination being present associated with this activity (i.e., road construction) is considered low and unlikely to present a risk to human health and the environment as the site is an active roadway with no sources of contamination observed. There may be fill material underlying the roadway where the proposed UGOH transmission line is to be constructed, however, the investigation did not encounter deleterious materials or fill that was considered high risk.

4.3.3 Delicenced

A review of the database indicates that there are three delicensed activities still regulated by the NSW EPA within 500 m of the Site. The closest premises is the University campus located approximately 28 m southeast of the Site.

4.4 Hazardous Chemicals Search – SafeWork NSW

A search of the SafeWork NSW files for records relating to historical storage of hazardous chemicals at the site was not undertaken based on a review aerial photography and the observations made during the site inspection. The outcomes of this research indicated a low potential for hazardous chemicals to be stored at the site, both above and below ground.

4.5 National liquid fuel facilities

A review of the information contained within the Geoscience Australia National Liquid Fuel Facilities dataset indicated that there were no premises relating to national liquid fuel facilities within 1 km of the site.

4.6 National waste management site database

A review of the information contained within the Geoscience Australia Waste Management Facilities Database indicates that was one premises situated approximately 90 m to the south west of the southern end of the site. This site is identified as ‘Hi-Quality Waste Manage Pty Ltd’ on the database.

4.7 Former gasworks sites

The NSW EPA maintains a public register of former gasworks within NSW and the register indicates that there are no former gasworks located within 1 km of the site.

4.8 NSW PFAS investigation programs

NSW PFAS investigation and management programs within Australia are undertaken by the NSW EPA, Department of Defence and Airservices Australia. A review of PFAS management sites listed by Defence indicates that there are no premises subject to PFAS investigation and management on the site or within 2 km of the site.

5. Preliminary conceptual site model

A conceptual site model (CSM) is a representation of site-related information regarding potential contamination sources, receptors and exposure pathways between those sources and receptors. The preliminary CSM is developed using information obtained from site history, former and current land use and other relevant environmental information. The development of a preliminary CSM is an essential part of site contamination assessments and provides the framework for identifying contamination sources and how potential receptors may be exposed to contamination. Based on the information collected as part of this desktop assessment, the following preliminary CSM has been developed.

5.1 Potential contamination sources

Based on a review of information, potential contamination sources at and in close proximity to the site have been assessed to include the following:

– Agricultural land uses prior to development of The Northern Road.
– Presence of fill material of unknown nature, quality and origin underlying The Northern Road (imported and used during historic and more recent construction).
– Use of pesticides/herbicides along the roadway and as part of ongoing maintenance.
– Presence of asbestos and other contaminants at the resource recovery facility located to the south west of the site.

5.2 Pathways

In the context of the proposed construction works that may involve excavation and disposal of soils offsite, the key pathways are considered to be dermal contact, incidental ingestion and inhalation of dust and/or asbestos fibres.

It is considered possible that asbestos containing material (ACM) is present in the soils underlying the site which may be mobilised during construction.

The presence of volatile contamination is considered unlikely based on the nature of the site where road related and agricultural associated contaminants are assessed to mainly include petroleum hydrocarbons (heavier end, low volatility), polycyclic aromatic hydrocarbons, heavy metals and pesticides/herbicides.

In the context of the construction works and ongoing UGOH network maintenance, risks to both surface water and groundwater are considered low. The road is covered in asphalt where downward migration of contaminants (surface derived) is unlikely. There may be a risk of migration via roadside drainage into the surrounding the roadside verge during construction particularly if stockpiles are formed at the site.

The risk of impact to surface water and groundwater associated with the operation and maintenance of the road is outside the scope of this assessment.

5.3 Receptors

In the context of the proposed construction works that may involve excavation of soils at the site, the key receptors are:

– Current site users.
– Construction workers i.e., involving excavations and/or soil disturbance.
– Future site users, future construction workers (including intrusive maintenance workers).
– Flora and fauna (terrestrial).

The risk to aquatic and groundwater resources is considered low based on the low likelihood of contamination sources present on the site, as such the risk to aquatic receptors is not considered further based on the available information.

6. Basis for assessment

6.1 Health risk screening criteria

The National Environment Protection Council (NEPC) (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (amended 2013) (NEPM 2013) health investigation levels (HILs) have been developed for a broad range of metals and organic substances and are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types and generally apply to the top 3.0 m of the soil profile.

Health screening levels (HSL) have been developed for selected petroleum hydrocarbons and are applicable to assessing human health risk via the inhalation and direct contact pathways. The HSLs apply to different soil types (i.e., clay, sand, silt), and to depths below ground surface to >4 m. In addition, the consideration was given to the use of HSLs for intrusive maintenance workers as receptors for the site.

For the purposes of this assessment the exposure settings applicable for open space recreational (HIL 'C') and commercial / industrial land use (HIL 'D') are considered the most appropriate based on the current land use i.e., main roadway with a footpath and verges situated in a mainly agricultural area. In addition, consideration was also given to HSLs for petroleum hydrocarbons, for intrusive maintenance workers associated with shallow trench works (Friebel & Nadebaum, 2011).

Based on observations and evidence obtained during the field investigation (detailed in Section 11) the adopted assessment criteria (where relevant) have are based on clay soils. These screening criteria are included in the analytical results, Table A, Appendix D.

6.2 Ecological risk screening criteria

Ecological investigation levels (EILs) for the protection of terrestrial ecosystems have been derived for common contaminants in soil based on a species sensitivity distribution (SSD) model developed for Australian conditions.

EILs for zinc, copper, chromium and nickel can be adjusted based on site-specific physico-chemical characteristics however for the purposes of this assessment a tier 1 screening method was utilised where conservative criteria are adopted as a 'first pass'. An exceedance of the tier 1 screening criteria does not imply a significant issue, rather that further assessment is required to understand if the exceedance is an actual risk.

Generic EILs exist for arsenic, DDT and naphthalene (Table 1B(5) of Schedule B1, NEPM 2013) and for the purposes of this assessment those applicable for commercial / industrial land use have been adopted.

The NEPM 2013 also includes ecological screening levels (ESL) for selected petroleum hydrocarbon compounds and total recoverable hydrocarbon (TRH) compounds and are compared against actual site conditions (i.e., sub-surface materials and depth) to assess the potential risk to terrestrial ecosystems. ESLs also depend on land use scenarios (identical to EILs) and broadly apply to coarse- and fine-grained soils and various land uses. They are generally applicable to the top 2 m of soil.

For the purposes of this assessment GHD consider clays soils to be most representative for the soil profile at the site. On the basis of the site and current land use, the following screening criteria were adopted:

– NEPC (2013) EIL C and D – urban residential/public open space and commercial/industrial land uses.
– NEPC (2013) ESL C and D – urban residential/public open space and commercial/industrial land uses.

The screening criteria are included in Table A, Appendix D. For this Site it has been assessed that the EILs will apply to contaminants within the top 2 m of soil at the surface/ground level which corresponds to the root zone and habitation zone of many species.

6.3 Asbestos

The NEPM (NEPC 2013) incorporates guidance provided by the Western Australian Department of Health (WA DoH, 2009). It includes assessment of bonded asbestos containing material (bonded ACM), fibrous asbestos (FA) and asbestos fines (AF).

Bonded ACM comprises asbestos containing material which is in sound condition where the asbestos is bound in a matrix and the material cannot pass through a 7 mm x 7 mm sieve. FA comprises asbestos material that is in a degraded condition that can be broken or crumpled by hand pressure. AF included free fibres, small fibre bundles and small fragments of bonded ACM that can pass through a 7 mm by 7 mm sieve.

For the purposes of this assessment the adopted criterion is 'no visible asbestos at the surface' as per the NEPM (NEPC 2013).

6.4 Waste classification guidelines

Soil wastes generated during potential stabilisation works would require assessment and classification prior to off-site disposal in accordance with the NSW EPA *Waste Classification Guidelines: Part 1 Classifying waste* (EPA 2014) (the *Waste Guidelines*). The wastes would fall into one of the following classifications as defined in the *Waste Guideline*:

– General Solid Waste Non-Putrescible (GSW). GSW is waste (such as surplus excavated soil) which contains contaminant concentrations less than or equal to the GSW contaminant threshold (CT1[3]) values or contains specific contaminant concentrations (SCC) and toxicity characteristics leaching procedure (TCLP) test concentrations less than or equal to the respective SCC1[4] and TCLP1 threshold values.
– Restricted Solid Waste (RSW). RSW is waste (such as surplus excavated fill/soil) which contains contaminant concentrations greater than the GSW criteria, however less than or equal to the RSW contaminant threshold CT2 values or contains SCC and TCLP test concentrations less than or equal to the respective SCC2 and TCLP2 threshold values.
– Hazardous Waste (HW). HW is waste (such as surplus excavated fill/soil) which contains contaminant concentrations greater than the RSW criteria, or a material which has been pre-classified as hazardous waste by the EPA.
– Special Waste (Asbestos). This is waste (such as surplus excavated fill/soil) that contains asbestos. Soils containing asbestos waste also need to be chemically assessed for other potential contaminants, such that they can be classified as either GSW, RSW or HW in accordance with the Waste Guidelines.

The waste classification criteria are included in Table B, Appendix D.

[3] EPA 2014 Table 1 Contaminant Threshold Values (CT1 and CT2) for classifying waste by chemical assessment without the leaching (TCLP) test
[4] EPA 2014 Table 2 Leachable concentration (TCLP) and Specific Contaminant Concentration (SCC) values for classifying waste by chemical assessment

7. Data quality objectives

Data Quality Objectives (DQOs) are a systematic planning process used for defining the objective of an assessment and to develop a plan for the collection and evaluation of representative data to achieve those objectives.

DQOs incorporate a seven-step process used to optimise the design of the investigation. The seven DQO steps for this report are defined in Table 5 and are based on guidance presented in Schedule B2, Guideline on Site Characterisation of the NEPM 2013.

Table 5 Data quality objectives

Step	Description
Step 1 State the problem	Endeavour Energy are proposing to install an UGOH transmission line on the site which will feed into a new 132/11 kV substation and associated infrastructure. An assessment of the potential contamination status of the site is required as soils may be exposed to site workers and future site workers, moved and/or managed during the stabilisation works. The exact method of soil removal and the installation of infrastructure is not known at this stage. The results of the soil contamination assessment will provide site based and laboratory analytical data to assist with the decision.
Step 2 Identify the decision / goal of the study	The decisions are issues that need to be addressed arising from Step 1. These are: – Where are the potential sources of contamination within the soils on the site to be excavated for the works? – Do the results of the sampling and analysis indicate a potential risk to human health and/or ecological receptors under the current land use? – What in-situ waste classification may be applied to site? – If contamination is present, will the presence of any contamination affect the future use of the site or pose a risk to the identified receptors? – Is there a need for further assessment, remediation and/or management?
Step 3 Identify the information inputs	The inputs to the decision represent the information and data that will be collected as part of the field investigation and data assessment. These include a review of field notes, laboratory analytical results and comparison of the analytical results with adopted human health and ecological assessment criteria and waste classification assessment criteria.
Step 4 Define the study boundaries	*Define the spatial boundaries of the decision* The spatial boundary of the investigation is shown in Figure 1, Appendix A. *Define the temporal boundaries of the decision* The temporal limit of this assessment is 9 September 2024 and 12 September 2024. *Identify the potential constraints on data collection* Time constraints due to the nature of the works (nightshifts and combination job (geotechnical and environmental).
Step 5 Develop the decision rules	The key decision rule is – Are contaminants of concern present at concentrations above the adopted assessment criteria? • If no, then potential risks to receptors and potential for migration is considered low. • If yes, further assessment of the potential risks to potential receptors is required.
Step 6 Tolerable limits on decision errors	Data generated must be appropriate to allow decisions to be made with confidence. Specific limits for this assessment have been adopted in accordance with the appropriate guidance.
Step 7 Optimisation data collection processes	This step involves identifying the most resource effective assessment design required to satisfy the DQOs. GHD utilised specialist personnel with previous experience in contaminated site assessment to cover the relevant aspects of the assessment.

7.1 Data quality indicators

The data quality indicators (DQIs) for sampling techniques and laboratory analysis of collected samples identifies the acceptable level of error for this investigation. The DQIs adopted in this investigation comprise five components, being precision, accuracy, representativeness, comparability and completeness. Detailed discussion of each component is provided below:

– Precision – measures the reproducibility of measurements under a given set of conditions. The precision of the data is assessed by calculating the Relative Percent Difference (RPD) between duplicate sample pairs.

$$RPD(\%) = \frac{|C_o - C_d|}{C_o + C_d} \times 200$$

Where Co = Analyte concentration of the primary sample
Cd = Analyte concentration of the duplicate sample

GHD adopts a nominal acceptance criterion of ± 50% RPD for field duplicates and splits for organics and an acceptance criterion of ± 30% RPD for inorganics. However, it is noted that this will not always be achieved, particularly at low analyte concentrations and in heterogeneous media.

– Accuracy: measures the bias in a measurement system. Accuracy can be undermined by such factors as field contamination of samples, poor preservation of samples, poor sample preparation techniques and poor selection of analytical techniques by the analysing laboratory. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes, laboratory blanks and analyses against reference standards. The nominal “acceptance limits” on laboratory control samples are defined as follows:
  - Laboratory spikes – 60 – 130% recovery for metals / inorganics and 60-140% for organics.
  - Laboratory duplicates – Nominal RPD values of 30% or lower. Higher RPD values are generally considered acceptable when the result is close to the PQL.
  - Laboratory Surrogates (Organics only) – 60 – 130% recovery.
  - Laboratory blanks – <PQL.
– Representativeness: expresses the degree which sample data accurately and precisely represents a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples in appropriate locations across the investigation area, and by using an adequate number of sample locations to characterise soil and groundwater at the investigation area. Consistent and repeatable sampling techniques and methods are utilised throughout the sampling.
– Completeness: defined as the percentage of measurements made which are judged valid measurements. The completeness goal is set at there being sufficient valid data generated during the study. If there is insufficient valid data, then additional data are required to be collected.
– Comparability – is a qualitative parameter expressing the confidence whether one data set can be compared with others. This is achieved through maintaining a level of consistency in techniques used to collect samples and ensuring analysing laboratories use consistent analysis techniques and reporting methods.

8. Sampling and analysis program

8.1 Workplace health and safety

GHD developed a site-specific job safety and environmental analysis (JSEA). All work was conducted under the appropriate permits and licences and employed appropriate personal protection equipment (PPE).

GHD also completed a site inspection on 9 September 2024 prior to on-site intrusive works to identify the proposed borehole locations, which included the following:

– Accessibility of each location was checked by GHD's site representative.
– Services clearance was undertaken by a professional underground services locator to further reduce the risk of intersecting subsurface services during the intrusive works, and a dial before you dig search was also referenced.

8.2 Soil sampling locations

The sampling locations are illustrated in Figure 1, Appendix A. Based on the information provided by Endeavour Energy and the linear nature of the proposed transmission line, the soil sampling locations were positioned at regular intervals to provide coverage of the site and assess potential variability in the underlying stratigraphy.

8.3 Field work

Fieldwork for the intrusive investigation was completed by experienced GHD environmental scientists and geotechnical engineers from 9 September 2024 and 14 September 2024 (inclusive).

Soil sampling was undertaken in accordance with GHD's standard field operating procedures which allowed representative samples to be collected and relevant sampling information was accurately recorded on field logs throughout the investigation. The investigation was undertaken in tandem with the geotechnical investigation where the drilled boreholes were used to collect soil samples.

The sampling depths for hand auger locations were determined by the GHD environmental scientist overseeing the field work and samples were generally collected as a minimum at 0.5 m, 1.0 m and 1.5 m. The geotechnical boreholes which were used to obtain samples for contamination purposes are summarised in Table 6.

The sampling depths for the borehole drilling locations were determined by the GHD geotechnical engineer overseeing these fieldworks. The sampling depths varied at some boreholes due to the time constraints associated with night works. Termination depths varied between 2.62 m and 4.25 m.

Samples collected from the bores were immediately transferred to 250 ml glass jars, sealed with Teflon-lined lids. To minimise the loss of volatiles from the soils, samples were placed directly into the jars with minimum disturbance, and the jars filled to remove the headspace. Records of field observations and material descriptions are presented in section 11.

A geological log was completed by the GHD geotechnical engineer and environmental scientist for each of the soil bore and hand auger locations. Where applicable the soil logs included both visual and olfactory observations relating to evidence of potential contaminants. Soils encountered were described in general accordance with the Australian Standard AS1726 Geotechnical Site Investigations (2017) with features such as seepage, discolouration, staining, odours and other indications of contamination noted.

The soil sample containers were clearly labelled with the sample number, sample location, sample depth, sample date and sampler's initials. The sample containers were transferred to an ice filled cool box for sample preservation prior to and during shipment to the primary and secondary analytical laboratory. A chain of custody form was completed and forwarded with the samples to the testing laboratory.

Soil samples were field screened using a photo-ionisation detector (PID) to assess for the presence of volatile organic compounds (VOCs) which may indicate fuel or similar organic chemical derived contamination.

Table 6 Contamination borehole summary

BH ID	Easting	Northing	BH Depth (m)	Depth to Bedrock from ground level
BH02	290975	6238827	2.82	2.82
BH04	290959	6238660	2.72	2.72
BH06	290906	6238518	3.00	Not encountered
BH07	290901	6238507	7.00	2.9
BH08	290863	6238431	2.63	2.63
BH09	290833	6238340	2.84	2.84
BH10	290822	6238286	3.00	Not encountered
BH12	290850	6238132	7.25	4.25

8.4 Laboratory analysis

The primary and secondary laboratories for this investigation were Australian Laboratory Services (ALS) and Eurofins Scientific (Eurofins) who are National Association of Testing Authorities (NATA) registered chemical laboratories for the specified tests.

A total of seventeen (18) primary soil samples were collected from the eight geotechnical focused boreholes drilled along the site with quality assurance/quality control (QA/QC) samples also collected:

– One (1) field duplicate and one (1) field triplicate.
– One (1) trip blank and one trip spike.
– Four (4) rinsate blank samples.

Table 7 details the analytical suite, primary sample quantities and QA/QC sampling quantities which were applied to the soil samples obtained during the field investigation.

Table 7 Laboratory analytical suite and quantities

Contaminants of potential concern (COPC)	Number of primary samples	Number of QC samples
Asbestos (presence / absence)	5	-
Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni & Zn)	16	4
Total recoverable hydrocarbons (TRH)	20	4
Benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN)	16	4
Polycyclic aromatic hydrocarbons (PAH)	16	4
Organochlorine pesticides (OCP) and organophosphate pesticides (OPP)	7	4
Polychlorinated biphenyls (PCB)	7	-

9. Field quality assurance and quality control

9.1 Field quality assurance

Fieldwork was conducted in general accordance with GHD's SOPs, which are aimed at collecting environmental samples using uniform and systematic methods, as required by GHD's Quality Assurance system. Key requirements of these procedures are as follows:

– Decontamination procedures including:
  - The use of new disposable nitrile gloves for the collection of each soil sample, and the use of dedicated sampling containers provided by the laboratory.
  - Reusable sampling equipment used for sampling (i.e. hand auger) were decontaminated using a phosphate free detergent, followed by rinsing with laboratory supplied deionised rinsate water.
– Sample identification procedures – collected samples were immediately transferred to sample containers of appropriate composition and preservation for the required laboratory analysis. All sample containers were clearly labelled with a sample number, sample location and sample date. The sample containers were then transferred to an ice filled cooler for sample preservation prior to and during shipment to the testing laboratory.
– Chain of custody protocols – a chain of custody form was completed and forwarded to the testing laboratory with each discrete batch of samples.

The field staff consisted of experienced personnel and the GHD standards of practice were followed to ensure quality of results.

9.2 Field quality control

9.2.1 Duplicate and triplicate sampling

Control procedures used during the project were in general accordance with GHD's field quality control procedures and included the collection and analysis of two duplicate intra-laboratory samples and two triplicate inter-laboratory samples.

Duplicate and triplicate samples are collected from a single sample that is divided into three (primary, intra-lab and inter-lab) separate sampling containers. One of the sample containers were sent anonymously to the primary laboratory and the remaining container was sent to a secondary laboratory.

Duplicates and triplicates analysis provide an indication of the analytical precision of the primary laboratory but are inherently influenced by other factors such as sampling techniques and sample media heterogeneity.

The duplicate and triplicate sampling details are detailed in Table 8.

Table 8 Field duplicate and triplicate sample details

Primary sample	Duplicate	Triplicate
BH10_0.5 - 0.7	DUP_01	TRI_01

The duplicate and triplicate samples were analysed for heavy metals, PAHs, TRHs, and BTEXN.

9.2.2 Rinsate blank samples

Rinsate (equipment) blanks consisted of pre-preserved bottles filled with laboratory-prepared water that had been passed over decontaminated field equipment. Rinsate blanks were prepared on site, labelled with a unique sample identification number and transported to the primary laboratory for analysis as regular environmental samples. The purpose of rinsate blank was to assess the efficiency of decontamination procedures.

For inorganic compounds and semi-volatile organic compounds (SVOCs), the rinsate water consisted of milli-Q water (distilled tap water passed through a resin de-ioniser). For volatiles (VOC) the rinsate water consisted of volatile water provided by ALS Laboratory.

The results of the rinsate blank samples are summarised in Table 8 and presented in Table D, Appendix D.

9.2.3 Trip blanks

The trip blanks consisted of laboratory-supplied clean soil. The purpose of trip blanks was to detect potential contamination during sample transport. These samples were kept within eskies during sampling activities and were not opened in the field. Trip blanks were analysed at the laboratory as regular samples for BTEX and TRH C_6-C_{10} compounds only.

A total of one (1) trip blank was submitted with samples delivered to the primary laboratory. Results for the trip blanks is provided in Table E, Appendix D.

9.2.4 Trip spikes

Laboratory-prepared trip spikes consisted of clean soil spiked with known concentrations of BTEX and TRH C_6-C_{10} compounds. These samples were submitted for BTEX and TRH C_6-C_{10} compounds analysis with the results compared with the known additions. Generally, samples were spiked with known concentrations of benzene, toluene, ethylbenzene and total xylenes respectively. The purpose of these samples was to monitor VOC losses during transit.

A total of one (1) trip spike was submitted with samples delivered to the primary laboratory. Results for the trip spikes is provided in Table F, Appendix D.

9.2.5 Laboratory Quality Control

Laboratory analysis was conducted in accordance with the standard test methods outlined in *Schedule B(3) of the NEPM (NEPC 2013), US EPA, APHA* or equivalent modified methods supported by adequate quality control. GHD contracted laboratories that are NATA accredited.

As part of GHDs internal quality control, the analytical laboratories used are audited and internal quality control procedures reviewed periodically.

The laboratory certificates, including chain of custody documentation, analytical methods, and laboratory QA/QC are presented in Appendix E.

10. Quality assurance / quality control (QA/QC) data quality assessment

10.1 Field QA/QC

The outcomes of the field QA/QC assessment are summarised in Table 9.

Table 9 Field QA/QC outcomes summary

Field QA/QC Aspect	Results
Duplicate samples	The analytical results of the primary, duplicate and triplicate soil samples, as well as their respective calculated RPDs are summarised in Table C, Appendix D. The results of the RPD comparison undertaken as part of the QA/QC program are: – BH10_0.5 - 0.7 and duplicate DUP_01 reported elevated RPDs for the following: • Copper (33%). • Lead (52%). – BH10_0.5 - 0.7 and triplicate TRI_01 reported elevated RPDs for the following: • Arsenic (39%). • Lead (57%). • Nickel (35%) • Zinc (58%). It is considered likely that the elevated RPDs are due to the heterogeneity of the soils sampled. Further, some elevated RPDs are also likely attributed to concentrations at or close to the laboratory's limit of reporting (LOR) where a small difference of concentrations between the primary and the duplicate samples can trigger and exaggerated RPD.
Rinsate samples	Four rinsate blank samples, RB01, FB01, RB02, FB02 were collected from the Standard Penetration Testing (STP) core barrel used during this investigation. The rinsate analytical results were measured at concentrations that were below the LOR and are presented in Table D, Appendix D.
Trip blanks	One (1) trip blank sample was collected during this investigation on 10 September 2024. The analytical results of the trip blank samples were reported below the laboratory LORs and therefore within the nominated QA/QC criteria and are presented in Table E, Appendix D.
Trip spikes	One trip spike sample, prepared by the primary laboratory ALS were collected during this investigation. The spike recovery of the trip spike ranged between 80% and 102% and are considered within the nominated QA/QC criteria. The results of the Trip Spike sample are presented in Table F, Appendix D.

10.2 Laboratory QA/QC assessment

10.2.1 Holding Times

The soil samples were extracted within the laboratory's technical holding times for chemical analysis.

10.2.2 Laboratory program

The NATA certified laboratories utilised for this assessment, ALS and Eurofins, undertook their own QA/QC procedures for sample analysis. GHD has reviewed the internal laboratory control data provided within the laboratory reports, which are attached as Appendix E.

The method blank results were less than the laboratory reporting limits, and the surrogate spike and laboratory control sample recoveries were within laboratory acceptance criteria. The laboratories' QC duplicate RPDs were within the acceptance limits (30% for Eurofins and 20% for ALS Environmental).

10.3 Data validation summary

The results of the QA/QC program are considered to provide an acceptable degree of confidence in the analytical program completed. RPD exceedances of some metal analytes identified in the results are considered to be immaterial in view of the compliance of other nominated DQIs and relatively low RPDs of other analytes in the dataset.

Overall, the analytical data set is considered to be valid and acceptable to base conclusions on the contamination status of the site.

11. Investigation outcomes

11.1 Subsurface conditions

The lithology encountered at the site during the investigation was generally described as fill material overlying a residual sandy clay. The soil units encountered during the borehole investigation are presented in Table 10.

The generalised soil profile indicates the presence of a layer of fill (sand to sandy clay) overlaid by a layer of concrete and asphalt. The presence of these layers is relatively consistent along the proposed alignment and these were underlain by natural soils consisting of a mixture of sandy clays, clayey sand and clay.

Fill material was encountered from surface to a maximum depth of 1.0 m bgl at BH03. Fill material that was encountered in every borehole along the transmission alignment consisted of a mixture of pale grey, fine grained sand and brown, low plasticity clayey sand.

Borehole logs are provided in Appendix F and further detail on the geotechnical drilling, including the borehole logs, is provided in the geotechnical report (GHD 2025).

Table 10 Soil and bedrock units encountered during investigation

Borehole	Depth (m)	Soil Profile
BH02	2.82	Asphalt to 0.19 m, Concrete to 0.46 m Fill: 0.8 m, sand, pale grey, with trace silt, trace fine sub-angular gravel Natural: Sandy clay, pale brown, fine grained sand, trace fine sub-angular gravel, medium to high plasticity.
BH04	2.72	Asphalt to 0.19 m, Concrete to 0.46 m Fill: 0.7 m, clayey sand, mottled pale brown, low plasticity, trace fine sub-angular gravel Natural: Sandy clay (low plasticity, dark grey, fine grained sand and trace fine grained sub-angular gravel), into Clay (pale brown, trace fine, sub-angular gravel, trace fine grained sand).
BH06	3.00	Asphalt to 0.19 m, Concrete to 0.42 m Fill: 0.7 m, sand, pale grey, trace fine sub-angular gravel, trace clay Natural: Sandy clay (medium plasticity, brown, fine-grained sand, trace fine grained gravel), into Sandy clay (medium to high plasticity, pale brown, fine grained sand, trace fine grained gravel), into Clay (medium plasticity, pale grey, mottled red, fine-grained sand, subangular gravel).
BH07	3.45*	Asphalt to 0.20 m, Concrete to 0.44 m Fill: 0.8 m, sand (fine to coarse, pale grey, trace fine sub-angular gravel, trace clay) Natural: Sandy clay (medium plasticity, red/brown, fine grained sand, trace fine grained gravel), into Sandy clay (low to medium plasticity, brown, fine-grained sand, trace fine grained gravel), into Sandy clay (medium plasticity, yellow brown/pale grey, fine grained sand, subangular gravel).
BH08	2.63	Asphalt to 0.19 m, Concrete to 0.45 m Fill: 0.8 m, sand (fine to coarse, pale grey, trace fine sub-angular gravel, trace clay) Natural: Sandy clay (medium to high plasticity, brown, fine-grained sand, trace fine subangular gravel), into Clay (medium to high plasticity, pale grey, trace fine, subangular gravel, trace fine grained sand).

Borehole	Depth (m)	Soil Profile
BH09	2.84	Asphalt to 0.19 m, Concrete to 0.45 m Fill: 0.8 m, sand (fine to coarse, pale grey, trace fine sub-angular gravel, trace clay) Natural: Sandy clay (medium to high plasticity dark grey, fine-grained sand, trace fine grained subangular gravel), into Sandy clay (similar to above, red brown, mottled pale grey), into Clay (medium to high plasticity, dark brown/pale grey, trace fine, subangular gravel, trace fine grained sand).
BH10	3.00	Asphalt to 0.20 m, Concrete to 0.40 m Fill: 1.0 m, clayey sand (fine to coarse grained sand, brown, trace fine sub-angular gravel, low plasticity clay) Natural: Sandy clay (medium to high plasticity, pale grey, fine grained sand, trace fine grained subangular gravel), into Clay (medium to high plasticity, greyish brown, trace fine, subangular gravel).
BH12	4.25*	Asphalt to 0.06 m, Concrete to 0.2 m Fill: 0.7 m, sand (fine to coarse grained sand, pale grey, trace silt, trace fine sub-angular gravel) Natural: Clay (medium to high plasticity, red brown, trace fine, subangular gravel), into Sand (fine grained, pale brown, trace silt, trace fine sub-angular gravel), into Clay (high plasticity, pale brown to red brown, fine grained sand, trace fine grained subangular gravel), into Clay (medium to high plasticity, pale brown, trace fine grained sand, trace subangular gravel).

11.2 Field screening

In-field volatile organic compound (VOC) screening was undertaken during the investigation using a handheld photoionisation detector (PID). The results of the screening indicated that VOCs concentrations ranged from 1.88 parts per million (ppm) to 4.9 ppm. This indicates that volatile compounds are not present at significant concentrations in the soils screened.

11.3 Soil analytical results

The analytical results are summarised in Table A, Appendix D. A copy of the laboratory certificates of analysis and associated documentation is presented in Appendix E. The analytical tables include the duplicate and triplicate sample results.

Soil samples exceeding the adopted assessment criteria are identified in the analytical tables and they are summarised below. The summary indicates the type of exceedance (i.e. exceedance of HIL, HSL, EIL, or ESL for the relevant future construction and operational land use).

Potential asbestos containing material (PACM) was not visually observed in the soils sampled noting the limitations of the adopted investigation method (borehole drilling) in identifying PACM in subsurface soils.

11.3.1 Human health

A summary of the analytical results is provided below:

– Concentrations of heavy metals, BTEXN, PAHs, TRHs, OCPs, OPPs, and PCBs were below the adopted human health screening criteria for commercial / industrial land use and intrusive maintenance workers.

– Asbestos was not detected in the soil samples analysed nor was it observed at the surface during the site walkover and the site investigation.

11.3.2 Ecological

There were exceedances of the adopted assessment criteria protective of ecological receptors in a commercial/industrial and open space land use scenario at BH02 at a depth of 1.5 – 1.7 m bgl for nickel and zinc. There were no exceedances measured at the other sample locations.

11.4 Preliminary waste classification (in-situ)

The contaminant concentration results were compared to the criteria outlined in Tables 1 and 2 of the NSW EPA (2014) Waste Classification Guidelines, Part 1: Classifying Waste. The analytical results for COPCs are summarised in Table B, Appendix D.

A summary of the results are as follows with exceedances observed at:

– BH02 (1.5 to 1.7 m) for nickel with a concentration of 69 mg/kg recorded against a CT1 threshold of 40 mg/kg.
– BH06 (1.5 to 1.7 m) for benzo(a)pyrene with a concentration of 1.0 mg/kg against a CT1 threshold of 0.8 mg/kg.
– TCLP analysis was scheduled for these exceedances and the results reported both nickel and benzo(a)pyrene below the TCLP1 waste classification criteria. These results indicate that soils at BH02 and BH06 at a depth of 1.5 to 1.7 m bgl are classified as GSW as per the Waste Classification guidelines (NSW EPA 2014).
– The remaining soil samples measured concentrations which classify the soils as general solid waste (GSW) in the event that offsite disposal is required.

11.5 Discussion

11.5.1 Soil assessment

The observations made during intrusive investigation works and the results of the laboratory analysis did not indicate evidence of significant contamination in the soils underlying the site. Concentrations of analytes were below the adopted assessment criteria protective of human health. In addition asbestos was not detected, nor observed, during the investigation. This indicates that the risks to current and future users, intrusive maintenance workers at the site are low.

Further, in the absence of contaminants at concentrations which exceed the adopted assessment criteria which are protective of human health, the source-pathway-receptor linkages are incomplete, and the risks are low to current and future receptors at the site, providing the land use does not change to a more sensitive use.

With respect to ecological receptors (land based flora and fauna), there were exceedances of the adopted assessment criteria protective of ecological receptors for zinc and nickel, however, it is noted that the criteria for heavy metals is conservative as site specific physico-chemical characteristics were not obtained. It is considered likely that the exceedances measured will present a low risk to the flora and fauna of the site, particularly given its current land use as a main roadway corridor and the exceedances were at a depth of 1.5 m bgl. It is also likely that the flora and fauna has adapted to local environmental conditions and the concentrations of heavy metals are of low consequence.

It is considered likely that the soils subject to the investigation, if they are required to be reused as part of the proposed stabilisation works, would be able to be reused on the site providing they are of geotechnical suitability.

If in the future, the development of the site for purposes other than the current land use was to be considered, a reassessment of the risks would be required.

11.5.2 Preliminary waste classification

A preliminary in-situ waste classification assessment was undertaken on the fill and natural soils underlying the site. The analytical results of the soils were compared against the criteria detailed in the *Waste Classification Guidelines Part 1: Classifying Waste* (NSW EPA 2014).

The results of the preliminary waste classification indicate that the soils within the site are classed as GSW, non-putrescible. Further, asbestos was not detected in soils sampled nor was it observed in the fill and soils during the site walkover and the site investigation.

If works include the requirement to excavate and dispose of waste soil offsite further sampling must be undertaken to confirm this preliminary assessment once the soils have been exposed and representative samples can be collected of the fill material requiring removal from the site.

It should be noted that the results provided above are indicative only and are not intended to form a waste classification for off-site disposal. Further sampling and analysis should be undertaken during project construction to verify ground conditions and material characteristics, and formal waste classification reports should be prepared for each individual type of materials in accordance with NSW EPA guidelines prior to offsite disposal.

12. Conclusion and recommendations

12.1 Conclusions

Based on the results of the investigation undertaken at the site, the potential risks to human health (current and future users of the site) and ecological receptors are considered to be low.

Based on the findings of the sampling and analysis and preliminary in-situ waste classification, the material to be excavated during the works is likely to be classified as General Solid Waste, non-putrescible. In accordance with the POEO Act 1997 Waste Regulation 2014 waste soils are permitted to be disposed only to waste facilities that are licensed to receive material with the determined Waste Classification. The soil material from proposed works area must be disposed of to a landfill licensed to accept *General Solid Waste*.

GHD positioned the sample locations to provide adequate vertical and lateral coverage of the site for the purposes of this investigation and assessment. It is considered unlikely that the fill, soil and weathered bedrock would vary significantly and that the outcomes of this investigation are accurate for the site.

12.2 Recommendations

It is recommended that a construction environmental management plan (CEMP) for the works should include an unexpected finds protocol (UFP) to assist with the management of contaminated soil and/or groundwater if it is encountered during future site works.

Further sampling and analysis either prior to or during construction activities at the site is recommended to confirm the preliminary waste classification detailed in this report. In addition, appropriate waste classification documentation should be prepared in accordance with the NSW EPA guidelines.

13. References

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Appendices

Appendix A

Figure

SOURCE: SURVEY & AERIAL IMAGERY BY MONTEATH & POWYS DATED 25/09/2024 REV 2.

SITE LAYOUT PLAN

SCALE 1:5000

0 50 100 150m

SCALE 1:5000 AT ORIGINAL SIZE

N

LEGEND

- GEOTECHNICAL / CONTAMINATION BOREHOLE
- GEOTECHNICAL BOREHOLES
- CADASTRAL
- PROPOSED
- EXISTING
- BOUNDARY

Endeavour Energy
132/11kV Lowes Creek Zone Substation
Site Investigation

Overall Location Plan

Project Number	12641966
Revision	A
Date	Nov 2024

Figure 1

Plot Date: 5 November 2024 - 12:00 PM Plotted by: Fara Hedayati

Cad File No: \\ghdnet\ghd\AU\Sydney\Projects\21\12641966\CADD\Drawings\Geotech\12641966-GHD-FIG-EN-00001.dwg

Appendix B

Photographic record

Plate no. 1	
Description: View north from southern end of the site	
Plate no. 2	
Description: View to the east towards agricultural land, from the Northern Road	

Plate no. 3	
Description: View to the north east from The Northern Road, mid-point of the site	
Plate no. 4	
Description: View south east towards agricultural land, close to mid-point of the site	

Plate no. 5	
Description: View north east at the northern end of the site	
Plate no. 6	
Description: View south east opposite the proposed substation building	

Appendix C

Aerial imagery

LOTSEARCH

LOTSEARCH AERIALS

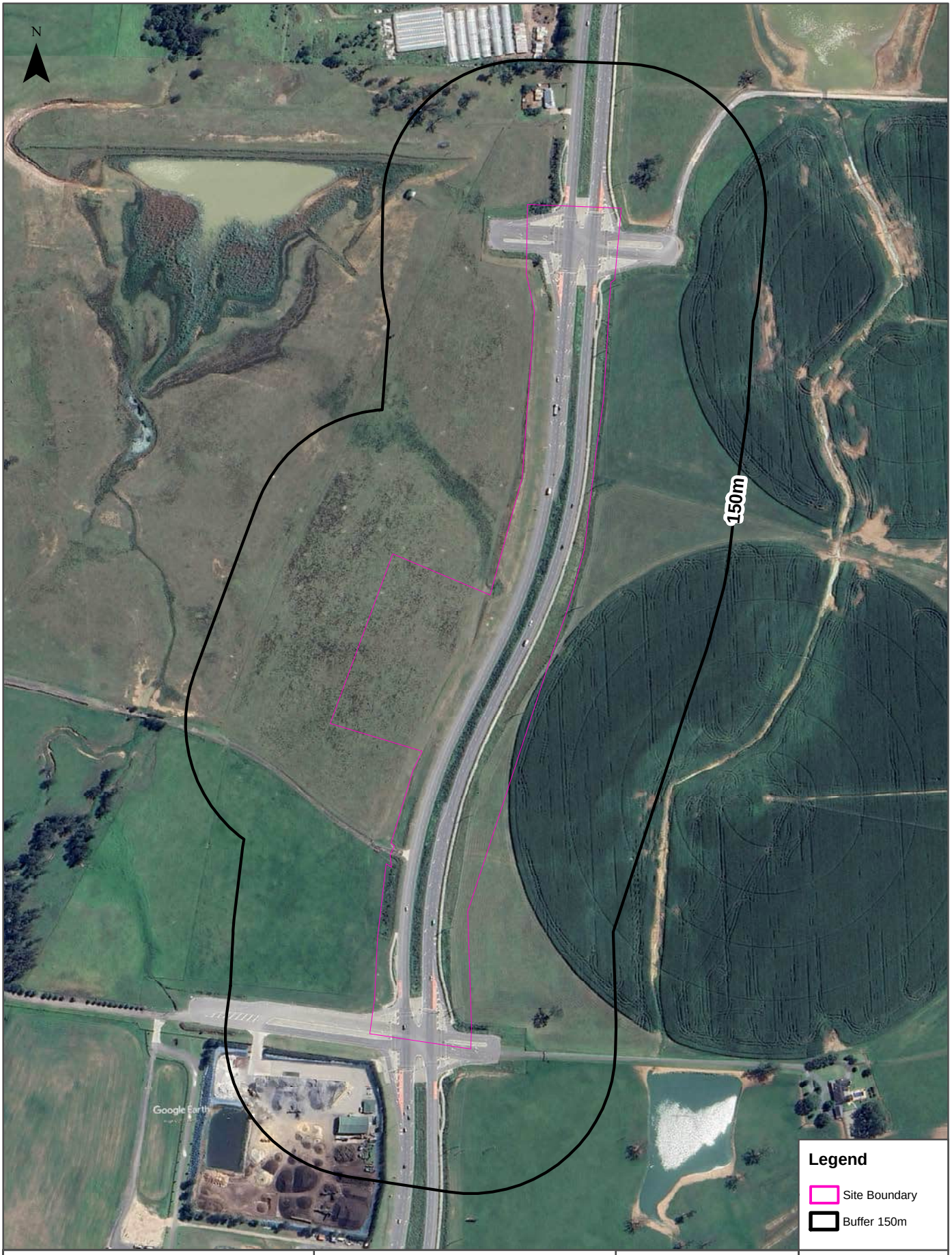
Date: 29 Aug 2024

Reference: LS060863 EA

Address: The Northern Road, Bringelly, NSW 2556

Aerial Imagery 2024

The Northern Road, Bringelly, NSW 2556



Scale:
0 60 120 180 240
Meters

Data Source Aerial Imagery: © 2024 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 29 August 2024

Aerial Imagery 2014

The Northern Road, Bringelly, NSW 2556

Scale:
0 60 120 180 240
Meters

Data Source Aerial Imagery: © 2024 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 29 August 2024

Aerial Imagery 2002

The Northern Road, Bringelly, NSW 2556

Aerial Imagery 1994

The Northern Road, Bringelly, NSW 2556

Aerial Imagery 1991

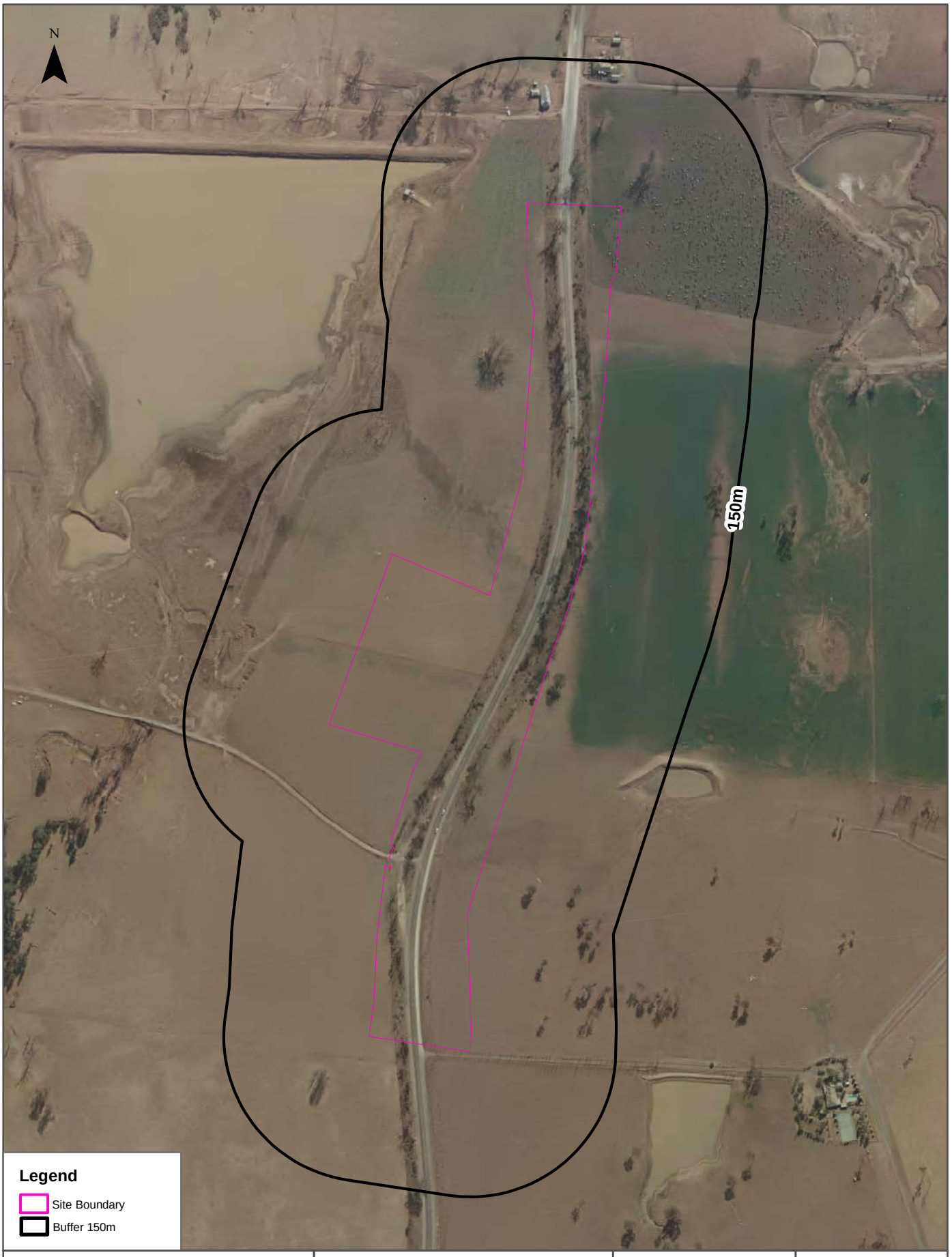
The Northern Road, Bringelly, NSW 2556

Aerial Imagery 1986

The Northern Road, Bringelly, NSW 2556

Aerial Imagery 1982

The Northern Road, Bringelly, NSW 2556



Aerial Imagery 1978

The Northern Road, Bringelly, NSW 2556

Aerial Imagery 1970

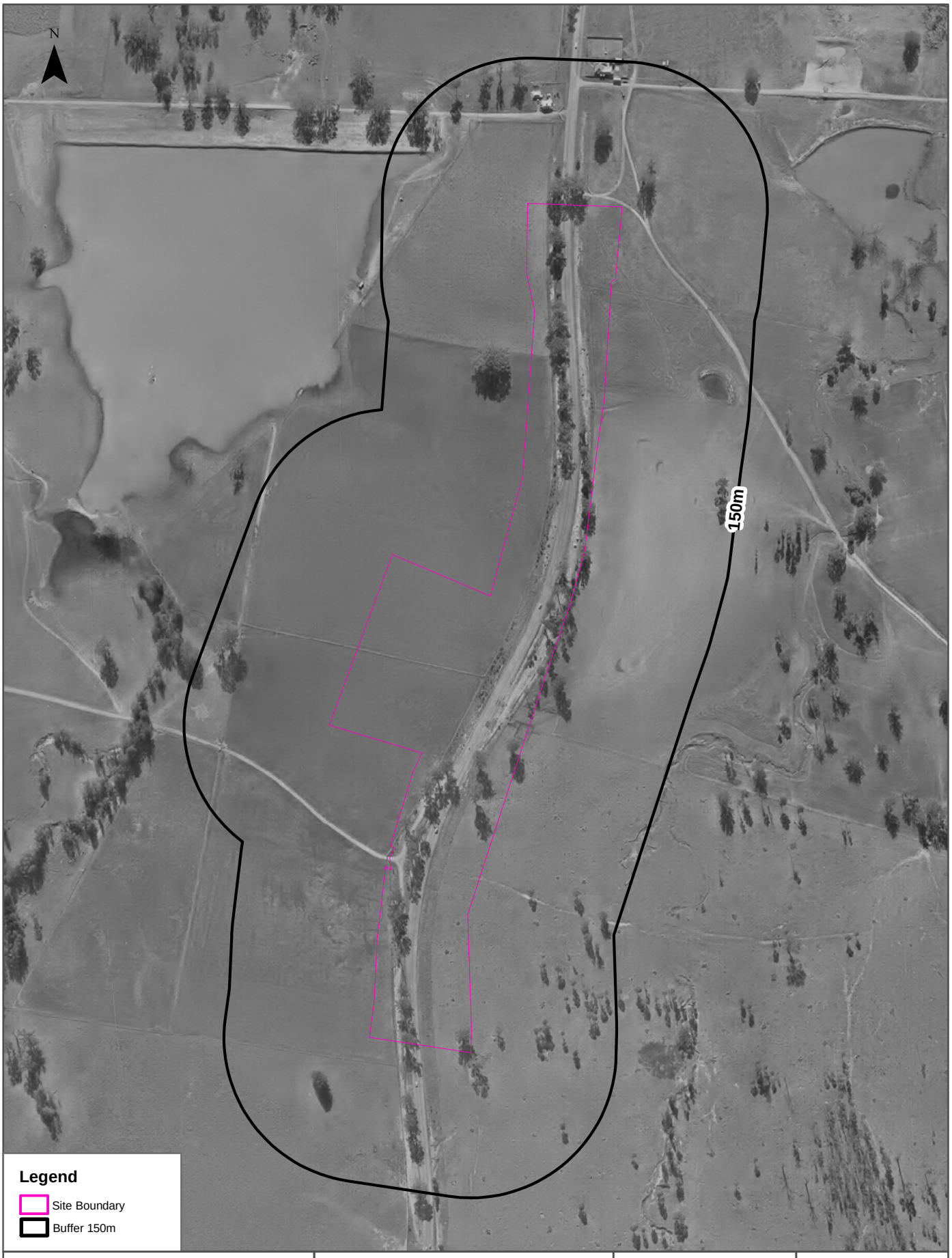
The Northern Road, Bringelly, NSW 2556

Aerial Imagery 1965

The Northern Road, Bringelly, NSW 2556

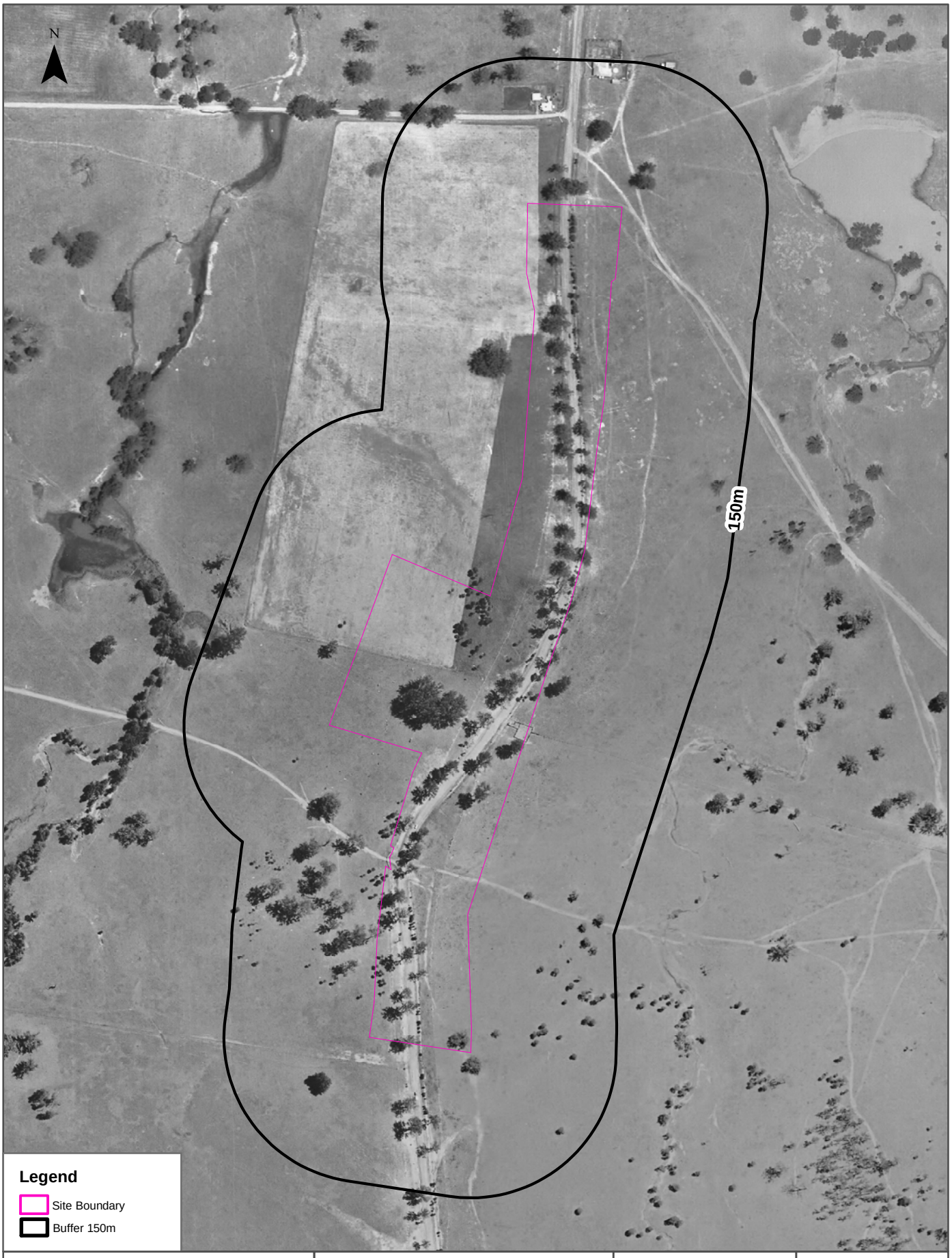
Aerial Imagery 1961

The Northern Road, Bringelly, NSW 2556



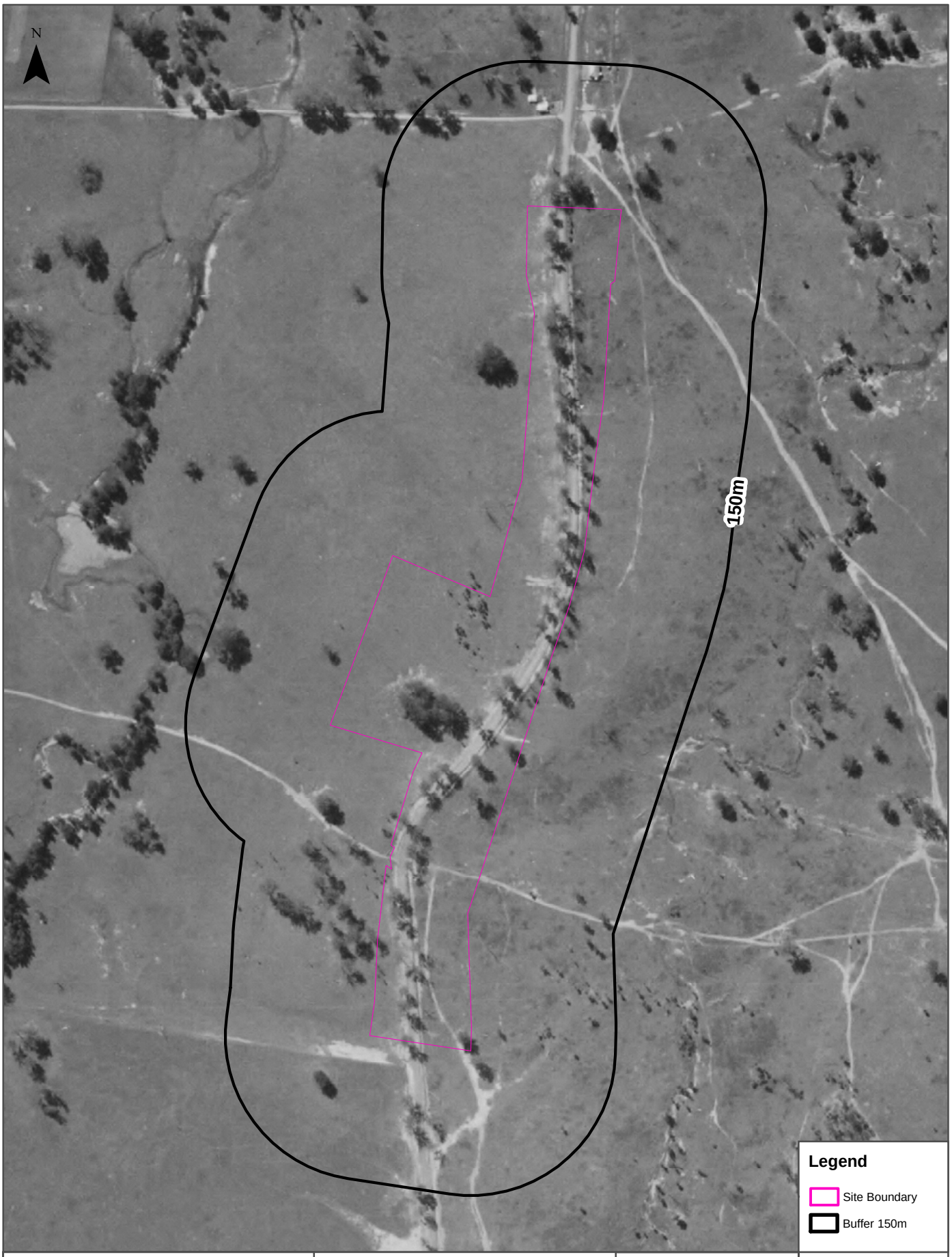
Aerial Imagery 1955, 1956

The Northern Road, Bringelly, NSW 2556



Aerial Imagery 1949

The Northern Road, Bringelly, NSW 2556



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Appendix D

Analytical tables

Appendix D
Table A
Analytical summary

	Inorganics	Asbestos						Metals								BTEXN								TRH - NEPM 2013							TRH - NEPM 1999							
	Moisture (%)	Asbestos Fibres (g)	Asbestos (Trace)	Asbestos Type	weight of sample	Organic Fibre	Synthetic Mineral Fibre	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene (value used in F2 calc)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Acenaphthene	Acenaphthylene	Anthracene
	%	g	Fibres	-	g	g/kg	g/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
EQL	1	0.1			0.01			2	0.4	2	5	5	0.1	2	5	0.5	0.1	0.1	0.1	0.1	0.2	0.3	0.2	10	10	50	50	100	100	50	10	20	50	50	50	0.5	0.5	0.5
NEPM 2013 EIL-Commercial/Industrial >=0m, <2m								160		310[#1]	85[#2]	1800		55[#3]	110[#4]																							
NEPM 2013 EIL-Urban Residential- Public Open Space >=0m, <2m								100		190[#5]	60[#5]	1100		30[#5]	70[#5]																							
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Fine Soil >=0m, <2m																	*95*	*135*	*185*			*95*		*215[#6]*			*170[#7]*	*2500*	*6600*									
NEPM 2013 Table 1A(1) HIL C Rec								**300[#8]**	**90**	**300[#9]**	**17000**	**600[#10]**	**80[#11]**	**1200**	**30000**																							
NEPM 2013 Table 1A(1) HIL D Comm/Ind								*3000[#15]*	*900*	*3600[#9]*	*240000*	*1500[#10]*	*730[#11]*	*6000*	*400000*																							
NEPM 2013 Table 1A(3) HSL C Rec Soil for Vapour Intrusion, Clay																																						
>=0m, <1m																	NL[#16]	NL[#16]	NL[#16]			NL[#16]		NL[#16]		NL[#16]												
>=1m, <2m																	NL[#16]	NL[#16]	NL[#16]			NL[#16]		NL[#16]		NL[#16]												
>=2m, <4m																	NL[#16]	NL[#16]	NL[#16]			NL[#16]		NL[#16]		NL[#16]												
>=4m																	NL[#16]	NL[#16]	NL[#16]			NL[#16]		NL[#16]		NL[#16]												
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Clay																																						
>=0m, <1m																	4	NL[#16]	NL[#16]			NL[#16]		310[#6]		NL[#16]												
>=1m, <2m																	6	NL[#16]	NL[#16]			NL[#16]		480		NL[#16]												
>=2m, <4m																	9	NL[#16]	NL[#16]			NL[#16]		NL[#16]		NL[#16]												
>=4m																	20	NL[#16]	NL[#16]			NL[#16]		NL[#16]		NL[#16]												

Location Code	Depth	Field ID	Date	Sample Type	Lab Report Number	Moisture (%)	Asbestos Fibres (g)	Asbestos (Trace)	Asbestos Type	weight of sample	Organic Fibre	Synthetic Mineral Fibre	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene (value used in F2 calc)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Acenaphthene	Acenaphthylene	Anthracene
BH02	0.5 - 0.7	BH02_0.5 - 0.7	09/09/2024	Normal	ES2429778	7.9	-	-	-	-	-	-	<5	<1	7	6	9	<0.1	5	22	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
	1 - 1.2	BH02_1.0 - 1.2	09/09/2024	Normal	ES2429778	12.3	-	-	-	-	-	-	16	<1	19	16	9	<0.1	9	32	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
	1.5 - 1.7	BH02_1.5 - 1.7	09/09/2024	Normal	ES2429778	7.7	-	-	-	-	-	-	25	<1	13	28	15	<0.1	69	137	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
BH04	0.46 - 0.5	BH04_0.46-0.5	11/09/2024	Normal	ES2430642	-	ND	ND	-	218	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.5 - 0.7	BH06_0.5-0.7	11/09/2024	Normal	ES2430642	22.6	-	-	-	-	-	-	<5	<1	6	<5	8	<0.1	3	18	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
	1.5 - 1.7	BH06_1.5-1.7	11/09/2024	Normal	ES2430642	34	-	-	-	-	-	-	8	<1	18	22	14	<0.1	14	32	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
BH07	0.5 - 0.7	BH07_0.5-0.7	11/09/2024	Normal	ES2430642	7	ND	ND	-	224	ND	ND	<5	<1	9	6	10	<0.1	4	22	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
	1.5 - 1.9	BH07_1.5-1.9	11/09/2024	Normal	ES2430642	22.3	-	-	-	-	-	-	7	<1	14	24	10	<0.1	11	58	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
BH08	0.5 - 0.8	BH8_0.5-0.8	11/09/2024	Normal	ES2430642	21.3	-	-	-	-	-	-	<5	<1	8	<5	9	<0.1	4	17	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
BH09	0.5 - 0.7	BH09_0.5 - 0.7	09/09/2024	Normal	ES2429778	7.5	ND	ND	-	197	ND	ND	<5	<1	7	<5	11	<0.1	4	21	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
	1.8 - 2	BH09_1.8 - 2.0	09/09/2024	Normal	ES2429778	11.8	-	-	-	-	-	-	14	<1	16	41	13	<0.1	12	63	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
	2 - 2.2	BH09_2.0-2.2	09/09/2024	Normal	ES2429778	16.7	-	-	-	-	-	-	13	<1	16	34	12	<0.1	12	59	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
BH10	0.5 - 0.7	BH10_0.5 - 0.7	09/09/2024	Normal	ES2429778	28.2	ND	ND	-	282	ND	ND	<5	<1	11	10	10	<0.1	7	27	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
		DUP_01	09/09/2024	Field_D	ES2429778	28.6	-	-	-	-	-	-	<5	<1	11	14	17	<0.1	7	32	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
		TRI_01	10/09/2024	Interlab_D	1139515	18	-	-	-	-	-	-	7.4	<0.4	13	27	18	<0.1	10	49	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<20	<20	<50	<50	<100	<100	<100	<20	<20	<50	<50	<50	<0.5	<0.5	<0.5
	2 - 2.2	BH10_2.0 - 2.2	09/09/2024	Normal	ES2429778	34.1	-	-	-	-	-	-	10	<1	18	20	18	<0.1	15	28	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
BH12	0.5 - 0.7	BH12_0.5-0.7	11/09/2024	Normal	ES2430642	7.6	ND	ND	-	160	ND	ND	<5	<1	10	<5	12	<0.1	5	25	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5
	1.5 - 1.7	BH12_1.5-1.7	11/09/2024	Normal	ES2430642	13.4	-	-	-	-	-	-	<5	<1	12	27	12	0.1	6	36	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5

***ND = Not Detected**

Comments
#1 Generic - based on 1% clay content
#2 Generic - based on pH 4.5
#3 Generic - based on CEC = 5 cmol/kg
#4 Generic - based on CEC = 5 cmol/kg and pH 4.0
#5 Develop site specific based on CEC, pH, clay content, state and traffic volume
#6 To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#7 Errata 30 April 2014 - Naphthalene should not be subtracted from >C10-C16 (as there is no separate ESL for naphthalene)
#8 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be considered where appropriate (refer Shedule B7).
#9 In the absence of a guideline value for total chromium, chromium VI value adopted
#10 Lead: HILs A,B,C based on blood lead models (IEUBK & HIL D on adult lead model for where 50% bioavailability considered. Site-specific bioavailability should be considered where appropriate.
#11 Elemental mercury: HIL does not address elemental mercury. a site specific assessment should be considered if elemental mercury is present, or suspected to be present.
#12 Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should consider presence of carcinogenic PAHs (should meet BaP TEQ HIL) & naphthalene (should meet relevant HSL)
#13 Carcinogenic PAHs: HIL based on 8 carc. PAHs & their TEFs (rel to BaP ref Schedule 7) BaP TEQ calc by multiplying the conc of each carc. PAH in sample by its BaP TEF (ref Table 1A(1)) & summing
#14 PCBs: HIL refers to non-dioxin like PCBs only. Where PCB source is known, or suspected at a site, a site-specific assessment of exposure to all PCBs (inc dioxin like PCBs) should be undertaken
#15 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be considered where appropriate (refer Schedule B7).
#16 Not limiting: Derived soil HSL exceeds soil saturation concentration

Appendix D
Table A
Analytical summary

Endeavour Energy
Lowes Creek Substation

	PAHs - standard 16																	OC Pesticides																							
	Benz(a)anthracene	Benzo(a)pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total) - Lab calc	Total 8 PAHs (as BaP TEQ)(zero LOR) Lab Calc	Total 8 PAHs (as BaP TEQ) (half LOR) Lab Calc	Total 8 PAHs (as BaP TEQ)(full LOR) - Lab Calc	4,4'-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	4,4'-DDD	4,4'-DDT	DDT+DDE+DDD - Lab Calc	Dieldrin	Endosulfan	Endosulfan I (alpha)	Endosulfan II (beta)	Endosulfan Sulfate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)
	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	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.05	0.05	50	0.05	0.05	0.05	0.05	0.05	0.05	0.05
NEPM 2013 EIL-Commercial/Industrial >=0m, <2m											370																	640	640										
NEPM 2013 EIL-Urban Residential- Public Open Space >=0m, <2m											170																	180	180										
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Fine Soil >=0m, <2m		*1.4*																																				
NEPM 2013 Table 1A(1) HIL C Rec														**300**[#12]	**3**[#13]	**3**[#13]	**3**[#13]				**10**		**70**						**400**		**340000**				**20**			
NEPM 2013 Table 1A(1) HIL D Comm/Ind														*4000*[#12]	*40*[#13]	*40*[#13]	*40*[#13]				*45*		*530*						*3600*		*2000000*				*100*			
NEPM 2013 Table 1A(3) HSL C Rec Soil for Vapour Intrusion, Clay																																						
>=0m, <1m											NL[#16]																												
>=1m, <2m											NL[#16]																												
>=2m, <4m											NL[#16]																												
>=4m											NL[#16]																												
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Clay																																						
>=0m, <1m											NL[#16]																												
>=1m, <2m											NL[#16]																												
>=2m, <4m											NL[#16]																												
>=4m											NL[#16]																												

Location Code	Depth	Field ID	Date	Sample Type	Lab Report Number																																					
BH02	0.5 - 0.7	BH02_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	1 - 1.2	BH02_1.0 - 1.2	09/09/2024	Normal	ES2429778	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 - 1.7	BH02_1.5 - 1.7	09/09/2024	Normal	ES2429778	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH04	0.46 - 0.5	BH04_0.46-0.5	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.5 - 0.7	BH06_0.5-0.7	11/09/2024	Normal	ES2430642	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	1.5 - 1.7	BH06_1.5-1.7	11/09/2024	Normal	ES2430642	1	1	1.2	<0.5	0.7	1	<0.5	2.6	<0.5	0.5	<0.5	1.4	2.4	11.8	1.3	1.6	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH07	0.5 - 0.7	BH07_0.5-0.7	11/09/2024	Normal	ES2430642	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	1.5 - 1.9	BH07_1.5-1.9	11/09/2024	Normal	ES2430642	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	0.5 - 0.8	BH8_0.5-0.8	11/09/2024	Normal	ES2430642	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH09	0.5 - 0.7	BH09_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.8 - 2	BH09_1.8 - 2.0	09/09/2024	Normal	ES2429778	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2 - 2.2	BH09_2.0-2.2	09/09/2024	Normal	ES2429778	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.5 - 0.7	BH10_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
		DUP_01	09/09/2024	Field_D	ES2429778	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRI_01	10/09/2024	Interlab_D	1139515	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.5	0.9	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2 - 2.2	BH10_2.0 - 2.2	09/09/2024	Normal	ES2429778	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.5 - 0.7	BH12_0.5-0.7	11/09/2024	Normal	ES2430642	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	1.5 - 1.7	BH12_1.5-1.7	11/09/2024	Normal	ES2430642	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

***ND = Not Detected**

Comments
#1 Generic - based on 1% clay content
#2 Generic - based on pH 4.5
#3 Generic - based on CEC = 5 cmol/kg
#4 Generic - based on CEC = 5 cmol/kg and pH 4.0
#5 Develop site specific based on CEC, pH, clay content, state and traffic volume
#6 To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#7 Errata 30 April 2014 - Naphthalene should not be subtracted from >C10-C16 (as there is no
#8 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe importar
#9 In the absence of a guideline value for total chromium, chromium VI value adopted
#10 Lead: HILs A,B,C based on blood lead models (IEUBK & HIL D on adult lead model for wh
#11 Elemental mercury: HIL does not address elemental mercury. a site specific assessment
#12 Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application shoul
#13 Carcinogenic PAHs: HIL based on 8 carc. PAHs & their TEFs (rel to BaP ref Schedule 7) E
#14 PCBs: HIL refers to non-dioxin like PCBs only. Where PCB source is known, or suspecte
#15 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe importa
#16 Not limiting: Derived soil HSL exceeds soil saturation concentration

Appendix D
Table A
Analytical summary

					OP Pesticides																				PCBs
					Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Azinphos methyl	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Demeton-S-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenamiphos	Fenthion	Malathion	Methyl parathion	Monocrotophos	Parathion	Pirimiphos-ethyl	Prothiofos	PCBs (Total)
					mg/kg	mg/kg	µg/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
EQL					0.05	0.05	50	0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.2	0.2	0.05	0.05	0.1
NEPM 2013 EIL-Commercial/Industrial >=0m, <2m																												
NEPM 2013 EIL-Urban Residential- Public Open Space >=0m, <2m																												
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Fine Soil >=0m, <2m																												
NEPM 2013 Table 1A(1) HIL C Rec					**10**		**10000**	**400**					**250**															**1**[#14]
NEPM 2013 Table 1A(1) HIL D Comm/Ind					*50*		*80000*	*2500*					*2000*															*7*[#14]
NEPM 2013 Table 1A(3) HSL C Rec Soil for Vapour Intrusion, Clay																												
>=0m, <1m																												
>=1m, <2m																												
>=2m, <4m																												
>=4m																												
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Clay																												
>=0m, <1m																												
>=1m, <2m																												
>=2m, <4m																												
>=4m																												
Location Code	**Depth**	**Field ID**	**Date**	**Sample Type**	**Lab Report Number**																							
BH02	0.5 - 0.7	BH02_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<50	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
	1 - 1.2	BH02_1.0 - 1.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 - 1.7	BH02_1.5 - 1.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<50	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
BH04	0.46 - 0.5	BH04_0.46-0.5	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.5 - 0.7	BH06_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<50	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
	1.5 - 1.7	BH06_1.5-1.7	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH07	0.5 - 0.7	BH07_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<50	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
	1.5 - 1.9	BH07_1.5-1.9	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	0.5 - 0.8	BH8_0.5-0.8	11/09/2024	Normal	ES2430642	<0.05	<0.05	<50	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
BH09	0.5 - 0.7	BH09_0.5 - 0.7	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.8 - 2	BH09_1.8 - 2.0	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2 - 2.2	BH09_2.0-2.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.5 - 0.7	BH10_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<50	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
		DUP_01	09/09/2024	Field_D	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRI_01	10/09/2024	Interlab_D	1139515	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2 - 2.2	BH10_2.0 - 2.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.5 - 0.7	BH12_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<50	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
	1.5 - 1.7	BH12_1.5-1.7	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

***ND = Not Detected**

Comments
#1 Generic - based on 1% clay content
#2 Generic - based on pH 4.5
#3 Generic - based on CEC = 5 cmol/kg
#4 Generic - based on CEC = 5 cmol/kg and pH 4.0
#5 Develop site specific based on CEC, pH, clay content, state and traffic volume
#6 To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#7 Errata 30 April 2014 - Naphthalene should not be subtracted from >C10-C16 (as there is no
#8 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe importar
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#10 Lead: HILs A,B,C based on blood lead models (IEUBK & HIL D on adult lead model for wh
#11 Elemental mercury: HIL does not address elemental mercury. a site specific assessment
#12 Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application shoul
#13 Carcinogenic PAHs: HIL based on 8 carc. PAHs & their TEFs (rel to BaP ref Schedule 7) E
#14 PCBs: HIL refers to non-dioxin like PCBs only. Where PCB source is known, or suspecte
#15 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe importa
#16 Not limiting: Derived soil HSL exceeds soil saturation concentration

Appendix D
Table B
Analytical summary - waste classification

Endeavour Energy
Lowes Creek Alignment
Lowes Creek Substation

								Inorganics	Asbestos						Metals									BTEXN								TRH - NEPM			
								Moisture (%)	Asbestos Fibres (g)	Asbestos (Trace)	Asbestos Type	weight of sample	Organic Fibre	Synthetic Mineral Fibre	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene (value used in F2 calc)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction
								%	g	Fibres	-	g	g/kg	g/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	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
EQL								1	0.1			0.01			2	0.4	2	5	5	0.1	2	0.1	5	0.5	0.1	0.1	0.1	0.1	0.2	0.3	0.2	10	10	50	50
NSW EPA (2014) General Solid Waste CT1 (No Leaching)															100	20	100		100	4	40			10	288	600			1000					
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)															400	80	400		400	16	160			40	1152	2400			4000					
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)															500	100	1900		1500	50	1050			18	518	1080			1800					
NSW EPA (2014) General Solid Waste TCLP1																						2												
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)															2000	400	7600		6000	200	4200			72	2073	4320			7200					
NSW EPA (2014) Restricted Solid Waste TCLP2																						8												
NSW EPA (2014) Special Waste (Asbestos)									Detected																									
Location Code	**Depth**	**Field ID**	**Date**	**Sample Type**	**Lab Report Number**																														
BH02	0.5 - 0.7	BH02_0.5 - 0.7	09/09/2024	Normal	ES2429778			7.9	-	-	-	-	-	-	<5	<1	7	6	9	<0.1	5	-	22	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
	1 - 1.2	BH02_1.0 - 1.2	09/09/2024	Normal	ES2429778			12.3	-	-	-	-	-	-	16	<1	19	16	9	<0.1	9	-	32	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
	1.5 - 1.7	BH02_1.5 - 1.7	09/09/2024	Normal	ES2429778			7.7	-	-	-	-	-	-	25	<1	13	28	15	<0.1	69	0.1	137	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
BH04	0.46 - 0.5	BH04_0.46-0.5	11/09/2024	Normal	ES2430642			-	ND	ND	-	218	ND	ND	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.5 - 0.7	BH06_0.5-0.7	11/09/2024	Normal	ES2430642			22.6	-	-	-	-	-	-	<5	<1	6	<5	8	<0.1	3	-	18	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
	1.5 - 1.7	BH06_1.5-1.7	11/09/2024	Normal	ES2430642			34	-	-	-	-	-	-	8	<1	18	22	14	<0.1	14	-	32	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
BH07	0.5 - 0.7	BH07_0.5-0.7	11/09/2024	Normal	ES2430642			7	ND	ND	-	224	ND	ND	<5	<1	9	6	10	<0.1	4	-	22	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
	1.5 - 1.9	BH07_1.5-1.9	11/09/2024	Normal	ES2430642			22.3	-	-	-	-	-	-	7	<1	14	24	10	<0.1	11	-	58	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
BH08	0.5 - 0.8	BH8_0.5-0.8	11/09/2024	Normal	ES2430642			21.3	-	-	-	-	-	-	<5	<1	8	<5	9	<0.1	4	-	17	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
BH09	0.5 - 0.7	BH09_0.5 - 0.7	09/09/2024	Normal	ES2429778			7.5	ND	ND	-	197	ND	ND	<5	<1	7	<5	11	<0.1	4	-	21	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
	1.8 - 2	BH09_1.8 - 2.0	09/09/2024	Normal	ES2429778			11.8	-	-	-	-	-	-	14	<1	16	41	13	<0.1	12	-	63	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
	2 - 2.2	BH09_2.0-2.2	09/09/2024	Normal	ES2429778			16.7	-	-	-	-	-	-	13	<1	16	34	12	<0.1	12	-	59	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
BH10	0.5 - 0.7	BH10_0.5 - 0.7	09/09/2024	Normal	ES2429778			28.2	ND	ND	-	282	ND	ND	<5	<1	11	10	10	<0.1	7	-	27	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
		DUP_01	09/09/2024	Field_D	ES2429778			28.6	-	-	-	-	-	-	<5	<1	11	14	17	<0.1	7	-	32	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
		TRI_01	10/09/2024	Interlab_D	1139515			18	-	-	-	-	-	-	7.4	<0.4	13	27	18	<0.1	10	-	49	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<20	<20	<50	<50
	2 - 2.2	BH10_2.0 - 2.2	09/09/2024	Normal	ES2429778			34.1	-	-	-	-	-	-	10	<1	18	20	18	<0.1	15	-	28	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
BH12	0.5 - 0.7	BH12_0.5-0.7	11/09/2024	Normal	ES2430642			7.6	ND	ND	-	160	ND	ND	<5	<1	10	<5	12	<0.1	5	-	25	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50
	1.5 - 1.7	BH12_1.5-1.7	11/09/2024	Normal	ES2430642			13.4	-	-	-	-	-	-	<5	<1	12	27	12	0.1	6	-	36	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50

***ND = Not Detected**

Comments
#1 No TCLP analysis required

Appendix D
Table B
Analytical summary - waste classification

Endeavour Energy
Lowes Creek Alignment
Lowes Creek Substation

						2013			TRH - NEPM 1999					PAHs - standard 16																			
						F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene		Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total) - Lab calc	4,4'-DDE	a-BHC
						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/L	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
EQL						100	100	50	10	20	50	50	50	0.5	0.5	0.5	0.5	0.5	0.0005	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.05	0.05
NSW EPA (2014) General Solid Waste CT1 (No Leaching)									650[#1]				10000[#1]					0.8													200		
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)									2600[#1]				40000[#1]					3.2													800		
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)									650[#1]				10000[#1]					10													200		
NSW EPA (2014) General Solid Waste TCLP1																			0.04														
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)									2600[#1]				40000[#1]					23													800		
NSW EPA (2014) Restricted Solid Waste TCLP2																			0.16														
NSW EPA (2014) Special Waste (Asbestos)																																	
Location Code	**Depth**	**Field ID**	**Date**	**Sample Type**	**Lab Report Number**																												
BH02	0.5 - 0.7	BH02_0.5 - 0.7	09/09/2024	Normal	ES2429778	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05
	1 - 1.2	BH02_1.0 - 1.2	09/09/2024	Normal	ES2429778	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-
	1.5 - 1.7	BH02_1.5 - 1.7	09/09/2024	Normal	ES2429778	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05
BH04	0.46 - 0.5	BH04_0.46-0.5	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.5 - 0.7	BH06_0.5-0.7	11/09/2024	Normal	ES2430642	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05
	1.5 - 1.7	BH06_1.5-1.7	11/09/2024	Normal	ES2430642	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	1	1	<0.0005	1.2	<0.5	0.7	1	<0.5	2.6	<0.5	0.5	<0.5	1.4	2.4	11.8	-	-
BH07	0.5 - 0.7	BH07_0.5-0.7	11/09/2024	Normal	ES2430642	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05
	1.5 - 1.9	BH07_1.5-1.9	11/09/2024	Normal	ES2430642	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-
BH08	0.5 - 0.8	BH8_0.5-0.8	11/09/2024	Normal	ES2430642	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05
BH09	0.5 - 0.7	BH09_0.5 - 0.7	09/09/2024	Normal	ES2429778	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-
	1.8 - 2	BH09_1.8 - 2.0	09/09/2024	Normal	ES2429778	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-
	2 - 2.2	BH09_2.0-2.2	09/09/2024	Normal	ES2429778	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-
BH10	0.5 - 0.7	BH10_0.5 - 0.7	09/09/2024	Normal	ES2429778	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05
		DUP_01	09/09/2024	Field_D	ES2429778	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-
		TRI_01	10/09/2024	Interlab_D	1139515	<100	<100	<100	<20	<20	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	-	-
	2 - 2.2	BH10_2.0 - 2.2	09/09/2024	Normal	ES2429778	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-
BH12	0.5 - 0.7	BH12_0.5-0.7	11/09/2024	Normal	ES2430642	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05
	1.5 - 1.7	BH12_1.5-1.7	11/09/2024	Normal	ES2430642	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-

***ND = Not Detected**

Comments
#1 No TCLP analysis required

Appendix D
Table B
Analytical summary - waste classification

OC Pesticides

Location Code	Depth	Field ID	Date	Sample Type	Lab Report Number	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	4,4'-DDD	4,4'-DDT	DDT+DDE+DDD - Lab Calc	Dieldrin	Endosulfan	Endosulfan I (alpha)	Endosulfan II (beta)	Endosulfan Sulfate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	mg/kg
EQL						0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.05	0.05	50	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	50	0.2
NSW EPA (2014) General Solid Waste CT1 (No Leaching)																	60000											
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)																	240000											
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)																	108000											
NSW EPA (2014) General Solid Waste TCLP1																												
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)																	432000											
NSW EPA (2014) Restricted Solid Waste TCLP2																												
NSW EPA (2014) Special Waste (Asbestos)																												
BH02	0.5 - 0.7	BH02_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<50	<0.2
	1 - 1.2	BH02_1.0 - 1.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 - 1.7	BH02_1.5 - 1.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<50	<0.2
BH04	0.46 - 0.5	BH04_0.46-0.5	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.5 - 0.7	BH06_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<50	<0.2
	1.5 - 1.7	BH06_1.5-1.7	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH07	0.5 - 0.7	BH07_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<50	<0.2
	1.5 - 1.9	BH07_1.5-1.9	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	0.5 - 0.8	BH8_0.5-0.8	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<50	<0.2
BH09	0.5 - 0.7	BH09_0.5 - 0.7	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.8 - 2	BH09_1.8 - 2.0	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2 - 2.2	BH09_2.0-2.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.5 - 0.7	BH10_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<50	<0.2
		DUP_01	09/09/2024	Field_D	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRI_01	10/09/2024	Interlab_D	1139515	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2 - 2.2	BH10_2.0 - 2.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.5 - 0.7	BH12_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<50	<0.2
	1.5 - 1.7	BH12_1.5-1.7	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Location Code	Depth	Field ID	Date	Sample Type	Lab Report Number	Azinphos methyl	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.05	0.05	0.05	0.05	0.05	0.05
NSW EPA (2014) General Solid Waste CT1 (No Leaching)										4	
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)										16	
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)										7.5	
NSW EPA (2014) General Solid Waste TCLP1											
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)										30	
NSW EPA (2014) Restricted Solid Waste TCLP2											
NSW EPA (2014) Special Waste (Asbestos)											
BH02	0.5 - 0.7	BH02_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	1 - 1.2	BH02_1.0 - 1.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-
	1.5 - 1.7	BH02_1.5 - 1.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH04	0.46 - 0.5	BH04_0.46-0.5	11/09/2024	Normal	ES2430642	-	-	-	-	-	-
BH06	0.5 - 0.7	BH06_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	1.5 - 1.7	BH06_1.5-1.7	11/09/2024	Normal	ES2430642	-	-	-	-	-	-
BH07	0.5 - 0.7	BH07_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	1.5 - 1.9	BH07_1.5-1.9	11/09/2024	Normal	ES2430642	-	-	-	-	-	-
BH08	0.5 - 0.8	BH8_0.5-0.8	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH09	0.5 - 0.7	BH09_0.5 - 0.7	09/09/2024	Normal	ES2429778	-	-	-	-	-	-
	1.8 - 2	BH09_1.8 - 2.0	09/09/2024	Normal	ES2429778	-	-	-	-	-	-
	2 - 2.2	BH09_2.0-2.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-
BH10	0.5 - 0.7	BH10_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
		DUP_01	09/09/2024	Field_D	ES2429778	-	-	-	-	-	-
		TRI_01	10/09/2024	Interlab_D	1139515	-	-	-	-	-	-
	2 - 2.2	BH10_2.0 - 2.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-
BH12	0.5 - 0.7	BH12_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	1.5 - 1.7	BH12_1.5-1.7	11/09/2024	Normal	ES2430642	-	-	-	-	-	-

***ND = Not Detected**

Comments
#1 No TCLP analysis required

Appendix D
Table B
Analytical summary - waste classification

						OP Pesticides													PCBs
						Demeton-S-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenamiphos	Fenthion	Malathion	Methyl parathion	Monocrotophos	Parathion	Pirimiphos-ethyl	Prothiofos	PCBs (Total)
						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
EQL						0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.2	0.2	0.05	0.05	0.1
NSW EPA (2014) General Solid Waste CT1 (No Leaching)																			50
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)																			50
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)																			50
NSW EPA (2014) General Solid Waste TCLP1																			
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)																			50
NSW EPA (2014) Restricted Solid Waste TCLP2																			
NSW EPA (2014) Special Waste (Asbestos)																			
Location Code	**Depth**	**Field ID**	**Date**	**Sample Type**	**Lab Report Number**														
BH02	0.5 - 0.7	BH02_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
	1 - 1.2	BH02_1.0 - 1.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 - 1.7	BH02_1.5 - 1.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
BH04	0.46 - 0.5	BH04_0.46-0.5	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.5 - 0.7	BH06_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
	1.5 - 1.7	BH06_1.5-1.7	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH07	0.5 - 0.7	BH07_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
	1.5 - 1.9	BH07_1.5-1.9	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	0.5 - 0.8	BH8_0.5-0.8	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
BH09	0.5 - 0.7	BH09_0.5 - 0.7	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.8 - 2	BH09_1.8 - 2.0	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2 - 2.2	BH09_2.0-2.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.5 - 0.7	BH10_0.5 - 0.7	09/09/2024	Normal	ES2429778	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
		DUP_01	09/09/2024	Field_D	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRI_01	10/09/2024	Interlab_D	1139515	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2 - 2.2	BH10_2.0 - 2.2	09/09/2024	Normal	ES2429778	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.5 - 0.7	BH12_0.5-0.7	11/09/2024	Normal	ES2430642	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	<0.1
	1.5 - 1.7	BH12_1.5-1.7	11/09/2024	Normal	ES2430642	-	-	-	-	-	-	-	-	-	-	-	-	-	-

***ND = Not Detected**

Comments
#1 No TCLP analysis required

		Location Code	BH10	BH10		BH10	BH10	
		Date	09 Sep 2024	09 Sep 2024		09 Sep 2024	10 Sep 2024	
		Field ID	BH10_0.5 - 0.7	DUP_01		BH10_0.5 - 0.7	TRI_01	
		Lab Report Number	ES2429778	ES2429778		ES2429778	1139515	
		Matrix Type	Soil	Soil		Soil	Soil	
		Sample Type	Normal	Field_D	RPD	Normal	Interlab_D	RPD
	Unit	EQL						
Metals								
Arsenic	mg/kg	2	<5	<5	0	<5	7.4	**39**
Cadmium	mg/kg	0.4	<1	<1	0	<1	<0.4	0
Chromium (III+VI)	mg/kg	2	11	11	0	11	13	17
Copper	mg/kg	5	10	14	**33**	10	27	**92**
Lead	mg/kg	5	10	17	**52**	10	18	**57**
Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
Nickel	mg/kg	2	7	7	0	7	10	**35**
Zinc	mg/kg	5	27	32	17	27	49	**58**
BTEXN								
Naphthalene (value used in F2 calc)	mg/kg	0.5	<1	<1	0	<1	<0.5	0
Benzene	mg/kg	0.1	<0.2	<0.2	0	<0.2	<0.1	0
Toluene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Ethylbenzene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Xylene (o)	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Xylene (m & p)	mg/kg	0.2	<0.5	<0.5	0	<0.5	<0.2	0
Xylene Total	mg/kg	0.3	<0.5	<0.5	0	<0.5	<0.3	0
BTEX (Sum of Total) - Lab Calc	mg/kg	0.2	<0.2	<0.2	0	<0.2	-	-
TRH - NEPM 2013								
F1 (C6-C10 minus BTEX)	mg/kg	10	<10	<10	0	<10	<20	0
C6-C10 Fraction	mg/kg	10	<10	<10	0	<10	<20	0
F2 (>C10-C16 minus Naphthalene)	mg/kg	50	<50	<50	0	<50	<50	0
>C10-C16 Fraction	mg/kg	50	<50	<50	0	<50	<50	0
F3 (>C16-C34 Fraction)	mg/kg	100	<100	<100	0	<100	<100	0
F4 (>C34-C40 Fraction)	mg/kg	100	<100	<100	0	<100	<100	0
>C10-C40 (Sum of Total)	mg/kg	50	<50	<50	0	<50	<100	0
TRH - NEPM 1999								
C6-C9 Fraction	mg/kg	10	<10	<10	0	<10	<20	0
C10-C14 Fraction	mg/kg	20	<50	<50	0	<50	<20	0
C15-C28 Fraction	mg/kg	50	<100	<100	0	<100	<50	0
C29-C36 Fraction	mg/kg	50	<100	<100	0	<100	<50	0
C10-C36 (Sum of Total)	mg/kg	50	<50	<50	0	<50	<50	0
PAHs - standard 16								
Acenaphthene	mg/kg	0.5	<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
Anthracene	mg/kg	0.5	<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
Benzo(a)pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0.5	0
Benzo[b+j]fluoranthene	mg/kg	0.5	<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
Benzo(g,h,i)perylene	mg/kg	0.5	<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
Dibenz(a,h)anthracene	mg/kg	0.5	<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
Fluorene	mg/kg	0.5	<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
Naphthalene	mg/kg	0.5	<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
Pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
PAHs (Sum of total) - Lab calc	mg/kg	0.5	<0.5	<0.5	0	<0.5	0.5	0

Comments

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (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

		Date	09 Sep 2024	09 Sep 2024	10 Sep 2024	10 Sep 2024
		Lab Report Number	ES2429778	ES2429778	ES2429778	ES2429778
		Matrix Type	Water	Water	Water	Water
	Unit	EQL				
Metals						
Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (III+VI)	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
BTEXN						
Naphthalene (value used in F2 calc)	µg/L	5	<5	<5	<5	<5
Benzene	µg/L	1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2
Xylene (o)	µg/L	2	<2	<2	<2	<2
Xylene (m & p)	µg/L	2	<2	<2	<2	<2
Xylene Total	µg/L	2	<2	<2	<2	<2
BTEX (Sum of Total) - Lab Calc	µg/L	1	<1	<1	<1	<1
TRH - NEPM 2013						
F1 (C6-C10 minus BTEX)	µg/L	20	<20	<20	<20	<20
C6-C10 Fraction	µg/L	20	<20	<20	<20	<20
F2 (>C10-C16 minus Naphthalene)	µg/L	100	<100	<100	<100	<100
>C10-C16 Fraction	µg/L	100	<100	<100	<100	<100
F3 (>C16-C34 Fraction)	µg/L	100	<100	<100	<100	<100
F4 (>C34-C40 Fraction)	µg/L	100	<100	<100	<100	<100
>C10-C40 (Sum of Total)	µg/L	100	<100	<100	<100	<100
TRH - NEPM 1999						
C6-C9 Fraction	µg/L	20	<20	<20	<20	<20
C10-C14 Fraction	µg/L	50	<50	<50	<50	<50
C15-C28 Fraction	µg/L	100	<100	<100	<100	<100
C29-C36 Fraction	µg/L	50	<50	<50	<50	<50
C10-C36 (Sum of Total)	µg/L	50	<50	<50	<50	<50

		Date	10 Sep 2024
		Sample ID	TB
		Lab Report Number	ES2429778-014
		Matrix Type	Soil
	Unit	EQL	
BTEXN			
Naphthalene (value used in F2 calc)	mg/kg	1	<1
Benzene	mg/kg	0.2	<0.2
Toluene	mg/kg	0.5	<0.5
Ethylbenzene	mg/kg	0.5	<0.5
Xylene (o)	mg/kg	0.5	<0.5
Xylene (m & p)	mg/kg	0.5	<0.5
Xylene Total	mg/kg	0.5	<0.5
BTEX (Sum of Total) - Lab Calc	mg/kg	0.2	<0.2
TRH - NEPM 2013			
F1 (C6-C10 minus BTEX)	mg/kg	10	<10
C6-C10 Fraction	mg/kg	10	<10
TRH - NEPM 1999			
C6-C9 Fraction	mg/kg	10	<10

Appendix D
Table F
Trip Spike sample results

Endeavour Energy
Lowes Creek Substation

Trip Spikes

Lab Report Number	Sampled Date/Time	Chem Name	Trip Spike Result	Trip Spike Control	Result Units	Spike Recovery %	Lab Sample ID
ES2429778	10/09/2024 15:00	Ethylbenzene	6.1	7.2	mg/kg	84.722	ES2429778015
ES2429778	10/09/2024 15:00	Xylene (m & p)	6.1	7.2	mg/kg	84.722	ES2429778015
ES2429778	10/09/2024 15:00	Toluene	5	6	mg/kg	83.333	ES2429778015
ES2429778	10/09/2024 15:00	Xylene Total	8.7	10.4	mg/kg	83.654	ES2429778015
ES2429778	10/09/2024 15:00	Benzene	< 0.2	< 0.2	mg/kg	100	ES2429778015
ES2429778	10/09/2024 15:00	Naphthalene (value used in F2 calc)	< 1	< 1	mg/kg	100	ES2429778015
ES2429778	10/09/2024 15:00	Xylene (o)	2.6	3.2	mg/kg	81.25	ES2429778015
ES2429778	10/09/2024 15:00	BTEX (Sum of Total) - Lab Calc	19.8	23.6	mg/kg	83.898	ES2429778015

Trip Spike Recoveries. Where no lab LCL and UCL is available, user defined limits between 70% and 130% have been adopted for non-compliance.

Appendix E

Laboratory information

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0290 E: adelaide@alsglobal.com

BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 4971 6900 E: gladstone@alsglobal.com

MACKAY 78 Murnane Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com

PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: perth.samples@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Garbutt QLD 4814 Ph: 07 4796 0600 E: townsville@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: GHD	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☐☒ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE:		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: 12641966	ALS QUOTE NO:	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 3.4 C
PROJECT MANAGER: Barry Houston	CONTACT PH:		Other comment.
SAMPLER: Malachi Hurley	SAMPLER MOBILE:		
COC emailed to ALS? YES	EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed): Barry.houston@ghd.com / malachi.hurley@ghd.com			
Email Invoice to (will default to PM if no other addresses are listed): Barry.houston@ghd.com			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Malachi Hurley	Fitzi		Brenton
DATE/TIME: 11/09/2024	DATE/TIME: 12/9/24 9:30	DATE/TIME:	DATE/TIME: 16/9 11:59

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: PLEASE PLACE ALL PFAS JARS ON HOLD

CR CHL

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	S-26	S-13	W-5 (RB/FB)	S-18 (TS/TB)	Asbestos (abs/Prs)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH02_0.5 - 0.7	9/09/2024	S	Jar	2	x	x							
2	BH02_1.0 - 1.2	9/09/2024	S	Jar	2	x								
3	BH02_1.5 -1.7	9/09/2024	S	Jar	2	x	x							
4	BH09_0.5 - 0.7	10/09/2024	S	Jar and bag	3	x				x				
5	BH09_1.8 - 2.0	10/09/2024	S	Jar and bag	3	x								
6	BH09_2.0-2.2	10/09/2024	S	Jar	2	x								
7	BH10_0.5 - 0.7	10/09/2024	S	Jar and bag	3	x	x			x				
8	BH10_2.0 - 2.2	10/09/2024	S	Jar and bag	3	x								
9	DUP_01	10/09/2024	S	Jar	2	x								
—	TRI_01	10/09/2024	S	Jar	2	Forward to Eurofins								
10	RB01	9/09/2024	W	Bottles	4			x						
11	FB01	9/09/2024	W	Bottles	4			x						
12	RB02	10/09/2024	W	Bottles	4			x						
13	FB02	10/09/2024	W	Bottles	4			x						
14	TB	10/09/2024	S	Jar	1				x					
15	TS	10/09/2024	S	Jar	1				x					
16 TSL				TOTAL	42									

Environmental Division Sydney
Work Order Reference
ES2429778

Telephone : + 61-2-8784 8555

Received By: ALS Newcastle/Eurofins
Released By / Date:
Received By / Date:
Comments / Courier: Asbestos lab. EWP
WO No.: ES2429778

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

1139515

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☑ **Sydney Laboratory**
179 Magowar Road Girraween NSW 2066
02 9900 8400 EnviroSampleNSW@eurofins.com

☐ **Brisbane Laboratory**
Unit 1 21 Smallwood Place Murarrie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

☐ **Perth Laboratory**
46-48 Banksia Road Welshpool WA 6106
08 6253 4444 Samples@ARLgroup.com.au

☐ **Melbourne Laboratory**
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	GHD Pty Ltd	**Project №**	12641966	**Project Manager**	Barry Houston	**Sampler(s)**	Malachi Hurley
Address	Level 15, 133 Castlereagh Street, Sydney NSW 2000	**Project Name**	Lowes Creek Waste Classification	**EDD Format** ESdat, EQuIS etc	Y	**Facility Code**	**Handed over by** Malachi Hurley
Contact Name	Malachi Hurley						**Email for Invoice** accountspayableAU@ghd.com
Phone №	0477619707						**Email for Results** malachi.hurley@ghd.com / barry.houston@ghd.com
Special Directions	-						
Purchase Order	12641966						
Quote ID №	GHD Rates 2024						

Analyses — Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing.

Containers — Change container type & size if necessary.

Required Turnaround Time (TAT) — Default will be 5 days if not ticked.

♦Surcharge will apply
☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☐ 5 days (Standard)
☐ Other( )

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	B7	500mL Plastic	250mL Plastic	60mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	TRI_01	10/09/24	Soil	X									
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
	Add Rows		Total Counts	1									

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature		Date		Time	

Laboratory Use Only	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Temperature	
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №	

eurofins | Environment Testing

www.eurofins.com.au EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079

Eurofins ARL Pty Ltd

ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
+61 8 6253 4444
NATA# 2377
Site# 2370

Eurofins ProMicro Pty Ltd

ABN: 47 009 120 549

Perth ProMicro
46-48 Banksia Road
Welshpool
WA 6106
+61 8 6253 4444
NATA# 2561
Site# 2554

Eurofins Environment Testing NZ Ltd

NZBN: 9429046024954

Auckland	Auckland (Focus)	Christchurch	Tauranga
35 O'Rorke Road	Unit C1/4 Pacific Rise,	43 Detroit Drive	1277 Cameron Road,
Penrose,	Mount Wellington,	Rolleston,	Gate Pa,
Auckland 1061	Auckland 1061	Christchurch 7675	Tauranga 3112
+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Sample Receipt Advice

Company name: GHD Pty Ltd NSW
Contact name: Barry Houston
Project name: LOWES CREEK WASTE CLASSIFICATION
Project ID: 12641966
Turnaround time: 7 Day
Date/Time received Sep 16, 2024 11:56 AM
Eurofins reference 1139515

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	Sample Temperature of chilled sample on the batch as recorded by Eurofins Sample Receipt : 3.9 degrees Celsius.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Please confirm asbestos analysis from jar subsample. Please confirm analysis. Standard TAT is currently 7 days due to temporary laboratory constraints, please contact your Analytical Services Manager should faster TAT be required or if you would like to receive an interim report.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Adam Bateup on phone : or by email: AdamBateup@eurofins.com

Results will be delivered electronically via email to Barry Houston - barry.houston@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd NSW email address.

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
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46-48 Banksia Road
Welshpool
WA 6106
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+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Company Name: GHD Pty Ltd NSW
Address: Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Project Name: LOWES CREEK WASTE CLASSIFICATION
Project ID: 12641966

Order No.:
Report #: 1139515
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Sep 16, 2024 11:56 AM
Due: Sep 23, 2024
Priority: 7 Day
Contact Name: Barry Houston

Eurofins Analytical Services Manager : Adam Bateup

Sample Detail						Moisture Set	Eurofins Suite B7
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	TRI_01	Sep 10, 2024		Soil	S24-Se0038884	X	X
Test Counts						1	1

GHD Pty Ltd NSW
Level 15, 133 Castlereagh Street
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Barry Houston**

Report **1139515-S**
Project name LOWES CREEK WASTE CLASSIFICATION
Project ID 12641966
Received Date Sep 16, 2024

Client Sample ID			**TRI_01**
Sample Matrix			**Soil**
Eurofins Sample No.			**S24-Se0038884**
Date Sampled			**Sep 10, 2024**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
TRH >C10-C16	50	mg/kg	< 50
TRH >C10-C16 less Naphthalene (F2)*[N01]	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	104
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.9
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5

Client Sample ID			TRI_01
Sample Matrix			**Soil**
Eurofins Sample No.			**S24-Se0038884**
Date Sampled			**Sep 10, 2024**
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	0.5
2-Fluorobiphenyl (surr.)	1	%	51
p-Terphenyl-d14 (surr.)	1	%	67
Heavy Metals			
Arsenic	2	mg/kg	7.4
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	13
Copper	5	mg/kg	27
Lead	5	mg/kg	18
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	10
Zinc	5	mg/kg	49
Sample Properties			
% Moisture	1	%	18

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Sep 17, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Sep 17, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Sep 17, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Sep 17, 2024	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Polycyclic Aromatic Hydrocarbons	Sydney	Sep 17, 2024	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals M8	Sydney	Sep 17, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Sep 16, 2024	14 Days
- Method: LTM-GEN-7080 Moisture			

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079

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Company Name: GHD Pty Ltd NSW
Address: Level 15, 133 Castlereagh Street
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NSW 2000

Project Name: LOWES CREEK WASTE CLASSIFICATION
Project ID: 12641966

Order No.:
Report #: 1139515
Phone: 02 9239 7100
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Received: Sep 16, 2024 11:56 AM
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Contact Name: Barry Houston

Eurofins Analytical Services Manager : Adam Bateup

Sample Detail						Moisture Set	Eurofins Suite B7
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	TRI_01	Sep 10, 2024		Soil	S24-Se0038884	X	X
Test Counts						1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the sampling date; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	**Colour:** Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	82			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C10-C14	%	81			70-130	Pass	
TRH C6-C10	%	81			70-130	Pass	
TRH >C10-C16	%	79			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	101			70-130	Pass	
Toluene	%	99			70-130	Pass	
Ethylbenzene	%	87			70-130	Pass	
m&p-Xylenes	%	93			70-130	Pass	
o-Xylene	%	83			70-130	Pass	
Xylenes - Total*	%	90			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	95			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	87			70-130	Pass	
Acenaphthylene	%	84			70-130	Pass	
Anthracene	%	93			70-130	Pass	
Benz(a)anthracene	%	87			70-130	Pass	
Benzo(a)pyrene	%	88			70-130	Pass	
Benzo(b&j)fluoranthene	%	75			70-130	Pass	
Benzo(g.h.i)perylene	%	72			70-130	Pass	
Benzo(k)fluoranthene	%	78			70-130	Pass	
Chrysene	%	86			70-130	Pass	
Dibenz(a.h)anthracene	%	82			70-130	Pass	
Fluoranthene	%	100			70-130	Pass	
Fluorene	%	88			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	86			70-130	Pass	
Naphthalene	%	86			70-130	Pass	
Phenanthrene	%	84			70-130	Pass	
Pyrene	%	99			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	103			80-120	Pass	
Cadmium	%	105			80-120	Pass	
Chromium	%	110			80-120	Pass	
Copper	%	111			80-120	Pass	
Lead	%	110			80-120	Pass	
Mercury	%	110			80-120	Pass	
Nickel	%	110			80-120	Pass	
Zinc	%	106			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	S24-Se0040359	NCP	%	86			70-130	Pass	
TRH C10-C14	S24-Se0035769	NCP	%	72			70-130	Pass	
TRH C6-C10	S24-Se0040359	NCP	%	84			70-130	Pass	
TRH >C10-C16	S24-Se0035769	NCP	%	74			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	N24-Se0031491	NCP	%	75			70-130	Pass	
Toluene	N24-Se0031491	NCP	%	83			70-130	Pass	
Ethylbenzene	S24-Se0040359	NCP	%	86			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
m&p-Xylenes	N24-Se0031491	NCP	%	73			70-130	Pass	
o-Xylene	S24-Se0040359	NCP	%	82			70-130	Pass	
Xylenes - Total*	S24-Se0040359	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S24-Se0040359	NCP	%	97			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S24-Se0036043	NCP	%	98			75-125	Pass	
Cadmium	S24-Se0036043	NCP	%	104			75-125	Pass	
Chromium	S24-Se0036043	NCP	%	103			75-125	Pass	
Copper	S24-Se0036043	NCP	%	101			75-125	Pass	
Lead	S24-Se0036043	NCP	%	102			75-125	Pass	
Mercury	S24-Se0036043	NCP	%	101			75-125	Pass	
Nickel	S24-Se0036043	NCP	%	103			75-125	Pass	
Zinc	S24-Se0036043	NCP	%	109			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	S24-Se0032879	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S24-Se0029142	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S24-Se0029142	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S24-Se0029142	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C6-C10	S24-Se0032879	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S24-Se0029142	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S24-Se0029142	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S24-Se0029142	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S24-Se0032879	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S24-Se0032879	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S24-Se0032879	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S24-Se0032879	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S24-Se0032879	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	S24-Se0032879	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S24-Se0032879	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	W24-Se0039400	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	W24-Se0039400	NCP	mg/kg	0.9	4.5	130	30%	Fail	Q02
Anthracene	W24-Se0039400	NCP	mg/kg	0.9	6.7	150	30%	Fail	Q02
Benz(a)anthracene	W24-Se0039400	NCP	mg/kg	1.4	9.4	150	30%	Fail	Q02
Benzo(a)pyrene	W24-Se0039400	NCP	mg/kg	2.3	12	140	30%	Fail	Q02
Benzo(b&j)fluoranthene	W24-Se0039400	NCP	mg/kg	1.3	6.2	130	30%	Fail	Q02
Benzo(g.h.i)perylene	W24-Se0039400	NCP	mg/kg	1.3	5.9	130	30%	Fail	Q02
Benzo(k)fluoranthene	W24-Se0039400	NCP	mg/kg	3.3	12	110	30%	Fail	Q02
Chrysene	W24-Se0039400	NCP	mg/kg	3.1	13	120	30%	Fail	Q02
Dibenz(a.h)anthracene	W24-Se0039400	NCP	mg/kg	< 0.5	2.5	140	30%	Fail	Q02
Fluoranthene	W24-Se0039400	NCP	mg/kg	5.2	29	140	30%	Fail	Q02
Fluorene	W24-Se0039400	NCP	mg/kg	< 0.5	2.0	160	30%	Fail	Q02
Indeno(1.2.3-cd)pyrene	W24-Se0039400	NCP	mg/kg	1.4	6.6	130	30%	Fail	Q02
Naphthalene	W24-Se0039400	NCP	mg/kg	< 0.5	2.4	160	30%	Fail	Q02

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Phenanthrene	W24-Se0039400	NCP	mg/kg	5.3	33	150	30%	Fail	Q02
Pyrene	W24-Se0039400	NCP	mg/kg	5.4	31	140	30%	Fail	Q02
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S24-Se0036222	NCP	mg/kg	7.4	4.8	42	30%	Fail	Q15
Cadmium	S24-Se0036222	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S24-Se0036222	NCP	mg/kg	14	12	14	30%	Pass	
Copper	S24-Se0036222	NCP	mg/kg	37	24	42	30%	Fail	Q15
Lead	S24-Se0036222	NCP	mg/kg	19	16	18	30%	Pass	
Mercury	S24-Se0036222	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S24-Se0036222	NCP	mg/kg	18	13	33	30%	Fail	Q15
Zinc	S24-Se0036042	NCP	mg/kg	5.5	5.4	2.0	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S24-Se0038739	NCP	%	11	9.5	10	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q02	The duplicate %RPD is outside the recommended acceptance criteria. Further analysis indicates sample heterogeneity as the cause
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Adam Bateup	Analytical Services Manager
Fang Yee Tan	Senior Analyst-Metal
Raymond Siu	Senior Analyst-Volatile
Roopesh Rangarajan	Senior Analyst-Organic
Roopesh Rangarajan	Senior Analyst-Sample Properties

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

CERTIFICATE OF ANALYSIS

Work Order	: **ES2429778**	Page	: 1 of 16
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Contact	: Samiksha Sathish
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12641966	Date Samples Received	: 11-Sep-2024 21:10
Order number	: ----	Date Analysis Commenced	: 13-Sep-2024
C-O-C number	: ----	Issue Date	: 19-Sep-2024 18:17
Sampler	: MALACHI HURLEY		
Site	:		
Quote number	: EN/000		
No. of samples received	: 16		
No. of samples analysed	: 16		

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
- Descriptive Results
- Surrogate Control Limits

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	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Brendan Schrader	Laboratory Technician	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, 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 Contract 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.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP080: The trip spike and its control have been analysed for volatile TPH and BTEXN only. The trip spike and control were prepared in the lab using reagent grade sand spiked with petrol. The spike was dispatched from the lab and the control retained.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02_0.5 - 0.7	BH02_1.0 - 1.2	BH02_1.5 - 1.7	BH09_0.5 - 0.7	BH09_1.8 - 2.0
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2429778-001	ES2429778-002	ES2429778-003	ES2429778-004	ES2429778-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		7.9	12.3	7.7	7.5	11.8
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		----	----	----	No	----
Asbestos (Trace)	1332-21-4	-	-		----	----	----	No	----
Asbestos Type	1332-21-4	-	--		----	----	----	-	----
Synthetic Mineral Fibre	----	-	--		----	----	----	No	----
Organic Fibre	----	-	--		----	----	----	No	----
Sample weight (dry)	----	0.01	g		----	----	----	197	----
APPROVED IDENTIFIER:	----	-	--		----	----	----	B.SCHRADER	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	16	25	<5	14
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		7	19	13	7	16
Copper	7440-50-8	5	mg/kg		6	16	28	<5	41
Lead	7439-92-1	5	mg/kg		9	9	15	11	13
Nickel	7440-02-0	2	mg/kg		5	9	69	4	12
Zinc	7440-66-6	5	mg/kg		22	32	137	21	63
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	<0.05	----	----
gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg		<0.05	----	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02_0.5 - 0.7	BH02_1.0 - 1.2	BH02_1.5 - 1.7	BH09_0.5 - 0.7	BH09_1.8 - 2.0
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2429778-001	ES2429778-002	ES2429778-003	ES2429778-004	ES2429778-005
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg		<0.05	----	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	----	<0.05	----	----
^ **Total Chlordane (sum)**	----	0.05	mg/kg		<0.05	----	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	----	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	----	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	<0.05	----	----
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		<0.05	----	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	----	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	----	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	----	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	----	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	----	<0.2	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	<0.05	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-29-2	0.05	mg/kg		<0.05	----	<0.05	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	----	<0.05	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	----	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	----	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	----	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	----	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02_0.5 - 0.7	BH02_1.0 - 1.2	BH02_1.5 - 1.7	BH09_0.5 - 0.7	BH09_1.8 - 2.0
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2429778-001	ES2429778-002	ES2429778-003	ES2429778-004	ES2429778-005
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	----	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	----	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg		<0.05	----	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	----	<0.05	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	----	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg		<0.2	----	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	----	<0.05	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	----	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	----	<0.05	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	----	<0.05	----	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	----	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg		<0.05	----	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	----	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	----	<0.05	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02_0.5 - 0.7	BH02_1.0 - 1.2	BH02_1.5 - 1.7	BH09_0.5 - 0.7	BH09_1.8 - 2.0
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2429778-001	ES2429778-002	ES2429778-003	ES2429778-004	ES2429778-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02_0.5 - 0.7	BH02_1.0 - 1.2	BH02_1.5 - 1.7	BH09_0.5 - 0.7	BH09_1.8 - 2.0
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2429778-001	ES2429778-002	ES2429778-003	ES2429778-004	ES2429778-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**77.8**	----	**100**	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**69.2**	----	**111**	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**62.2**	----	**61.6**	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**87.0**	**81.7**	**82.4**	**83.8**	**82.2**
2-Chlorophenol-D4	93951-73-6	0.5	%		**83.4**	**82.6**	**86.0**	**89.5**	**88.1**
2.4.6-Tribromophenol	118-79-6	0.5	%		**63.8**	**54.0**	**64.0**	**63.8**	**64.6**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**91.8**	**86.0**	**87.7**	**85.7**	**86.5**
Anthracene-d10	1719-06-8	0.5	%		**91.5**	**86.5**	**88.2**	**84.9**	**86.0**
4-Terphenyl-d14	1718-51-0	0.5	%		**103**	**104**	**105**	**103**	**104**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**75.8**	**75.7**	**78.6**	**89.9**	**84.3**
Toluene-D8	2037-26-5	0.2	%		**82.5**	**83.8**	**86.6**	**79.8**	**78.5**
4-Bromofluorobenzene	460-00-4	0.2	%		**91.3**	**93.7**	**94.3**	**91.3**	**86.1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH09_2.0-2.2	BH10_0.5 - 0.7	BH10_2.0 - 2.2	DUP_01	TB
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	10-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2429778-006	ES2429778-007	ES2429778-008	ES2429778-009	ES2429778-014
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		16.7	28.2	34.1	28.6	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		----	No	----	----	----
Asbestos (Trace)	1332-21-4	-	-		----	No	----	----	----
Asbestos Type	1332-21-4	-	--		----	-	----	----	----
Synthetic Mineral Fibre	----	-	--		----	No	----	----	----
Organic Fibre	----	-	--		----	No	----	----	----
Sample weight (dry)	----	0.01	g		----	282	----	----	----
APPROVED IDENTIFIER:	----	-	--		----	B.SCHRADER	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		13	<5	10	<5	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg		16	11	18	11	----
Copper	7440-50-8	5	mg/kg		34	10	20	14	----
Lead	7439-92-1	5	mg/kg		12	10	18	17	----
Nickel	7440-02-0	2	mg/kg		12	7	15	7	----
Zinc	7440-66-6	5	mg/kg		59	27	28	32	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		----	<0.1	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	<0.05	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		----	<0.05	----	----	----
gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg		----	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		----	<0.05	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH09_2.0-2.2	BH10_0.5 - 0.7	BH10_2.0 - 2.2	DUP_01	TB
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	10-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2429778-006	ES2429778-007	ES2429778-008	ES2429778-009	ES2429778-014
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
Heptachlor	76-44-8	0.05	mg/kg		----	<0.05	----	----	----
Aldrin	309-00-2	0.05	mg/kg		----	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		----	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		----	<0.05	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	<0.05	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		----	<0.05	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		----	<0.05	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		----	<0.05	----	----	----
Endrin	72-20-8	0.05	mg/kg		----	<0.05	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	<0.05	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		----	<0.05	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		----	<0.05	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	<0.05	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		----	<0.2	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		----	<0.05	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg		----	<0.2	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		----	<0.05	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		----	<0.05	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		----	<0.05	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		----	<0.05	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		----	<0.2	----	----	----
Dimethoate	60-51-5	0.05	mg/kg		----	<0.05	----	----	----
Diazinon	333-41-5	0.05	mg/kg		----	<0.05	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH09_2.0-2.2	BH10_0.5 - 0.7	BH10_2.0 - 2.2	DUP_01	TB
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	10-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2429778-006	ES2429778-007	ES2429778-008	ES2429778-009	ES2429778-014
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		----	<0.05	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		----	<0.2	----	----	----
Malathion	121-75-5	0.05	mg/kg		----	<0.05	----	----	----
Fenthion	55-38-9	0.05	mg/kg		----	<0.05	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	<0.05	----	----	----
Parathion	56-38-2	0.2	mg/kg		----	<0.2	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		----	<0.05	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		----	<0.05	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		----	<0.05	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		----	<0.05	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg		----	<0.05	----	----	----
Ethion	563-12-2	0.05	mg/kg		----	<0.05	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg		----	<0.05	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		----	<0.05	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH09_2.0-2.2	BH10_0.5 - 0.7	BH10_2.0 - 2.2	DUP_01	TB
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	10-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2429778-006	ES2429778-007	ES2429778-008	ES2429778-009	ES2429778-014
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH09_2.0-2.2	BH10_0.5 - 0.7	BH10_2.0 - 2.2	DUP_01	TB
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	09-Sep-2024 00:00	10-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2429778-006	ES2429778-007	ES2429778-008	ES2429778-009	ES2429778-014
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	**87.0**	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	**97.1**	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	**77.6**	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**83.3**	**83.3**	**84.5**	**81.9**	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**87.0**	**86.8**	**88.7**	**83.0**	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**65.1**	**58.1**	**63.7**	**58.8**	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**86.8**	**85.6**	**85.4**	**88.2**	----
Anthracene-d10	1719-06-8	0.5	%		**89.0**	**84.7**	**87.0**	**90.0**	----
4-Terphenyl-d14	1718-51-0	0.5	%		**104**	**102**	**103**	**106**	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**81.6**	**87.5**	**78.2**	**84.5**	**99.6**
Toluene-D8	2037-26-5	0.2	%		**72.9**	**79.2**	**73.4**	**79.4**	**104**
4-Bromofluorobenzene	460-00-4	0.2	%		**85.1**	**92.9**	**78.6**	**85.7**	**109**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TS	TSC	----	----	----
				Sampling date / time	10-Sep-2024 00:00	10-Sep-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2429778-015	ES2429778-016	--------	--------	--------
					Result	Result	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		**5.0**	**6.0**	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		**6.1**	**7.2**	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		**6.1**	**7.2**	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		**2.6**	**3.2**	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		**19.8**	**23.6**	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg		**8.7**	**10.4**	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**101**	**104**	----	----	----
Toluene-D8	2037-26-5	0.2	%		**106**	**104**	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**107**	**106**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RB01	FB01	RB02	FB02	----
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	10-Sep-2024 00:00	10-Sep-2024 00:00	----
Compound	CAS Number	LOR	Unit		ES2429778-010	ES2429778-011	ES2429778-012	ES2429778-013	--------
					Result	Result	Result	Result	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RB01	FB01	RB02	FB02	----
				Sampling date / time	09-Sep-2024 00:00	09-Sep-2024 00:00	10-Sep-2024 00:00	10-Sep-2024 00:00	----
Compound	CAS Number	LOR	Unit		ES2429778-010	ES2429778-011	ES2429778-012	ES2429778-013	--------
					Result	Result	Result	Result	----
EP080: BTEXN - Continued									
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**109**	**103**	**106**	**104**	----
Toluene-D8	2037-26-5	2	%		**109**	**105**	**106**	**104**	----
4-Bromofluorobenzene	460-00-4	2	%		**109**	**107**	**110**	**107**	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	BH09_0.5 - 0.7 - 09-Sep-2024 00:00	A soil sample.
EA200: Description	BH10_0.5 - 0.7 - 09-Sep-2024 00:00	A soil sample.

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	63	125
Toluene-D8	2037-26-5	67	124
4-Bromofluorobenzene	460-00-4	66	131

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

QUALITY CONTROL REPORT

Work Order	: **ES2429778**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Contact	: Samiksha Sathish
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12641966	Date Samples Received	: 11-Sep-2024
Order number	: ----	Date Analysis Commenced	: 13-Sep-2024
C-O-C number	: ----	Issue Date	: 19-Sep-2024
Sampler	: MALACHI HURLEY		
Site	:		
Quote number	: EN/000		
No. of samples received	: 16		
No. of samples analysed	: 16		

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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Brendan Schrader	Laboratory Technician	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, 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.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
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
RPD = Relative Percentage Difference
# = Indicates failed QC
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 6057525)									
ES2429544-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	11	11	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	16	16	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	10	10	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	22	20	12.2	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	24	20	16.8	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	79	94	17.8	0% - 50%
ES2429778-008	BH10_2.0 - 2.2	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	18	21	14.7	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	15	14	8.4	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	10	12	12.7	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	20	20	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	18	20	7.2	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	28	28	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 6055970)									
ES2429629-022	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	11.2	10.6	5.9	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 6057530)									
ES2429778-004	BH09_0.5 - 0.7	EA055: Moisture Content	----	0.1 (1.0)*	%	7.5	7.2	3.0	No Limit
ES2429900-002	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	9.3	8.8	6.1	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 6060061)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 6060061) - continued									
ES2429915-002	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	8.1	6.1	28.1	No Limit
ES2429915-013	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	23.2	23.6	1.6	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 6057524)									
ES2429544-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2429778-008	BH10_2.0 - 2.2	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 6054565)									
ES2429778-001	BH02_0.5 - 0.7	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 6054566)									
ES2429778-001	BH02_0.5 - 0.7	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 6054566)									
ES2429778-001	BH02_0.5 - 0.7	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 6054566) - continued									
ES2429778-001	BH02_0.5 - 0.7	EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 6054563)									
ES2429778-001	BH02_0.5 - 0.7	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6054564)									
ES2429778-001	BH02_0.5 - 0.7	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6054752)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6054752) - continued									
ES2429629-022	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2429778-003	BH02_1.5 - 1.7	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6057995)									
ES2430150-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2430150-007	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 6054564)									
ES2429778-001	BH02_0.5 - 0.7	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 6054752)									
ES2429629-022	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2429778-003	BH02_1.5 - 1.7	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 6057995)									
ES2430150-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2430150-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 6054752)									
ES2429629-022	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
ES2429778-003	BH02_1.5 - 1.7	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP080: BTEXN (QC Lot: 6057995)									
ES2430150-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 6057995) - continued									
ES2430150-001	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
ES2430150-007	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 6061480)									
ES2429816-001	Anonymous	EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
ES2429809-005	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.011	0.008	34.5	No Limit
ES2429816-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.017	0.017	0.0	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 6061485)									
ES2429778-010	RB01	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2429816-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6058046)									
CA2405891-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	400	400	0.0	0% - 20%
ES2430188-005	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 6058046)									
CA2405891-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	430	430	0.0	0% - 20%
ES2430188-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 6058046)									
CA2405891-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP080: BTEXN (QC Lot: 6058046) - continued									
CA2405891-001	Anonymous	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES2430188-005	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6057525)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	109	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	96.9	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	117	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	101	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	98.3	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	109	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	92.0	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 6057524)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	75.2	70.0	125
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 6054565)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	92.8	62.0	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 6054566)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	88.0	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	89.2	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	85.7	67.0	119
EP068: gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.5	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.9	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.8	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	88.0	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	86.9	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	92.9	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.2	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	86.7	66.0	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.2	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.9	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	95.0	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	89.8	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	86.3	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.7	62.0	124

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068A: Organochlorine Pesticides (OC) (QCLot: 6054566) - continued								
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	90.0	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	83.7	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	106	54.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6054566)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	92.0	59.0	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.6	62.0	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	89.8	54.0	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	81.8	67.0	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	76.9	70.0	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	86.2	72.0	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	79.8	68.0	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	77.9	68.0	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.1	69.0	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	88.2	76.0	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	77.9	64.0	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	87.4	70.0	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	80.9	69.0	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	88.8	66.0	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	75.5	68.0	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	86.7	62.0	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	80.7	68.0	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.1	65.0	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	55.6	41.0	123
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6054563)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	91.5	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	89.8	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	84.5	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	88.9	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	110	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	90.4	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	90.5	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	89.0	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	91.4	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	93.8	75.0	127

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6054563) - continued								
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	89.7	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	95.6	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	91.6	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	80.1	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	71.5	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	85.0	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6054564)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	101	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	101	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	100	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6054752)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	95.8	72.2	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6057995)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	90.2	72.2	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6054564)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	106	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	100	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	97.6	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6054752)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	91.8	72.4	133
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6057995)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	88.5	72.4	133
EP080: BTEXN (QCLot: 6054752)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	103	76.0	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	97.3	78.5	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	99.9	77.4	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	103	78.2	121
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	99.8	81.3	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	116	78.8	122
EP080: BTEXN (QCLot: 6057995)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	96.8	76.0	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	94.8	78.5	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	96.1	77.4	121

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080: BTEXN (QCLot: 6057995) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	94.3	78.2	121
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	96.6	81.3	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	98.9	78.8	122

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 6061480)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.4	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.7	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100.0	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	104	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.6	85.0	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.7	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.7	79.0	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 6061485)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.1	77.0	111
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6054558)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	59.2	53.7	97.0
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	80.0	63.3	107
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	70.8	58.3	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6058046)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	83.0	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6054558)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	61.4	53.9	95.5
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	75.6	57.8	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	60.6	50.5	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6058046)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	83.7	75.0	127
EP080: BTEXN (QCLot: 6058046)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.5	68.3	119
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	95.8	73.5	120
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	95.7	73.8	122
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	90.6	73.0	122

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080: BTEXN (QCLot: 6058046) - continued								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	96.7	76.4	123
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	118	75.5	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6057525)							
ES2429544-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	97.9	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	101	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	99.0	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	89.8	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	99.7	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	96.9	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	97.6	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 6057524)							
ES2429544-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	85.4	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 6054565)							
ES2429778-001	BH02_0.5 - 0.7	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	80.7	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 6054566)							
ES2429778-001	BH02_0.5 - 0.7	EP068: gamma-BHC - (Lindane)	58-89-9	0.5 mg/kg	78.8	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	86.4	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	80.8	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	82.5	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	74.5	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	80.4	70.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6054566)							
ES2429778-001	BH02_0.5 - 0.7	EP068: Diazinon	333-41-5	0.5 mg/kg	78.9	70.0	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	74.4	70.0	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	76.8	70.0	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	81.1	70.0	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	77.4	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6054563)							
ES2429778-001	BH02_0.5 - 0.7	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	85.0	70.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6054563) - continued							
ES2429778-001	BH02_0.5 - 0.7	EP075(SIM): Pyrene	129-00-0	10 mg/kg	91.2	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6054564)							
ES2429778-001	BH02_0.5 - 0.7	EP071: C10 - C14 Fraction	----	480 mg/kg	116	73.0	137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	106	53.0	131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	120	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6054752)							
ES2429629-022	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	79.1	60.4	142
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6057995)							
ES2430150-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	72.7	60.4	142
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6054564)							
ES2429778-001	BH02_0.5 - 0.7	EP071: >C10 - C16 Fraction	----	860 mg/kg	97.6	73.0	137
		EP071: >C16 - C34 Fraction	----	4320 mg/kg	112	53.0	131
		EP071: >C34 - C40 Fraction	----	890 mg/kg	104	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6054752)							
ES2429629-022	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	75.1	61.1	142
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6057995)							
ES2430150-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	73.0	61.1	142
EP080: BTEXN (QCLot: 6054752)							
ES2429629-022	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	83.8	62.1	122
		EP080: Toluene	108-88-3	2.5 mg/kg	82.5	66.6	119
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	84.5	67.4	123
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	87.0	66.4	121
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	86.0	70.7	121
		EP080: Naphthalene	91-20-3	2.5 mg/kg	95.7	61.1	115
EP080: BTEXN (QCLot: 6057995)							
ES2430150-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	78.2	62.1	122
		EP080: Toluene	108-88-3	2.5 mg/kg	77.1	66.6	119
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	80.2	67.4	123
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	75.8	66.4	121
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	79.9	70.7	121
		EP080: Naphthalene	91-20-3	2.5 mg/kg	79.2	61.1	115

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020T: Total Metals by ICP-MS (QCLot: 6061480)							
ES2429736-010	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	94.9	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	95.5	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	101	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	101	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	97.5	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	97.1	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	96.3	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 6061485)							
ES2429736-010	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	102	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6058046)							
CA2405891-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	103	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6058046)							
CA2405891-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	95.2	70.0	130
EP080: BTEXN (QCLot: 6058046)							
CA2405891-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	105	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	109	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	105	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	111	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	99.3	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	98.6	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2429778**	Page	: 1 of 9
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Telephone	: +61-2-8784 8555
Project	: 12641966	Date Samples Received	: 11-Sep-2024
Site	:	Issue Date	: 19-Sep-2024
Sampler	: MALACHI HURLEY	No. of samples received	: 16
Order number	: ----	No. of samples analysed	: 16

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, where applicable to the methodology, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)						
TRH - Semivolatile Fraction	EP071	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)						
TRH - Semivolatile Fraction	EP071	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BH02_1.5 - 1.7	**09-Sep-2024**	**----**	----	----	**13-Sep-2024**	23-Sep-2024	✓
Soil Glass Jar - Unpreserved (EA055)							
BH02_0.5 - 0.7, BH02_1.0 - 1.2, BH09_0.5 - 0.7, BH09_1.8 - 2.0, BH09_2.0-2.2, BH10_0.5 - 0.7, BH10_2.0 - 2.2, DUP_01	**09-Sep-2024**	**----**	----	----	**16-Sep-2024**	23-Sep-2024	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag - Friable Asbestos/PSD Bag (EA200)							
BH09_0.5 - 0.7, BH10_0.5 - 0.7	**09-Sep-2024**	**----**	----	----	**16-Sep-2024**	08-Mar-2025	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH02_0.5 - 0.7, BH02_1.0 - 1.2, BH02_1.5 - 1.7, BH09_0.5 - 0.7, BH09_1.8 - 2.0, BH09_2.0-2.2, BH10_0.5 - 0.7, BH10_2.0 - 2.2, DUP_01	**09-Sep-2024**	**16-Sep-2024**	08-Mar-2025	✓	**17-Sep-2024**	08-Mar-2025	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BH02_0.5 - 0.7, BH02_1.0 - 1.2, BH02_1.5 - 1.7, BH09_0.5 - 0.7, BH09_1.8 - 2.0, BH09_2.0-2.2, BH10_0.5 - 0.7, BH10_2.0 - 2.2, DUP_01	**09-Sep-2024**	**16-Sep-2024**	07-Oct-2024	✓	**18-Sep-2024**	07-Oct-2024	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066)							
BH02_0.5 - 0.7, BH02_1.5 - 1.7, BH10_0.5 - 0.7	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**16-Sep-2024**	23-Oct-2024	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
BH02_0.5 - 0.7	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**16-Sep-2024**	23-Oct-2024	✓
Soil Glass Jar - Unpreserved (EP068)							
BH02_1.5 - 1.7, BH10_0.5 - 0.7	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**17-Sep-2024**	23-Oct-2024	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068)							
BH02_0.5 - 0.7	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**16-Sep-2024**	23-Oct-2024	✓
Soil Glass Jar - Unpreserved (EP068)							
BH02_1.5 - 1.7, BH10_0.5 - 0.7	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**17-Sep-2024**	23-Oct-2024	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
BH02_0.5 - 0.7, BH02_1.0 - 1.2, BH02_1.5 - 1.7, BH09_0.5 - 0.7, BH09_1.8 - 2.0, BH09_2.0-2.2, BH10_0.5 - 0.7, BH10_2.0 - 2.2, DUP_01	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**16-Sep-2024**	23-Oct-2024	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
BH02_0.5 - 0.7, BH02_1.0 - 1.2, BH02_1.5 - 1.7, BH09_0.5 - 0.7, BH09_1.8 - 2.0, BH09_2.0-2.2, BH10_0.5 - 0.7, BH10_2.0 - 2.2, DUP_01	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**14-Sep-2024**	23-Sep-2024	✓
Soil Glass Jar - Unpreserved (EP080)							
BH10_0.5 - 0.7	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**17-Sep-2024**	23-Sep-2024	✓
Soil Glass Jar - Unpreserved (EP080)							
TB	**10-Sep-2024**	**16-Sep-2024**	24-Sep-2024	✓	**17-Sep-2024**	24-Sep-2024	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BH02_0.5 - 0.7, BH02_1.0 - 1.2, BH02_1.5 - 1.7, BH09_0.5 - 0.7, BH09_1.8 - 2.0, BH09_2.0-2.2, BH10_0.5 - 0.7, BH10_2.0 - 2.2, DUP_01	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**14-Sep-2024**	23-Sep-2024	✓
Soil Glass Jar - Unpreserved (EP080) BH10_0.5 - 0.7	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**17-Sep-2024**	23-Sep-2024	✓
Soil Glass Jar - Unpreserved (EP080) TB	**10-Sep-2024**	**16-Sep-2024**	24-Sep-2024	✓	**17-Sep-2024**	24-Sep-2024	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) BH02_0.5 - 0.7, BH02_1.0 - 1.2, BH02_1.5 - 1.7, BH09_0.5 - 0.7, BH09_1.8 - 2.0, BH09_2.0-2.2, BH10_2.0 - 2.2, DUP_01	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**14-Sep-2024**	23-Sep-2024	✓
Soil Glass Jar - Unpreserved (EP080) BH10_0.5 - 0.7	**09-Sep-2024**	**13-Sep-2024**	23-Sep-2024	✓	**17-Sep-2024**	23-Sep-2024	✓
Soil Glass Jar - Unpreserved (EP080) TB, TS, TSC	**10-Sep-2024**	**16-Sep-2024**	24-Sep-2024	✓	**17-Sep-2024**	24-Sep-2024	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) RB01, FB01	**09-Sep-2024**	**17-Sep-2024**	08-Mar-2025	✓	**17-Sep-2024**	08-Mar-2025	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) RB02, FB02	**10-Sep-2024**	**17-Sep-2024**	09-Mar-2025	✓	**17-Sep-2024**	09-Mar-2025	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) RB01, FB01	**09-Sep-2024**	**----**	----	----	**19-Sep-2024**	07-Oct-2024	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) RB02, FB02	**10-Sep-2024**	**----**	----	----	**19-Sep-2024**	08-Oct-2024	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
RB01,	FB01	**09-Sep-2024**	**13-Sep-2024**	16-Sep-2024	✓	**17-Sep-2024**	23-Oct-2024	✓
Amber Glass Bottle - Unpreserved (EP071)								
RB02,	FB02	**10-Sep-2024**	**13-Sep-2024**	17-Sep-2024	✓	**17-Sep-2024**	23-Oct-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
RB01,	FB01	**09-Sep-2024**	**16-Sep-2024**	23-Sep-2024	✓	**17-Sep-2024**	23-Sep-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
RB02,	FB02	**10-Sep-2024**	**16-Sep-2024**	24-Sep-2024	✓	**17-Sep-2024**	24-Sep-2024	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
RB01,	FB01	**09-Sep-2024**	**13-Sep-2024**	16-Sep-2024	✓	**17-Sep-2024**	23-Oct-2024	✓
Amber Glass Bottle - Unpreserved (EP071)								
RB02,	FB02	**10-Sep-2024**	**13-Sep-2024**	17-Sep-2024	✓	**17-Sep-2024**	23-Oct-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
RB01,	FB01	**09-Sep-2024**	**16-Sep-2024**	23-Sep-2024	✓	**17-Sep-2024**	23-Sep-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
RB02,	FB02	**10-Sep-2024**	**16-Sep-2024**	24-Sep-2024	✓	**17-Sep-2024**	24-Sep-2024	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
RB01,	FB01	**09-Sep-2024**	**16-Sep-2024**	23-Sep-2024	✓	**17-Sep-2024**	23-Sep-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
RB02,	FB02	**10-Sep-2024**	**16-Sep-2024**	24-Sep-2024	✓	**17-Sep-2024**	24-Sep-2024	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	5	45	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	3	6	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	4	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	4	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2429778**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Contact	: Samiksha Sathish
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: barry.houston@ghd.com	E-mail	: samiksha.sathish@alsglobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12641966	Page	: 1 of 3
Order number	: ----	Quote number	: EB2020GHDSER0038 (EN/000)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: MALACHI HURLEY		

Dates

Date Samples Received	: 11-Sep-2024 21:10	Issue Date	: 13-Sep-2024
Client Requested Due Date	: 19-Sep-2024	Scheduled Reporting Date	: **19-Sep-2024**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 9.3'C 6.7'C 10.1'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 16 / 16

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **QC Forward analysis will be conducted by Eurofins.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Asbestos analysis will be conducted by ALS Newcastle.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Unless otherwise stated, analytical work for this work order will be conducted at ALS Sydney, NATA accreditation no. 825, site no. 10911.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EA200 Asbestos Identification in Soils -	SOIL - EP080 BTEXN	SOIL - S-13 OC/OP/PCB	SOIL - S-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES2429778-001	09-Sep-2024 00:00	BH02_0.5 - 0.7	✓			✓		✓
ES2429778-002	09-Sep-2024 00:00	BH02_1.0 - 1.2	✓					✓
ES2429778-003	09-Sep-2024 00:00	BH02_1.5 - 1.7	✓			✓		✓
ES2429778-004	09-Sep-2024 00:00	BH09_0.5 - 0.7	✓	✓				✓
ES2429778-005	09-Sep-2024 00:00	BH09_1.8 - 2.0	✓					✓
ES2429778-006	09-Sep-2024 00:00	BH09_2.0-2.2	✓					✓
ES2429778-007	09-Sep-2024 00:00	BH10_0.5 - 0.7	✓	✓		✓		✓
ES2429778-008	09-Sep-2024 00:00	BH10_2.0 - 2.2	✓					✓
ES2429778-009	09-Sep-2024 00:00	DUP_01	✓					✓
ES2429778-014	10-Sep-2024 00:00	TB					✓	
ES2429778-015	10-Sep-2024 00:00	TS			✓			
ES2429778-016	10-Sep-2024 00:00	TSC			✓			

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - W-05T TRH/BTEXN/8 Metals (Total)
ES2429778-010	09-Sep-2024 00:00	RB01	✓
ES2429778-011	09-Sep-2024 00:00	FB01	✓
ES2429778-012	10-Sep-2024 00:00	RB02	✓
ES2429778-013	10-Sep-2024 00:00	FB02	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

BARRY HOUSTON

- *AU Certificate of Analysis - NATA (COA)	Email	barry.houston@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	barry.houston@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	barry.houston@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	barry.houston@ghd.com
- A4 - AU Tax Invoice (INV)	Email	barry.houston@ghd.com
- Chain of Custody (CoC) (COC)	Email	barry.houston@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	barry.houston@ghd.com
- EDI Format - XTab (XTAB)	Email	barry.houston@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	barry.houston@ghd.com

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com

MALACHI HURLEY

- *AU Certificate of Analysis - NATA (COA)	Email	malachi.hurley@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	malachi.hurley@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	malachi.hurley@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	malachi.hurley@ghd.com
- Chain of Custody (CoC) (COC)	Email	malachi.hurley@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	malachi.hurley@ghd.com
- EDI Format - XTab (XTAB)	Email	malachi.hurley@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	malachi.hurley@ghd.com

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

SAMPLES RECEIVED WITHOUT COC

Environmental Division
Sydney
Work Order Reference
ES2429778

Telephone : +61-2-8784 8555

CLIENT: GHD	CARRIER: ATC
PROJECT / QUOTE: 12641966	CONNOTE #:
CONTACT NAME:	AWB #:
CONTACT NUMBER:	# OF ESKIES: 1 SECURITY SEAL: Y N N/A
SAMPLER NAME:	TYPE OF ESKIES: Large
SAMPLER NUMBER:	ESKY NUMBERS: WE0917
SAMPLES RECEIVED BY:	# OF SAMPLES:
DATE/TIME RECEIVED: 11/9/24 CLIENT SERVICES NOTIFIED BY:	TEMPERATURE: 9.3°C, 6.7°C, 10.1°C

LAB ID	SAMPLE DETAILS: SAMPLE ID	DATE	MATRIX	NUMBER OF CONTAINERS	ADDITIONAL INFORMATION / COMMENTS:
1	BH02-0.5-0.7	9/9/24	S		OTHER INFORMATION: ☐ MICRO ☐ BIOSECURITY ☐ BROKEN CONTAINERS ☐ COC EMAILED ☐ ALS COMPASS
2					
3					
4					
5					
			TOTAL		

CORRESPONDENCE (DATE, INITIALS - DETAILS OF CORRESPONDENCE):

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

BRISBANE 32 Shand Street, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 08 8359 0890 E: mackay@alsglobal.com

MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com

PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: samples.townsville@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: samples.wollongong@alsglobal.com

CLIENT: GHD	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☒ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Sydney		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes / No / N/A
PROJECT: 12541966	ALS QUOTE NO:	COC SEQUENCE NUMBER (Circle)	Free Ice / frozen Ice bricks present upon receipt? Yes / No / N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Barry Houston	CONTACT PH:	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Malachi Hurley	SAMPLER MOBILE:	RELINQUISHED BY: Malachi Hurley	RECEIVED BY: Ferns
COC emailed to ALS? YES	EDD FORMAT (or default):	DATE/TIME: 11/09/2024	DATE/TIME: 12/9/24 9.30
Email Reports to (will default to PM if no other addresses are listed): Barry.houston@ghd.com / malachi.hurley@ghd.com			RELINQUISHED BY: / DATE/TIME: / RECEIVED BY: / DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed): Barry.houston@ghd.com			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: PLEASE PLACE ALL PFAS JARS ON HOLD

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	S-26	S-13	W-5 (RB/FB)	S-18 (TS/TB)	Asbestos (abs/Prs)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH02_0.5 - 0.7	9/09/2024	S	Jar	2	x	x							
2	BH02_1.0 - 1.2	9/09/2024	S	Jar	2	x								
3	BH02_1.5 -1.7	9/09/2024	S	Jar	2	x	x							
4	BH09_0.5 - 0.7	10/09/2024	S	Jar and bag	3	x				x				
5	BH09_1.8 - 2.0	10/09/2024	S	Jar and bag	3	x								
6	BH09_2.0-2.2	10/09/2024	S	Jar	2	x								
7	BH10_0.5 - 0.7	10/09/2024	S	Jar and bag	3	x	x			x				
8	BH10_2.0 - 2.2	10/09/2024	S	Jar and bag	3	x								
9	DUP_01	10/09/2024	S	Jar	2	x								
—	TRI_01	10/09/2024	S	Jar	2	Forward to Eurofins								
10	RB01	9/09/2024	W	Bottles	4			x						
11	FB01	9/09/2024	W	Bottles	4			x						
12	RB02	10/09/2024	W	Bottles	4			x						
13	FB02	10/09/2024	W	Bottles	4			x						
14	TB	10/09/2024	S	Jar	1				x					
15	TS	10/09/2024	S	Jar	1				x					
16 TSL				TOTAL	42									

Environmental Division
Sydney
Work Order Reference
ES2429778

Telephone : +61-2-8784 8555

Split WO
Lab Analysis: ALS Newcastle/Eurofins
Organised By / Date:
Relinquished By / Date:
Courier: Asbestos/QC Eurofins
WO No: ES2429778
Actioned By / Date:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: **ES2430642**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Contact	: Samiksha Sathish
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12641966	Date Samples Received	: 18-Sep-2024 12:00
Order number	: 12641966	Date Analysis Commenced	: 25-Sep-2024
C-O-C number	: ----	Issue Date	: 01-Oct-2024 15:38
Sampler	: MALACHI HURLEY, MORASLIN CHOWDURY		
Site	:		
Quote number	: EN/000		
No. of samples received	: 14		
No. of samples analysed	: 8		

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
- Descriptive Results
- Surrogate Control Limits

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*
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Brendan Schrader	Laboratory Technician	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, 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 Contract 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.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP080: Samples not received in a suitable time frame to conduct the analysis within the recommended holding time.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH06_0.5-0.7	BH06_1.5-1.7	BH07_0.5-0.7	BH07_1.5-1.9 Received as BH07_1.7-1.9	BH12_0.5-0.7
				Sampling date / time	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2430642-001	ES2430642-002	ES2430642-003	ES2430642-004	ES2430642-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		22.6	34.0	7.0	22.3	7.6
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		----	----	No	----	No
Asbestos (Trace)	1332-21-4	-	-		----	----	No	----	No
Asbestos Type	1332-21-4	-	--		----	----	-	----	-
Synthetic Mineral Fibre	----	-	--		----	----	No	----	No
Organic Fibre	----	-	--		----	----	No	----	No
Sample weight (dry)	----	0.01	g		----	----	224	----	160
APPROVED IDENTIFIER:	----	-	--		----	----	B.SCHRADER	----	B.SCHRADER
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	8	<5	7	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		6	18	9	14	10
Copper	7440-50-8	5	mg/kg		<5	22	6	24	<5
Lead	7439-92-1	5	mg/kg		8	14	10	10	12
Nickel	7440-02-0	2	mg/kg		3	14	4	11	5
Zinc	7440-66-6	5	mg/kg		18	32	22	58	25
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	<0.1	----	<0.1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg		<0.05	----	<0.05	----	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH06_0.5-0.7	BH06_1.5-1.7	BH07_0.5-0.7	BH07_1.5-1.9 Received as BH07_1.7-1.9	BH12_0.5-0.7
				Sampling date / time	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2430642-001	ES2430642-002	ES2430642-003	ES2430642-004	ES2430642-005
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Aldrin	309-00-2	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Endrin	72-20-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	----	<0.2	----	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	----	<0.2	----	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	----	<0.2	----	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH06_0.5-0.7	BH06_1.5-1.7	BH07_0.5-0.7	BH07_1.5-1.9 Received as BH07_1.7-1.9	BH12_0.5-0.7
				Sampling date / time	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2430642-001	ES2430642-002	ES2430642-003	ES2430642-004	ES2430642-005
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Dimethoate	60-51-5	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Diazinon	333-41-5	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	----	<0.2	----	<0.2
Malathion	121-75-5	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Fenthion	55-38-9	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Parathion	56-38-2	0.2	mg/kg		<0.2	----	<0.2	----	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Ethion	563-12-2	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	**1.4**	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	**2.6**	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	**2.4**	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	**1.0**	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH06_0.5-0.7	BH06_1.5-1.7	BH07_0.5-0.7	BH07_1.5-1.9 Received as BH07_1.7-1.9	BH12_0.5-0.7
				Sampling date / time	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00
Compound	CAS Number	LOR	Unit		ES2430642-001	ES2430642-002	ES2430642-003	ES2430642-004	ES2430642-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	**1.0**	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	**1.2**	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	**1.0**	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	**0.5**	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	**0.7**	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	**11.8**	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	**1.3**	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**1.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.8**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Sample ID	BH06_0.5-0.7	BH06_1.5-1.7	BH07_0.5-0.7	BH07_1.5-1.9 Received as BH07_1.7-1.9	BH12_0.5-0.7
				Sampling date / time	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00
					ES2430642-001	ES2430642-002	ES2430642-003	ES2430642-004	ES2430642-005
					Result	Result	Result	Result	Result
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**75.3**	**----**	**93.8**	**----**	**84.0**
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**106**	**----**	**125**	**----**	**115**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**81.6**	**----**	**116**	**----**	**94.4**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**81.6**	**84.9**	**82.3**	**89.2**	**81.0**
2-Chlorophenol-D4	93951-73-6	0.5	%		**84.7**	**82.5**	**85.7**	**83.2**	**80.3**
2.4.6-Tribromophenol	118-79-6	0.5	%		**70.9**	**72.3**	**66.0**	**67.8**	**53.0**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**87.1**	**86.1**	**89.7**	**87.7**	**89.0**
Anthracene-d10	1719-06-8	0.5	%		**90.8**	**89.4**	**93.7**	**92.4**	**91.0**
4-Terphenyl-d14	1718-51-0	0.5	%		**83.7**	**82.2**	**85.3**	**83.5**	**84.5**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**81.5**	**87.0**	**90.9**	**88.9**	**95.1**
Toluene-D8	2037-26-5	0.2	%		**70.4**	**78.8**	**77.0**	**78.7**	**82.0**
4-Bromofluorobenzene	460-00-4	0.2	%		**75.5**	**76.0**	**79.5**	**77.6**	**77.9**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH12_1.5-1.7	BH04_0.46-0.5 Received as extra	BH8_0.5-0.8 Received as extra	----	----
				Sampling date / time	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2430642-006	ES2430642-010	ES2430642-013	--------	--------
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**13.4**	**----**	**21.3**	**----**	**----**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		**----**	**No**	**----**	**----**	**----**
Asbestos (Trace)	1332-21-4	-	-		**----**	**No**	**----**	**----**	**----**
Asbestos Type	1332-21-4	-	--		**----**	**-**	**----**	**----**	**----**
Synthetic Mineral Fibre	----	-	--		**----**	**No**	**----**	**----**	**----**
Organic Fibre	----	-	--		**----**	**No**	**----**	**----**	**----**
Sample weight (dry)	----	0.01	g		**----**	**218**	**----**	**----**	**----**
APPROVED IDENTIFIER:	----	-	--		**----**	**B.SCHRADER**	**----**	**----**	**----**
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	**----**	<5	**----**	**----**
Cadmium	7440-43-9	1	mg/kg		<1	**----**	<1	**----**	**----**
Chromium	7440-47-3	2	mg/kg		**12**	**----**	**8**	**----**	**----**
Copper	7440-50-8	5	mg/kg		**27**	**----**	<5	**----**	**----**
Lead	7439-92-1	5	mg/kg		**12**	**----**	**9**	**----**	**----**
Nickel	7440-02-0	2	mg/kg		**6**	**----**	**4**	**----**	**----**
Zinc	7440-66-6	5	mg/kg		**36**	**----**	**17**	**----**	**----**
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		**0.1**	**----**	<0.1	**----**	**----**
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		**----**	**----**	<0.1	**----**	**----**
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		**----**	**----**	<0.05	**----**	**----**
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		**----**	**----**	<0.05	**----**	**----**
beta-BHC	319-85-7	0.05	mg/kg		**----**	**----**	<0.05	**----**	**----**
gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg		**----**	**----**	<0.05	**----**	**----**
delta-BHC	319-86-8	0.05	mg/kg		**----**	**----**	<0.05	**----**	**----**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH12_1.5-1.7	BH04_0.46-0.5 Received as extra	BH8_0.5-0.8 Received as extra	----	----
				Sampling date / time	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2430642-006	ES2430642-010	ES2430642-013	--------	--------
					Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Heptachlor	76-44-8	0.05	mg/kg		----	----	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg		----	----	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	----	<0.05	----	----
^ **Total Chlordane (sum)**	----	0.05	mg/kg		----	----	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		----	----	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	----	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		----	----	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg		----	----	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		----	----	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg		----	----	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	----	<0.05	----	----
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		----	----	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		----	----	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	----	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	----	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		----	----	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		----	----	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg		----	----	<0.2	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		----	----	<0.05	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-29-3	0.05	mg/kg		----	----	<0.05	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		----	----	<0.05	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		----	----	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		----	----	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg		----	----	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg		----	----	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH12_1.5-1.7	BH04_0.46-0.5 Received as extra	BH8_0.5-0.8 Received as extra	----	----
				Sampling date / time	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2430642-006	ES2430642-010	ES2430642-013	--------	--------
					Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued									
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		----	----	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		----	----	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg		----	----	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg		----	----	<0.05	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	----	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg		----	----	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		----	----	<0.05	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		----	----	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		----	----	<0.05	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		----	----	<0.05	----	----
Prothiofos	34643-46-4	0.05	mg/kg		----	----	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg		----	----	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg		----	----	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		----	----	<0.05	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH12_1.5-1.7	BH04_0.46-0.5 Received as extra	BH8_0.5-0.8 Received as extra	----	----
				Sampling date / time	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2430642-006	ES2430642-010	ES2430642-013	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	<0.5	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	----	<0.5	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	----	<0.5	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	----	**0.6**	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	----	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	----	<100	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	<100	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	----	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	<10	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	----	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	----	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	----	<50	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	----	<50	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	----	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH12_1.5-1.7	BH04_0.46-0.5 Received as extra	BH8_0.5-0.8 Received as extra	----	----
				Sampling date / time	11-Sep-2024 00:00	11-Sep-2024 00:00	11-Sep-2024 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2430642-006	ES2430642-010	ES2430642-013	--------	--------
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	<0.5	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	----	<0.2	----	----
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	----	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	<1	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	**84.8**	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	**126**	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	**80.1**	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**80.7**	----	**82.4**	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**81.3**	----	**81.8**	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**67.6**	----	**66.1**	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**89.4**	----	**88.3**	----	----
Anthracene-d10	1719-06-8	0.5	%		**92.0**	----	**88.0**	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**84.0**	----	**83.9**	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**92.8**	----	**94.5**	----	----
Toluene-D8	2037-26-5	0.2	%		**80.9**	----	**86.5**	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**75.1**	----	**90.6**	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	*Sample ID - Sampling date / time*	*Analytical Results*
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	BH07_0.5-0.7 - 11-Sep-2024 00:00	A soil sample.
EA200: Description	BH12_0.5-0.7 - 11-Sep-2024 00:00	A soil sample.
EA200: Description	BH04_0.46-0.5Received as extra - 11-Sep-2024 00:00	A soil sample.

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	63	125
Toluene-D8	2037-26-5	67	124
4-Bromofluorobenzene	460-00-4	66	131

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

QUALITY CONTROL REPORT

Work Order	: **ES2430642**	Page	: 1 of 17
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Contact	: Samiksha Sathish
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12641966	Date Samples Received	: 18-Sep-2024
Order number	: 12641966	Date Analysis Commenced	: 25-Sep-2024
C-O-C number	: ----	Issue Date	: 01-Oct-2024
Sampler	: MALACHI HURLEY, MORASLIN CHOWDURY		
Site	:		
Quote number	: EN/000		
No. of samples received	: 14		
No. of samples analysed	: 8		

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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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*
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Brendan Schrader	Laboratory Technician	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, 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.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
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
RPD = Relative Percentage Difference
# = Indicates failed QC
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 6077260)									
ES2430642-001	BH06_0.5-0.7	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	7	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	3	3	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	8	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	18	15	16.3	No Limit
ES2431063-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	7	5	42.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 6083993)									
ES2430537-006	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	16	19	13.4	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	5	6	21.4	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	8	44.5	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	128	110	15.6	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	83	65	24.8	0% - 50%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 6083993) - continued									
ES2430537-006	Anonymous	EG005T: Zinc	7440-66-6	5	mg/kg	52	73	33.7	0% - 50%
ES2431161-004	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	16	17	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	7	8	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	9	9	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	13	14	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	75	76	1.7	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 6077267)									
ES2430642-003	BH07_0.5-0.7	EA055: Moisture Content	----	0.1 (1.0)*	%	7.0	7.3	4.0	No Limit
ES2431063-004	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	<1.0	<1.0	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 6084000)									
ES2430642-013	BH8_0.5-0.8 Received as extra	EA055: Moisture Content	----	0.1 (1.0)*	%	21.3	22.2	4.1	0% - 20%
ES2431161-008	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	12.8	12.4	3.2	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 6077259)									
ES2430642-001	BH06_0.5-0.7	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2431063-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 6083994)									
ES2430642-013	BH8_0.5-0.8 Received as extra	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 6076300)									
ES2430642-001	BH06_0.5-0.7	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 6083611)									
ES2430642-013	BH8_0.5-0.8 Received as extra	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 6076301)									
ES2430642-001	BH06_0.5-0.7	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 6076301) - continued									
ES2430642-001	BH06_0.5-0.7	EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 6083608)									
ES2430642-013	BH8_0.5-0.8 Received as extra	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 6076301)									
ES2430642-001	BH06_0.5-0.7	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 6076301) - continued									
ES2430642-001	BH06_0.5-0.7	EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 6083608)									
ES2430642-013	BH8_0.5-0.8 Received as extra	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 6076303)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 6076303) - continued									
ES2430642-001	BH06_0.5-0.7	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 6083610)									
ES2430642-013	BH8_0.5-0.8 Received as extra	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 6083610) - continued									
ES2430642-013	BH8_0.5-0.8 Received as extra	EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6076302)									
ES2430642-001	BH06_0.5-0.7	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6077191)									
ES2430642-003	BH07_0.5-0.7	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2430642-002	BH06_1.5-1.7	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6083609)									
ES2430642-013	BH8_0.5-0.8 Received as extra	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6084803)									
ES2431643-002	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 6076302)									
ES2430642-001	BH06_0.5-0.7	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 6077191)									
ES2430642-003	BH07_0.5-0.7	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2430642-002	BH06_1.5-1.7	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 6083609)									
ES2430642-013	BH8_0.5-0.8 Received as extra	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 6084803)									
ES2431643-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 6077191)									
ES2430642-003	BH07_0.5-0.7	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP080: BTEXN (QC Lot: 6077191) - continued									
ES2430642-003	BH07_0.5-0.7	EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
ES2430642-002	BH06_1.5-1.7	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP080: BTEXN (QC Lot: 6084803)									
ES2431643-002	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6077260)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	103	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	83.8	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	109	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	104	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	99.6	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	95.1	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	90.8	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6083993)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	110	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	117	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	124	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	109	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	112	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	108	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	104	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 6077259)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	100	70.0	125
EG035T: Total Recoverable Mercury by FIMS (QCLot: 6083994)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	119	70.0	125
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 6076300)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	84.8	62.0	126
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 6083611)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	89.2	62.0	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 6076301)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	88.8	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	91.8	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	90.1	67.0	119
EP068: gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	90.1	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.3	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	88.3	67.0	115

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068A: Organochlorine Pesticides (OC) (QCLot: 6076301) - continued								
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	88.7	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	90.7	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.2	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.6	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	88.2	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	87.0	66.0	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	91.3	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.2	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	88.8	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.9	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	83.8	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.7	62.0	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	86.5	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	82.7	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	87.8	54.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 6083608)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	83.4	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	82.9	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	80.5	67.0	119
EP068: gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	84.9	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	80.7	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.3	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.4	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	85.8	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	82.9	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	80.8	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	84.4	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	80.5	66.0	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	81.7	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.3	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	79.5	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.7	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	80.8	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	87.0	62.0	124

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068A: Organochlorine Pesticides (OC) (QCLot: 6083608) - continued								
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	81.0	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	84.9	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	79.6	54.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6076301)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	76.8	59.0	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.8	62.0	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	86.3	54.0	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	88.2	67.0	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	91.9	70.0	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	90.1	72.0	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	76.3	68.0	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	87.1	68.0	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	85.6	69.0	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	76.0	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	80.4	64.0	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	86.5	70.0	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.3	69.0	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	92.8	66.0	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	80.9	68.0	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	90.3	62.0	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	85.8	68.0	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	95.7	65.0	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	65.0	41.0	123
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6083608)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	105	59.0	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	91.9	62.0	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	106	54.0	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	94.6	67.0	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	88.1	70.0	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	86.9	72.0	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	75.8	68.0	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	85.2	68.0	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	84.0	69.0	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.8	76.0	118

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6083608) - continued								
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	78.4	64.0	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	84.7	70.0	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	85.4	69.0	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	85.2	66.0	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	98.0	68.0	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	81.9	62.0	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.0	68.0	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	87.8	65.0	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	105	41.0	123
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6076303)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	99.0	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	91.2	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	89.5	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	92.8	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	90.4	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	91.3	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	92.2	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	93.7	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	89.6	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	95.2	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	97.1	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	101	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	91.9	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	87.6	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	89.7	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	83.1	63.0	121
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6083610)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	95.7	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	86.2	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	89.5	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	90.8	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	90.9	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	90.5	77.0	127

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6083610) - continued								
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	92.0	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	90.0	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	87.5	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	96.6	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	93.0	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	97.8	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	93.5	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	88.8	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	90.3	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	88.2	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6076302)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	90.3	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	96.6	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	101	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6077191)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	92.7	72.2	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6083609)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	102	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	99.9	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	103	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6084803)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	80.9	72.2	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6076302)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	95.3	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	98.8	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	105	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6077191)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	90.5	72.4	133
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6083609)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	102	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	100	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	110	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6084803)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6084803) - continued								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	81.6	72.4	133
EP080: BTEXN (QCLot: 6077191)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	98.9	76.0	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	98.9	78.5	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	95.6	77.4	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	93.1	78.2	121
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	93.4	81.3	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	91.2	78.8	122
EP080: BTEXN (QCLot: 6084803)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	94.4	76.0	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	89.9	78.5	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	89.2	77.4	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	91.5	78.2	121
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	90.2	81.3	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	91.2	78.8	122

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6077260)							
ES2430642-001	BH06_0.5-0.7	EG005T: Arsenic	7440-38-2	50 mg/kg	103	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	102	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	104	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	102	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	104	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	103	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	103	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6083993)							
ES2430537-006	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	89.6	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	97.2	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	99.5	68.0	132

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6083993) - continued							
ES2430537-006	Anonymous	EG005T: Copper	7440-50-8	250 mg/kg	82.2	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	88.7	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	97.1	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	106	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 6077259)							
ES2430642-001	BH06_0.5-0.7	EG035T: Mercury	7439-97-6	5 mg/kg	106	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 6083994)							
ES2430642-013	BH8_0.5-0.8 Received as extra	EG035T: Mercury	7439-97-6	5 mg/kg	102	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 6076300)							
ES2430642-001	BH06_0.5-0.7	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	92.6	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 6083611)							
ES2430642-013	BH8_0.5-0.8 Received as extra	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	82.0	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 6076301)							
ES2430642-001	BH06_0.5-0.7	EP068: gamma-BHC - (Lindane)	58-89-9	0.5 mg/kg	93.8	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	101	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	82.1	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	99.6	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	84.8	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	77.4	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 6083608)							
ES2430642-013	BH8_0.5-0.8 Received as extra	EP068: gamma-BHC - (Lindane)	58-89-9	0.5 mg/kg	106	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	94.6	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	110	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	107	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	74.3	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	102	70.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6076301)							
ES2430642-001	BH06_0.5-0.7	EP068: Diazinon	333-41-5	0.5 mg/kg	98.7	70.0	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	74.9	70.0	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	80.4	70.0	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	97.1	70.0	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	90.9	70.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6083608)							
ES2430642-013	BH8_0.5-0.8 Received as extra	EP068: Diazinon	333-41-5	0.5 mg/kg	106	70.0	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	77.1	70.0	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	77.0	70.0	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6083608) - continued							
ES2430642-013	BH8_0.5-0.8 Received as extra	EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	92.4	70.0	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	93.2	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6076303)							
ES2430642-001	BH06_0.5-0.7	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	94.4	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	101	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6083610)							
ES2430642-013	BH8_0.5-0.8 Received as extra	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	92.2	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	95.1	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6076302)							
ES2430642-001	BH06_0.5-0.7	EP071: C10 - C14 Fraction	----	480 mg/kg	90.9	73.0	137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	86.2	53.0	131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	98.7	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6077191)							
ES2430642-003	BH07_0.5-0.7	EP080: C6 - C9 Fraction	----	32.5 mg/kg	78.6	60.4	142
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6083609)							
ES2430642-013	BH8_0.5-0.8 Received as extra	EP071: C10 - C14 Fraction	----	480 mg/kg	111	73.0	137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	96.5	53.0	131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	99.9	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6084803)							
ES2431643-002	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	72.5	60.4	142
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6076302)							
ES2430642-001	BH06_0.5-0.7	EP071: >C10 - C16 Fraction	----	860 mg/kg	81.6	73.0	137
		EP071: >C16 - C34 Fraction	----	4320 mg/kg	93.4	53.0	131
		EP071: >C34 - C40 Fraction	----	890 mg/kg	96.8	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6077191)							
ES2430642-003	BH07_0.5-0.7	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	74.2	61.1	142
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6083609)							
ES2430642-013	BH8_0.5-0.8 Received as extra	EP071: >C10 - C16 Fraction	----	860 mg/kg	98.2	73.0	137
		EP071: >C16 - C34 Fraction	----	4320 mg/kg	101	53.0	131
		EP071: >C34 - C40 Fraction	----	890 mg/kg	94.0	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6084803)							
ES2431643-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	73.5	61.1	142
EP080: BTEXN (QCLot: 6077191)							
ES2430642-003	BH07_0.5-0.7	EP080: Benzene	71-43-2	2.5 mg/kg	80.6	62.1	122
		EP080: Toluene	108-88-3	2.5 mg/kg	79.7	66.6	119

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080: BTEXN (QCLot: 6077191) - continued							
ES2430642-003	BH07_0.5-0.7	EP080: Ethylbenzene	100-41-4	2.5 mg/kg	85.4	67.4	123
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	87.7	66.4	121
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	81.5	70.7	121
		EP080: Naphthalene	91-20-3	2.5 mg/kg	87.2	61.1	115
EP080: BTEXN (QCLot: 6084803)							
ES2431643-002	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	70.7	62.1	122
		EP080: Toluene	108-88-3	2.5 mg/kg	67.7	66.6	119
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	69.8	67.4	123
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	70.0	66.4	121
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	71.4	70.7	121
		EP080: Naphthalene	91-20-3	2.5 mg/kg	77.6	61.1	115

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2430642**	Page	: 1 of 8
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Telephone	: +61-2-8784 8555
Project	: 12641966	Date Samples Received	: 18-Sep-2024
Site	:	Issue Date	: 01-Oct-2024
Sampler	: MALACHI HURLEY, MORASLIN CHOWDURY	No. of samples received	: 14
Order number	: 12641966	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, where applicable to the methodology, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)						
Soil Glass Jar - Unpreserved						
BH8_0.5-0.8 - Received as extra	----	----	----	27-Sep-2024	25-Sep-2024	**2**
EP066: Polychlorinated Biphenyls (PCB)						
Soil Glass Jar - Unpreserved						
BH8_0.5-0.8 - Received as extra	27-Sep-2024	25-Sep-2024	**2**	----	----	----
EP068A: Organochlorine Pesticides (OC)						
Soil Glass Jar - Unpreserved						
BH8_0.5-0.8 - Received as extra	27-Sep-2024	25-Sep-2024	**2**	----	----	----
EP068B: Organophosphorus Pesticides (OP)						
Soil Glass Jar - Unpreserved						
BH8_0.5-0.8 - Received as extra	27-Sep-2024	25-Sep-2024	**2**	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons						
Soil Glass Jar - Unpreserved						
BH8_0.5-0.8 - Received as extra	27-Sep-2024	25-Sep-2024	**2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons						
Soil Glass Jar - Unpreserved						
BH8_0.5-0.8 - Received as extra	27-Sep-2024	25-Sep-2024	**2**	27-Sep-2024	25-Sep-2024	**2**
Soil Glass Jar - Unpreserved						
BH8_0.5-0.8 - Received as extra	27-Sep-2024	25-Sep-2024	**2**	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions						
Soil Glass Jar - Unpreserved						
BH8_0.5-0.8 - Received as extra	27-Sep-2024	25-Sep-2024	**2**	27-Sep-2024	25-Sep-2024	**2**
Soil Glass Jar - Unpreserved						
BH8_0.5-0.8 - Received as extra	27-Sep-2024	25-Sep-2024	**2**	----	----	----
EP080: BTEXN						
Soil Glass Jar - Unpreserved						
BH8_0.5-0.8 - Received as extra	27-Sep-2024	25-Sep-2024	**2**	27-Sep-2024	25-Sep-2024	**2**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH06_0.5-0.7,	BH06_1.5-1.7,	**11-Sep-2024**	**----**	----	**----**	**25-Sep-2024**	25-Sep-2024	✓
BH07_0.5-0.7,	BH07_1.5-1.9 - Received as BH07_1.7-1.9,							
BH12_0.5-0.7,	BH12_1.5-1.7							
Soil Glass Jar - Unpreserved (EA055)								
BH8_0.5-0.8 - Received as extra		**11-Sep-2024**	**----**	----	**----**	**27-Sep-2024**	25-Sep-2024	×
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Snap Lock Bag (EA200)								
BH04_0.46-0.5 - Received as extra		**11-Sep-2024**	**----**	----	**----**	**30-Sep-2024**	10-Mar-2025	✓
Snap Lock Bag - Friable Asbestos/PSD Bag (EA200)								
BH07_0.5-0.7,	BH12_0.5-0.7	**11-Sep-2024**	**----**	----	**----**	**26-Sep-2024**	10-Mar-2025	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH06_0.5-0.7,	BH06_1.5-1.7,	**11-Sep-2024**	**25-Sep-2024**	10-Mar-2025	✓	**26-Sep-2024**	10-Mar-2025	✓
BH07_0.5-0.7,	BH07_1.5-1.9 - Received as BH07_1.7-1.9,							
BH12_0.5-0.7,	BH12_1.5-1.7							
Soil Glass Jar - Unpreserved (EG005T)								
BH8_0.5-0.8 - Received as extra		**11-Sep-2024**	**27-Sep-2024**	10-Mar-2025	✓	**27-Sep-2024**	10-Mar-2025	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH06_0.5-0.7,	BH06_1.5-1.7,	**11-Sep-2024**	**25-Sep-2024**	09-Oct-2024	✓	**26-Sep-2024**	09-Oct-2024	✓
BH07_0.5-0.7,	BH07_1.5-1.9 - Received as BH07_1.7-1.9,							
BH12_0.5-0.7,	BH12_1.5-1.7							
Soil Glass Jar - Unpreserved (EG035T)								
BH8_0.5-0.8 - Received as extra		**11-Sep-2024**	**27-Sep-2024**	09-Oct-2024	✓	**28-Sep-2024**	09-Oct-2024	✓
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
BH06_0.5-0.7,	BH07_0.5-0.7,	**11-Sep-2024**	**25-Sep-2024**	25-Sep-2024	✓	**26-Sep-2024**	04-Nov-2024	✓
BH12_0.5-0.7								
Soil Glass Jar - Unpreserved (EP066)								
BH8_0.5-0.8 - Received as extra		**11-Sep-2024**	**27-Sep-2024**	25-Sep-2024	×	**27-Sep-2024**	06-Nov-2024	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
BH06_0.5-0.7,	BH07_0.5-0.7,	**11-Sep-2024**	**25-Sep-2024**	25-Sep-2024	✓	**26-Sep-2024**	04-Nov-2024	✓
BH12_0.5-0.7								
Soil Glass Jar - Unpreserved (EP068)								
BH8_0.5-0.8 - Received as extra		**11-Sep-2024**	**27-Sep-2024**	25-Sep-2024	×	**28-Sep-2024**	06-Nov-2024	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068) BH06_0.5-0.7, BH07_0.5-0.7, BH12_0.5-0.7	**11-Sep-2024**	**25-Sep-2024**	25-Sep-2024	✓	**26-Sep-2024**	04-Nov-2024	✓
Soil Glass Jar - Unpreserved (EP068) BH8_0.5-0.8 - Received as extra	**11-Sep-2024**	**27-Sep-2024**	25-Sep-2024	×	**28-Sep-2024**	06-Nov-2024	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH06_0.5-0.7, BH06_1.5-1.7, BH07_0.5-0.7	**11-Sep-2024**	**25-Sep-2024**	25-Sep-2024	✓	**25-Sep-2024**	04-Nov-2024	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH07_1.5-1.9 - Received as BH07_1.7-1.9, BH12_0.5-0.7, BH12_1.5-1.7	**11-Sep-2024**	**25-Sep-2024**	25-Sep-2024	✓	**26-Sep-2024**	04-Nov-2024	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH8_0.5-0.8 - Received as extra	**11-Sep-2024**	**27-Sep-2024**	25-Sep-2024	×	**27-Sep-2024**	06-Nov-2024	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) BH06_0.5-0.7, BH06_1.5-1.7, BH07_0.5-0.7, BH07_1.5-1.9 - Received as BH07_1.7-1.9, BH12_0.5-0.7, BH12_1.5-1.7	**11-Sep-2024**	**25-Sep-2024**	25-Sep-2024	✓	**25-Sep-2024**	25-Sep-2024	✓
Soil Glass Jar - Unpreserved (EP071) BH06_0.5-0.7, BH06_1.5-1.7, BH07_0.5-0.7, BH07_1.5-1.9 - Received as BH07_1.7-1.9, BH12_0.5-0.7, BH12_1.5-1.7	**11-Sep-2024**	**25-Sep-2024**	25-Sep-2024	✓	**27-Sep-2024**	04-Nov-2024	✓
Soil Glass Jar - Unpreserved (EP071) BH8_0.5-0.8 - Received as extra	**11-Sep-2024**	**27-Sep-2024**	25-Sep-2024	×	**28-Sep-2024**	06-Nov-2024	✓
Soil Glass Jar - Unpreserved (EP080) BH8_0.5-0.8 - Received as extra	**11-Sep-2024**	**27-Sep-2024**	25-Sep-2024	×	**27-Sep-2024**	25-Sep-2024	×
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BH06_0.5-0.7, BH06_1.5-1.7, BH07_0.5-0.7, BH07_1.5-1.9 - Received as BH07_1.7-1.9, BH12_0.5-0.7, BH12_1.5-1.7	**11-Sep-2024**	**25-Sep-2024**	25-Sep-2024	✓	**25-Sep-2024**	25-Sep-2024	✓
Soil Glass Jar - Unpreserved (EP071) BH06_0.5-0.7, BH06_1.5-1.7, BH07_0.5-0.7, BH07_1.5-1.9 - Received as BH07_1.7-1.9, BH12_0.5-0.7, BH12_1.5-1.7	**11-Sep-2024**	**25-Sep-2024**	25-Sep-2024	✓	**27-Sep-2024**	04-Nov-2024	✓
Soil Glass Jar - Unpreserved (EP071) BH8_0.5-0.8 - Received as extra	**11-Sep-2024**	**27-Sep-2024**	25-Sep-2024	×	**28-Sep-2024**	06-Nov-2024	✓
Soil Glass Jar - Unpreserved (EP080) BH8_0.5-0.8 - Received as extra	**11-Sep-2024**	**27-Sep-2024**	25-Sep-2024	×	**27-Sep-2024**	25-Sep-2024	×

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
BH06_0.5-0.7, BH06_1.5-1.7, BH07_0.5-0.7, BH07_1.5-1.9 - Received as BH07_1.7-1.9, BH12_0.5-0.7, BH12_1.5-1.7	**11-Sep-2024**	**25-Sep-2024**	25-Sep-2024	✓	**25-Sep-2024**	25-Sep-2024	✓
Soil Glass Jar - Unpreserved (EP080)							
BH8_0.5-0.8 - Received as extra	**11-Sep-2024**	**27-Sep-2024**	25-Sep-2024	×	**27-Sep-2024**	25-Sep-2024	×

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	8	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	25	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	22	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	2	13	**15.38**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	8	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	5	**40.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	10	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	2	13	**15.38**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	8	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	5	**40.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	10	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	2	13	**15.38**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	8	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	5	**40.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	10	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.

Preparation Methods	Method	Matrix	Method Descriptions
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2430642**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Contact	: Samiksha Sathish
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: barry.houston@ghd.com	E-mail	: samiksha.sathish@alsglobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12641966	Page	: 1 of 3
Order number	: 12641966	Quote number	: EB2020GHDSER0038 (EN/000)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: MALACHI HURLEY, MORASLIN CHOWDURY		

Dates

Date Samples Received	: 18-Sep-2024 12:00	Issue Date	: 24-Sep-2024
Client Requested Due Date	: 01-Oct-2024	Scheduled Reporting Date	: **01-Oct-2024**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 15.2'C, 15.1'C, 8.7'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 14 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Samples #9 - #14 received extra and placed on hold.
- Unable to conduct Asbestos for sample 1, BH06_0.5-0.7 due to the bag was not supplied.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Asbestos analysis will be conducted by ALS Newcastle.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Unless otherwise stated, analytical work for this work order will be conducted at ALS Sydney, NATA accreditation no. 825, site no. 10911.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

ES2430642-004	: [11-Sep-2024]	: BH07_1.5-1.9 - Received as BH07_1.7-1.9
ES2430642-009	: [11-Sep-2024]	: BH02 - Received as extra
ES2430642-010	: [11-Sep-2024]	: BH04_0.46-0.5 - Received as extra
ES2430642-011	: [11-Sep-2024]	: BH06 - Received as extra
ES2430642-012	: [11-Sep-2024]	: BH8 - Received as extra
ES2430642-013	: [11-Sep-2024]	: BH8_0.5-0.8 - Received as extra
ES2430642-014	: [11-Sep-2024]	: BH - Received as extra

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EA200 Asbestos Identification in Soils -	SOIL - S-13 OC/OP/PCB	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES2430642-001	11-Sep-2024 00:00	BH06_0.5-0.7		✓		✓	✓
ES2430642-002	11-Sep-2024 00:00	BH06_1.5-1.7		✓			✓
ES2430642-003	11-Sep-2024 00:00	BH07_0.5-0.7		✓	✓	✓	✓
ES2430642-004	11-Sep-2024 00:00	BH07_1.5-1.9 Receiv...		✓			✓
ES2430642-005	11-Sep-2024 00:00	BH12_0.5-0.7		✓	✓	✓	✓
ES2430642-006	11-Sep-2024 00:00	BH12_1.5-1.7		✓			✓
ES2430642-007	10-Sep-2024 00:00	DUP-02	✓				
ES2430642-008	10-Sep-2024 00:00	TRI-02	✓				
ES2430642-009	11-Sep-2024 00:00	BH02 Received as ex...	✓				
ES2430642-010	11-Sep-2024 00:00	BH04_0.46-0.5 Recei...	✓				
ES2430642-011	11-Sep-2024 00:00	BH06 Received as ex...	✓				
ES2430642-012	11-Sep-2024 00:00	BH8 Received as ext...	✓				
ES2430642-013	11-Sep-2024 00:00	BH8_0.5-0.8 Receive...	✓				
ES2430642-014	11-Sep-2024 00:00	BH Received as extra	✓				

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

BARRY HOUSTON

- *AU Certificate of Analysis - NATA (COA)	Email	barry.houston@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	barry.houston@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	barry.houston@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	barry.houston@ghd.com
- A4 - AU Tax Invoice (INV)	Email	barry.houston@ghd.com
- Chain of Custody (CoC) (COC)	Email	barry.houston@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	barry.houston@ghd.com
- EDI Format - XTab (XTAB)	Email	barry.houston@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	barry.houston@ghd.com

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com

MALACHI HURLEY

- *AU Certificate of Analysis - NATA (COA)	Email	malachi.hurley@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	malachi.hurley@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	malachi.hurley@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	malachi.hurley@ghd.com
- Chain of Custody (CoC) (COC)	Email	malachi.hurley@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	malachi.hurley@ghd.com
- EDI Format - XTab (XTAB)	Email	malachi.hurley@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	malachi.hurley@ghd.com

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

SAMPLES RECEIVED WITHOUT COC

Environmental Division
Sydney
Work Order Reference
ES2430642

CLIENT: GHD	CARRIER:
PROJECT / QUOTE: 12641966	CONNOTE #:
CONTACT NAME:	AWB #:
CONTACT NUMBER:	# OF ESKIES: 2 SECURITY SEAL: Y N N/A
SAMPLER NAME: MC, MH	TYPE OF ESKIES: Large
SAMPLER NUMBER:	ESKY NUMBERS: WED977-978
SAMPLES RECEIVED BY: Jack	# OF SAMPLES:
DATE/TIME RECEIVED: 18/09/24 12pm. CLIENT SERVICES NOTIFIED BY:	TEMPERATURE: 15.2, 15.1, 8.7°C. - Ice.

Telephone : +61-2-8784 8555

LAB ID	SAMPLE ID	DATE	MATRIX	NUMBER OF CONTAINERS
1	BH07 0.5-0.7	12/09/24	S	
2	BH07 1.7-1.9	↓	↓	
3	BH12 0.5-0.7	↓	↓	
4	TR1-02	10/09/24	S	
5				

ADDITIONAL INFORMATION / COMMENTS:

OTHER INFORMATION:

- ☐ MICRO
- ☐ BIOSECURITY
- ☐ BROKEN CONTAINERS
- ☐ COC EMAILED
- ☐ ALS COMPASS

CORRESPONDENCE (DATE, INITIALS - DETAILS OF CORRESPONDENCE):

HT

UPDATED COC

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT:	GHD Pty Ltd	TURNAROUND REQUIREMENTS: ■ Standard TAT (List due date): ■	FOR LABORATORY USE ONLY (Circle)
OFFICE:	Level 15, 133 Castlereagh Street, Sydney NSW	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: 12641968		ALS QUOTE NO.: ALS standard quote	COC SEQUENCE NUMBER (Circle) coc: 1 2 3 4 5 6 7
ORDER NUMBER:			Free ice, frozen ice bricks present upon receipt? Yes No N/A
PROJECT MANAGER: Barry Houston	CONTACT PH: +61 2 9239 7979		of: 1 2 3 4 5 6 7 Random Sample Temperature on Receipt: °C
SAMPLER: Malachi Hurley, Morsalin Chowdury	SAMPLER MOBILE: -		Other comment:

COC emailed to ALS? (YES _ NO)	EDD FORMAT (or default): ESDAT, PDF, EXCEL	RELINQUISHED BY: Morsalin Chowdury	RECEIVED BY:	RELINQUISHED BY:
Email Reports to: barry.houston@ghd.com, ghdlabreports@ghd.com, malachi.hurley@ghd.com		DATE/TIME 10/09/2024	DATE/TIME	DATE/TIME

RECEIVED BY: DATE/TIME 23/9/24 1752

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please hold un-analysed samples. Rock samples to be processed as EN84 (Christopher Redford at ALS to confirm).

** RELATED TO WORKORDER # ES2430642

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to retrieve suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required)																Additional Information
LAB ID	SAMPLE ID	DATE_TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EA003 - pH field/lox	EA002 pH 1:5	EA200G - Asbestos presence/absence	S-26 - 8 metals_TRH_BTEXN_PAH	S-13 - OCP/OPP/PCB	EP066 - PCB	EP074 - VOC	EP033SF - Total Phenols	EG048G - Total Hex Chromium	Cyanide	EP231X - PFAS Full Suite (28 Analytes)	PFAS Short suite	BTEXN and TRH (C6-C40)	TCLP - metals, PAHs	TRHC6-C10, BTEX	HOLD	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc
NR	BH04_0.5-0.7	10/09/2024	S		2			x	x	x												
NR	BH04_1.0-1.1	10/09/2024	S		2			x	x	x												
NR	BH04_1.5-1.7	10/09/2024	S		2																x	
1	BH06_0.5-0.7	11 10/09/2024	S		2			x	x	x												
2	BH06_1.5-1.7	11 10/09/2024	S		2				x													
3	BH07_0.5-0.7	12/09/2024	S		2			x	x	x												
4	BH07_1.5-1.9	12/09/2024	S		2				x													
NR	BH08_0.5-0.7	11/09/2024	S		2			x	x													
5	BH12_0.5-0.7	12/09/2024	S		2			x	x	x												
6	BH12_1.5-1.7	12/09/2024	S		2				x													
7	DUP-02	10/9/24	S																		x	
8	TRI-02	10/9/24	S																		x	

Water Container Codes: P = Unpreserved Plastic; AP = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AF = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulfate Soils; B = Unpreserved Bag

Subcon / Forward Lab / Split WO
Lab / Analysis: Mercastle - Analysis #3 5
Organised By / Date:
Relinquished By / Date:
Courier / Courier:
WO No: ES2430642
Attached By PO / Internal Sheet:

Environmental Division
Sydney
Work Order Reference
ES2430642

Telephone : +61-2-8784 8555

Mandatory Fields

CHAIN OF CUSTODY

Page ___of___

CoC #: *(if applicable)*

*CLIENT CODE:

***PROJECT MANAGER:**

SAMPLER:

***CLIENT:**

***PM MOBILE:**

SAMPLER MOBILE:

OFFICE: *(Invoiced Office)*

ALS QUOTE # *(Client PL if blank)*

PURCHASE ORDER NO.:

PROJECT NO./PROJECT:

SITE:

***INVOICE** TO: *(client default if nil)*

☐ CC Invoice to PM

BIOSECURITY

*EMAIL **REPORTS** TO: *(default to PM if blank)*

Country of Origin: *(if not Australia)*

*** STORAGE REQUIREMENTS**

Please check box.

→

Standard Storage time from receipt of samples:

Waters - 3 weeks
Soils - 2 months

☐ Standard Storage

☐ Extended Storage

Specify Disposal Date:

Note: Extended storage incurs a fee and requires a signed agreement.

*** TURNAROUND**

Please check box.

→

(Not all tests can be expedited, contact Client Services for more information)

☐ 5+ days (no surcharge)

☐ 3 day (+15%)

☐ 2 day (+30%)

☐ 1 day (+50%)

***ANALYSIS REQUIRED**

(NB. ALS Quote No. and/or Analysis Suite Codes must be listed to attract suite/quoted price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).
Mark an X in the boxes below analysis to indicate the parameter listed above to be tested on that sample.

WO Sticker to go here.
(ALS use only)

Comments:

ALS Use Only Lab ID	Sample ID	Depth	Date/Time	No. Bottles	MATRIX: Soil/Solid(**S**) Water(**W**) Sediments (**SD**), Dust (**D**), Product (**P**), Biota (**B**), Biosolid (**BS**)	Lab QC (additional bottles req.) Dup	Lab QC (additional bottles req.) MS	Additional Information (Comment on hazards - e.g., asbestos, known high contamination)
extras								
9	BH02		9/9/24			☐	☐	
10	BH04 0.46-0.5					☐	☐	
11	BH06		11/9/24			☐	☐	
12	BH8		10/9/24			☐	☐	
13	BH8 0.5-0.8		10/9/24			☐	☐	
14	BH		10/9/24			☐	☐	
						☐	☐	
						☐	☐	
						☐	☐	
						☐	☐	
						☐	☐	

Receipt Detail (Lab Use ONLY)

Chilling Method: Ice: Frozen / Melted Ice Bricks: Frozen / Thawed None

Sample Temp at Receipt °C °C °C

Security Seal Intact *(circle)* Yes / No / NA(None)

Carrier Details ☐ Courier/Post ☐ Client

Con Note #

Packaging: *(Circle)* Hard Esky Foam Esky Box/Bag/Other

Count # # #

Relinquished by: Signature: Date/Time:

Relinquished by: Signature: Date/Time:

Received by: Signature Date/Time:

Received by: Signature Date/Time:

UPDATED COC

CHAIN OF CUSTODY

ALS Laboratory please tick →

CLIENT:	GHD Pty Ltd	TURNAROUND REQUIREMENTS : ■ Standard TAT (List due date): ■	FOR LABORATORY USE ONLY (Circle)
OFFICE:	Level 13, 133 Castlereagh Street, Sydney NSW	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	
PROJECT: 12541958		ALS QUOTE NO.: ALS standard quote	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
ORDER NUMBER:			
PROJECT MANAGER: Barry Houston		CONTACT PH: +61 2 92397879	
SAMPLER: Maisoni Horley, Morsalin Chowdury		SAMPLER MOBILE: -	
COC emailed to ALS? (YES _ NO)		EDD FORMAT (or default): ESDAT, PDF, EXCEL	
Email Reports to barry.houston@ghd.com; ghdlabreports@ghd.com; maisoni.horley@ghd.com			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Morsalin Chowdury			Kim
DATE/TIME: 16/9/2024	DATE/TIME:	DATE/TIME:	DATE/TIME: 26.09.24 1.46pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please hold un-analysed samples. Rock samples to be processed as EN84 (Christopher Redford at ALS to confirm).

** RELATED TO WORKORDER # ES2430642

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required)																Additional Information
LAB ID	SAMPLE ID	DATE _TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EA003 - pH/field/flox	EA002 -pH:5	EA200G - Asbestos presence/absence	S-26 - 6 metals_TRH_BTEXN_PAH	S-13 - OCP/OPP/PCB	EP068 - PCB	EP074 - VOC	EP035SF - Total Phenols	EG048G - Total Hex Chromium	Cyanide	EP231X - PFAS Full Suite (28 Analytes)	PFAS Short suite	BTEXN and TRH (C6-C40)	TCLP - metals, PAHs	TRHC6-C10, BTEX	HOLD	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
10	BH04_0.48-0.5	10/09/2024	S		2			X	X	X												
	BH04_1.0-1.1	10/09/2024	S	not received	2																	
	BH04_1.5-1.7	10/09/2024	S	not received	2																X	
1	BH06_0.5-0.7	10/09/2024	S		2			X	X	X											X	
2	BH06_1.5-1.7	10/09/2024	S		2				X													
3	BH07_0.5-0.7	12/09/2024	S		2			X	X	X												
4	BH07_1.5-1.9	12/09/2024	S		2				X													
SMR -	BH06_0.5-0.7	11/09/2024	S		2			X	X													
13	BH08_0.5-0.8	11/09/2024	S		2				X	X												
5	BH12_0.5-0.7	12/09/2024	S		2			X	X	X												
6	BH12_1.5-1.7	12/09/2024	S		2				X													
7	DUP-02		S																		X	
8	TRI-02		S																		X	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sodium Bisulphate Preserved; VG = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = Hydrochloric Preserved Plastic; HS = HCl preserved Speciation bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Division Sydney

Work Order Reference

ES2430642

Telephone : +61-2-8784 8555

ES2430642

CERTIFICATE OF ANALYSIS

Work Order	: **ES2432291**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Contact	: Samiksha Sathish
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12641966	Date Samples Received	: 01-Oct-2024 16:15
Order number	: 12641966	Date Analysis Commenced	: 08-Oct-2024
C-O-C number	: ----	Issue Date	: 10-Oct-2024 18:00
Sampler	: MALACHI HURLEY, MORASLIN CHOWDURY		
Site	:		
Quote number	: EN/000		
No. of samples received	: 2		
No. of samples analysed	: 2		

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
- Surrogate Control Limits

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*
Edwandy Fadjar	Organic Coordinator	Sydney Organics, 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 Contract 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.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH06_1.5-1.7	BH02_1.5-1.7	----	----	----
			Sampling date / time	11-Sep-2024 00:00	09-Sep-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2432291-001	ES2432291-002	--------	--------	--------
				Result	Result	----	----	----
EN33: TCLP Leach - Inorganics/Non-Volatile Organics (Glass Vessel)								
Initial pH	----	0.1	pH Unit	**7.7**	**10.0**	**----**	**----**	**----**
After HCl pH	----	0.1	pH Unit	**1.5**	**1.9**	**----**	**----**	**----**
Extraction Fluid Number	----	1	-	**1**	**1**	**----**	**----**	**----**
Final pH	----	0.1	pH Unit	**5.0**	**5.0**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Sample ID	BH06_1.5-1.7	BH02_1.5-1.7	----	----	----
				Sampling date / time	11-Sep-2024 00:00	09-Sep-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2432291-001	ES2432291-002	--------	--------	--------
					Result	Result	----	----	----
EG005(ED093)C: Leachable Metals by ICPAES									
Nickel	7440-02-0	0.1	mg/L		**----**	**0.1**	**----**	**----**	**----**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	**----**	**----**	**----**	**----**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		**30.2**	**----**	**----**	**----**	**----**
2-Chlorophenol-D4	93951-73-6	1.0	%		**69.7**	**----**	**----**	**----**	**----**
2.4.6-Tribromophenol	118-79-6	1.0	%		**82.9**	**----**	**----**	**----**	**----**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		**86.7**	**----**	**----**	**----**	**----**
Anthracene-d10	1719-06-8	1.0	%		**87.1**	**----**	**----**	**----**	**----**
4-Terphenyl-d14	1718-51-0	1.0	%		**88.9**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: TCLP LEACHATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

QUALITY CONTROL REPORT

Work Order	: **ES2432291**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Contact	: Samiksha Sathish
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12641966	Date Samples Received	: 01-Oct-2024
Order number	: 12641966	Date Analysis Commenced	: 08-Oct-2024
C-O-C number	: ----	Issue Date	: 10-Oct-2024
Sampler	: MALACHI HURLEY, MORASLIN CHOWDURY		
Site	:		
Quote number	: EN/000		
No. of samples received	: 2		
No. of samples analysed	: 2		

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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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*
Edwandy Fadjar	Organic Coordinator	Sydney Organics, 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.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
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
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)C: Leachable Metals by ICPAES (QC Lot: 6108519)									
ES2432291-002	BH02_1.5-1.7	EG005C: Nickel	7440-02-0	0.1	mg/L	0.1	0.1	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EN33: TCLP Leach - Inorganics/Non-Volatile Organics (Glass Vessel) (QCLot: 6104000)								
EN33a-G: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a-G: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a-G: Final pH	----	0.1	pH Unit	1.0	----	----	----	----

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)C: Leachable Metals by ICPAES (QCLot: 6108519)								
EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	0.1 mg/L	106	83.0	115
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6108377)								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	81.0	63.3	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)C: Leachable Metals by ICPAES (QCLot: 6108519)							
ES2432310-001	Anonymous	EG005C: Nickel	7440-02-0	1 mg/L	97.6	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2432291**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BARRY HOUSTON	Telephone	: +61-2-8784 8555
Project	: 12641966	Date Samples Received	: 01-Oct-2024
Site	:	Issue Date	: 10-Oct-2024
Sampler	: MALACHI HURLEY, MORASLIN CHOWDURY	No. of samples received	: 2
Order number	: 12641966	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, where applicable to the methodology, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EN33: TCLP Leach - Inorganics/Non-Volatile Organics (Glass Vessel)						
Non-Volatile Leach: 14 day HT(e.g. SV organics)						
BH02_1.5-1.7	08-Oct-2024	23-Sep-2024	**15**	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics)						
BH06_1.5-1.7	08-Oct-2024	25-Sep-2024	**13**	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
		QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)						
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)						
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EN33: TCLP Leach - Inorganics/Non-Volatile Organics (Glass Vessel)							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a-G)							
BH02_1.5-1.7	**09-Sep-2024**	**08-Oct-2024**	23-Sep-2024	×	**----**	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a-G)							
BH06_1.5-1.7	**11-Sep-2024**	**08-Oct-2024**	25-Sep-2024	×	**----**	----	----

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005(ED093)C: Leachable Metals by ICPAES							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG005C)							
BH02_1.5-1.7	**08-Oct-2024**	**09-Oct-2024**	06-Apr-2025	✓	**09-Oct-2024**	06-Apr-2025	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
BH06_1.5-1.7	**08-Oct-2024**	**09-Oct-2024**	15-Oct-2024	✓	**10-Oct-2024**	18-Nov-2024	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB)							
TCLP for Non & Semivolatile Analytes - Glass Leaching Vessel	EN33a-G	1	11	9.09	9.09	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Leachable Metals by ICPAES	EG005C	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Leachable Metals by ICPAES	EG005C	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Leachable Metals by ICPAES	EG005C	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Leachable Metals by ICPAES	EG005C	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Leachable Metals by ICPAES	EG005C	SOIL	In house: referenced to APHA 3120; USEPA SW 846 - 6010: The ICPAES technique ionises leachate sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM Schedule B(3).
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Digestion for Total Recoverable Metals in TCLP Leachate	EN25C	SOIL	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
TCLP for Non & Semivolatile Analytes - Glass Leaching Vessel	EN33a-G	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Separatory Funnel Extraction of Liquids	ORG14	SOIL	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.

REBATCH REQUEST

Workorder / Client code / Project:	ALS Workorder ES2430642/ES2429778. Client GHDSER. Project 12641966
Project Manager:	***Please include this rebatch PM plus all report recipients as per original workorder***
Date samples rec'd:	18/09/2024 0:00
Date Instructions rec'd:	1/10/2024 16:15
Rebatch due date:	Wednesday, 9 October 2024 — FTAT approved?
Due date surcharge:	**N/A**

CS Contact: Sam Sathish

Additional Information:

New Lab ID	Sample information							Analysis: Standard					Analysis: Leach					Shortest Holding time expiry
	Client ID	Sampling Date / Time	Previous Work Order Reference	Previous ALS ID	Tray Number(s)	Container	Managed Moisture						TCLP (BaP)	TCLP (Nickel)				
	BH06_1.5-1.7	11/09/2024 0:00	ES2430642-003	3	S-529-530	il glass jar							X					
	BH02_1.5-1.7	13/08/2024 0:00	ES2429778-003	3	S-777, 778, 779	"								X				
TOTAL																		

Environmental Division
Sydney
Work Order Reference
ES2432291

Telephone : +61-2-8784 8555

Appendix F

Borelogs

BOREHOLE LOG SHEET

CLIENT : Endeavour Energy
PROJECT : 132/11kV Lowes Creek Zone Substation
LOCATION : Lowes Creek, NSW

HOLE NO : BH02
SHEET : 1 OF 1 VERSION : **A**

POSITION : E: 290975.0, N: 6238827.0 (MGA2020 / 56) SURFACE RL : 83.35 (AHD) ANGLE FROM HORIZONTAL: 90°
RIG TYPE : MI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : ML
DATE STARTED : 9/9/24 DATE COMPLETED : 9/9/24 DATE LOGGED : 9/9/24 LOGGED BY : MC CHECKED BY : CJ / JJ

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH RL (m)	GRAPHIC LOG	USC SYMBOL	Description	MOISTURE CONDITION	CONSISTENCY/ DENSITY INDEX	COMMENTS / OBSERVATIONS
					0.0 83.35			ASPHALT 0.19m			0.00m PAVEMENT
DT	N/A		Groundwater Not Observed					CONCRETE 0.46m			
SOLID FLIGHT AUGER		N/A		0.50m ES 0.80m D **1.00m** SPT / ES 8, 26, 13/70mm HB N=R 1.37m 1.50m ES	1.0 82.35		-	[FILL]: SAND: fine to coarse grained, pale grey, trace silt , trace fine sub-angular gravel 0.80m		L	FILL / ROADBASE 0.50m 0.7; ES Sample, PID: 1.8 ppm
							CI-CH	Sandy CLAY: medium to high plasticity, greenish grey and pale brown, fine to medium grained sand, trace fine sub-angular gravel 1.27m			ALLUVIUM 1.00m SPT Recovery: 370 m 1.00m 1.2; ES Sample
					2.0 81.35		CI	Sandy CLAY: medium plasticity, pale brown, fine grained sand, trace fine sub-angular gravel	M	VSt	1.50m 1.7; ES Sample
				2.30m D **2.50m** SPT 6, 16, 25/20mm HB N=R 2.82m				2.82m			2.50m SPT Recovery: 325 m
					3.0 80.35			BOREHOLE BH02 TERMINATED AT 2.82 m Refusal			
					4.0 79.35						
					5.0 78.35						
					6.0 77.35						
					7.0 76.35						
					8.0 75.35						

See Standard Sheets for details of abbreviations & basis of descriptions

GHD
Level 11, 558 Pacific Highway St Leonards NSW 2065 Australia
T: 61 2 9462 4700 F: 61 2 9462 4710 E: slnmail@ghd.com
CONSULTING GEOTECHNICAL ENGINEERING AND GEOTECHNICS

Job No. 12641966

BOREHOLE LOG SHEET

CLIENT : Endeavour Energy
PROJECT : 132/11kV Lowes Creek Zone Substation
LOCATION : Lowes Creek, NSW

HOLE NO : BH04
SHEET : 1 OF 1 VERSION : **A**

POSITION : E: 290959.0, N: 6238660.0 (MGA2020 / 56) SURFACE RL : 86.10 (AHD) ANGLE FROM HORIZONTAL: 90°
RIG TYPE : MI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : ML
DATE STARTED : 10/9/24 DATE COMPLETED : 10/9/24 DATE LOGGED : 10/9/24 LOGGED BY : MC CHECKED BY : CJ / JJ

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH RL (m)	GRAPHIC LOG	USC SYMBOL	Description	MOISTURE CONDITION	CONSISTENCY/ DENSITY INDEX	COMMENTS / OBSERVATIONS
					0.0 86.10			ASPHALT 0.19m			0.00m PAVEMENT
DT	N/A		Groundwater Not Observed	0.46m 0.50m SPT 8, 11, 9 N=20				CONCRETE 0.46m			
SOLID FLIGHT AUGER		N/A		0.95m 1.10m U 1.50m	1.0 85.10		-	[FILL]: Clayey SAND: fine to coarse grained, grey, mottled pale brown , low plasticity clay , trace fine, sub-angular gravel 0.70m		L	FILL / ROADBASE 0.46m 0.5; ES Sample, PID: 3.0 ppm FILL / ROADBASE 0.50m SPT Recovery: 0.45 m
							CL	Sandy CLAY: low plasticity, dark grey, fine grained sand, trace fine, sub-angular gravel	M	VSt	ALLUVIUM
				2.30m D 2.45m 2.50m SPT 10, 15/70mm HB N=R 2.72m	2.0 84.10		CI	2.30m Sandy CLAY: medium plasticity, greyish brown, fine grained sand, trace fine, sub-angular gravel 2.45m			RESIDUAL SOIL
							CI	CLAY: medium plasticity, pale brown, trace fine, sub-angular gravel , trace fine grained sand 2.72m			EXTREMELY WEATHERED MATERIAL 2.50m SPT Recovery: 0.22 m
					3.0 83.10			BOREHOLE BH04 TERMINATED AT 2.72 m Refusal			
					4.0 82.10						
					5.0 81.10						
					6.0 80.10						
					7.0 79.10						
					8.0 78.10						

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BOREHOLE LOG SHEET

CLIENT : Endeavour Energy
PROJECT : 132/11kV Lowes Creek Zone Substation
LOCATION : Lowes Creek, NSW

HOLE NO : BH06
SHEET : 1 OF 1 VERSION : **A**

POSITION : E: 290906.0, N: 6238518.0 (MGA2020 / 56) SURFACE RL : 84.30 (AHD) ANGLE FROM HORIZONTAL: 90°

RIG TYPE : MI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : ML

DATE STARTED : 11/9/24 DATE COMPLETED : 11/9/24 DATE LOGGED : 11/9/24 LOGGED BY : MC CHECKED BY : CJ / JJ

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH RL (m)	GRAPHIC LOG	USC SYMBOL	Description	MOISTURE CONDITION	CONSISTENCY/ DENSITY INDEX	COMMENTS / OBSERVATIONS
					0.0 84.30			ASPHALT 0.19m			0.00m PAVEMENT
DT	N/A		Groundwater Not Observed					CONCRETE 0.42m			
SOLID FLIGHT AUGER				0.50m ES 0.70m			-	[FILL]: SAND: fine to coarse grained, pale grey , trace fine, sub-angular gravel , trace low plasticity clay 0.70m		L	FILL / ROADBASE 0.50m 0.7; ES Sample
				D **1.00m** SPT 7, 8, 7 N=15	1.0 83.30		CI	Sandy CLAY: medium plasticity, brown, fine grained sand, trace fine, sub-angular gravel 1.10m			ALLUVIUM 1.00m SPT Recovery: 0.45 m
		N/A		1.45m 1.50m ES			CI-CH	Sandy CLAY: medium to high plasticity, pale brown, fine grained sand, trace fine, sub-angular gravel	M	St	RESIDUAL SOIL 1.50m 1.7; ES Sample
				2.20m D **2.50m** SPT 5, 10, 11 N=21	2.0 82.30		CI	CLAY: medium plasticity, pale grey, mottled red, trace fine, sub-angular gravel , trace fine grained sand 2.50m		VSt	2.50m SPT Recovery: 0.45 m
				2.95m	3.0 81.30			BOREHOLE BH06 TERMINATED AT 3.00 m Target depth 3.00m			
					4.0 80.30						
					5.0 79.30						
					6.0 78.30						
					7.0 77.30						
					8.0 76.30						

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BOREHOLE LOG SHEET

CLIENT : Endeavour Energy
PROJECT : 132/11kV Lowes Creek Zone Substation
LOCATION : Lowes Creek, NSW

HOLE NO : BH07
SHEET : 1 OF 2 VERSION : **A**

POSITION : E: 290901.0, N: 6238507.0 (MGA2020 / 56) SURFACE RL : 84.68 (AHD) ANGLE FROM HORIZONTAL: 90°
RIG TYPE : MI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : ML
DATE STARTED : 12/9/24 DATE COMPLETED : 12/9/24 DATE LOGGED : 12/9/24 LOGGED BY : CJ CHECKED BY : CJ / JJ

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH RL (m)	GRAPHIC LOG	USC SYMBOL	Description	MOISTURE CONDITION	CONSISTENCY/ DENSITY INDEX	COMMENTS / OBSERVATIONS
					0.0 84.68		-	ASPHALT 0.20m			0.00m PAVEMENT
DT	N/A						-	CONCRETE 0.44m			
SOLID FLIGHT AUGER		N/A	Groundwater Not Observed	0.50m ES 0.60m D 0.80m U 1.10m SPT 5, 7, 8 N=15 1.50m ES 1.55m	1.0 83.68		-	[FILL]: SAND: fine to coarse, pale grey, trace fine, sub-angular gravel , trace low plasticity clay 0.80m		L	FILL / ROADBASE 0.50m 0.7; ES Sample, PID: 4.9 ppm
							CI	Sandy CLAY: medium plasticity, red brown, fine grained sand, trace fine, sub-angular gravel	M	St	ALLUVIUM 1.10m SPT Recovery: 0.45 m 1.50m 1.9; ES Sample, PID: 4.1 ppm
				2.20m D 2.50m SPT 1, 6, 9 N=15 2.90m	2.0 82.68		CL-CI	Sandy CLAY: low to medium plasticity, brown, fine grained sand, trace fine, sub-angular gravel 2.20m			RESIDUAL SOIL 2.50m SPT Recovery: 0.45 m
				2.95m D 3.20m	3.0 81.68		CI	Sandy CLAY: medium plasticity, yellow brown, fine grained sand, trace fine, sub-angular gravel 2.90m		MD	EXTREMELY WEATHERED MATERIAL
				SPT 15/20mm N=R 3.22m			CI	Sandy CLAY: medium plasticity, pale brown, fine grained sand, trace fine, sub-angular gravel 3.20m		H	3.20m SPT Recovery: 0.02 m
								Continued as Cored Drill Hole 3.45m			
					4.0 80.68						
					5.0 79.68						
					6.0 78.68						
					7.0 77.68						
					8.0 76.68						

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BOREHOLE LOG SHEET

CLIENT : Endeavour Energy
PROJECT : 132/11kV Lowes Creek Zone Substation
LOCATION : Lowes Creek, NSW

HOLE NO : BH08
SHEET : 1 OF 1 VERSION : **A**

POSITION : E: 290863.0, N: 6238431.0 (MGA2020 / 56) SURFACE RL : 84.70 (AHD) ANGLE FROM HORIZONTAL: 90°
RIG TYPE : MI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : ML
DATE STARTED : 11/9/24 DATE COMPLETED : 11/9/24 DATE LOGGED : 11/9/24 LOGGED BY : MC CHECKED BY : CJ / JJ

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH RL (m)	GRAPHIC LOG	USC SYMBOL	Description	MOISTURE CONDITION	CONSISTENCY/ DENSITY INDEX	COMMENTS / OBSERVATIONS
					0.0 84.70			ASPHALT 0.19m			0.00m PAVEMENT
DT	N/A		Groundwater Not Observed					CONCRETE 0.45m			
SOLID FLIGHT AUGER		N/A		0.50m ES 0.90m 0.00m 1.00m SPT 2, 5, 6 N=11 1.45m	1.0 83.70		- CI-CH	[FILL]: SAND: fine to coarse grained, pale grey , trace fine, sub-angular gravel , trace low plasticity clay 0.80m Sandy CLAY: medium to high plasticity, brown, fine grained sand, trace fine, sub-angular gravel 1.37m		L	FILL / ROADBASE 0.50m 0.88; ES Sample, PID: 3.5 ppm ALLUVIUM 1.00m SPT Recovery: 0.45 m
				2.50m SPT 9/20mm HB N=R 2.52m	2.0 82.70		CI-CH	CLAY: medium to high plasticity, pale grey, trace fine, sub-angular gravel , trace fine grained sand 2.63m	M	St	RESIDUAL SOIL 2.50m SPT Recovery: 0.02 m
								BOREHOLE BH08 TERMINATED AT 2.63 m Refusal			
					3.0 81.70						
					4.0 80.70						
					5.0 79.70						
					6.0 78.70						
					7.0 77.70						
					8.0 76.70						

See Standard Sheets for details of abbreviations & basis of descriptions

GHD
Level 11, 558 Pacific Highway St Leonards NSW 2065 Australia
T: 61 2 9462 4700 F: 61 2 9462 4710 E: slnmail@ghd.com
CONSULTING GEOTECHNICAL ENGINEERING AND GEOTECHNICS

Job No. 12641966

BOREHOLE LOG SHEET

CLIENT : Endeavour Energy
PROJECT : 132/11kV Lowes Creek Zone Substation
LOCATION : Lowes Creek, NSW

HOLE NO : BH09
SHEET : 1 OF 1 VERSION : **A**

POSITION : E: 290833.0, N: 6238340.0 (MGA2020 / 56) SURFACE RL : 86.05 (AHD) ANGLE FROM HORIZONTAL: 90°
RIG TYPE : MI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : ML
DATE STARTED : 11/9/24 DATE COMPLETED : 11/9/24 DATE LOGGED : 11/9/24 LOGGED BY : MC CHECKED BY : CJ / JJ

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH RL (m)	GRAPHIC LOG	USC SYMBOL	Description	MOISTURE CONDITION	CONSISTENCY/ DENSITY INDEX	COMMENTS / OBSERVATIONS
					0.0 86.05			ASPHALT 0.19m			0.00m PAVEMENT
DT	N/A		Groundwater Not Observed	0.50m				CONCRETE 0.45m			
SOLID FLIGHT AUGER		N/A		SPT / ES 13/130mm HB N=R 0.63m	1.0 85.05		-	[FILL]: SAND: fine to coarse grained, pale grey , trace fine, sub-angular gravel , trace low plasticity clay 0.80m		VL	FILL / ROADBASE 0.50m SPT Recovery: 0.45 m 0.50m 0.7; ES Sample
				1.50m SPT 5, 10, 12 N=22 1.80m ES 1.95m 2.00m ES 2.20m D			CI-CH	Sandy CLAY: medium to high plasticity, dark grey, fine grained sand, trace fine, sub-angular gravel	M		ALLUVIUM 1.50m SPT Recovery: 0.45 m
					2.0 84.05			Sandy CLAY: medium to high plasticity, red brown, mottled pale grey, fine grained sand, trace fine, sub-angular gravel , trace fine grained sand 1.60m		St	RESIDUAL SOIL 1.80m 2; ES Sample 2.00m 2.2; ES Sample
				2.50m SPT 2, 15, 19/35mm HB N=R 2.84m			CI-CH	CLAY: medium to high plasticity, dark brown changed to pale grey, trace fine, sub-angular gravel , trace fine grained sand 2.20m	D	VSt	EXTREMELY WEATHERED MATERIAL 2.50m SPT Recovery: 0.45 m
					3.0 83.05			BOREHOLE BH09 TERMINATED AT 2.84 m Refusal 2.84m			
					4.0 82.05						
					5.0 81.05						
					6.0 80.05						
					7.0 79.05						
					8.0 78.05						

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BOREHOLE LOG SHEET

CLIENT : Endeavour Energy
PROJECT : 132/11kV Lowes Creek Zone Substation
LOCATION : Lowes Creek, NSW

HOLE NO : BH10
SHEET : 1 OF 1 VERSION : **A**

POSITION : E: 290822.0, N: 6238286.0 (MGA2020 / 56) SURFACE RL : 86.30 (AHD) ANGLE FROM HORIZONTAL: 90°
RIG TYPE : MI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : ML
DATE STARTED : 11/9/24 DATE COMPLETED : 11/9/24 DATE LOGGED : 11/9/24 LOGGED BY : MC CHECKED BY : CJ / JJ

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH RL (m)	GRAPHIC LOG	USC SYMBOL	Description [FILL/TOPSOIL/COBBLES/BOULDERS/-] SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and ROCK NAME: grain size, colour, fabric / texture, inclusions or minor components, durability, strength, weathering / alteration, defects	MOISTURE CONDITION	CONSISTENCY/ DENSITY INDEX	COMMENTS / OBSERVATIONS
DT	N/A		Groundwater Not Observed		0.0 86.30			ASPHALT 0.20m CONCRETE 0.40m			0.00m PAVEMENT
SOLID FLIGHT AUGER		N/A		0.50m ES 0.70m D 1.00m SPT 3, 6, 3 N=9 1.45m	1.0 85.30		-	[FILL]: Clayey SAND: fine to coarse grained sand, brown , low plasticity clay , trace fine, sub-angular gravel 1.00m	M	L	FILL / ROADBASE 0.50m 0.7; ES Sample, DUP_01/TRI_01
				2.00m ES 2.30m D 2.50m SPT 2, 3, 6 N=9 2.95m	2.0 84.30 3.0 83.30		CI-CH CI-CH	Sandy CLAY: medium to high plasticity, pale grey, fine grained sand, trace fine, sub-angular gravel 2.30m CLAY: medium to high plasticity, greyish Brown, red brown, trace fine, sub-angular gravel 3.00m	D	St	ALLUVIUM 1.00m SPT Recovery: 0.45 m ALLUVIUM 2.00m 2.2; ES Sample RESIDUAL SOIL 2.50m SPT Recovery: 0.45 m
					4.0 82.30 5.0 81.30 6.0 80.30 7.0 79.30 8.0 78.30			BOREHOLE BH10 TERMINATED AT 3.00 m Target depth			

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BOREHOLE LOG SHEET

CLIENT : Endeavour Energy
PROJECT : 132/11kV Lowes Creek Zone Substation
LOCATION : Lowes Creek, NSW

HOLE NO : BH12
SHEET : 1 OF 2 VERSION : **A**

POSITION : E: 290850.0, N: 6238132.0 (MGA2020 / 56) SURFACE RL : 85.15 (AHD) ANGLE FROM HORIZONTAL: 90°
RIG TYPE : MI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : ML
DATE STARTED : 12/9/24 DATE COMPLETED : 13/9/24 DATE LOGGED : 13/9/24 LOGGED BY : MC CHECKED BY : CJ / JJ

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH RL (m)	GRAPHIC LOG	USC SYMBOL	Description	MOISTURE CONDITION	CONSISTENCY/ DENSITY INDEX	COMMENTS / OBSERVATIONS
DT	N/A				0.0 85.15			0.06m ASPHALT 0.20m CONCRETE			0.00m PAVEMENT
SOLID FLIGHT AUGER				0.50m ES 0.70m D			-	[FILL]: SAND: fine to coarse grained, pale grey , trace silt , trace fine, sub-angular gravel 0.70m		L	FILL / ROADBASE 0.50m 0.7; ES Sample, PID: 4.1 ppm
				1.00m SPT 4, 6, 9 N=15	1.0 84.15		CI-CH	CLAY: medium to high plasticity, red brown, trace fine, sub-angular gravel 1.00m		S	ALLUVIUM 1.00m SPT Recovery: 0.45 m
				1.45m 1.50m ES 2.10m D			CI-CH	CLAY: medium to high plasticity, pale grey, mottled red, trace fine, sub-angular gravel	M	St	1.50m 1.7; ES Sample, PID: 4.1 ppm
		N/A	Groundwater Not Observed	**2.50m** SPT 2, 6, 16 N=22	2.0 83.15		SP	SAND: fine grained, pale brown, trace silt , trace fine, sub-angular gravel 2.50m		L	RESIDUAL SOIL 2.50m SPT Recovery: 0.45 m RESIDUAL SOIL
				2.95m	3.0 82.15		CH	CLAY: high plasticity, pale brown to red brown, trace fine grained sand , trace fine, sub-angular gravel	D	VSt	
				3.60m D				3.60m			EXTREMELY WEATHERED MATERIAL
				4.00m SPT 4/100mm HB N=R 4.10m	4.0 81.15		CI-CH	CLAY: medium to high plasticity, pale brown, trace fine grained sand , trace fine, sub-angular gravel 4.25m			4.00m SPT Recovery: 0.1 m
					5.0 80.15			Continued as Cored Drill Hole			
					6.0 79.15						
					7.0 78.15						
					8.0 77.15						

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